

5-11-1928

The
MEDICAL DEPARTMENT
OF THE UNITED STATES ARMY
IN THE WORLD WAR

REFERENCE ONLY.

VOLUME III

FINANCE AND SUPPLY

PREPARED UNDER THE DIRECTION OF
MAJ. GEN. M. W. IRELAND
The Surgeon General

BY

COL. EDWIN P. WOLFE, M. C.

1113



REFERENCE ONLY.

U. S. GOVERNMENT PRINTING OFFICE : WASHINGTON : 1928

OTIS HISTORICAL ARCHIVES
ARMED FORCES MEDICAL MUSEUM, AFIP

ADDITIONAL COPIES
OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
U. S. GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
\$3.00 PER COPY

LETTER OF TRANSMISSION

I have the honor to submit herewith Volume III of the history of THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY IN THE WORLD WAR. The volume submitted is entitled "FINANCE AND SUPPLY."

M. W. IRELAND,
Major General, the Surgeon General.

The SECRETARY OF WAR.

Lieut. Col. FRANK W. WEED, M. C., *Editor in Chief.*
LOY McAFEE, A. M., M. D., *Assistant Editor in Chief.*

EDITORIAL BOARD *

Col. BAILEY K. ASHFORD, M. C.
Col. FRANK BILLINGS, M. C.
Col. THOMAS R. BOGGS, M. C.
Col. GEORGE E. BREWER, M. C.
Col. W. P. CHAMBERLAIN, M. C.
Col. C. F. CRAIG, M. C.
Col. HAVEN EMERSON, M. C.
Brig. Gen. JOHN M. T. FINNEY, M. D.
Col. J. H. FORD, M. C.
Lieut. Col. FIELDING H. GARRISON, M. C.
Col. H. L. GILCHRIST, M. C.
Brig. Gen. JEFFERSON R. KEAN, M. D.
Lieut. Col. A. G. LOVE, M. C.
Col. CHARLES LYNCH, M. C.
Col. JAMES F. MCKERNON, M. C.
Col. S. J. MORRIS, M. C.
Col. R. T. OLIVER, D. C.
Col. CHARLES R. REYNOLDS, M. C.
Lieut. Col. G. E. DE SCHWEINITZ, M. C.
Col. J. F. SILER, M. C.
Brig. Gen. W. S. THAYER, M. D.
Col. A. D. TUTTLE, M. C.
Col. WILLIAM H. WELCH, M. C.
Col. E. P. WOLFE, M. C.
Lieut. Col. CASEY A. WOOD, M. C.
Col. HANS ZINSSER, M. C.

* The highest rank held during the World War has been used in the case of each officer.

PREFACE*

The purpose of this volume is to record the manner in which the Medical Department functioned as a supply department during the World War and to give details concerning selected articles of supply. Because of the breadth of the subject, it is manifestly impossible to include herein all matters relating either to the administrative features of the subject or to the supplies themselves. Since this is the first time an attempt has been made to consider fully the history of Medical Department supplies, it is appropriate that due consideration be given to the pre-war history of supplies. More especially does this apply to that period of time intervening between the Spanish-American War and the World War, for it was during this interval that the Medical Department not only brought its field equipment to a high state of efficiency but also established for itself a reasonable reserve of such equipment. Furthermore, the supply experiences of the Medical Department in connection with the Mexican border mobilization of our Army (1911-1916) make a fitting prelude to any consideration of World War medical supply matters, for the one merged imperceptibly into the other.

It is to be regretted that it has been possible, through lack of space, to use only two of the reports of activities of the medical supply depots in the United States. The report of the New York medical supply depot was chosen as the type depot for description, because it always has been our most important depot and was the parent from which the others might be considered to have sprung. While its methods of procedure may have differed in certain respects from those of the other depots, and while it is true that some depots handled certain classes of articles to a preponderant extent, nevertheless the account of one of these supply depots answers present purposes very well. On the other hand, since the motor ambulance supply depot at Louisville was the only depot of its kind, a chapter has been devoted to it.

During war there are two distinct types of service: (*a*) The interior, where the procedures and supplies conform to those in times of peace; and (*b*) the theater of operations, wherein a different procedure and type of supplies must prevail. The major portion of the volume pertains to the question of medical supplies in the United States (the interior), and rightly, since supplies had to be procured there not only for the Army in the United States but also for the American Expeditionary Forces. Colonel Wolfe, who prepared this portion of the volume, has long been identified with Army medical supplies and served

* For the purpose of the History of the Medical Department of the United States Army in the World War, the period of war activities extends from April 6, 1917, to December 31, 1919. In the professional volumes, however, in which are recorded the medical and surgical aspects of the conflict as applied to the actual care of the sick and wounded, this period is extended, in some instances, to the time of the completion of the history of the given service. In this way only can the results be followed to their logical conclusion.

in the finance and supply division of the Surgeon General's Office as assistant chief in charge of distribution throughout the war. The last section of the volume concerns medical supplies in the American Expeditionary Forces and was prepared by Maj. Norman L. McDiarmid, M. C., who was on duty in the supply division, first of the office of the chief surgeon, Line of Communications, and then of the chief surgeon, A. E. F., following the merging of the two offices in March, 1918, and was for a major portion of the time the chief of the division.

The section on medical supplies, American Expeditionary Forces, contains the history of but one of our medical supply depots which functioned in France. The same reason obtains here as in the case of the medical supply depots in the United States. Intermediate Medical Supply Depot No. 3, Cosne, was the principal and only full-stocked medical supply depot of the American Expeditionary Forces during the period of active hostilities. Unfortunately, there is no discoverable report of the activities of this depot, and in its place the history of the supply depot at Gievres has been used. The loss is more seeming than real, however, for the Gievres depot was the outgrowth of the depot at Cosne, and, until after the armistice was signed, was subsidiary to it. It functioned in the same manner as did the depot at Cosne.

To facilitate a proper understanding of the routine procedures concerning medical supplies in both the interior and the theater of operations, pertinent paragraphs of the Manual for the Medical Department, effective during the World War, are included in the appendix; in addition, the promulgations of General Headquarters, A. E. F., relating to the procurement and distribution of supplies, are included there.

As an index of the accomplishments of the Medical Department as a supply department during the World War, it is within the bounds of propriety to state that the department emerged from the World War unscathed by material criticism for not having either suitable or adequate supplies at all places where they were needed. This is in marked contrast to previous experience.

TABLE OF CONTENTS

	Page
PREFACE	5
INTRODUCTION	11
SECTION I. ORGANIZATION FOR ADMINISTERING SUPPLY MATTERS	
CHAPTER I. In the Surgeon General's Office	45
II. Storing and distributing agencies; using agencies	67
SECTION II. PROCUREMENT	
III. Estimates and appropriations	85
IV. Requirements	99
V. Advertising for bids	107
VI. Contracts	113
VII. Factors affecting production of supplies	133
VIII. Clearance and priority of materials to be manufactured	151
IX. Purchase of supplies	165
X. Inspection of supplies	195
XI. Consolidation of procurement	207
XII. Consolidation of finances	223
XIII. Disbursements	229
SECTION III. FIELD EQUIPMENT	
XIV. Individual equipment	235
XV. Combat equipment	251
XVI. Field hospital, ambulance company and other divisional unit equipment	263
XVII. Evacuation hospital	289
XVIII. Litters and litter carriers	303
XIX. Surgical dressings	317
SECTION IV. MOTOR VEHICLES	
XX. Motor ambulance subdivision, Surgeon General's Office	333
XXI. The ambulance chassis	337
XXII. The ambulance body	351
XXIII. Ford ambulances	363
XXIV. Motor cycles	375
XXV. Spare parts; supplies	379
XXVI. Consolidation of procurement	391
XXVII. Overseas shipments	395
XXVIII. Donated ambulances	407
SECTION V. CAMP MEDICAL SUPPLY SERVICE	
XXIX. Camp medical supply depot	411
XXX. Supplies and equipment	429
XXXI. Special supplies	465

SECTION VI. HOSPITAL SUPPLIES AND EQUIPMENT	
CHAPTER XXXII. Hospital furniture and equipment.....	475
XXXIII. Overseas base hospitals.....	493
XXXIV. Surgical instruments.....	525
XXXV. Surgical dressings and sutures.....	541
XXXVI. Sterilizing apparatus.....	563
XXXVII. X-ray equipment and supplies.....	579
SECTION VII. DENTAL AND VETERINARY EQUIPMENT AND SUPPLIES	
XXXVIII. Dental equipment and supplies.....	605
XXXIX. Veterinary equipment and supplies.....	629
SECTION VIII. ACTIVITIES OF DISTRIBUTING MEDICAL SUPPLY DEPOTS	
XL. New York medical supply depot.....	659
XLI. Motor ambulance supply depot, Louisville.....	697
SECTION IX. ACTIVITIES CONNECTED WITH THE OVERSEAS TRANSPORTATION OF SUPPLIES	
XLII. Port medical supply depots.....	713
XLIII. Shipping regulations.....	729
XLIV. Transport unit equipment.....	737
XLV. Termination of accountability for supplies sent to the American Expeditionary forces.....	743
SECTION X. MEDICAL SUPPLIES, AMERICAN EXPEDITIONARY FORCES	
XLVI. Organization and activities of the supply division, chief surgeon's office.....	747
XLVII. Finance and accounting.....	817
XLVIII. Activities of intermediate medical supply depot No. 2, Gievres, France.....	825
APPENDIX.....	853
INDEX.....	919

LIST OF FIGURES

Figure	
1. Medical officer's belt.....	239
2. Medical Department enlisted man's web belt.....	244
3. A pile of filled enlisted men's belts, representing a day's work, awaiting boxing for shipment, at the field medical supply depot at Washington.....	247
4. Showing manner of filling belts.....	247
5. Medical cart.....	257
6. Method of packing contents of medical cart.....	258
7. Litter with slings.....	304
8. Snowshoe litter.....	308
9. Field litter carrier in collapsed form.....	309
10. Field litter carrier in use.....	310
11. Field litter carrier as a trailer.....	311
12. Wheeled litter carrier.....	313
13. First-aid packet in metal case, and pouch.....	317
14. Contents of first-aid packet.....	318
15. G. M. C. chassis, model 1916.....	338
16, 17. Showing method of boxing G. M. C. chassis for shipment.....	346, 347
18. G. M. C. ambulance, model 1916, open type.....	352
19. G. M. C. ambulance, model 1916, closed type.....	353
20. Standard G. M. C. ambulance, 1918, with model AA body, side view.....	357
21. Standard G. M. C. ambulance, 1918, with AA body, rear view.....	358

Figure	Page
22. Standard Ford ambulance of 1917, side view	364
23. Standard Ford ambulance of 1917, rear view	365
24. This and Figures 25 to 27 show the Ford ambulance of 1918	367, 368, 369, 370
28. Spare parts trailer, side view	380
29. Spare parts trailer, front view	381
30. Spare parts trailer, rear view	382
31. Spare parts trailer, showing equipment carried	383
32. Spare parts trailer, road side set up	384
33. Layout of a camp medical supply depot in one of the buildings of the general camp warehouse group	412
34. Floor plan and side elevation of one of the standard base hospital storehouses ..	413
35. Standard sterilizing outfit, with two sterilizers	566
36. Portable disinfecter	568
37. Portable X-ray outfit, model of 1917. Table top removed	581
38. Standard bedside X-ray unit	582
39. Portable dental outfit	606
40. Veterinary ambulance, side view	652
41. Veterinary ambulance, front view	653
42. New York medical supply depot	661
43. Intermediate medical supply depot No. 2, Gievres, entrance	771
44. Advance medical supply depot No. 1, Is-sur-Tille, general view	772
45. Map showing location of medical supply establishments, American Expeditionary Forces	780
46. Intermediate medical supply depot No. 2, Gievres, main office	826
47. Intermediate medical supply depot No. 2, showing railroad tracks	837
48. Intermediate medical supply depot No. 2, showing Decauville track and turn- table, as used in all warehouses	838
49. Intermediate medical supply depot No. 2, showing interior of a warehouse	840
50. Intermediate medical supply depot No. 2, showing issue room	851

INTRODUCTION

EVOLUTION OF THE MEDICAL DEPARTMENT SUPPLY SYSTEM

REVOLUTIONARY PERIOD

The procurement of medical and hospital supplies during the Revolution divides into three quite definite, but somewhat overlapping, periods. The first began with the raising of troops by the individual colonies in 1774, and not only continued until those troops were demobilized in December, 1775, but obtained to a greater or less extent until near the close of the war. The second covers the period from the appointment of Dr. John Morgan,¹ director general of the hospital, October 15, 1775, to July 15, 1781. The third period began in July, 1781, with the transfer, by resolve of Congress,² of the procurement of all supplies for the Army to the superintendent of finance, and continued until the close of the war.

During the first period each colony, as it passed resolves for the raising and equipping of its troops, directed that the necessary medicine chests and surgical instruments be purchased and issued to the several regimental surgeons.³ These resolves frequently did not specify the agency to arrange for their procurement. In some instances the committee of safety was directed to arrange for them by importation or otherwise;⁴ in others, individuals were designated to procure or supply them.⁵ Hospitals were authorized, buildings, were selected and altered for the purpose, equipment was collected, surgeons were designated to have charge of them, and persons were selected to provide provisions, refreshments, and necessaries for the sick.⁶

A medical commissary was appointed for the troops assembled at Cambridge whose duty it was to receive, store, and issue, upon proper orders, such medicines, instruments, and hospital stores, supplies, and equipment as might be obtained for the colonial forces. He was authorized by the Provincial Congress, Massachusetts Bay, to purchase medicines and hospital stores as needed, and was empowered to impress beds, bedding, and other necessaries for the sick. For such articles as were taken in this manner a receipt was given the owners thereof⁷ and the articles either were paid for or were returned when no longer needed. So acute did the shortage of medicines and medical and surgical supplies become during 1776 and later years that most stringent measures were taken for their economical use and disposition. Regimental surgeons were even required to give oath before receiving them that the medicines so received would be used exclusively for the sick of their respective regiments and that they would account for them upon being discharged from the service.⁸

The several colonies appear to have done, and at all times showed a desire to do, all they could, as individual colonies, for the medical welfare of their own troops. When such troops passed beyond the borders and control of the respective provinces, it became necessary for the Continental Congress to make provision for them both in hospitals and in supplies.

When General Washington arrived at the headquarters of the forces of the continent, then at Cambridge, Mass., on July 3, 1775, he began immediately a thorough and searching personal investigation of the condition of the troops, their equipment and supplies, and the organization of the service of supply. Since these forces were made up of colonial troops, organized, officered, and equipped by the respective colonies from which they were sent, the methods of supply in vogue differed, apparently, for every colony represented. Commenting upon these different and at times conflicting methods, General Washington wrote the President of the Continental Congress on July 13, 1775, that "there is a vital and inherent principle of delay, incompatible with military service, in transacting business through such numerous and different channels. I esteem it, therefore, my duty to represent the inconvenience which must unavoidably ensue from a dependence on a number of persons for supplies, and submit it to the consideration of Congress whether the public will not be best promoted by appointing a commissary general for these purposes. Connecticut troops observing this method are exceptionally well furnished under the direction of Mr. Trumbull."⁹

General Washington, finding the same centralization of authority and responsibility lacking in the medical service with the troops and the same undesirable results emanating therefrom as in the case of supplies, reported, July 12, 1775, to the President of the Continental Congress that the hospital was in a very unsettled condition; that there was no principal director, or subordination among the surgeons; that disputes and contentions existed among them and would inevitably continue until reduced to system; that the health and lives of both officers and men so much depended upon a due regulation of that department that its immediate consideration was greatly to be desired.¹⁰ Congress, however, on July 19, 1775, probably before the receipt of this letter, had begun the consideration of the subject and had appointed a committee "to bring in a plan for an hospital." The committee's report was adopted by resolve of July 27, 1775. This resolve prescribed the personnel of the medical establishment, their rank, title, emoluments, and duties. The medical establishment so authorized was based upon and covered the hospital needs of a force of only 20,000 troops, and was, in fact, what it purported to be, "an hospital." It was called at various times an hospital, the hospital, the Continental Hospital, and the American Hospital.¹¹

Medical and surgical care of individuals who required treatment but did not need hospital care was furnished by the regimental surgeons and mates assigned to duty with the respective regiments.¹² Among other duties, Congress required of the director general of the hospital the establishment of hospitals, the providing of the supplies and the subordinate personnel required therein, the disbursements therefor, and the keeping of the accounts thereof.¹³

The act of July 27, 1775, represents the first attempt on American soil to provide the medical service of the Army with a central organization. It is not clear from the wording of the legislation itself just what Congress contemplated, or how much or how extensive was the authority intended to be conferred upon the director general therein provided, whether it contemplated a single hospital with the director general in command of it, or a number of hospitals with that

official as the head of a medical department. The act made no provision for any expansion or for coordination with hospitalization in other territorial departments or divisions of the Army. It is noteworthy that the total personnel authorized for the department was inadequate to operate hospitals with combined bed capacity of 1,000 patients.

Although the resolution of July 27, 1775, placed upon the director general the responsibility, and gave authority for providing the necessary medicines and hospital supplies, Congress, possibly because of uncertainty of the authority so granted, possibly because of its keen desire to assist in every way the successful prosecution of the war, shortly thereafter appointed a committee of five of its members to "devise ways and means for supplying the Continental Army with medicines."¹⁴ This committee came later to be known as the medical committee and continued to have charge in Congress of all matters pertaining to the medical establishment until it was discontinued and its records, duties, and functions were transferred by resolution of May 28, 1781, to the board of war.¹⁵ This committee took an active part in procuring medical supplies during the earlier years of its existence.¹⁶ As time passed and the activities of Congress broadened, this committee divested itself more and more of its supply functions and devoted its attention to the personnel and duties of the medical establishment.

PROCUREMENT AND DISTRIBUTION OF SUPPLIES

During the first two or three years after the establishment of the medical service with the Army there was considerable confusion and overlapping of function in the procurement of medicines, instruments, surgical supplies, furniture, bedding, and hospital stores, but especially in the procurement of medicines.¹⁷ No plan for a systematic and continuing supply had been evolved. Purchases were made, rather indiscriminately, by the director general, deputy director general, surgeons of hospitals, regimental surgeons, and the medical committee. Even the deputy commissary general was called upon to pay for medicines and occasionally (probably on the selection of a medical officer) to purchase and ship them to designated points on instructions from the department or army commander.

The determination of the types and quantities of the various articles required by the medical service of the Army and their procurement and distribution to that service remained the responsibility of the director general until Congress, by resolve of April 7, 1777,¹⁸ directed that it be shared with the deputy directors general of military departments, positions created by the same resolve. These deputy directors general, during the absence of the director general from the department, and with the approval of the department commander, were empowered and directed, either personally or through assistant deputy directors also authorized by this act, " * * * to provide medicines, instruments, dressings, bedding, and other necessary furniture, proper diet, and everything requisite for the sick and wounded soldiers and the officers of the hospitals; to pay the salaries and all other expenses of the same."

The duties of the apothecary general are nowhere described in detail, but it is probable that he received in bulk, medicines, medicinal herbs, and the paraphernalia of his profession. The medicines were compounded under his

direction and put up in containers suitable for dispensing by the hospitals and by the regimental medical personnel. Issues of these supplies were made in accordance with instructions received from the director general or the deputy director general of the district in which the issues were made. The apothecaries were not purchasing agents but received their supplies from the director or deputy directors general, or the purveyor.

Provisions, forage, and other like articles were purchased, stored, and issued by the hospital commissary, another position created by the act of April 7, 1777.¹⁸ This commissary officer was to be guided in his purchases by the prices paid for like articles by the commissary general and the quartermaster general, respectively, with whom he was required to consult freely. Such of these supplies as were needed by general hospitals were delivered to the hospital steward thereof who distributed them to the patients and accounted to the commissary for them. Supplies needed for regimental hospitals were committed to the care of a steward or medical storekeeper appointed for that especial purpose in each army. Such supplies were obtained by this steward from the commissary of the army or a general hospital upon requisitions signed by the director general or one of the deputy directors general. The steward then distributed them to the using organizations upon instructions from the chief physician and surgeon of an army. Since the latter was charged also with the maintenance of a suitable stock of tents, beds, beddings, medicines, and hospital stores which he received on requisition from the director general or deputy director general, it is probable that the same storekeeper or steward was custodian of both provisions and supplies.

The finances of each district or territorial department pertaining to the medical establishment were administered by a clerk in the office of the deputy director general. This clerk kept the accounts of the several hospitals and received and disbursed under the orders of the director general or the deputy director general of the district the funds provided for the use of the medical establishment in that district.

The director general, by resolve of February 6, 1778, was relieved of all duties in connection with the procurement of supplies, and limited in his activities in this line to determining the quantities required and to issuing the necessary instructions for their procurement.¹⁹ The deputy directors general, also, no longer were concerned directly in the procurement and distribution of supplies but were required to appoint assistant deputy directors under them to the immediate and sole duty of providing supplies. Supplies and equipment for the hospitals were divided into two main groups and each group was assigned to one or more assistant deputy directors for procurement. The one group consisted of articles necessary for the care and physical comfort of the patients—beds and bedding, ward and office furniture and equipment, mess equipment, hospital clothing, and the like. The other group comprised articles required by the professional services—medicines, instruments, dressings, herbs, etc. By common consent, apparently, and in view of their particular duties, these assistant deputy directors engaged upon the procurement of supplies came presently to be called purveyors, which title was incorporated later into law and continued in use until the close of the war.

In the reorganization of the medical establishment provided in the resolve of September 30, 1780, the procurement, storage, and issue of supplies devolved upon a purveyor and one assistant purveyor for the entire establishment.²⁰ The purveyor based his purchases upon estimates furnished him by the director general, now called the director, or by a board of two of the deputy directors general, now called chief hospital physicians. The purveyor purchased or procured all articles necessary for the use of the medical service of the army, regimental as well as hospital. While all articles were grouped under one officer for procurement, the channels of distribution differed somewhat. The grouping of articles for distribution conformed to those under the previous organization. Those for the professional service, medicines, instruments, dressings, and the like, were committed to the custody of the apothecary and his assistants, by whom the medicines were prepared for dispensing. All articles committed to his care were distributed by him directly to the hospitals and the army, upon requisitions approved, in writing, by the director, one of the chief hospital physicians, or the chief surgeon of the army. All medical department personnel were forbidden to use for themselves any of the stores provided for the sick.

The remaining articles procured by the purveyor were stored and issued by him or his assistant upon requisitions approved or instructions issued by the director, chief hospital physicians, chief physician and surgeon of the army, or the senior surgeon on duty at any of the general hospitals.

The functions and responsibilities of the hospital steward in connection with supplies underwent very little change in this organization. The scope of his procurements was somewhat extended and included the procurement of any small article needed by the hospital and not in stock.

By resolve of July 10, 1781, the actual procurement of supplies devolved upon the superintendent of finance,² which function that official continued to exercise until the close of the war.

UNDER THE CONSTITUTION

From the close of the Revolution to April, 1818, the medical service was without a central organization or head except for two brief periods, 1799–1800, and 1813–14.²¹ Its affairs, both as to personnel and supply, during that period appear to have been administered by the head of the War Department. Its supplies were procured under instructions emanating from his office by the agencies designated to provide those for the remainder of the military forces. A definite sum for the Hospital Department, beginning with 1791, appears in the annual appropriations for the Military Establishment. Beginning with the appropriations for the year 1802, the title of the appropriation was changed to "Medical and Hospital Department,"²² and has so continued in all appropriations for the support of the Military Establishment since that date.

In 1818 the central office of the Medical Department was established by the appointment of a Surgeon General,²³ which office continues. It may be noted, in passing, that the act authorizing a Surgeon General did not define his duties, that detail being left to be fixed by regulation. In September, 1818, orders were issued from the War Department prescribing the duties of the Surgeon General, wherein he was made the director and immediate accounting

officer of the Medical Department, and defining in a fair amount of detail the manner of procuring, receiving, requisitioning, and accounting for the articles needed in the care and treatment of the sick.²⁴ It was directed therein that the apothecary general and his assistants should purchase all medicines, hospital stores, surgical and other instruments, books, and dressings required for the public service of the Army. Issues were to be made of these articles only upon annual requisitions or estimates furnished by the Surgeon General. Issues, under certain exceptional conditions without specific instructions from the Surgeon General were authorized. Whenever an issue was made it was accompanied by an itemized invoice, of which a duplicate was sent to the Surgeon General.²⁵

The apothecary general and his assistants were directed to render to the second auditor quarterly returns of purchases accompanied by invoices of the articles purchased, for which they thereupon became both responsible and accountable.²⁵ They could be relieved of this accountability by the receipt of the person to whom the supplies were issued or upon a certificate on honor for such articles as had been expended in the apothecary's department, stating for what purpose. Responsibility for damaged supplies did not cease until they had been sold. The apothecaries were required to render to the Surgeon General annually, on September 30, a return showing the articles purchased by them during the year and the average price paid for each article.

While a supply table for the use of the Medical Department appears to have been compiled during the Revolution and revised during the War of 1812, it appears to have been observed more in the breach than in the keeping, and the several medical officers requisitioned for the articles and in the quantities which appealed to them, with but little regard to any standard.²⁶ One of the early duties to which the Surgeon General turned his attention was the compilation of a supply table containing all articles necessary for the treatment of the sick and wounded in the military service and fixing the quantities of each article thereon which would be sufficient for routine treatment of 100 men for one year. The list was submitted to the various officers of the Medical Department for comment and criticism and finally published to the service March 20, 1819.²⁷

Requisitions were to be based upon this list, to be made annually and forwarded on December 31, of each year.²⁷ If the surgeon needed articles not on the list, or quantities in excess of those enumerated in the supply table, he noted the reasons therefor in the proper column of the requisition for the consideration of the Surgeon General, who approved or modified the request as he deemed the conditions to warrant.

When the requisitions from the various posts had been received, the apothecary general and his assistants compiled the total requirements, made the necessary purchases, filled the requisitions as soon as the supplies were available, and delivered them to the Quartermaster's Department for shipment to their respective destinations.²⁸

The office of the apothecary general and his assistants was discontinued in the reduction and reorganization of the military establishment which took place in 1821.²⁹ Purchases of supplies for the Medical Department thereafter,

for many years, were made by one of the surgeons of the regular establishment detailed thereto in addition to his other duties. In such capacity he was referred to for a number of years as "the apothecary." At a later period, about 1839, his title was changed to "medical purveyor." Although this term occurs in the Army Regulations of 1841 and seems to have been in common use in the Surgeon General's Office for many years, it did not acquire legislative sanction until the act of April 16, 1862, in which the duties of the medical purveyors were defined and somewhat amplified. By the act of July 17, 1862, they were required to give bonds for the faithful performance of their duties in such sums as the Secretary of War prescribed. The act of July 28, 1866, authorized a chief medical purveyor and four assistant medical purveyors, who, when not acting as purveyors, might be assigned to duty as surgeons upon the orders of the President. These titles and requirements relative to medical purveyors were incorporated in the Revised Statutes of 1878, where references to them appear in sections 1168, 1171, and 1173. The last section provides that "the chief medical purveyor shall have, under the direction of the Surgeon General, supervision of the purchase and distribution of the hospital and medical supplies." With the retirement in 1897 of the then chief medical purveyor, the position was not filled and the use of the title was discontinued.³⁰ The medical purveying depots came to be known as medical supply depots. The officer performing the duty of medical purveyor was designated officer in charge of the particular depot to which he was assigned. Of later years this title has been changed to medical supply officer and applied to all officers of the Medical Department in charge of medical sections of general and corps area depots, of depots of purely Medical Department supplies, and of the medical property at general and station hospitals.³¹

So far as can be ascertained the principal depot for Medical Department supplies has been in New York City since the War of 1812. During the years preceding 1861 practically all medical and hospital supplies were purchased at and distributed from this depot. A supplemental depot existed for a number of years, particularly during the Mexican War, in New Orleans. As the upper Mississippi and Missouri Valleys were settled and military posts were established in that region a small distributing depot was maintained at St. Louis. During the years 1862-1866 the number of medical supply depots increased until at the close of the Civil War there were six principal depots in operation: New York, N. Y.; Philadelphia, Pa.; Washington, D. C.; St. Louis, Mo.; New Orleans, La.; and San Francisco, Calif.³² During the years 1867-1897, inclusive, as the strength of the Army diminished the number of depots was reduced to three, New York, St. Louis, and San Francisco. Such were the number and locations of the depots at the outbreak of the Spanish-American War, at which time a depot was reestablished in Washington, D. C.; a subdepot drawing its supplies from St. Louis was established at Chickamauga, Ga.³³

The variety of articles purchased at medical supply depots gradually increased as the years passed, the needs of the hospital increased, and the equipment for them became specialized. Army Regulations of 1841 required the medical purveyor to cause suitable medicine chests to be constructed and

furnished to hospitals, regiments, posts, and garrisons, and to purchase all medicines, hospital stores, bedding, surgical and other instruments, books, stationery, and dressings, required by the Medical Department of the Army. In 1862 the duties of the medical purveyors were extended, under the direction of the Surgeon General, to include the selection and purchase of all medical supplies, including new standard preparations, and of all books, instruments, hospital stores, furniture, and other articles for the sick and wounded of the Army.³⁴ The standard articles to be furnished out of the appropriation entitled "Medical and Hospital Department" have appeared either in Army Regulations, in general orders and circulars of the War Department, or in the Manual for the Medical Department, approved by the Secretary of War, as its supply table, since 1819. This has included, in the main, all movable articles in the hospital required for its effective operation, as distinguished from the permanent fixtures such as plumbing and lighting fixtures and cooking and heating apparatus, which are supplied from another appropriation. Such fixed apparatus as instruments, dressing, and water sterilizers, and apparatus for the disinfection of bedding, clothing, etc., are now and have for many years been purchased out of the appropriation, "Medical and Hospital Department."

During the decade which preceded the Spanish-American War the list of articles in the standard supply table had undergone little if any change. The equipment and supplies provided, while limited in variety, were always ample in quantity and were believed to include all articles necessary for the military service in time of peace. New remedies of determined therapeutic value were added from time to time to the supply table, but few preparations were supplied for experimentation, or because of more agreeable taste, or to save trouble in compounding.³⁵ Such care was taken in the use and conservation of both expendable and nonexpendable supplies that expenditures of both were kept at a minimum consistent with the service. The number of articles worn out and condemned during the year was correspondingly small. The personnel of the Medical Department, both commissioned and enlisted, trained in the true essentials of economy, were able to make the most out of everything furnished them and to adapt themselves to their environment with a minimum of inconvenience and a maximum of efficiency. The Army, too, was well trained in this respect, was familiar with all the equipment issued, the uses for which that equipment was intended, and the regulations governing its use and replacement; consequently, expenditures were low.³⁶

As a result of this ability of the personnel of the Medical Department in the care, preservation, and utilization of medical and hospital supplies and equipment, the annual appropriations gradually diminished from \$200,000 for the fiscal year of 1888 to \$135,200 for the fiscal year 1898. The annual expenditures for medical supplies and equipment declined from an average of \$133,041.65 for the three-year period, 1888-1890, to an average of \$58,624.19 for the three-year period, 1895-1897, although the strength of the Army remained practically the same, about 26,000. During the latter period, of the \$461,500 appropriated, \$147,566.11 remained unexpended and reverted to the Treasury.³⁶ This economy was manifested in the meagerness of the supplies carried in the medical supply depots. Purchases for replenishment of stock were made semi-

annually in the spring and fall, and the amount depended largely upon the quantities included in the annual requisitions. This inevitably resulted in small stocks and the absence of any reserves beyond the needs for current issue, and left the Medical Department wholly unprepared for an emergency such as would result from the mobilization of any considerable body of troops in addition to those of the regular establishment.³⁷

It is appropriate here to refer to the equipment for the Medical Department unit on duty with regiments and smaller organizations of the line of the Army. In the early part of the development of this equipment the Army was small and it seemed proper that the equipment for a mobile hospital of 10 beds be provided for each regiment. Such equipment was revised and improved in 1892 and issued to the larger posts for observation, field tests, and report.³⁸ This equipment consisted of a medical chest, a surgical chest, a mess chest, a food chest, a commode chest, a field desk, and a set of folding field furniture supplied by the Medical Department, and the necessary tentage, cooking and heating apparatus, and shovels, rakes, etc., supplied by the Quartermaster Department.³⁹ This unit hospital equipment was improved and augmented from time to time so that by 1898 it had reached such a state of amplification and perfection that the routine care of the sick of a peace-time regiment in the field could be fairly well provided for by it.

THE SPANISH-AMERICAN WAR

The advent of the War with Spain found the supplies and equipment of the Medical Department at a very low ebb. Its field equipment was in the process of evolution. The bulk of the equipment previously acquired was in the possession of the troops. The stock of such equipment in the depots was but little more than sufficient for 20 regiments.⁴⁰ New pattern medical chests and surgical chests were developed while the war clouds were gathering, and instructions to purchase a sufficient number to equip the troops were issued as soon as funds became available.⁴¹ There was, at that time, no official table of equipment for any medical unit larger than a regimental hospital.⁴¹ The field hospital organization developed during the Civil War, which provided all the necessary appliances for the proper care of the wounded for a great battle, without delay or confusion, had completely disappeared.⁴² The tables of equipment for field hospitals, ambulance companies, camp and division hospitals, evacuation and general hospitals, or the units which corresponded to them, had all to be evolved as the need for them arose.⁴³ None of the articles included in these lists appear to have been in stock in sufficient quantities to provide the initial equipment required. They had to be purchased and the units assembled after war was declared.

Although the appropriation for the national defense was made available in the early part of March, 1898, no orders for medical and hospital supplies were placed, pursuant to instructions from the Secretary of War, prior to the first call for volunteers in anticipation of that call.⁴⁴ Immediately following the President's proclamation of April 23, 1898, for 125,000 volunteers, instructions were issued by the Surgeon General to the officers in charge of medical supply depots for the purchase of such medicines, dressings, instruments, first-aid

packets, furniture for field and general hospitals, medical and surgical chests for field use, mess chests, field desks, litters, hospital stores, and other supplies as were considered requisite for the number of troops called into the service.⁴⁴ Instructions were issued to the surgeons of all Regular troops to take with them to their respective mobilization camps their regimental field medical equipment and sufficient supplies to last for three months, and most of the surgeons complied with the instructions.⁴⁵

It early became evident that the rate of muster into the Federal service of the Volunteer regiments would outstrip the rate of delivery of the field medical equipment required for them. A telegraphic appeal was sent May 3 to the governors of the several States to utilize the equipment of the National Guard in the service of the State to outfit the regiments of Volunteers being raised in their respective States until Medical Department supplies were ready for issue. This appeal was granted in so far as the medical equipment of the States would permit. Many of the States had no such equipment and the numbers actually furnished fell, for various reasons, greatly below what had been expected.⁴⁵ To tide over the period between the actual muster into the Federal Service of the Volunteer regiments and the delivery to them of the standard unit equipment, instructions were issued, May 12, 1898,⁴⁶ to the medical supply depots at New York and St. Louis to assemble a number of modified equipments, called advance regimental outfits, and to report as soon as the assembly of any of them had been completed. These advance outfits consisted of an assortment of the more essential medicines, antiseptics, and hospital stores contained in the standard medical chests. They were packed in a standard packing box provided with suitable hinges, hasp, and padlock. Sufficient folding field furniture, bedding, hospital clothing, ward utensils, and mess equipment to provide for the patients were also included in this outfit. The New York depot reported May 14, 1898, that 5 outfits were ready and that 25 more would be completed during the following week. The St. Louis depot reported on May 21, 1898, the assembly of 5 such sets, but that they were short some articles. Some of these sets, as well as the completed units in storage, were issued direct to regiments. Others, and probably the greater number, were shipped to the local medical depots at the mobilization camps and there issued under instructions from the chief surgeon of the corps or camp. Additional supplies, calculated from the field supply table for 10,000 or 20,000 men, were shipped to the camp depots from time to time on instructions from the Surgeon General's Office.

The Medical Department supply division, being accustomed to the economical use of supplies by medical officers of the Regular Army and thoroughly familiar with their ability and willingness to get along with the articles on the standard supply table, did not at first appreciate that the demands of Volunteer surgeons in quantities and variety of articles would be so great as experience developed. In view of the low previous sick rate of the Regular Army, the great morbidity which developed in the mobilization camps was not anticipated, nor was the prolonged stay of the troops in those camps.⁴⁷ An adequate conception of the magnitude of the task of providing the troops and hospitals with adequate supplies and equipment did not obtain during the early days of

the war, nor, in the absence of definite plans previously worked out and carefully prepared, was the increase in and the adjustment of the medical supply service to the task imposed upon it so great or so rapid as was needed. Some time, also, was lost in adjusting the methods of procurement to war-time conditions. Some time was lost in the beginning by advertising for bids, but this method was soon discarded for the more expeditious, if less orthodox, method of purchase in the open market, contracts being made only when the sums involved required it.⁴⁵

In the initial establishment of camps and general hospitals the equipment was shipped under instructions from the Surgeon General's Office and without requisition.⁴⁹ Purchases of quantities of supplies in Washington, Baltimore, and Philadelphia were made directly by that office to provide for the immediate needs of the troops at Camp Alger, and the general hospitals at Fort Myer, Va.; Washington Barracks, D. C.; and Fort Monroe, Va.⁵⁰ Requisitions were made by telegraph and supplies were shipped by express.⁵¹ By the midsummer supplies were being issued with great liberality,⁵² if not prodigality. Long delays were experienced in the delivery of supplies shipped, due largely to railroad congestion in the vicinity of the camps.⁵²

By the end of September, 1898, 11 general hospitals, with a total capacity approximating 7,000 beds, had been fully equipped, in addition to the supplies required for Cuba, Porto Rico, and the Philippines. In some instances cots and bedding were obtained from the Quartermaster's Department. The hospitals in the various camps, too, had been equipped and these supplies replenished.⁵³ The expedition of 18,000 men for the Philippines had been furnished their unit equipment and six months' supplies of the expendable articles. Full equipment for the fixed hospitals in Manila required for these troops and a large reserve of supplies accompanied the expedition and replenishments followed.⁵⁴

The Army had been rapidly mobilized and it was with difficulty that the procurement and delivery of supplies by any of the supply bureaus could keep pace with the mustering in of the Volunteers and the expansion of the Regular organizations. The transportation systems of the country were very poorly prepared to handle the movement of the supplies it became necessary to ship, and great congestion of traffic at points in the vicinity of the mobilization points was inevitable. New problems thrust themselves upon both the military and the civilian personnel involved in the mobilization and supply.

Years of economy, of limited appropriations, of contracted and contracting methods of administration, made rapid expansion difficult. As a result of the many complaints made to and criticisms of the War Department because of these things, the Secretary of War on September 8, 1898, applied to the President of the United States for a thorough investigation, by an impartial board of eminent and distinguished soldiers and civilians, of every bureau of the War Department in connection with the mustering, clothing, supplying, and arming of the troops, contracts, transportation, expenditures and all other things pertaining to the Army. The President acceded to that request and appointed a commission of 10, including its recorder, known as the Dodge Commission.

This commission made an exhaustive investigation of the Army and of its conduct during the war and arrived at some very definite conclusions. Those relating to medical supplies were to the effect, briefly, that the Medical Department, at the commencement of hostilities, had few medicines and practically

no hospital furniture; that the economy with which it had been administered for years had prevented the accumulation of any reserve stores; that no contracts, even provisional, for needed supplies and equipment had been made during March and April because of lack of funds, since, in the absence of a state of war, no part of the national defense fund could be used for this purpose; that if there had been a stock of supplies available for prompt shipment much of the complaints and wants of the sick and the surgeons would have been prevented; that time was lost in having manufactured standard chests of various kinds for drugs, stores, dressings, furniture, etc., the making of which never equaled the demand for them; that the medicines on the supply table were too restricted; that the shortage of supplies was in many instances due to the lack of knowledge on the part of untrained medical officers of how to get the supplies; that because of the methods of administration evolved through years of strict economy it was impossible for the Medical Department to operate largely, freely, and without undue regard to cost; that the demands made upon the resources of the department were very much greater than had been anticipated, and consequently, in like proportion, those demands had been imperfectly met; and that because of its lack of ability to control the shipment of its supplies it had been seriously crippled in its efforts to fulfill the regulation duty of "furnishing all medical and hospital supplies."⁵⁵

The commission recommended, with regard to medical and hospital supplies, that "a year's supply for an Army of at least four times the actual strength, of all such medicines, hospital furniture, and stores as are not materially damaged by keeping, be held constantly on hand in the medical supply depots," and that the Medical Department have charge of transportation to such extent as would secure prompt shipment and ready delivery of the medical supplies.⁵⁶

PERIOD 1900 TO 1916

The Medical Department took very seriously the findings and recommendations of the Dodge Commission and set about correcting the defects and in initiating measures to make effective the recommendations relative to a reserve of supplies. The occupation of tropical territory called for intensive studies in sanitation and the prevention of disease. These studies called for and were followed by studies in equipment, its procurement and distribution. The expanding Army, too, made necessary the development of unit equipment for the organizations which that expansion called into being.

UNIT EQUIPMENT

During the War with Spain the use of the regimental hospital unit of equipment with brigaded or division troops was discontinued and a larger local unit under the title, division hospital, was substituted, following the plan of the latter part of the Civil War.⁵⁷ This hospital had a capacity of 200 to 250 beds. The regimental hospital continued in use with those regiments which were stationed apart from other regiments. The equipment of the regimental hospitals had been utilized in the establishment of the division hospitals, consequently when the Regular Army regiments joined their stations they had but

little medical equipment. Regimental field hospital equipment was again assembled and issued to a number of posts. This number was at first 19, but later was increased to provide one such equipment at the headquarters of every regiment within the continental limits of the United States.⁵⁸

The Manual for the Medical Department for the year 1898 provided a meager equipment for a brigade or division hospital and for an ambulance company.⁵⁹ In the revision of the manual, published in 1902, extended study was made of the equipment of this unit, which was given the title, field hospital. The equipment provided for 108 beds instead of the 200 to 250 of the former brigade or division hospital, and included supplies considered to be sufficient for 5,000 effectives for three months. The equipment of this unit was packed in specially designed cases, chests, and field desk. It contained not only medical and surgical supplies, surgical instruments, folding ward furniture, bedding and clothing, and mess and cooking appliances, but also bathtub sets, an acetylene illuminating outfit, microscope and microscopical accessories, and a water sterilizing outfit. A separate equipment especially designed to provide for first-aid treatment and refreshment of the wounded and their transportation to the rear was provided for the ambulance company. The equipment of the regimental hospital was revised and improved and its capacity reduced to six beds.⁶⁰

The studies on supplies and equipment continued, and a revision of the supply table and tables of equipment appears in the Manual for the Medical Department, 1906, together with a description of the duties and regulations for each unit. In this manual the studies of equipment are carried to units which functioned between the units of the division and the general hospitals established for the definitive and final treatment of the seriously disabled. The equipment of the field hospital remains at 108 beds, but it is considered as a unit of mobility intended for primary treatment only.⁶¹ A larger unit intended for more complete and prolonged treatment is provided under the title stationary hospital. This unit has a capacity of 324 beds and is more elaborate than the field hospital. It also is essentially a mobile unit capable of being housed under canvas and moving at short notice. While an effort was made to provide as great comfort as possible for the patients, it was necessary, in order to provide for ready and rapid removal to points needed, to keep the weight and bulk of the equipment at the minimum. The equipment for this unit was supplied in part by the Medical Department and in part by the the Quartermaster's Department. The latter furnished the vehicles, animals, harness, tentage, cooking and heating apparatus, and the implements for policing the hospital area. The Medical Department furnished the remainder. The weight of the articles furnished by the Medical Department, packed and ready for shipment, approximated 40,000 pounds, and that of the articles furnished by the Quartermaster's Department approximated 18,000 pounds, making the aggregate 58,000 pounds.⁶²

The need for an agency to make prompt delivery of medical supplies to the units at the front also received consideration, and equipment and supplies therefor were provided under the title, advanced supply depot. The weight of this equipment, all of which was supplied by the Medical Department, approximated, when packed for shipment, 12,000 pounds. The equipment of this

unit was intended to provide a reserve supply of medicines, dressings, hospital stores, stationery, etc., for the division, including the field hospitals.⁶³

The attitude toward the regimental hospital changed materially in the 1906 edition of the manual. A full field hospital equipment was contemplated for regiments serving alone, but the equipment of regiments brigaded in camp, where the facilities of the field hospital or stationary hospital were available, were limited to that of infirmaries giving dispensary service only.⁶⁴ All cases requiring hospitalization were sent to the camp hospital. The total weight of the infirmary equipment, exclusive of tentage for personnel, rations, and forage, was approximately 1,700 pounds as against 4,161 pounds for the hospital equipment.

At the large camps of mobilization at the base whence military operations were to be undertaken, a larger hospital of 500 beds was contemplated, to be known as a base hospital.⁶⁵ Ordinarily it was to be housed in suitable buildings, but in the absence of such it might be housed under canvas. The equipment provided for this unit was of the same field type as that for the stationary hospital, but was correspondingly more ample. The weight of the equipment of this unit as packed by the Medical Department was approximately 54,000 pounds. The equipment furnished by the Quartermaster's Department weighed approximately 24,000 pounds, an aggregate of 78,000 pounds.

The equipment of the ambulance company was but little changed in this edition of the manual.

An equipment was provided for the office of the chief surgeon of a corps, division, or brigade.⁶⁶ It consisted essentially of folding field office equipment, chairs, desks, tables, typewriters, etc., stationery, record books, and blank forms.

The next revision of the Manual for the Medical Department (1911) contains no new unit equipment. The name of the stationary hospital was changed to evacuation hospital, a title more nearly descriptive of its function. The advanced supply depot became more appropriately "reserve medical supply." There was a gradual increase and amplification in the equipment of the less mobile units and an improvement in its type. The weight of the field hospital equipment furnished by the Medical Department was reduced to 8,105 pounds. The weight of medical supplies in the evacuation hospital was about the same as the stationary hospital which preceded it but its gross weight increased to 65,960 pounds. The gross weight of the base hospital was increased to 92,143 pounds. The standards for the regimental hospital and infirmary had not been changed. The standard supply table for fixed or stationary hospitals had undergone some change. The dental equipment was revised and the manner of packing improved.⁶⁷

The whole trend of the period was along the line of improvement in type and quality of supplies furnished. Inspection of supplies delivered became increasingly more careful and rigid although the methods of procurement continued unchanged. As the quality of supplies improved the number of persons bidding increased. Fair dealing and promptness in paying bills engendered a better spirit among the contractors for medical and hospital supplies. Study was given at the depots to the development of tests and analytical methods to

determine the qualities of the different articles of supply and whether they conformed to the standard samples upon which the invitations to bid were based. Except for the drugs listed in the United States Pharmacopeia there were no detailed specifications for any article purchased. All purchases were based upon sample. In the acceptance of the articles delivered was the matching of wits between the buyer and seller. By applying the general principles of analysis in the examination of all articles the description of or specification for any particular article became, from invitation to invitation, more detailed and more complete. As these specifications grew they were written into the contracts and the contractual stipulations enforced. If the deliveries met the requirements of the stipulations they were accepted. If they did not meet these requirements, the articles were rejected and the requirements were enforced at the expense of the contractor. The bulk of the business at this time was transacted through jobbers or firms which specialized in Government contracts. The manufacturer and wholesaler rarely bid upon textiles, china-ware, furniture, or even medicines. Surgical instruments, operating room and ward furniture and equipment were for the most part from the manufacturers.⁶⁵

In providing medical supplies for the troops in Cuba, in Hawaii, in the Philippines, and in the Boxer rebellion in China, much valuable experience was gained by the various medical officers having duties in connection therewith. The purchase of the medical and hospital supplies required during the construction of the Panama Canal also added to this experience. An effort was made to train medical officers for the supply service of the department, but the chronic shortage of medical officers prevented this effort from coming to full fruition and the number so trained was pitifully small. Nevertheless they served to form the nucleus of the organization which developed in 1916-1918, and to train and direct the new men called into service during those years.⁶⁶

The revision of the standard supply table in 1916 introduced new equipment for the medical officer and the enlisted men of the Medical Department. The orderly pouch and the Hospital Corps pouch gave place to a web belt with pockets in it in which were carried the essential articles formerly carried in the pouches. The belt for the medical officer provided him with the medicines and the few simple instruments required in rendering first aid.⁶⁷ The regimental hospital and regimental infirmary equipment gave way to a regimental combat equipment intended only for first-aid and dispensary treatment and the evacuation of the wounded from the firing line to the regimental aid station.⁷⁰ A camp infirmary equipment was provided for use in camp. Camp dispensaries were established with these equipments. A reserve stock of medicines was provided for these dispensaries. No case was to be hospitalized at these dispensaries; all cases requiring hospitalization were to be sent to the field hospital serving the division for the time being, or to the camp hospital.⁷¹

RESERVE EQUIPMENT

While the studies of the articles appropriate to the various unit equipments were in progress, procurements were not neglected. The quantity of equipment recommended by the Dodge Commission to be kept in reserve was the goal. For years no specific appropriation was made for this purpose, and every dollar which could be saved in the administration of supplies for post

and general hospitals was used to purchase the reserve equipment. Being convinced that the system of unit equipment was the correct method of furnishing equipment to new organizations, every effort was made to assemble a given number of such units in proportion to the needs from front to rear. The number of regimental units kept pace with those for the division, the corps, and the army. One field hospital and one ambulance company equipment were provided for a definite number of regiments. Evacuation hospitals had a definite ratio to the units required for the division. In 1908 a special appropriation of \$200,000 was made by Congress to enable the Medical Department to procure its needed reserve equipment.⁷²

These unit equipments of every type were assembled complete with every article which would not deteriorate with storage and kept at the supply depots in readiness for immediate issue upon telegraphic instructions from the Surgeon General so to do. So effective did this system prove that, during the Mexican border mobilization in Texas in 1911, the entire medical equipment for 20,000 men was at the mobilization point eight days after telegraphic instructions were sent to the St. Louis depot to ship it. Perishable articles, such as ether, chloroform, and rubber goods, were not stored with the unit equipment but were taken from stock on hand at the time of shipment of such equipment.⁴⁰ Articles pertaining to the Quartermaster Department were requisitioned by the supply depots and incorporated in the unit equipment as it was assembled.

By the end of 1915 these unit equipments, sufficient to provide for 11 divisions, were in storage at various points within the continental United States. A number of them had been distributed to National Guard organizations,⁴⁰ and were taken with these organizations during the border mobilization in 1916. Nevertheless, because of lack of funds, it was impracticable to bring the reserve equipment up to the limit prescribed by the Dodge Commission.⁷²

WAR-TIME PROCUREMENT PLANS

Studies on war-time procurement appear to have had their beginning in November, 1902, and to have been instigated by a request from the Army War College board for the quantity of medical and hospital equipment which should be on hand to equip armies of 150,000 and 250,000, respectively, and fit them for field service in the event of sudden and unexpected hostilities.⁷³ The officers in charge of the medical supply depots were called upon for a report of the quantities of articles of war materials habitually carried in stock by manufacturers and dealers, the manufacturing facilities for such articles and the probable period within which contracts therefor could be filled.⁷⁴ Based upon these reports and upon studies conducted in the Surgeon General's Office, lists of equipment required by Medical Department units with armies of the strengths given were prepared and transmitted, with the estimated cost of such equipment, to the Army War College the latter part of January, 1903.⁷³ The need for an adequate reserve of such equipment was stressed in this report and its great expense indicated. Such reserve was to be held at the nearest base in the event of hostilities.

These studies continued and a new list and estimate of cost of equipment were prepared in 1906 on the basis of a definite number of organizations and mobilization rate. As material changes in tables of equipment for medical

units were then in preparation, a revised list was furnished the Army War College the following year.⁷⁵ In 1908 another list of equipment and supplies for an army of approximately 500,000 as initial equipment and maintenance was prepared.⁷⁶ The cost of these supplies and equipment for the combatant troops was estimated at \$5,545,054.32. Those for the transport columns, line of communications, and general hospitals was estimated at \$2,214,924.66, making a total estimated cost, on the basis of the then tables of equipment and allowances, of \$7,759,978.98.

The National Guard of the several States was provided with unit equipment for divisional units whenever requested by the governor of the State. The Medical Department was reimbursed for the equipment so issued out of funds appropriated annually for arming and equipping the militia, and apportioned among the several States for that purpose.⁷⁷ The moneys received by the Medical Department from these reimbursements were promptly reinvested in similar supplies for stock and new unit equipments assembled to replace those issued to the National Guard. Some of the National Guard organizations were equipped in this manner.

Considerable study was devoted in 1913-14 to the preparation of comprehensive and definite plans for the procurement of medical and hospital supplies in time of war. These plans were submitted to the Chief of Staff for consideration and file in the War College. They were approved July 21, 1914.⁷⁸ These plans contemplated that the unit system of supply whereby a definite unit of organization could be furnished with its proper unit of equipment with a minimum loss of time would be observed and that as many as possible of these completed units would be assembled and stored in the various medical supply depots where they would be available immediately for issue. It was assumed (1) that the Regular Army would be increased to its maximum strength; (2) that the Organized Militia at war strength would be mustered into the service in advance of any Volunteer forces; (3) that all troops, Regulars, Militia, and Volunteers, would be fully equipped with the necessary sanitary units at mobilization or concentration camps, before their departure for the scene of operations; (4) that all the sanitary equipment on hand with the Regular Army and the Organized Militia would be accounted for in the mobilization, and the Medical Department would consider only the completion of imperfect units or the supply of new units where necessary; and (5) that the Volunteer forces to be organized would be supplied from medical supply depots, advantage being taken of the interval elapsing between the declaration of war and the mustering in of the Volunteers to replenish depleted stock and assemble new sanitary units where necessary.

Studies on requirements were continued from time to time. On June 12, 1915, estimates were furnished the Secretary of War of the materials required, in addition to those on hand, to equip 21 Infantry divisions, 7 Cavalry divisions, and the requisite army troops, and the approximate cost thereof required for equipment and maintenance of the Medical Department units therein.⁷⁹ These estimates indicated a cost of \$2,308,635 for unit equipment, \$1,401,546 for maintenance of the field force, and \$2,128,000 for base hospital equipment.

In furnishing additional information to The Adjutant General, August 20, 1915, on the quantities of field supplies required to equip one Infantry division and one Cavalry division, respectively, under the heads of (*a*) those obtainable in the market at any time; (*b*) those obtainable on 15 days' notice; (*c*) those obtainable on three months' notice; and (*d*) those not obtainable within three months, the following principles were stated by the Surgeon General: That a limited quantity of every item on the supply table could be purchased in less than 90 days; that in every field unit there were components which could not be purchased in any considerable quantities within three months, such as special cases and containers, because they are not common articles of commerce and must be manufactured to order; that after the receipt of the containers at the supply depots, a considerable time would be required in which to fill them with their component articles and pack them for shipment.⁸⁰ These principles again were stressed in a letter from the Surgeon General to The Adjutant General, September 8, 1915, in response to a request for a list of the articles of equipment which could not be procured with reasonable quickness and should be kept in reserve.⁸⁰

DEPOTS FOR RESERVE SUPPLIES

The question of storage space for the reserve equipment was one of considerable moment on account of the expense involved in the rental of the necessary buildings. The space in Government-owned buildings was very limited, and the expense of construction considerable. An intensive study was given this question in 1910-11, and the requirements of the several supply bureaus in the amount of storage space required for reserve equipment were determined.⁸¹ The storage requirements of the Medical Department were found to approximate 23,000 cubic feet per division. In this study, unit assemblage was urged by the Surgeon General, who reported that the Medical Department was prepared to furnish complete field equipment for 10 divisions of troops. The plan eventually approved by the Secretary of War contemplated the establishment of depots of reserve supplies within those areas in which troops would be mobilized in the event of war. These depots were to be known as field supply depots and located at strategic points. Field supply depot No. 1 was to have been established at Philadelphia, Pa. In it were to be stored all kinds of supplies required to equip and maintain the troops, Regular Army, Militia, Volunteers, to be organized in the then Department of the East. The depot was to be commanded by an officer of the Quartermaster Department especially selected therefor by the Secretary of War. An authoritative list of supplies, to be known as the standard list of field supplies, was to have been furnished this depot commander by the various supply bureaus using the depot for storage purposes. It was not contemplated that issues to meet current needs would be made from this depot. If, and when, mobilization was ordered, the necessary supplies were to be shipped in bulk to mobilization points and there distributed to the troops. At later dates, as appropriations became available, it was contemplated that other depots of like character would be established—No. 2 at Jeffersonville, Ind.; No. 3 at Atlanta, Ga.; No. 4 at Omaha, Nebr.; No. 5 at San Francisco, Calif.; and No. 6 probably at

Springfield, Mass. The articles of medical equipment which it was at first intended to store at field supply depot No. 1, Philadelphia, under this policy were 25 field hospital, 22 ambulance company, 13 evacuation hospital, 7 reserve medical supply, and 80 regimental hospital equipments. For various reasons the supplies actually ordered to that depot were limited to litters, brassards, and first-aid packets.⁸¹ The articles, however, eventually were returned in July, 1916, to the Field Medical Depot, Washington, D. C.⁸² No measures looking to the establishment of the contemplated field supply depots Nos. 2 to 5 were taken. Only such changes were made in depot arrangements, prior to April 6, 1917, as were required from time to time by the military situation along the Mexican border.

The total number of unit equipments available at the end of December, 1915, were:

Evacuation hospitals -----	24	Base hospitals -----	3
Field hospitals -----	46	Ambulance companies (less transportation) -----	45
Medical reserve supply -----	15	Regimental infirmaries -----	101
Ambulances -----	180	First-aid packets -----	562, 000
Brassards -----	30, 000		

MEXICAN BORDER MOBILIZATION

Because of the political unrest in Mexico which followed the fall of the Diaz régime, in 1911, a large part of the mobile forces of the United States was assembled along the Mexican border, so that by 1916 more than 40,000 of our troops had occupied that area.⁸³ Temporary stations or camps were established at various strategical points, such as Eagle Pass, Marfa, and Harlingen, Tex.; Columbus and Hachita, N. Mex.; Douglas, Nogales, and Yuma, Ariz.; and Calexico, Calif.⁸⁴ The hospitals at these posts were provided with standard medical post and field equipment and supplies commensurate with their needs. These supplies and equipment the senior medical officers with the commands obtained upon requisitions in the prescribed form forwarded at the customary periods to the department surgeon. The greater part of their supplies and equipment came from the medical supply depot at St. Louis, Mo., but special articles were sent directly from the medical supply depots at New York and Washington from time to time as occasion required. Each principal camp had essentially the equipment of a regimental hospital which, being compact and limited in amount, could be packed for transportation in a very short time. To minimize the delay in delivering to Medical Department personnel with these troops supplies needed in emergencies which were liable to arise from sudden and unexpected movements of the troops, and to care promptly for any casualties should hostilities actually occur, reserves of medical field equipment and supplies were kept at convenient points along the border. Thus, two evacuation hospitals, a reserve unit of medical supplies, and 10 modified regimental infirmaries were stored at the hospital at Fort Sam Houston, Tex.; a reserve unit of medical supplies was kept at the hospital at Fort Bliss, Tex., and another at the hospital at Fort Huachuca, Ariz.⁸⁵ These units were kept replenished and in complete readiness for immediate use. No medical supply depot was maintained in the Southern Department, except for short periods at Fort Sam Houston, Tex., during the mobilization of the provisional division at that

place in 1911, and at Galveston, Tex., in 1913-1915, during the mobilization at Texas City, Tex., and the expedition to Vera Cruz, Mexico.⁸⁶

The sending of the punitive expedition into Mexico immediately following the memorable raid by Francisco Villa and his followers upon the town of Columbus, N. Mex., March 9, 1916, with the subsequent mobilization of the National Guard on the border, marks the beginning of the expansion for the supply bureaus of the War Department, which, in so far as supplies were concerned, merged imperceptibly into the greater expansion of 1917-18. The experiences gained by the supply service of the Medical Department in 1916 proved of inestimable value in 1917-18, and demonstrated the correctness of the principle of unit equipment.

A medical officer was ordered to Fort Bliss in April, 1916,⁸⁷ to look after the increasing volume of supplies and issues from the augmented reserve unit of medical supplies at Fort Bliss, and to make the disbursements of Medical Department funds in that locality which it was anticipated would be required. The supplies of this reserve unit were stored in the basement of the hospital at that post. This hospital had been designated a base hospital and was being rapidly expanded to take care of the sick from the troops in that locality and the more serious cases from the punitive expedition and needed all the available storage space for its own supplies and equipment. It was anticipated that this reserve unit would make frequent issues to the punitive expedition.⁸⁸

The storage space at Fort Bliss did not exceed the immediate and urgent needs of the post. None could be spared for the medical supply depot. The location of the post was inconvenient and unsuitable for a rapid and expeditious distribution of supplies. It was necessary, therefore, to find quarters for it in El Paso and to obtain authority for its rental. An ideal fireproof warehouse could not be found, but a fairly satisfactory two-story and basement brick building of loft type and mill construction was secured.⁸⁹ The supplies of the reserve unit were promptly transferred to the new depot. Requisitions for stock were forwarded through the usual channels May 6 and 29 and June 16 and 20 and subsequently thereto as the needs required.⁹⁰

In addition to the supplies requisitioned by the medical supply officer, there were shipped to this depot, upon the requests of the department surgeon of July 5 and 14, the equipment of 1 complete base hospital with 500 iron bedsteads and hair mattresses, 9 evacuation hospitals, 4 reserve medical supply units, and 4 division surgeon's offices.⁹¹ Thirty-eight ward units and a number of motor ambulances were received under instructions from the Surgeon General⁹² and properly stored. The base and evacuation hospitals and reserve units of medical supplies were held in reserve against a possible intervention and resultant hostilities in Mexico.⁹¹

At the request of the surgeon of the Southern Department the establishment of a medical supply depot at the base hospital at Fort Sam Houston, Tex., was authorized June 1, 1916, and a medical officer on duty at that hospital was detailed in charge of it.⁹³ Reserve medical supply unit No. 11, then in storage at that point, was utilized for the initial equipment of this depot. These supplies were augmented from time to time by requisitions from the medical supply officer through usual channels.

With the prospect of the early mobilization of National Guard troops in the Southern Department it became evident that the storage space available at Fort Sam Houston for the use of the medical supply depot would be wholly inadequate. Steps were taken during the latter part of June to obtain suitable office and warehouse space for the depot in San Antonio. A nucleus of trained depot employees was transferred to this depot from other medical supply depots.⁹⁴ Upon telegraphic request from the department surgeon, the medical supply depot at Washington was directed, on July 18, to ship by freight to the San Antonio depot five times the quantities of expendable articles for a base hospital listed in the Manual for the Medical Department (1916, par. 891), to expedite the shipment, to make open-market purchases if necessary, and to purchase the most satisfactory substitutes if the standard articles were not available. On the same date similar instructions were wired to the medical supply officer at New York to ship twenty-five times the annual allowance of expendable post supplies for posts of 1,000 as listed (pars. 843 to 848, inclusive, M. M. D. 1916) and ten times the annual allowance of nonexpendable post supplies (pars. 844, 845, and 847, same manual), excepting certain articles.⁹⁵

Two calls for the mobilization of the National Guard were issued in 1916. The first call was issued May 9, and was limited to the National Guard of the States of Texas, Arizona, and New Mexico.⁹⁶ The mobilization points for these troops were designated by the commanding general of the Southern Department under the terms of the call. The second call was issued June 18, designated units and mobilization points, and included all States except Texas, Arizona, and New Mexico. The object in specifying the units in the respective States to be included in the second call was to exclude units which up to that time had failed to receive Federal recognition. Such of these units as later received recognition were called into the Federal service.⁹⁷ The mobilization points for the several States had already been determined, and although a few of them were changed later to more suitable localities, the mobilization occurred as previously planned. In order that adequate medical supplies and facilities might be available for the organizations as they arrived, under instructions of June 19, from the Surgeon General, a field hospital equipment was sent to camps where it was known that no organized and equipped field hospital of the National Guard was present. Every regiment of the National Guard was presumed to have with it a regimental hospital or infirmary equipment and its regimental medical personnel. Upon this personnel and the supplies in the regimental equipment these troops were expected to depend until the arrival of the field hospital equipment. Under verbal instructions from the Surgeon General the Army Medical School at Washington, D. C., forwarded on June 20, by mail or express to the various mobilization camps, sufficient quantities of typhoid vaccine to immunize the number of men expected to report at the respective camps. Additional quantities of this vaccine were forwarded from time to time upon the request of the camp surgeons. Smallpox vaccine was supplied to these camps as needed upon requests by the camp surgeon to the surgeon of the department in which the camp was located.⁹⁷ At camps where a shortage of medicines occurred pending the arrival from the medical supply depots of the field hospital equipment, authority was granted the camp surgeon for the

local purchase of such medicines as might be required. Replenishment of supplies in the regimental equipment was obtained upon requisitions initiated by the regimental surgeon and forwarded through the camp surgeon. If the articles were not available in the camp hospital such requisitions were forwarded through the department surgeon to the Surgeon General, who directed the issue from the appropriate depot.⁹⁷ As rapidly as the organizations completed their physical examination, equipment, and muster into the Federal service, they were forwarded to their designated station in the Southern Department. Thereafter they received their medical supplies in the manner already described. As rapidly as the mobilization camps were emptied of troops the medical equipment pertaining to the camp hospital was shipped to the depot from which it originally came.⁹⁷

Some items of field equipment were listed in the Manual for the Medical Department, 1916, which had not appeared in the previous edition and consequently were not available for issue to sanitary units upon the distribution of the 1916 Manual. Being new items, the sources of supply had to be developed. Shortages of materials and parts contributed to the difficulties of contractors in completing their contracts. This was particularly true of packmule boxes, ambulance boxes, and the boxes for the venereal prophylaxis units. Surgical and dental instruments were difficult to obtain, as will be discussed in detail in the chapters devoted to those subjects. While these articles were not in themselves particularly essential to the treatment of the sick, since their contents were readily obtainable on requisition, the unit equipment of the sanitary organizations could not be completed without them. The inability of the depots to furnish these articles gave rise to a great number of back orders, a large amount of correspondence, and some dissatisfaction.

The expansion of the base hospital at Fort Sam Houston had taken place before the arrival of supplies at the San Antonio depot, and the equipment of that hospital was obtained on requisitions, formal and telegraphic, forwarded to the Surgeon General. The bulk of its equipment was shipped from the New York medical supply depot. After August, however, requisitions from that hospital were referred by the department surgeon to the San Antonio depot for issue for such articles as were carried by it. Requisitions for large quantities of supplies and for articles not stocked by the local supply depot continued to be sent to the Surgeon General for reference to other depots for issue.⁹⁸

MOTOR AMBULANCES

Motor ambulances were utilized for the first time in the field service of our Army during this mobilization. Abundant opportunity offered in which to determine the value and limitations of such transportation. The conditions under which they were required to operate were as severe as could well have been devised. They traversed a desert country where roads were either absent or at best were mere trails; sand and deep chuck holes filled with dust frequently were encountered. Patients had to be evacuated great distances over these seemingly impassable roads. The strains to which the vehicles were put over the route from Columbus, N. Mex., to Namiquipa and El Valle, Mexico,

and the experiences gained thereby proved of great advantage in the later developments of the motor ambulance as it finally evolved during the participation of the United States in the World War.

Almost as soon as it was known to the Surgeon General that an expedition was to be sent into Mexico, a telegram was sent to the department surgeon of the Southern Department inquiring whether motor ambulances were needed for Mexico and if so to whom they should be sent.⁹⁹ It may be stated here, in passing, that the appropriation for the support of the Army for the fiscal year ending June 30, 1916, approved March 4, 1915, contained authority, under the title of "Medical and Hospital Department," for the purchase of motor ambulances, and at the request of the Surgeon General, a board of three medical officers was appointed at Washington, D. C., in July, 1915, for the purpose of investigating and reporting upon the motor ambulance best adapted for use in the military service.¹⁰⁰ The department surgeon desired that six motor ambulances each be sent to Ambulance Companies Nos. 3 and 7, at Columbus, N. Mex.⁹⁹ Telegraphic instructions were sent March 11, to a medical officer at Fort Leavenworth, Kans., to purchase five Ford motor ambulances and trailers.¹⁰¹ One such ambulance and trailer designed by this officer, previously had been purchased, examined, and tentatively accepted by the ambulance board, and was in use at Walter Reed General Hospital, Washington, D. C. This machine was at once shipped to Columbus, N. Mex., for Ambulance Company No. 3. Of the five ambulances purchased and shipped to Columbus, N. Mex., April 7, two were consigned to Ambulance Company No. 3 and three to Ambulance Company No. 7.¹⁰¹

The medical supply officer at Washington was instructed, on March 13, to purchase in open market as an emergency measure six motor ambulances and trailers conforming to specifications which he would receive from the ambulance board. These instructions were supplemented by further instructions of March 18, to purchase 10 more motor ambulances with trailers in accordance with specifications from the motor ambulance board. These instructions to the medical supply officer were followed March 24 by instructions to ship 6 of the motor ambulances and trailers to Columbus, N. Mex., consign 3 to Ambulance Company No. 3, and 3 to Ambulance Company No. 7, 4 ambulances and trailers to the surgeon, base hospital, Fort Bliss, and 6 to the surgeon, base hospital, Fort Sam Houston.¹⁰² The surgeon, medical base group, Columbus, N. Mex., reported the arrival of the 6 motor ambulances at that base on April 18, and the trailers and spare parts on April 20.¹⁰³ The ambulances and trailers for Fort Bliss were shipped from Philadelphia, Pa., on April 28; those for Fort Sam Houston, May 5.¹⁰⁴ The Ford ambulances having been found too light and otherwise unsuited to the heavy service in Mexico, no more of them were purchased at that time.¹⁰⁵ Further purchases of ambulances of the large type were made from time to time until the end of July, when such purchases were suspended by the Secretary of War pending a decision upon the policy of motor equipment for division trains.¹⁰⁶ This was brought up by a request of the commanding general, Southern Department, for touring cars for use of the commanding officer's of motorized ambulance companies and for the substitution

of two motor trucks of 1½-ton capacity for the wagon transportation of ambulance companies and eight motor trucks of equivalent capacity for the wagon transportation of field hospitals. This motor equipment was allowed Field Hospital Company No. 7 and Ambulance Company No. 7, as an emergency measure on account of the exceptional conditions under which they were operating.¹⁰⁷ Approximately 200 motor ambulances had been purchased or were in the process of being purchased at the time the suspension of purchase was directed by the Secretary of War. Some of these vehicles were issued to camp and station hospitals, to the Philippine and the Hawaiian Departments, and the remainder were placed in storage at the medical supply depots at St. Louis, San Antonio, and El Paso.¹⁰⁸ Some of the ambulances were released later for issue to Ambulance Company No. 1 at El Paso, Tex.¹⁰⁹

The majority of the chassis purchased during 1916 were model 15, ¾-ton truck, built by the General Motors Truck Co., of Pontiac, Mich. While this G. M. C. chassis had a few defects, it proved on the whole to be satisfactory and the experiences gained on the border enabled that company to perfect their model 16, ¾-ton truck chassis, which ultimately became the standard chassis for the large motor ambulance.

DEFICIENCY APPROPRIATIONS

The funds available to the Medical Department for the performance of its mission during the period of the border mobilization were included in the annual appropriations for the support of the Army during the fiscal years ending June 30, 1916, and June 30, 1917, under the title Medical and Hospital Department, and urgent deficiency appropriations were made as the mobilization progressed. These funds were available for the immediate use of the sick and wounded, including motor ambulances for their transportation when necessary. The funds with which to provide shelter or housing for the sick and wounded, in short for hospitals, were contained in another appropriation under the title, "Construction and repair of hospitals," listed among the appropriations for the Quartermaster Department, in the same annual appropriations for the support of the Army.

The appropriation, "Medical and Hospital Department", for 1916 was \$750,000, based on a total military force of 100,000 officers and men.¹¹⁰ This sum was equivalent to an allowance of \$7.50 per man per year. This figure had been the approximate basis of appropriations under the title for several years. This appropriation for the fiscal year 1916 included, for the first time, among the purposes for which it might be used, a provision for the purchase of motor and other ambulances, their maintenance, repair, and operation. It was under this authority that the purchase of motor ambulances already noted was made.

Immediately following the entry of the expeditionary force into Mexico, Congress passed a joint resolution authorizing the filling of existing organizations of the Army to war strength.¹¹¹ This contemplated an increase of approximately 20,000 men. To cover the expenses of the Army incident to this increase a deficiency appropriation act was passed on the last day of March in which was included the sum of \$37,500 under the title, "Medical and Hospital

Department," and applicable to the same purposes as the annual appropriation act for the then current fiscal year.¹¹² This sum was determined upon the needs of 20,000 men for three months at the rate of \$7.50 per man-year.¹¹³

The circumstances which led to the calling of the National Guard into the Federal service in June, under the provisions of the national defense act, made it immediately imperative to incur large obligations for which no funds had been appropriated, specifically for motor ambulances for the proper equipment not only of the mobile troops of the Regular Army but also of the Militia when mustered into the Federal service. Because of the manifest urgency of the need, the Surgeon General on June 22, requested authority to incur a deficiency of \$1,584,000 for medical and hospital supplies to cope with the situation. The number of ambulances estimated as necessary to equip three of the four ambulance companies for each division at the rate of 12 ambulances and 1 repair car per company, less the number of ambulances already purchased, was 792. The estimated cost per ambulance complete was \$2,000. This request was approved by the Secretary of War on June 24 and deficiency estimates in the sum of \$1,584,000 were forwarded the same day. The Surgeon General was informed on July 11 that the funds were available.¹¹⁴

In response to an inquiry of June 15, 1916, from The Adjutant General for the amount of funds which would be needed by the Medical Department immediately upon the outbreak of War for an army of 500,000 men, including the Regular Army and the National Guard, the Surgeon General reported on June 19 that, for the initial equipment of this force, there would be required 207 combat equipments, 150 infirmaries, 103 ambulance companies, 68 field hospitals, 44 divisional medical supply units, 36 evacuation hospitals, 27 base hospitals, 100 general hospitals (on the basis of 10 per cent of the strength of the Army), 2 hospital ships, and 10 hospital trains (equipment only).¹¹⁵ This initial equipment, it was estimated, would cost \$6,535,632.55, without any provision for maintenance. Maintenance for a year would add \$4,000,000 more. The total of these two sums, less \$2,000,000 included in the annual appropriation bill for 1917 for the support of the Army and the \$1,584,000 in the urgent deficiency bill, both of which were then pending, would leave \$6,951,632.55 to be provided. Before the annual appropriation bill was passed the amount allowed the Medical and Hospital Department was increased to \$4,500,000, of which \$500,000 was for hospital construction purposes.¹¹⁶

PORTABLE DENTAL OUTFITS

Following the passage of the act of February 2, 1901, (31 Stats. 752), authorizing the employment of contract dental surgeons, a section of dental supplies and equipment was added to the standard supply table of the Medical Department. Since an insufficient number of such dental surgeons had been authorized to provide one for every one of the established military posts, it became necessary, if the troops everywhere were to receive dental attention, to assign to many of the dental surgeons a number of military stations which they would visit on itinerary, spending so much time at each as the immediate needs of the command indicated. It was also impracticable to provide at all these stations, and particularly those of small size, a dental outfit such as was

used in civil life and authorized for the large stations where the services of a dental surgeon were continuously required. No good reason could be seen why the individual dental surgeon should not have a portable outfit of such character and completeness as would enable him to perform all emergency work, extractions, filling, and the less complicated artificial dentures. Such an outfit was developed and issued under the title, "portable dental outfit."¹¹⁷

This outfit consisted essentially of a foot-power dental engine, capable of being sufficiently dismantled to permit being packed in a small case about the size of and somewhat resembling an ordinary suitcase; a folding dental chair with canvas seat and back, and provided with a suitable adjustable headrest, all packed in a wooden case which became the base of the chair when set up; two fiber covered chests with compartments and trays in which were carried a suitable assortment of tooth extracting forceps, burs, and other dental instruments; and a fiber-covered supply chest of sufficient size and divided into compartments suitable for the apparatus, dressings, and other articles necessary for a fairly complete dental office. The complete list of contents of such outfits may be found under appropriate titles in the Manual for the Medical Department for the years 1911 and 1916. One complete outfit was issued the dental surgeon upon entry into the service and accompanied him upon on his itinerary wherever he went. To insure that the outfit would be available upon arrival at a station on this itinerary it was customarily shipped by express. Because of the character of the chests and the great variety of articles included in the set a considerable time was required in which to purchase the articles and assemble the unit. Consequently the issue of such equipment, unless already assembled when request for it was received, was slow, and unless complete it was of but little value.

WARD UNIT^a

Since the unit system so greatly facilitated communications by telegraph, relative to equipment, the officer in charge of the reserve medical supply depot at Fort Bliss, at the suggestion and with the collaboration of the surgeon of the base hospital at that post, prepared a list of articles commonly used in hospital wards and designated it a ward unit. Copies of this list were filed in the offices of the Surgeon General, the department surgeons, and the purchasing medical supply depots. The list included equipment for a 50-bed ward, or its equivalent in smaller wards.¹¹⁸ This ward unit was freely used in issuing instructions for procurement of supplies and the shipping of equipment to new hospitals during the years 1916-1918, inclusive.¹¹⁹ The contents of this unit follow:

A 50-bed ward unit

Bedsteads, white enamel	50	Bed pans, white enamel	4
Blankets, white	100	Cups, spit, white enamel	10
Chairs:		Cushions, rubber, open center	2
Arm	10	Cuspidors	6
Folding	20	Eye shades:	
Invalid, rolling	2	Single	6
Rocking	6	Double	4
Close stools	4	Gowns, convalescent, summer	50

^aThis ward unit commonly was referred to as the "Wolfe unit" during the World War.—Ed.

Looking glasses	2	Shirts, cotton	50
Mattress covers	76	Sheets, cotton	150
Mattresses, hair	50	Tables, bedside, folding	50
Pajama suits	120	Towels:	
Pillows:		Bath (dozen)	12½
Feather	20	Hand (dozen)	20
Hair	50	Tubs, foot	2
Pillowcases, cotton	200	Urinals, agate ware or white enamel ..	6
Racks for urinals and bedpans	2	Back rests	4
Rubber sheeting (yards)	4	Thermometers, bath	2

PORTABLE DISINFECTING APPARATUS

Disquieting reports of the prevalence of typhus fever in some of the larger cities of Mexico at no great distance from the border had been received from time to time for many months by the United States Public Health Service. Measures had been taken by that service for the inspection at the various ports of entry along the Mexican frontier of all immigrants and refugees coming into the United States from Mexico. These inspections covered railway conveyances as well as the persons and the baggage of such immigrants and refugees. Inspection of freight cars coming into some ports of entry from Mexico showed them to be teeming with bedbugs and pediculi. Reports indicated that freight cars had been commonly used in Mexico in troop movements owing to the destruction of passenger coaches.¹²⁰

To provide against the infestation of our troops in camps along the border, the department surgeon, Southern Department, requested, July 17, that one disinfection apparatus each be sent to Brownsville, Eagle Pass, Laredo, and Fort Bliss, in Texas, and Douglas and Nogales in Arizona.¹²¹ For greater utility it was necessary that this device be readily transportable.

In all probability, too, other infectious diseases common to camp life, particularly those of the respiratory tract, would make their appearance in such prevalence as would require extensive disinfection of bedding and clothing to limit their spread. An autoclave of size sufficiently large to admit mattresses had been devised by the United States Public Health Service and had been in use for a number of years at its various immigration stations. It consisted essentially of a double-walled rectangular or cylindrical steel chamber of large dimensions, capable of using steam under high pressure. It had a swinging door provided with a radial arm type of locking device at one or both ends. This permitted the ready admission and removal of infected material and facilitated operation. It was connected with a high-pressure steam boiler and provided with safety valve, steam, and vacuum gauges. All those in use by the Public Health Service were, from the nature of the service required, of the fixed or stationary type. Some work in developing a portable type of this apparatus had been done by one of the large firms making disinfecting apparatus for hospital use.¹²⁰ Collaborating with the officers at the New York medical supply depot, this firm made a number of improvements and developed an apparatus sufficiently mobile for field use. This apparatus as finally developed was a self-contained unit consisting of a disinfecting chamber and a steam boiler mounted on a steel chassis with ball-bearing wheels and capable of being animal drawn or used as a trailer behind a truck. The disinfecting chamber

was a double-walled shell having inside dimensions 44 inches high, 36 inches wide, and 84 inches long, with a single door at the front end. It was provided with a suitable valve device by which a vacuum of 2 atmospheres could be readily developed. The steam boiler of the submerged head vertical type and suitable size was mounted in rear of and in series with the disinfecting chamber and connected to it with suitable steam pipes. The boiler was designed to burn coal and was capable of generating within 20 minutes sufficient steam to raise the pressure in the disinfecting chamber to 40 pounds. The apparatus was provided with a device whereby formaldehyde could be admitted into the sterilizing chamber when desired and later be neutralized by ammonia. The adequacy of the sterilization effected by this apparatus was carefully checked by suitable bacteriological tests. It was found that subjection of the contents of the sterilizing chamber, even when it was completely filled, for one-half hour to a steam pressure of 15 to 20 pounds was sufficient to kill the most resistant bacteria, their spores, and the ova of vermin, when the infected material was placed in the center of the mass in the chamber.¹²² The performance of this apparatus on the border proved to be wholly satisfactory and led to its purchase during 1917 and 1918 in large numbers for use at the various training camps at home and for use at the hospitals overseas.

MANNER OF PROCURING SUPPLIES

The method of determining the quantities of medical supplies required during this mobilization followed the same general lines as had been utilized during the preceding years. In the Surgeon General's Office, calculations were made for new equipment required by the troops and the amount of equipment for prospective new troops to be called into service. The quantities of the articles on the standard supply table which it would be necessary to purchase at each semiannual procurement were determined in the Surgeon General's Office for each period from estimates submitted by the four medical supply depots in the United States. These estimates, in turn, were based upon previous issues of those items during a six months' period. The quantities on such estimates usually represented one-fourth of the total issues of the particular articles during the two years just preceding the date of the estimate. From the quantities indicated by these figures no deductions were made unless the stock on hand of any item exceeded the average six months' issue of that time, the object being to have a six months' stock in the depot and to be purchasing those required for the second ensuing six months. Issues to other depots in the United States were not considered in making up these estimates, the net issues to troops being desired. Issues to the depots supplying troops in Panama, Hawaii, the Philippine Islands, and China were not included because of the distances of such depots from Washington and delay incident to receiving their estimates. Since most of the issues were post supplies, the principal purchases were for post medical supplies. The purchase of field supplies and equipment was for the most part to enable the assembling of new unit equipment.

Since the total additions to the Regular Army prior to July, 1916, did not exceed materially the 20,000 men needed for the expansion of organizations to their full authorized strength, no special measures were initiated for the pro-

curement of additional supplies other than motor ambulances, X-ray and sterilizing apparatus. With the issuing of the second call of National Guard troops into the Federal service in 1916 procurement activities became greatly augmented. Requisitions from the medical supply depots in the Southern Department for initial stock and replenishment came in with a rush and were referred to the appropriate depots for issue, with authority to purchase in emergency. If the standard articles could not be readily obtained the most suitable substitutes were purchased. The time on circulars inviting proposals was reduced to seven days. Medical supply officers were authorized in making contracts to erase the article requiring approval by the Surgeon General and approve the contracts themselves, "By order of the Surgeon General."¹²³

The medical supply officer at New York was directed, on June 28, to purchase 100 portable dental outfits and send 40 to the medical supply depot at El Paso and another 40 to the depot at San Antonio.¹²⁴ On June 30, instructions were telegraphed to the medical supply officer at New York to accumulate 100 ward units and such other articles not included in the ward unit as would be necessary to provide for 5,000 patients.¹²⁵ The medical supply officer at St. Louis was instructed by telegram on the same date to accumulate 100 ward units and additional supplies for 5,000 patients.¹²⁶ These instructions contemplated advertising by a seven-day circular, incorporating in the contracts provisions for 100 per cent increase and the purchase from satisfactory samples if standard articles were not readily available. By prior instructions of June 24, the New York depot had been directed to purchase 2,000 bedsteads and the same number of mattresses.¹²⁷

As in previous years, difficulties and delays were experienced in placing orders and securing deliveries of articles contracted for. Bedsteads and mattresses were still coming in at the end of October on contracts placed early in July. Nevertheless shipments of the principal items in the ward units were started to the border July 20 from the New York depot and August 1 from the St. Louis depot, and continued in a steady stream as fast as deliveries were made by the contractors until the shipment of 37 units to San Antonio and 38 units to El Paso had been completed by the end of August.¹²⁸

While the experiences in the procurement of supplies for the border mobilization were frequently annoying and far from satisfactory, they proved to be invaluable from a developmental standpoint and as a preparation for the conditions which obtained during the stress of the months of war which followed. The observance of peace-time restrictions had been supplanted, in a measure by independence of action and fertility of expedient so necessary for action under stress of war conditions. New methods of procurement had been tried out and proved successful. Those in charge of the work had come to think in terms of figures that a year previous would have been astounding. The plans for procurement and distribution evolved during this period were broader, more comprehensive and flexible. The contracted horizon of peace-time economy in procurement had broadened perceptibly and rendered the transition into the war period less difficult.

REFERENCES

- (1) American Archives. Compiled by Peter Force, Washington, Clark & Force, 1843-1853. Fourth Series, Vol. III, 1897.
- (2) Journal of the Continental Congress, Library of Congress edition, Vol. XIX, 126, 180, 432; Vol. XX, 721, 734; Vol. XXI, 948-951.
- (3) Public Records of the Colony of Connecticut, from October, 1706, to October, 1716. Compiled by Charles J. Hoadly, LL. D., Hartford, Mass., Case, Lockwood & Brainard, 1870, Vol. XV, 15.
- (4) American Archives. Fourth Series, Vol. IV, 1026.
- (5) *Ibid.* Fourth Series, Vol. IV, 1026; Vol. V, 263; Fifth Series, Vol. I, 282, 314, et seq.
- (6) Public Records of the Colony of Connecticut, from October, 1706, to October, 1716: Vol. XV, 522-523. *Also:* American Archives: Fourth Series, Vol. II, 748, 1355, 1434, 1440; Fifth Series, Vol. III, 455.
- (7) American Archives. Fourth Series, Vol. II, 756.
- (8) *Ibid.* Fifth Series, Vol. I, 282.
- (9) *Ibid.* Fourth Series, Vol. II, 1625.
- (10) *Ibid.* Fourth Series, Vol. II, 1706.
- (11) Journal of the Continental Congress, Library of Congress edition, Vol. II, 209; Vol. IV, 284; Vol. V, 556, 568, 673.
- (12) American Archives. Fifth Series, Vol. I, 108-109.
- (13) *Ibid.* Fourth Series, Vol. II, 1893.
- (14) Journal of the Continental Congress, Library of Congress edition, Vol. II, 211; Vol. III, 261.
- (15) *Ibid.*, Vol. XX, 570.
- (16) *Ibid.*, Vol. III, 261, 344; Vol. IV, 180, 188, 197, 348; Vol. V, 453, 463, 528, 622, 633, 661, 781, 998; Vol. VII, 34, 91.
- (17) American Archives. Fourth Series, Vol. III, 1880.
- (18) Journal of the Continental Congress, Library of Congress edition, Vol. VII, 231-237.
- (19) *Ibid.*, Vol. VII, 197-200; Vol. XVIII, 878-888; Vol. XIX, 103, 118, 292-294, 375; Vol. XXIII, 759.
- (20) *Ibid.*, Vol. XVIII, 878-888.
- (21) Act of March 2, 1798 (1 Stats. 721). *Also:* Act of March 3, 1813 (1 Stats. 819-820).
- (22) Act of May 2, 1802 (2 Stats. 183). *Also:* Subsequent acts making appropriations for Military establishments.
- (23) Act of April 14, 1818 (3 Stats. 426).
- (24) Military Laws, Rules, and Regulations for the Army of the United States, January, 1820, 102.
- (25) *Ibid.*, 105.
- (26) Letters from the Surgeon General to the Secretary of War, November 1, 1818, and May 1, 1819. On file, Record Room, S. G. O., Old Records, Reports Book, 1818-1832, 1-7, 43-50.
- (27) Circular letter from the Surgeon General to all surgeons of the Army, October 14, 1818. Record Room, S. G. O., Old Records, Letters Sent Book, 1818-1822, 15. *Also:* Circular letter from the Surgeon General to all surgeons of the Army, March 22, 1819, transmitting new supply table. Record Room, S. G. O., Old Records, Letters Sent Book, 1818-1820, 48.
- (28) Military Laws, Rules, and Regulations for the Army of the United States, January, 1820, 112-113
- (29) Act of March 3, 1821 (3 Stats. 616).
- (30) Official Army Register, 1898, 228.
- (31) Letter from the Surgeon General to The Adjutant General, May 16, 1898. Subject: Medical Supply Depot, Washington, D. C. On file, Record Room, S. G. O., 38405-A (Old Files). *Also:* Supply Letter No. 4, 1920, S. G. O.
- (32) Annual Report of the Surgeon General, U. S. Army, 1866, 2.
- (33) Annual Report of the Surgeon General, U. S. Army, 1897, 9; 1898, 105-106.

- (34) Act of April 16, 1862 (12 Stats. 378).
- (35) Manual for the Medical Department, U. S. Army, 1896, par. 77; 1898, par. 67.
- (36) Annual Report of the Surgeon General, U. S. Army, 1888-1898, inclusive, Medical and Hospital Supplies.
- (37) *Ibid.*, 1898, 103. *Also*: Commission to Investigate Conduct of War Department in War with Spain. Washington, Government Printing Office, 1900, Vol. I, 172-174.
- (38) Annual Report of the Surgeon General, U. S. Army, 1892, 5-6.
- (39) Manual for the Medical Department, U. S. Army, 1896, par. 271-276, 279.
- (40) Lecture on preparedness of the Medical Department for war. Delivered, October 22, 1914, at the Army War College, by Lieut. Col. Henry C. Fisher, Medical Corps. On file, Finance and Supply Division, S. G. O., 11709-E (Old Files).
- (41) Annual Report of the Surgeon General, U. S. Army, 1898, 103.
- (42) Commission to Investigate Conduct of War Department in War with Spain, Vol. I, 571. *Also*: Lecture on preparedness of the Medical Department for war. Delivered November 16, 1916, at the Army War College, by Lieut. Col. Henry C. Fisher, Medical Corps. On file, Finance and Supply Division, S. G. O., 11709-G (Old Files).
- (43) Manual for the Medical Department, U. S. Army, 1898.
- (44) Letter from the Surgeon General, June 9, 1898, to the honorable the Secretary of War. Subject: Medical and hospital supplies for Volunteers. On file, Record Room, S. G. O., 39964 (Old Files).
- (45) Commission to Investigate Conduct of War Department in War with Spain, Vol. VI, 2797.
- (46) *Ibid.*, Vol. VIII, 27-28.
- (47) *Ibid.*, Vol. VI, 2836.
- (48) *Ibid.*, Vol. V, 1918.
- (49) *Ibid.*, Vol. VI, 2798, 2801.
- (50) *Ibid.*, Vol. V, 1919; Vol. VI, 2803.
- (51) *Ibid.*, Vol. VI, 2828.
- (52) *Ibid.*, Vol. III, 435; Vol. IV, 842; Vol. VI, 2827.
- (53) *Ibid.*, Vol. V, 1,937-1,938.
- (54) *Ibid.*, Vol. V, 1,935.
- (55) *Ibid.*, Vol. I, 172-174, 188.
- (56) *Ibid.*, Vol. I, 189.
- (57) *Ibid.*, Vol. I, 571.
- (58) Correspondence between the Surgeon General, The Adjutant General, and the Quartermaster General, during the years 1903 to 1906, inclusive. Subject: Regimental hospitals. On file, Record Room, S. G. O., 97275-A to J (Old Records).
- (59) Manual for the Medical Department, U. S. Army, 1898, par. 272, 290.
- (60) *Ibid.*, 1902, par. 288, 338.
- (61) *Ibid.*, 1906, par. 553, 582-590.
- (62) *Ibid.*, 1906, par. 559, 582-590.
- (63) *Ibid.*, 1906, par. 562, 582-589, 596.
- (64) *Ibid.*, 1906, par. 505, 592, 593.
- (65) *Ibid.*, 1906, par. 560, 582-589.
- (66) *Ibid.*, 1906, par. 531-532, 597.
- (67) *Ibid.*, 1911, par. 805-809, 836-844, 847-879.
- (68) Observations and experiences of the writer as medical supply officer, 1907-1911, inclusive.
- (69) Manual for the Medical Department, U. S. Army, 1916, par. 864, 907.
- (70) *Ibid.*, 1916, par. 866.
- (71) *Ibid.*, 1916, par. 657-666, 869-871, 886.
- (72) Act of May 11, 1908 (35 Stats. 123).
- (73) Letter from the Surgeon General, January 22, 1903, to the president, Army War College. Subject: Medical Department field equipment for an army of 150,000 to 250,000. On file, Record Room, S. G. O., 93360 (Old Files).

- (74) Telegrams from the Surgeon General, January 24, 1903, to the officers in charge, medical supply depots, New York City, St. Louis, Mo., and San Francisco, Calif. Subject: Report of field supplies in stock. On file, Record Room, S. G. O., 93360A, A-1, A-2 (Old Files).
- (75) Letter from the Surgeon General to the Chief of Staff, February 16, 1906. Subject: Medical field equipment. On file, Record Room, S. G. O., 93360-G, G-1, 2, 3, 4, 5, 6 (Old Files).
- (76) Letter from the Surgeon General to the Chief of Staff, March 13, 1908. Subject: Supplies and equipment of an army of 437,144 combatants. On file, Record Room, S. G. O., 93360-H (Old Files).
- (77) Memorandum from the Surgeon General to the Chief of Staff, October 20, 1913. Subject: Medical equipment for certain divisions. On file, Record Room, S. G. O., 93360-I (Old Files).
- (78) Memoranda from the Surgeon General, for the Chief of Staff, April 11, 1914 and for The Adjutant General, July 21, 1914. Subject: General war plans, Medical Department. On file, Record Room, S. G. O., 93360-I (Old Files).
- (79) Letter from the Surgeon General to The Adjutant General of the Army, June 12, 1915. Subject: Material for equipment of a field force. On file, Record Room, S. G. O., 93360-K (Old Files).
- (80) Memorandum from the Surgeon General to The Adjutant General of the Army, August 20, 1915. Subject: Field supplies necessary to equip one division and one Cavalry division. On file, Record Room, S. G. O., 93360-M (Old Files).
- (81) Correspondence between the Chief of Staff and the Surgeon General, November 9, 1910, to December 23, 1912. Subject: Depots of supplies for mobilization purposes. On file, Record Room (Old Files, 134777-A to J, incl.), S. G. O.
- (82) Indorsement, Depot Quartermaster, Philadelphia, Pa., to The Adjutant General, November 21, 1916. Subject: Transfer of field equipment in Field Supply Depot No. 1. On file, Record Room, S. G. O., 134777-M (Old Files).
- (83) Annual Report of the Surgeon General, U. S. Army, 1916, 20.
- (84) Army List and Directory, January, 1916.
- (85) Correspondence under respective station Nos. 11447, 11562, and 12516. On file, Finance and Supply Division, S. G. O. (Old Files). Also: Letter from the department surgeon, Southern Department, to the Surgeon General, April 10, 1916. On file, Record Room, S. G. O., 156267-D (Old Files).
- (86) Correspondence under appropriate heads. On file, Record Room, S. G. O., 136, 186, 240, and Finance and Supply Division, S. G. O., 12,413 (Old Files).
- (87) S. O. No. 91, W. D., April 18, 1916.
- (88) Letter from Colonel Fisher to Colonel Clayton, April 11, 1916. On file, Finance and Supply Division, S. G. O., 12,998-S. Also: Telegram from the surgeon, Southern Department, to the surgeon, Cantonment Hospital, Columbus, N. Mex., March 18, 1916. On file, Finance and Supply Division, S. G. O., 12,998-N-1 (Old Files).
- (89) Telegram from the medical supply officer, El Paso, Tex., to the Surgeon General, May 17, 1916. On file, Finance and Supply Division, S. G. O., 12,808-K-1.
- (90) References to action taken on these requisitions. On file, Finance and Supply Division, S. G. O., 12,808-J, -P, -V, -W (Old Files).
- (91) Correspondence between the Surgeon General and the department surgeon, Southern Department, various dates. On file, Finance and Supply Division, S. G. O., 13,256-179 and 211, 13,707.
- (92) Correspondence between the Surgeon General and the department surgeon, Southern Department, on ward units and motor ambulances. On file, Finance and Supply Division, S. G. O., 11,220 and 12,805.
- (93) Correspondence between the Surgeon General and the department surgeon, Southern Department, in May, 1916, relative to the need of an additional depot in the Southern Department. On file, Finance and Supply Division, S. G. O., 13,451.

- (94) Correspondence of various dates between the Surgeon General, The Adjutant General, and the headquarters, Southern Department, in 1916. On file, Record Room, S. G. O., 157,818, A, B, C, E, H, and I.
- (95) Telegram to the Surgeon General, July 16, 1916, for additional supplies, and the action of the Surgeon General thereon. On file, Finance and Supply Division, S. G. O., 13,431-J.
- (96) Report on Mobilization of the Organized Militia and the National Guard of the United States, 1916, 10. Government Printing Office, 1916.
- (97) Correspondence under title of the several States. On file, Finance and Supply Division, S. G. O., 13,530.
- (98) Correspondence between the Surgeon General and Base Hospital, Fort Sam Houston, 1916. On file, Finance and Supply Division, S. G. O., 13,242, parts 1-4, inclusive.
- (99) Telegram from the Surgeon General to the department surgeon, Southern Department, March 11, 1916, and reply thereto. On file, Finance and Supply Division, S. G. O., 13,256-42.
- (100) Letter from the Surgeon General to The Adjutant General, July 10, 1915, requesting the appointment of the board. On file, Record Room, S. G. O., 153,155.
- (101) Correspondence of March 11 and April 7 between the Surgeon General and Maj. Kent Nelson, M. C., relative to this transaction. On file, Finance and Supply Division, S. G. O., 13,256-42-2.
- (102) Correspondence between the Surgeon General and the officer in charge of Medical Supply Depot, Washington, D. C., on the dates given. On file, Finance and Supply Division, S. G. O., 13,256-42-3 and 5-2-3.
- (103) Telegram from Col. Frick at Columbus, N. Mex., to the Surgeon General, April 20, 1916. On file, Finance and Supply Division, S. G. O., 13,256-42-13.
- (104) Telegram from the Surgeon General to the department surgeon, Southern Department, April 22, 1916. On file, Finance and Supply Division, S. G. O., 13,256-42-15.
- (105) Letter from the department surgeon, Southern Department, to the Surgeon General, April 5, 1916. On file, Finance and Supply Division, S. G. O. 13,256-72.
- (106) Letter from the Surgeon General to the department surgeon, Southern Department, August 10, 1916, relative to equipping other ambulance companies with motor ambulances. On file, Finance and Supply Division, S. G. O., 11,220-6-71.
- (107) Correspondence between the commanding general, Southern Department, The Adjutant General, the Quartermaster General, and the Surgeon General, on providing motor trucks and touring cars for motorized ambulance companies, April and May, 1916. On file, Record room, S. G. O., 148,945-P (Old Files).
- (108) Correspondence between the Surgeon General, the Medical Supply Officer, Washington, and the surgeon, Southern Department, from July to December, 1916. On file, Finance and Supply Division, S. G. O., 11, 220-52-54-59-60-78.
- (109) Telegram from The Adjutant General to the commanding general, Southern Department, September 22, 1916. On file, Finance and Supply Division, S. G. O., 11, 220-80-1.
- (110) Act of March 4, 1915, chapter 143 (39 Stats. 1079-1080).
- (111) Joint resolution of Congress, of March 17, 1916, chapter 46 (39 Stats. 36).
- (112) Act of March 31, 1916, chapter 56 (39 Stats. 46).
- (113) Letter from the Surgeon General to The Adjutant General, on the needs of the Medical Department for 20,000 additional men. On file, Record Room, S. G. O., 155,943.
- (114) Letter from the Surgeon General to The Adjutant General, June 22, 1916, and subsequent action thereon. On file, Record Room, S. G. O., Old Files, 157,549-X. *Also:* Act of July 1, 1916, chapter 210 (39 Stats. 338).
- (115) Letter from The Adjutant General to the Surgeon General, June 15, 1916, and the latter's reply thereto. On file, Record Room, S. G. O., Old Files, 157,549.
- (116) Act of August 26, 1916, chapter 418 (39 Stats. 640).
- (117) Manual for the Medical Department, U. S. Army, 1916, par. 854.

- (118) Letter from the medical supply officer, El Paso, Tex., to the Surgeon General, May 8, 1916, and the various indorsements thereon. On file, Finance and Supply Division, S. G. O., 13,707.
- (119) Correspondence between the Surgeon General, the medical supply officers at New York and St. Louis, and the surgeon, Southern Department, at various dates. On file, Finance and Supply Division, S. G. O., 13,707.
- (120) Letters from the Surgeon General, U. S. Public Health Service, to the Surgeon General of the Army, June 6 and 11, 1915, and the district surgeon, El Paso, Tex., September 9, 1916, to the Surgeon General on this subject. On file, Record Room, S. G. O., Old Files, 152, 859-A-C.
- (121) Letter from the department surgeon, Southern Department, to the Surgeon General, July 17, 1916, requesting disinfection apparatus. On file, Finance and Supply Division, S. G. O., 13,256,219-1-3.
- (122) Letter from Col. F. M. Hartsock, M. C., New York, to Col. Edwin P. Wolfe, M. C., September 7, 1920, on the history of sterilizers and disinfectors. On file, Finance and Supply Division, S. G. O. 414-4-6.
- (123) Correspondence between the Surgeon General, the department surgeon, Southern Department, and the medical supply officers, New York, St. Louis, and Washington. On file, Finance and Supply Division, S. G. O., files 13,217, 13,256, 13,241, at various dates between June 15, 1916, and December 31, 1916, relative to issues.
- (124) Telegram from the Surgeon General to the medical supply officer, New York, June 28, 1916. On file, Finance and supply Division, S. G. O., 13,217-49.
- (125) Telegrams of June 30, 1916, and subsequent instructions relative thereto, from the Surgeon General to the medical supply officer, New York, directing purchases. On file, Finance and Supply Department, S. G. O., 13, 217-52.
- (126) Telegram of June 30, 1916, and subsequent instructions relative thereto, from the Surgeon General to the medical supply officer, St. Louis, directing purchases. On file, Finance and Supply Division, S. G. O., 13, 241-31-1.
- (127) First indorsment of the Surgeon General's Office upon recommendations of medical supply officer, New York, of June 22, 1916, for the purchase of these articles. On file, Finance and Supply Division, S. G. O., 13, 217-42.
- (128) Reports to the Surgeon General of shipments made from New York and St. Louis depots to depots in the Southern Department. On file, Finance and Supply Division, S. G. O., 13, 256-185-2, and 13, 247-28-2.

SECTION I
ORGANIZATION FOR ADMINISTERING SUPPLY MATTERS
CHAPTER I
IN THE SURGEON GENERAL'S OFFICE

When we entered the World War, and for a number of years prior to that time, matters relating to supplies were administered in the Surgeon General's Office by two divisions, whose functions are briefly stated below.

RECORD, CORRESPONDENCE AND EXAMINING DIVISION

In theory this division was administered directly by the Surgeon General through the chief clerk; in practice some of the accounting work was done under instructions obtained from the officer in charge of the supply division. It comprised the chief clerk's own branch, dealing with civilian personnel, office and field, correspondence and general matters, the stock room (office supplies), and the record room; also, three activities now allocated, so far as they still operate, to the finance and supply division, viz, The *construction* branch (preliminary plans for hospitals and stewards' quarters; advisory management of estimates and appropriations therefor), the *journal* branch (charged with the receipt and distribution to the Medical Department of periodicals purchased on subscription), and the *examining* branch (charged with the preparation of estimates of appropriations under the Surgeon General, with keeping the ledger accounts thereof, with procuring the issue of funds to disbursing officers, with making the administrative audit of their accounts, with the prepayment audit of claims arising against all appropriations except artificial limbs, appliances, and trusses, and with the receipt and settlement of returns of medical property).

SUPPLY DIVISION

This division was administered by a commissioned assistant to the Surgeon General, who was also the disbursing officer of the Medical Department in Washington.¹ It comprised two branches—the supply branch (charged with supervision of the procurement and issue of medical supplies, including the operation of medical supply depots, the preparation and approval of contracts, and and action on requisitions), and the disbursing branch (charged with the disbursing functions of the officer in charge, and the adjudication of claims under the appropriations for artificial limbs, appliances, and trusses).

Another officer was added to the force April 28, 1917,² who became disbursing officer, assisting generally in the duties of the office, and later took charge of the distribution of supplies. Another assistant, an officer of the Medical Reserve Corps, reported for duty May 18, 1917.³ This officer in turn became

disbursing officer. He had charge of the procurement and distribution of X-ray equipment, apparatus and supplies, and the selection and training of medical officers as X-ray specialists and of enlisted men of the Medical Department and Sanitary Corps as X-ray technicians. He also acted for the finance and supply division upon requisitions for supplies which required administrative action. Other assistants reported for duty from time to time as the needs of the expanding organization required. Technical assistants, dental, veterinary, and X ray, were called in as needed. Nor were the other professions altogether overlooked; certified public accountants and traffic or transportation experts added their knowledge and skill to increase the efficiency of the operation of the machine.

FINANCE AND SUPPLY DIVISION, SEPTEMBER, 1917

In September, 1917, all activities relating to the purchase, distribution, and accounting for medical and hospital department property, and those pertaining to money accounts of the Medical Department (excepting the hospital fund) were consolidated into one division, known as the finance and supply division.⁴

At this time the finance and supply division consisted of four sections: Finance, property returns, supply, and records. Some of these were subdivided later into two or more subsections, and other sections were added.

FINANCE SECTION

The finance section was charged with providing disbursing officers with funds, the administrative examination of disbursing officers' accounts, and of the vouchers and checks of the disbursing officer in the division. This section later became two distinct sections, the finance section and the disbursing section, with a commissioned officer in charge of each.

Whenever a disbursing officer required additional funds to meet expected payments he wrote a letter to the Surgeon General stating the amount required and requesting that it be placed to his official credit. Upon the receipt of this request in the Surgeon General's Office, it was routed to the principal clerk in the finance section, who prepared the necessary request to the Secretary of War through the assistant and chief clerk, War Department, to have the specified sum placed to the credit of the designated disbursing officer. This the Treasury Department did by warrant, notifying the officer on whom the money had been requested that it had been placed to his official credit. Every disbursing officer was assigned a number, commonly referred to as a "symbol," which had to appear on all his checks. It was printed on all official blank checks furnished him by the Treasury Department. When all the checks had been used the disbursing officer applied to the Treasury Department for an additional lot of check books, for which he gave a receipt. He turned in all unused checks when he ceased to be a disbursing officer.

At the end of each month the disbursing officers prepared an abstract or schedule of disbursements arranged in chronological order, showing the number of the voucher, the name and address of the payee, the purpose of the payment, and the amount paid. The several sheets were footed and carried forward. The aggregate amount was entered on the last sheet. This abstract or schedule was forwarded to the Surgeon General, accompanied by the originals of the

vouchers enumerated therein, and an account current. Each voucher in payment for supplies purchased was accompanied by an invoice of the property purchased which served to charge the purchasing officer with accountability for the property so purchased. After serving its purpose as a check on the purchases, this invoice was turned over to the returns or property audits section to be used in the settlement of the property accounts of the purchasing officer. The account current corresponded to the balance sheet of commercial organizations and showed for each appropriation the accounts remaining from the preceding month, the sums received during the month, the gross amounts disbursed during the month, and the balance remaining at the end of the month. Only one account current was rendered each month, but it covered all appropriation titles under which disbursements were made and was supported by as many abstracts of disbursements as there were appropriation titles reported during the month.

When these accounts current and supporting papers were received by the finance section they were subjected to a critical examination for errors in amounts, appropriation title, authority for the expenditure, mode of purchase, and justification for the expenditure. Errors requiring changes in the voucher, schedule, or account current were returned to the disbursing officer for correction. Other measures were applied where necessary to correct improper disbursements. When all the papers in the month's account had been corrected and recorded they were transmitted to the Treasury Department for the action of the Auditor for the War Department. If no exceptions were taken by the accounting officers of the Treasury to any of the disbursements, the disbursing officer was notified of the settlement of the account. Accounts were settled quarterly at the end of March, June, September, and December. If exceptions were taken by the Treasury officials to any of the accounts during the quarter, the disbursing officer was furnished a statement of differences. This statement, besides listing the checks paid, specified the accounts suspended and the reasons therefor. The disbursing officer, as soon as practicable, furnished the information required concerning the suspended amounts. If this information proved satisfactory, as it did in most instances, the suspensions were removed by the Treasury Department, the account was allowed, and the disbursing officer was so notified. In occasional instances the account would be disallowed in whole or in part and the disbursing officer required to deposit to the credit of the Treasurer of the United States the sum in question. The finance section of the finance and supply division of the Surgeon General's Office, if satisfied of the justification for the expenditure, rendered material assistance to the disbursing officer in securing the final settlement of the suspended or disallowed account.

The finance section maintained a record of disbursements and of available or unallotted balances. From the nature of the services the Medical Department was required to render, it was necessary that a reserve of funds be held to meet any emergency which might occur near the end of the year and to meet unpaid bills which found their way into the Surgeon General's Office after the year had closed. It was very necessary, therefore, that an accurate record of available and unobligated funds be maintained in the central office.

The primary and principal book of money accounts kept in the Surgeon General's Office up to April, 1917, was known as the appropriation ledger. Following the granting of appropriations to be handled by the War Department, the Secretary of the Treasury advised the Secretary of War thereof, noting in his advice the number of the appropriation warrant by which the moneys were withdrawn from the general funds of the Treasury. The Secretary of War in turn advised his bureau chiefs of the appropriations assigned to them, respectively, to manage. The Surgeon General, upon receipt of such advices, opened in the appropriation ledger an account for each appropriation, under its title, so intrusted to him, debiting the same in the amount appropriated by date of appropriation act and number of appropriation warrant. From time to time thereafter the Surgeon General prepared requisitions for the advance of funds under such appropriation to a disbursing officer of the Medical Department, which, if approved by the Secretary of War, then went to the Secretary of the Treasury, who, in the absence of reasons to the contrary, allowed the requisition and by accountable warrant placed the funds with the Treasurer of the United States to the credit of the officer, whereupon the funds became available for the payment of his checks. As these requisitions were prepared in the Surgeon General's Office their amounts were credited under the proper head or heads in the appropriation ledger, according to the dates they were forwarded; but such credits were considered contingent only until completed by notation by number and date of the accountable warrants issued by the Treasury Department, of which advice duly was communicated to the War Department and the Surgeon General.

These debits and credits cover what may be termed only the initial entries under each appropriation to get its use and application in motion. In the course of its life, supplemental debits would arise, by way of deficiency appropriations, deposits by disbursing officers of unexpended funds, deposits by disbursing officers and others to correct disbursing errors, transfers by Treasury settlements to adjust appropriations, etc. In like manner, supplemental credits would arise, chiefly by Treasury settlements direct with claimants or for adjustment of appropriations.

Eventually, at the end of its statutory period, all disbursing balances having meanwhile been deposited, the residuary balance was turned back into the general fund of the Treasury by surplus fund warrant issued by the Secretary of the Treasury upon his own motion from information shown by his own books, advice of the issue of such warrant being given to the Secretary of War and by the latter to the Surgeon General, thus closing the account.

Besides the accounts covering the funds expressly so appropriated by titles in the annual appropriation bills, a similar debit and credit account was kept in this ledger (after 1906) of the funds "replacing medical supplies" derived from sales of serviceable medical and hospital supplies, as authorized by the act approved June 12, 1906.

To promote the accuracy of these accounts the War Department, through the division of requisitions and accounts, kept in constant touch with the division of bookkeeping and warrants in the Treasury Department respecting current

balances of appropriations; and communicated to the Surgeon General transcripts of such balances as the same changed, to enable him to check his own records and reconcile discrepancies, should any be disclosed.

Appropriation ledgers representing the foregoing, or a substantially similar procedure, are on file in the finance and supply division from an early date until 1915. In the fall of 1918 the records pertaining to the appropriations then current, including "Medical and Hospital Department, 1916," but not the records of the other 1916 appropriations, were taken over by the newly instituted service of the Director of Finance. Such appropriation ledgers were not thereafter maintained in the Office of the Surgeon General.

It was not the practice to maintain a formal ledger by debit and credit for the individual accounts of Medical Department disbursing officers, presumably because of the small number of them, and the resulting ease of the "follow up" to see that they actually accounted for the funds advanced; but the practice prevailed for many years of entering a résumé of each monthly account current, when received, in the purveyors' abstracts below described, followed by a detailed record of the vouchers paid. About 1906 it had proved convenient to open a record of the accounts current in a separate book, continuing the purveyors' abstracts as a record of vouchers paid. The entries in the register of accounts current were made from the accounts current themselves when received, comprising all debits and credits by appropriation heads, indicating by notation the date of their receipt, the date of their transmittal to the auditor, and the latter's settlements thereof (usually by quarters) by settlement certificate numbers, dates, and amounts found due the United States. The register was continued until the Director of Finance took over the fiscal business of this office in 1918.

The purveyors' abstracts exhibited a record of all payments made by medical disbursing officers, in more or less detail, varying from time to time. They were kept for many years in numbered bound books, by names of disbursing officers and appropriations disbursed. About 1906 a loose-leaf system was substituted (in connection with the register of accounts current), which made it possible to assemble all payments under any one appropriation on consecutive sheets, by names of disbursing officers. For some years prior to 1917 the abstract or record of vouchers paid was fully itemized, and in connection with the register of accounts current showed what each disbursing officer did with the money advanced to him. The record ends about 1918, when the Director of Finance took over all disbursements.

The three foregoing records were all primary—that is, made up from original papers—and noted the fundamental data from which a complete picture of the fiscal operations of the Medical Department could be drawn. But, as will be perceived, these data were scattered, and to get the complete picture some process of assembling and digesting them was desirable. No assembled record was kept from which the complete picture could be seen. An assembled record was begun in 1899, taking up all balances on hand in the Treasury and in the hands of disbursing officers on July 1, 1898, adding thereto the appropriations and other debits during 1899, and following the sums to their status

June 30, 1899. The same procedure was followed at the close of each fiscal year until all disbursements were taken over by the Director of Finance. The resulting compilation was called, for want of a better term, the control ledger, of which two large volumes were accumulated. This, of course, was a secondary record, data being posted thereto from (a) the appropriation ledgers, (b) the register of accounts current, and (c) the purveyors' abstracts. It gave a compact and convenient summary by years, appropriations, officers, and objects of expenditure for the period covered, of all the fiscal operations of the Medical Department, and by its checks and counterchecks made sure at the wind-up of each fiscal year that every dollar of appropriated money had been accounted for.

The disbursing section prepared occasional vouchers and wrote all the checks for the local medical disbursing officer. It may be stated in passing that property accounts at the various medical supply depots were paid by a disbursing officer thereat, usually the officer in charge, except the depot at Washington, D. C. It was not the policy of the Surgeon General to have more than one medical disbursing officer in the same locality. Consequently, payments for the supplies purchased at the field medical supply depot, Washington, were made by the medical disbursing officer in the Surgeon General's Office. Payments for services, both personal and nonpersonal, and for purchases of supplies at places other than regularly established depots were made for the most part by the disbursing officer in the Surgeon General's Office, although some of those accounts were sent for payment to the depot disbursing officer nearest the claimant. Vouchers for such supplies and services were generally prepared by the officer procuring them, and were transmitted to the Surgeon General's Office for examination prior to payment. Such vouchers were scrutinized in the disbursing section and returned for correction when necessary. When the vouchers were finally completed the checks were written and presented to the disbursing officer for signature. After receiving his signature they were mailed to the payee. This section kept its own records of funds received and disbursed and prepared the abstracts of disbursements and the accounts current of the disbursing officer whose accounts it handled.

PROPERTY RETURNS SECTION

The property returns section audited and settled the property accounts of every officer of the Medical Department who was accountable for medical and hospital property. This section handled invoices, receipts, and returns of Medical Department property. With the requisitions it was not directly concerned.

While the manner of requisitioning medical and hospital supplies and the channels through which the requisitions passed remained the same as they had been for many years, the form of return of medical property and the periods at which it was required to be rendered had materially changed. The annual return had been discontinued and a return was required only where accountability for the property changed. This materially reduced the number of returns handled. The old cumbersome printed form with its numerous abstracts of purchases and issues gave place to a small-sized loose-leaf return, with a separate sheet for each item or article on the return. The sheets for this return

were so ruled that there were separate columns for the date and voucher number, receipts, and issues, with space at the bottom in which the name of the article could be typed or written.

The vouchers, whether issues or receipts, were all carried in a single numerical series. The debit and credit columns were totaled at the foot of the sheet and the balance noted in the appropriate space. If one sheet were insufficient, as many more could be used and placed in sequence as the number of entries required. The return was always prepared in duplicate. Two colors of paper were used so that no mistake could be made in the final assembly, a white sheet for the original and a blue sheet for the duplicate. Entries were made as the invoices came in. The entries on the original sheet were made with an indelible pencil and those on the duplicate sheet by interposing a sheet of carbon paper between. The sheets were kept on Shannon files until the last entry for the quarter had been made, when they were separated and bound into two sets, the white and the blue. The white set was forwarded and the blue retained. The sheets were arranged in the order in which the items appeared on the standard supply table. The accountable officer certified, on the outside sheet at the back, to the correctness of the return and the period which it covered. If the work had been kept up to date it was possible to forward the return within 15 days after the end of the quarter. The intervening period was used for a recheck of the entries on the return against the vouchers, to insure their accuracy. If the accountable officers at the depot changed during the quarter, the return was closed at the date of transfer of accountability and the certificate at the end of each part of the return signed by both officers. An effort was made, however, to have the transfer effected at the end of the quarter. Returns from post and general hospitals and other Medical Department units were required only when accountability changed by the transfer of the accountable officer to another station. Entries followed one another in numerical and chronological sequence throughout this period.

When the invoices were received in the Surgeon General's Office they were arranged temporarily by the name of the issuing officer, and also by voucher number, if from a depot. All receipts also were arranged by name of the issuing officer, and by voucher number if from a depot. Thus both invoices and receipts were arranged in the same order. At stated intervals all corresponding invoices and receipts were withdrawn, and casual comparison of the two made to see that they pertained to the same issue and had no serious discrepancies. The voucher number of the receiving officer was placed on the brief of the invoice, together with his name and station. A distinctive check mark was made on the brief fold of each to indicate that the corresponding voucher had been received and filed. The invoice was then filed as a charge against the receiving officer, while the receipt was filed under the proper number as a credit to the issuing officer.

Search was then made in the files for vouchers corresponding to those not already paired as indicated above, and, if found, both invoice and receipt were checked and filed as previously indicated.

The remaining vouchers (those in each incoming mail whose corresponding voucher was found not to be in the office) either were held temporarily on the

file clerk's desk for rehandling with the next incoming mail, or temporary pencil memorandum was made showing that the voucher had been filed but that the corresponding voucher had not been received, the memorandum being filed in lieu of the missing invoice or receipt, the voucher itself being filed, if a receipt as a credit to the issuing officer and if an invoice as a tentative charge against the officer to whom the issue was made. When the corresponding voucher was later received, both the invoice and receipt were checked to show that the corresponding voucher had been received and the voucher last received was filed and the memorandum slip previously mentioned withdrawn.

Reports of survey, inventory and inspection reports, accounts of sales of condemned medical property, etc., when received in the office were inspected for irregularities, returned for correction, if necessary, and when found in proper order were filed as credits to the accountable officer.

The voucher file was kept alphabetically by name of the accountable officer, except for medical supply depots, and, in the case of medical supply depots, first by the name of the depot, second by the quarter to which the voucher pertained, and third by the voucher number.

The returns when received were immediately recorded in books ruled for the purpose under the name of the accountable officer, giving the station from which the return was made and the period which it covered.

The vouchers filed against the officer whose return was being examined were then gone over and those pertaining to the return in question were withdrawn for comparison with the return; those of a later period were returned to file, while those of an earlier period or of a similar period at another place, if found were made the subject of special investigation and returns were called for if necessary.

The vouchers pertaining to the return undergoing examination were first assorted into debit and credit vouchers and then arranged by numbers, if this had not already been done, and each item on the return was checked with the corresponding item on the vouchers. Totals on the return were also verified, and note made of any items improperly dropped as expended.

Slight discrepancies as to expendable articles between the return and vouchers were usually adjusted in the central office, but all serious errors were noted and embodied in a discrepancy letter. This letter was sometimes addressed directly to the office making the return, but more often to the surgeon at the post or to the officer in charge of the medical supply depot where the records were presumably filed. Copy of the letter was filed with the return itself. An additional reason for addressing the surgeon at the post or depot was that the correction of discrepancies would be likely to affect his own accountability.

The vouchers were then arranged by number, both debit and credit vouchers in one series, entry in the record book was made to show the date the return was suspended, and the return, together with the vouchers, was placed in the suspended file awaiting reply to the discrepancy letter. When the reply was received, the corrections authorized were made in the return in red ink, brought forward to date, and the reply was filed with the return as authority for the changes.

The return was then marked "settled" (finally settled if no further accountability remained therefor to the officer making the return), and entry to that effect was made in the record book with the name of the examiner and date of settlement. A notice of settlement was sent to the address of the accountable officer and a copy of the letter filed with the return. The return was then placed in the permanent alphabetical file of settled returns, a separate file of such post returns being kept for those ending in each calendar year, depot returns being filed consecutively by name of the depot.

When certificates or other similar papers were received as vouchers to account for articles lost or destroyed, unless the property was of trifling value, they were submitted customarily with a brief memorandum to the officer in charge of the supply division. The officer marked the memorandum for acceptance or for such further action as he desired, initialed it, and returned it to the clerk in charge of the property section. The certificate with the memorandum was then filed with the return or with the accountable officer's vouchers as authority for the action indicated.

SUPPLY SECTION

The supply section was charged with all matters relative to the procurement and distribution of medical and hospital supplies. In this section originated all estimates of quantities of supplies to be purchased during the fiscal year. Here questions of articles to be added to the standard supply table were decided, and all orders and instructions concerning purchases were prepared. The development of new equipment, reserve supplies, specifications of articles purchased, price index contracts, etc., were all handled by this section. The finance and property returns sections both handled affairs already accomplished. The supply section directed and initiated those affairs and constituted the operating end of the organization. In performing its mission the supply section called upon the other sections for assistance when necessary and for special information not otherwise available.

RECORDS SECTION

The old supply division had maintained its own files of correspondence, requisitions, contracts, etc. Matters of general import were filed in the main record room of the Surgeon General's Office where they were readily accessible to all divisions of that office. This separate file, being immediately accessible and limited to the particular activities of the division, was convenient, economical, and efficient. It was absorbed by the new finance and supply division upon its organization and continued to function until the transfer of the division to the office of the Director of Purchase and Storage, War Department, in November, 1918. A separate file for this division was necessary because during a part of its war existence the division was located in a building separate and at a considerable distance from the remainder of the Surgeon General's Office.

To permit of more rapid filing and ready location of correspondence, a new vertical filing system was adopted in August, 1917, known as the library bureau system. Briefly, it was a system of numbering correspondence which

did not require an index of subjects. The method of numbering consisted essentially of a numerator and a denominator in which the numbers in the numerator indicated the subject and the location of the organization, while the denominator represented the serial number of the particular piece of correspondence with the organization. Thus, $\frac{713}{113} \cdot 539$ indicates that the particular letter was number 1137 in the series of communications on supply matters with the Medical Supply Depot, 713, at New York City, 539. In the general key to the use of this system, which was very short and simple, certain figures and groups of two figures represent certain letters of the alphabet, 71 representing "su" for supply, and 3 representing the letters D-E when in combination with a previous group; 713 therefore represents "supply depot," 53 represents the group of letters NI and NE, and stands for new. In this arrangement 9 stands for Y in York. Wherever in the documentation the number 713 occurs it represents medical supply depot; 539 in combination signifies New York, 570 signifies Philadelphia, 30 Atlanta, 644 San Francisco, etc. The system is so arranged that anyone tolerably familiar with it is enabled to locate any correspondence if given the name and address of the writer and the subject matter, or any two of them. No index is required but to have some record in the event that the correspondence should be lost, a card index was kept under each file number with the date and subject matter of the correspondence entered thereon. A limited cross-reference index also was kept. As with all filing systems it was found necessary at a very early date in its use to make a number of interpretations of the key and method of use as applied to the particular kind of correspondence for which it was used. The method of numbering was rather cumbersome when used in referring to a previous correspondence, otherwise the system worked satisfactorily. It was able to carry the load of the great volume of correspondence received during the last six months of its use; that is, prior to November 24, 1918. Less difficulty was experienced with it than would have been the case with inexperienced personnel with the War Department system in the main record room of the Surgeon General's Office.

MODIFICATION OF ORGANIZATION IN 1918

With the passing of time and the mounting multitude of details which required the attention of the central office, details were centralized under selected personnel organized into groups or sections, to handle particular duties. These new sections were formed as the need arose. Practically all of them had come into being by the end of March, 1918. The duties of the finance and supply division on April 1, 1918, were distributed essentially as given below, although there was no formal organization to that effect. Each section operated more or less as an independent unit. The grouping as given below is an arrangement largely by function rather than a definite organization prescribed in orders from the Surgeon General or the division chief.

1. Administrative subdivision.

- (a) Personnel section.
- (b) Records.

2. Procurement subdivision.
 - (a) Requirements section.
 - (b) Contracts and authorization section.
 - (c) Statistical section.
 - (d) Finance section.
 - (e) Trouble section.
 - (f) Board of contract review.
3. Storage and issue subdivision.
 - (a) Issue section.
 - (b) Tabulation section.
 - (c) Transportation section.
 - (d) Property accounts section.
 - (e) Overseas requirements section.
 - (f) Equipment section.
 - (g) Biological section.
4. Ambulance subdivision.^a
 - (a) Production and inspection section.
 - (b) Experimental section.
 - (c) Drafting section.

In general the administrative and procurements subdivisions were under the supervision and direction of the chief of the division, while the storage and issue and the ambulance subdivisions reported to the assistant chief of the division. The functions and duties of the various subdivisions and sections were so interrelated that instruction to all of them at times emanated from the assistant chief of the division as well as from the chief. The correlation of the work of different sections was so intimate that many of the questions constantly arising were settled by conferences between the section chiefs.

ADMINISTRATIVE SUBDIVISION

PERSONNEL SECTION

To meet the need of personnel trained in supply, a section for that purpose was established early in the finance and supply division. It kept in close contact with the supply depots in the camps, advised in the selection of the enlisted personnel for that service, directed the courses of instruction to be given, followed the progress of individuals up through various grades of noncommissioned officers, selected, upon the recommendation of the various camp medical supply officers, noncommissioned officers to be sent to selected schools for training them for higher duties in the supply service, and out of those so trained selected the most suitable men for commissions for duty as camp and divisional supply officers. This section arranged for the selection of limited service men for duties in the home land in matters of supply, and as clerks and stenographers.

RECORDS SECTION

The records section has been described above and it need here only be stated that the growth of the volume of correspondence handled resulted in a distinct division of duties, an information desk, a files section, an index section, and a requisitions section.

^aThis subdivision is not treated in this chapter; it is given full consideration in Chap. XX.—*Ed.*

PROCUREMENT SUBDIVISION

The procurement subdivision handled all matters pertaining to purchases in bulk or for stock.

The issue section of the storage and issue subdivision gave instructions for the purchase of nonstandard articles on approved requisitions. Here estimates of quantities of supplies to be procured were prepared and their prospective costs estimated. Estimates for funds were also compiled here and prepared for presentation to Congress. Contracts were scrutinized and approved if found correct and reasonable, or returned for such modifications as might be indicated. Statistics covering purchases and issues were tabulated and kept in such form as to be readily available to furnish any information relative to the state of supplies which might be called for. Vouchers were prepared and payments made. Administrative examination was given the disbursing officers accounts. Progress reports were checked; and if production did not keep pace with the contract, investigations of the causes of delay were initiated and assistance rendered the manufacturer in matters of fuel, raw material, labor, transportation service and priorities.

CONTRACT AND AUTHORIZATION SECTION

Under existing regulations no purchase of medical and hospital supplies could be made except under authority from the Surgeon General's Office. Sometimes this authority was general in character but always limited to the fiscal year in which given. It expired on June 30 and was to be renewed if the need therefor continued. These authorizations generally were given in the form of a permission to expend a definite sum, either monthly, quarterly, or annually, for prescribed purposes. They were limited to purpose but not in detail. For example, authority was granted to the commanding officers of all camps to expend \$100 per month for the purchase of medical and hospital supplies. If it became necessary to exceed this allotment in any month to save life or to prevent suffering, a report of the fact to the Surgeon General's Office was required. All medical officers were authorized under provisions in the Manual for the Medical Department at all times to make purchases of medical supplies for military personnel in emergency to prevent loss of life or to prevent suffering. In such cases a full report of the circumstances and conditions which made the purchase necessary was forwarded by the medical officer who authorized or made the purchase, with the vouchers in payment of the purchase. If the reasons given in this report were satisfactory to the central office the vouchers were paid; if not, the vouchers were returned to the medical officer authorizing or making the purchase, to be paid out of private funds.

Authorities for the purchase of supplies for stock were always for a specified quantity, and purchases were expected to be initiated within a reasonable time thereafter. Information of the quantities actually purchased was obtained from copies of the contracts on file in the central office, reports of open-market purchases furnished at stated periods by the purchasing depots, and from the quarterly returns of property rendered by those depots. Every contract bore, in the prescribed place, the authority or approval of the Surgeon General and

was cited on all vouchers covering payment for the supplies authorized by the contract. Every purchase order, and voucher for the articles delivered thereon, bore a notation of the authority from the Surgeon General's Office for the purchase so made. This notation gave the date and file number of the authority.

A record of quantities purchased, by item, was kept in the statistical section, showing the name of the vendor and the price paid. This record was kept current in order that the office might have a record at all times of the latest prices paid. It disclosed the rise and fall in prices and the variation in price paid the different vendors for the same article purchased at the same date or closely approximated dates. It enabled the finance and supply division to detect abnormal prices and to initiate investigations of excessive prices, or to call for the reasons for making purchases at the higher prices. It served as an efficient check upon purchasing officers, and permitted comparisons of prices paid in different parts of the country.

Army Regulations, based upon the requirements of law and the regulations of the accounting officers of the Treasury Department, prescribed the manner in which supplies should be purchased and contracts prepared and executed. In order to insure prompt settlement of disbursing officers' accounts these requirements had to be observed. The contracts and purchase orders were examined to assure their conformity with these regulations.

No small difficulty arose from the failure of officers in writing contracts and purchase orders to follow the nomenclature prescribed in the standard supply tables of the Medical Department. Not infrequently the article described by the name in the supply tables had other names in the trade. These trade names were used in common parlance in the the depots and, unless care was exercised, they would creep into contracts, purchase orders, vouchers, and property papers, making difficult an effectual check of the property return. The effort of the finance and supply division was continuously required to overcome this tendency and to assure correctness in nomenclature.

STATISTICAL SECTION

The duties of this section were substantially as follows: (1) To maintain a record of purchases by article, showing contract or order number, date, contractor, quantity, unit price, total obligated, f. o. b. point, deliveries, and date completed. (2) To maintain a record, by article, of the deliveries promised in the contract. The report to the statistics section of the General Staff had to show the promised deliveries of each article reported on. (3) To maintain a record of actual deliveries, by article, by weeks. This record showed the contract number, date, contractor, total contracted for, and deliveries by weeks. The information was included in the biweekly report of the finance and supply division to the statistics section, General Staff. (4) To maintain a record of shipments to ports of embarkation and deliveries to the transport service. A separate record was kept of each port of embarkation. The record of ports other than New York and Locust Point (Baltimore) were simple and required little work. This information, also, was included in the biweekly report of the finance and supply division. (5) To maintain a record of ambulances and

motor cycles by factory numbers and also by detachments to which they were assigned or transferred. (6) To maintain a record by contractors of articles purchased by the general purchasing office.

This section compiled the data upon which orders for the periodic purchase of supplies were based. From these computations of probable requirements in supplies were compiled the estimates for funds to be presented to Congress for such additional appropriations as appeared to be necessary.

Records of actual consumption of supplies by large bodies of troops under training camp, field, and combat conditions, so far as the Medical Department was concerned, did not exist at the declaration of war. The experiences of the Civil War were no longer applicable had they been available in a concrete and practicable form. The experiences of the Spanish-American War, because of the shortness of its duration and the shortage of supplies, served but little purpose other than to impress upon the minds of the administrative officers the need for adequate quantities on the supply table. The experiences of peace time under the economy complex everywhere enforced, and the rigid sanitary measures enforced at all military stations, were only a guide. The annual allowances of many articles given in the standard supply were seldom sufficient for even peace-time requirements, although others were in excess of the needs. Field requirements had of necessity to be based largely on the observation, experience, and judgment of the individual officer. The experiences of the Mexican border mobilization in 1916 would have been of material value had there been time and personnel to make a critical analysis of the quantities used. Therefore, in determining the quantities to be provided in the initial purchases after the declaration of war, recourse was had to the simple expedient of multiplying the annual allowances on the standard supply table for a post of 1,000 troops by 1,000 and the supplies in the field equipment of a division by the number of divisions or equivalent number of troops, and that by a number obtained by dividing the number of months in a year by the period the expendable supplies in the field equipment was expected to last. This gave the theoretical quantities required. Instructions were given accordingly, to purchase the supplies required for a million men for one year. As statistics of the consumption of supplies at the various camps and posts became available, they were utilized in the preparation of requirements for purchases and of estimates for funds.

The development of an automatic supply for troops overseas, wherein a definite quantity of every article required for one month for a body of 25,000 troops was stated, also served to make the subsequent statements of requirements in supplies more definite and exact. This automatic supply plan will be described in the chapter dealing with the shipment of supplies to France.

FINANCE SECTION

The functions of this section, under the organization of 1918, continued as previously described. Changing conditions of procurement required corresponding changes in the administrative details of this section. The development, at the beginning of the calendar year 1918, of the Medical Department general

purchasing office in Washington (see Chap. IX), necessitated innovations and changes in procedure, somewhat at variance with existing customs.

All purchases prior to the establishment of the general purchasing office had been made at the several supply depots, military posts, and stations. There was an officer at each of these places who received and accounted for the property so purchased and received. When the general purchasing office was established difficulties at once arose concerning the method by which accountability should lie. It was not desirable that a property return should be made by the general purchasing office on account of the added burden in commissioned and civilian personnel and the office space required to keep such a return. Financial conditions throughout the country called for prompt payment of accounts. Many of the manufacturers had found it necessary to increase their facilities which, in turn, involved the securing of additional capital with which to carry out these expansions. Large sums were required to meet payments for raw or semifinished materials and for the weekly pay roll of employees.

These conditions required a modification of distributing and accounting procedure. To meet these new requirements a system was devised whereby supplies were accepted f. o. b. cars at the contractor's plant, after proper inspection, and the contractor's invoice and properly authenticated bill of lading were accepted as delivery upon which payment could be made. Since all purchases were made from reputable manufacturers, it was believed that any discrepancies in quantities when checked at destination would be rectified by the contractor and adjustments made on subsequent vouchers as needed. This permitted payment within a comparatively few days after shipment and doubtless served to tide many manufacturers through periods of stress which they could not otherwise have weathered. In such cases the purchasing officer signed the vouchers but did not assume accountability for the property so purchased. Accountability was assumed directly by the officer who received it. A description of the method by which this was effected follows.

Progress reports were required from manufacturer on all orders and contracts. Whenever, from these reports or letters from the vendor, information was received that supplies were ready for shipment, notice of the amount available was sent by the general purchasing office to the transportation branch of the finance and supply division, where the necessary shipping instructions were entered on appropriate blank forms and sent to the contractor, who loaded the supplies on cars, completed the bills of lading, secured signature of the transportation company to the original and all memorandum copies of the bills of lading, and distributed these bills of lading as directed in the printed instructions which accompanied them. The copies of the memorandum bills of lading forwarded to the Surgeon General's Office were accompanied by properly certified invoices or bills of the contractor for the property shipped. When these papers were received in the finance section vouchers were prepared and the account paid.

At the same time that the bills of lading were prepared in the transportation section a shipping order was made up for the contractor and invoice-receipts for the consignee. The shipping order was printed on blue paper; the invoice-receipts were made out on pink, yellow, green, and white sheets,

each color intended for a specific purpose. Identical information appeared on the upper two-thirds of this form. The lower third of the shipping order contained instructions to the contractor covering shipping requirements. The lower third on the invoice-receipt covered action to be taken by the receiving officer. With the shipping order was sent a data card to be filled in by the shipper and mailed to the transportation section in an addressed envelope inclosed for the purpose. This card was used primarily by that section for tracing shipments.

When the green sheet, duly signed by the receiving officer, was received in the returns section it was accepted as a receipt in the same manner as the standard M. D. form of invoice-receipt. The yellow copy served as a notice to the tabulation section of the pending shipment and to initiate an entry on the records of that branch. When the green sheet passed through that branch it confirmed the original entry, or if it differed from the yellow sheet was corrected accordingly.

VOUCHERING PURCHASES

In vouchering purchases the following routine was used: (1) Shipping order received from director of shipments; (2) memorandum bill of lading received from contractor, showing shipment; bill (invoice) of vendor; (3) contract withdrawn from contract branch; (4) vouchers constructed from facts in hand; (5) vouchers certified by purchasing officer; (6) voucher transmitted to vendor for signature to certificate; (7) voucher received back, recorded on claims record, and audited for payment; (8) voucher paid by disbursing officer.

STORAGE AND ISSUE SUBDIVISION

This subdivision assumed charge of supplies as soon as the order or contract was placed, except for priorities and production reports, which were handled by the procurement subdivision. Assistance to the manufacturers in the matter of rail or water transportation were handled by the transportation section. It assumed all duties incident to the distribution of supplies, including storage facilities. Requisitions were examined and approved or modified. Overseas requirements were calculated and shipping instructions given. Records were kept of the state of supplies at all depots. This information, although not entirely accurate because a complete and satisfactory inventory could not be obtained, and because of the failure of the depots to keep the central office supplied with accurate information concerning the receipts of supplies, proved to be very helpful. However, given an accurate report of stock on hand, the system followed would have enabled this section to know what would be the state of supplies a week to ten days in advance of any given date instead of less timely information. The office record of issues was made from requisitions immediately after their approval by the officers designated to examine them and before they were forwarded to the depots for issue.

ISSUE SECTION

For many years prior to 1917 requisitions for articles not on the standard supply table and for quantities of standard articles in excess of the quantities authorized in the supply table had been required by regulations to be forwarded

to the Surgeon General for the action of his office before such articles were purchased or such excess issues made. The controlling reason for this regulation was the meagerness of funds available for the purchase of supplies and the consequent need of close scrutiny of all expenditures. With the mobilizing of the increasing number of troops during the latter half of the calendar year 1917, these special requisitions increased at such a rate that it became necessary to assign qualified officers to whole-time duty on this subject alone. Other officers gave part-time service as needed, or performed other duties in connection with their work on requisitions.

Originally it was contemplated that department or division surgeons would be authorized to approve replenishment requisitions for the camps and cantonments and forward them direct to the depots designated to supply them. It soon became evident that excessive quantities of supplies were being entered on these requisitions and approved by the division or camp surgeons, quantities which could not be supplied if all camps were to have enough to meet actual needs. It was considered necessary to require that all requisitions from camps, cantonments, and military stations be forwarded to the Surgeon General's Office for action before issue. Their excess quantities were reduced to something like reasonable quantities and shipments were ordered from depots known to have available stocks. This caused some delay and dissatisfaction, but it eliminated the hoarding of supplies, reduced the reserve stock to a minimum, and tided the Medical Department over critical periods, which otherwise would not have been possible. At a later date camp medical supply officers were required to forward their requisitions for supplies monthly. A careful record was kept of all issues during the month, and the quantities so issued were entered in the first column, on the requisition opposite the item. In the second column was entered the stock on hand, and in the third column the quantities required, which represented for every article three times the quantities issued during the preceding month, less the quantity in stock. This method assured a month's supply in the warehouses, a month's supply in transit, and the third month required for. It took some time to familiarize supply officers with the method, but it was ultimately effected and appeared to work satisfactorily. This branch acted on requisitions for the various kinds of supplies—post, field, dental, laboratory, X-ray, veterinary, and motor. When the requisitions were received in the Surgeon General's Office they were numbered, and one copy was sent to the officer designated to handle the particular class of supplies. That officer scrutinized the requisition, called for such information from the tabulation section as he found requisite to a proper decision, modified the quantities of such articles as he deemed in excess or unnecessary, and returned the requisition to the issue section, where the alterations or erasures made by the approving officers were entered on all copies of the requisition, items no longer issued were erased, and the issuing depot was determined by the nature of the materials and the location of the station making the requisition. Letters and indorsements of transmittal then were written and submitted to the approving officers for signature, after which the signed copy was mailed to the depot designated to make the issue. The second copy was returned to the requisitioning officer for his information concerning the action of the approving authority.

The third copy was filed under its proper number. Instructions required that there be separate requisitions for each class of supplies. This shortened the time and lessened the work of the finance and supply division. It also permitted reference of the particular class of supplies to the appropriate depot without extracting any part of it to another depot. Veterinary supplies could be examined by the veterinary assistant in the finance section, dental supplies by the dental assistant, X-ray supplies by the roentgenologists, etc., each group being handled by an expert in that line. The business transacted by this section had reached such volume in April, 1918, that the daily mail averaged 150 pieces requiring signature of the approving officers. This volume continued to increase until the armistice, although there are no records extant for the later periods.

TABULATION SECTION

This section was established in February, 1918, to meet the growing need for adequate information concerning the location and availability of supplies and the consumption at posts, camps, cantonments, and general hospitals. Requirements seemed to increase at a rate difficult to be met by production. It seemed necessary to have a ready record of the quantities of supplies issued to each camp medical supply depot for the guidance of the officers approving requisitions. Dependence could not be placed upon the property returns because they were too slow in coming in. It was concluded that this delay could be overcome and the future state of stocks determined by entering on the record, as a charge against the unit submitting the requisition, the quantities on each requisition approved by the officers who authorized the issue. It was assumed that the standard items were or would shortly be in stock at the depot designated to issue. This section, then, virtually kept a stock record card for every unit to which the distributing depots made issues. As previously stated, the chief difficulty lay in securing correct and complete inventories of supplies at the depots to serve as a starting point. It was easy enough to keep the record of approved issues, but it was difficult for some time to determine the approximate quantities available for issue.

The functions of the tabulation section were, in general, to compile and tabulate all information having to do with the issue of medical and hospital supplies.

TRANSPORTATION SECTION

This section was organized in October, 1917, primarily for overseas shipments, to keep in touch with the embarkation service, and to move supplies to the ports of embarkation for loading on transports. Later, as the organization developed and Government bills of lading came to be more and more used, it took over all matters pertaining to rail and water shipments. It supervised, as its name indicates, the transportation of medical and hospital supplies. It was in close liaison with the Railway Administration, and by personal affiliation was enabled to secure needed information promptly and to obtain cars for the movement of contractors' supplies as well as for those of the Medical Department. It had a representative in the office of the director of inland transportation after that service was organized. It arranged for all shipping releases

and had much to do with the movement of supplies from the manufacturers' establishments to the various depots and ports of embarkation. It kept a record of the tonnage going overseas, at the port, en route, and under orders. It followed all the carload inland shipments from the point of manufacture to destination. After the organization of the general purchasing office this section looked after the distribution of the supplies purchased by that office. When the monthly shipment of supplies to France had been compiled, the requisition was referred to this section for direct shipments from the manufacturer to the ports of such supplies as could be so routed. It arranged for the releases, then required, and issued the necessary instructions concerning the numbering and other marks to be put upon the packages to be shipped. When it became necessary under the instructions of the director of inland transportation to secure transportation orders from that office, this section developed those orders and distributed them, notifying the contractor, the consignee, and all other parties concerned. A representative on duty in the office of the director of embarkation kept an itemized record of all articles shipped overseas, with dates of shipment, quantities, and names of vessels on which forwarded. This section kept a card record file of all shipments in carload lots made by all medical supply depots in the United States, and until June 30, 1918, by the Gas Defense Service.

PROPERTY ACCOUNTS SECTION

There was no change in the functions and duties of this section during 1918.

OVERSEAS REQUIREMENTS SECTION

The work of this section was handled almost entirely by one officer of the Sanitary Corps. It began to function when, in the early autumn of 1917, the first newly organized combat division was ordered overseas, and continued until the end of December, 1918, when the need for additional supplies to France practically ceased. When instructions were received in 1917 to ship initial equipment and four months' replenishment for units going overseas, and to ship monthly one month's replenishment for every combat division already overseas,⁵ lists were prepared showing the quantities of every article on the supply table needed by the authorized number of base hospitals for a division and by the divisional medical units for one month. These quantities were calculated upon the best information available with 26,000 troops and 4 base hospitals per division as the basis. The plan followed was to multiply the quantities required monthly for 25,000 by a factor which represented the number of times that many troops expected to be in France during the month to which the shipment applied. The factor for a force of 300,000 would be 12, for 500,000 it would be 20, and so on. The factor used in the last calculation, which was for the month of January, 1919, was 135. Shipments for that month were never made. The factors were determined from the schedule of troop movements furnished the Surgeon General from time to time by The Adjutant General and the chief of the embarkation service. Formal requisitions for each class of supplies were prepared for each month's shipment, and a sufficient number of copies were made to provide one copy each for the issuing depot, the office files, the assistant chief of the division, and the chief of the section.

EQUIPMENT SECTION

With a view of furnishing the commanding officer of every unit with clear and concise information concerning the entire equipment to be provided his organization, War Department tables of equipment accompanied tables of organization. These tables of equipment showed the particular articles the different supply services of the Army were expected to furnish any particular organization provided for in official tables of organization. They were printed on the loose-leaf system to facilitate the frequent changes as they occurred. The several supply services showed this equipment in their respective manuals and regulations, but the information was scattered and not readily available to new organizations, hence the need for a compilation to show under the title of each organization the total equipment authorized for that particular unit. To meet these requirements for the Medical Department, an equipment section was added to the organization of the finance and supply division. A representative of this section worked in conjunction with representatives from the other supply services and The Adjutant General's Office on the compilation of these tables of equipment. As rapidly as the tables were completed, they were printed and distributed to the Army. Loose-leaf binders were provided for their proper filing and preservation. These tables had not been entirely completed when the armistice was signed.

LIAISON SECTION

Growing out of the discussions of consolidation of procurement and finance which began early in the calendar year 1918, certain officers of each supply service were designated to represent their respective services. These officers were designated liaison officers. After the consolidation of procurement had been ordered, liaison officers were required to keep in touch with the progress of procurement being made for the Medical Department by other supply services. As many officers on full-time liaison duty were designated as the current needs required. Other officers in charge of special activities, such as motor ambulances, acted as liaison officers for their particular specialties. These officers maintained contact with the other services and such superior organizations as were required by regulations. This included, for the Medical Department, the War Industries Board and its various commodity groups, the Railway Administration, the Fuel Administration, the Labor Administration, the Treasury Department, the Bureau of Mines of the Department of the Interior, the Navy Department, and the several subservices of the War Department—Quartermaster Corps, Ordnance Department, Signal Corps, Air Service, and Engineer Corps. It was expected, by means of these liaison officers, to keep the activities of supply coordinated. From the middle of August, 1918, to the time of the signing of the armistice, the officers in liaison with the other supply services were kept very busy. The development of a new system of supply in the middle of the stream of war activity threw a very heavy burden upon both the procuring agencies and the liaison officers. It also resulted in a marked slowing in the placing of contracts and in the deliveries of supplies.

This section was charged also with matters pertaining to priorities. Every contract placed required an authorization from the War Industries Board and

was given a priority rating in accordance with the procedure fixed by that board. The question of priorities will be further discussed in the section on procurement.

PRODUCTION INSPECTION SECTION

In the summer and fall of 1918, a decided slowing of production was noticed on many contracts. Production did not progress as it should; deliveries were not made according to schedule. Various excuses for these delays were given. To investigate these delays, and to accelerate the rate of production, several officers were sent into the field to visit the plants of the delinquent manufacturers, to ascertain, if possible, what were the real reasons for the unsatisfactory progress then being made, and to assist in overcoming the difficulties which were found to exist.⁶ For want of a better name these officers were designated as expeditors, and a section was established in the finance and supply division to direct and coordinate the work in the field and to keep in close contact with the control agencies of the Government in Washington. If the difficulty was found to be shortage of fuel, the facts elicited by the investigation were presented to the Federal Fuel Administrator, and adjustments of fuel allotments obtained. If the difficulty was labor trouble, the investigator attempted to adjust the matter as mediator between the workmen and the employer. The investigator not infrequently succeeded in bettering the workmen's condition and in adjusting their differences with their employer. An appeal to the loyalty of both often did much good. If the difficulty was due to a local shortage of labor, the difficulty was presented to the Labor Administrator and the shortage overcome. If the difficulty proved to be a shortage of raw or semifinished materials, or of transportation, the difficulty was brought to the attention of the proper governmental agency and its assistance solicited in the solution of the problem. These expeditors were stationed at central points from which they covered the area and plants assigned to them. The reports rendered by them enabled the Surgeon General's Office to keep in close touch with the progress of manufacture under the various contracts and orders outstanding, to form a better estimate of future deliveries, and determine whether the ever-increasing requirements could be met. While not every difficulty was removed nor every demand met, these expeditors proved to be a valuable asset in speeding up production.

REFERENCES

- (1) Orders, January 16, 1899, signed by Surg. Gen. George M. Sternberg. On file, Record Room, S. G. O., 50882 (Old Files)
- (2) S. O. 85, W. D. April 13, 1917.
- (3) S. O. 114, W. D. May 17, 1917.
- (4) Orders, September 20, 1917, signed by Surg. Gen. W. C. Gorgas. On file, Record Room, S. G. O., 50882 (Old Files).
- (5) Memorandum, G. H. Q., A. E. F., August 20, 1917. Subject: Automatic supply. Copy on file, Historical Division, S. G. O. Also: Cable No. 145-S from General Pershing to The Adjutant General, September 7, 1917.
- (6) Letter from the Surgeon General to medical supply officers, August 17, 1918. Subject: Headquarters for district officers, production department. On file, Finance and Supply Division, S. G. O., $\frac{713 \text{ Misc.}}{77}$.

CHAPTER II

STORING AND DISTRIBUTING AGENCIES; USING AGENCIES

MEDICAL SUPPLY DEPOTS

IN EXISTENCE WHEN WE ENTERED THE WORLD WAR

At the end of March, 1917, there were in operation within the continental limits of the United States, six medical supply depots, located at New York City; Washington, D. C.; St. Louis, Mo.; San Francisco, Calif.; San Antonio, Tex.; and El Paso, Tex. The depots at San Antonio and El Paso had been established in 1916 for the supply of troops mobilized on the Mexican border; the other depots had functioned as such for many years. The general organization of all these depots at the declaration of war, April 6, 1917, was essentially the same, although no attempt had ever been made to standardize their methods and render them entirely uniform. Each succeeding officer in charge of a depot made such minor changes in its interior administration as seemed to him appropriate and advisable.

PERSONNEL

COMMISSIONED

Each depot was under the charge of an officer of the Medical Department, selected because of his special qualifications for that work. When practicable an assistant was assigned to duty as an understudy; the remaining personnel of the depot forces were civilian employees.

CIVILIAN EMPLOYEES

The civilian employees in the supply depots were of two classes, those whose duties were unskilled manual labor only and those of higher grade. The former were subject to labor regulations promulgated by the President; the latter were classified employees subject to civil-service rules.

The labor regulations governed the employment of unskilled labor in Federal offices in nearly all the large cities of the United States. To secure the service of laborers under these regulations, application for the certification of eligibles was made by the officer in charge to the local board of labor employment. From such certifications suitable laborers were selected. The number and compensation of unskilled laborers and workmen in the depots were determined by the Surgeon General under the direction of the Secretary of War. No workman or laborer was permanently employed by the month without authority from the Surgeon General, nor at a salary of more than \$60 a month without special authority from the Secretary of War. They could be reduced or discharged at the discretion of the Surgeon General, as the interests of the service required. In emergencies, temporary laborers could be employed under labor

regulations, if applicable, without previous authority but at not more than \$0.25 an hour. If the position of an unskilled laborer or workman, employed at less than \$60 per month by authority from the Surgeon General, became vacant the vacancy might be filled without new authority but a report of the change was to be made promptly to the Surgeon General. Persons employed as unskilled laborers or workmen could not be assigned to work of the grade performed by classified employees.

Civil employees, above the grade of unskilled laborer or workman, were appointed by the Secretary of War upon the recommendation of the Surgeon General, selection being made from the list of eligibles furnished by the United States Civil Service Commission or by reinstatements or transfers by the Secretary of War under civil-service rules. Their number and compensation were authorized by the Secretary of War and their promotion, reduction, and removal determined by him upon the recommendation of the Surgeon General. Their assignment to and transfer between stations at home or abroad were regulated by the Surgeon General under the Secretary's direction. If a vacancy occurred among them by death or otherwise, the officer in charge promptly reported to the Surgeon General whether it was necessary to fill the vacancy, in which event he submitted a recommendation for promotion or for an original appointment, as was appropriate. Temporary appointments without examination and certification by the Civil Service Commission, pending permanent appointment, promotion, or transfer, were not made by the Secretary to any classified position except when the public emergency required it, and then only upon the prior authorization of the commission. Such appointments continued only for the period necessary to make appointment through certification of eligibles or by promotion or transfer, and in no case without prior approval of the commission would they extend beyond 30 days from the receipt of the Secretary's certification or beyond 30 days from the date of the temporary appointment. Recommendations for the promotion of classified employees originated with the officer under whose supervision the employee was serving. No recommendations originating otherwise were considered. Classified employees were promoted, reduced, or discharged only by the Secretary of War, but the officer under whom they were serving had authority to suspend them from duty and pay for a cause. In such cases he informed the suspended employee the reason for his suspension and gave him three days in which to answer the same in writing. If the answer was satisfactory the employee might be restored, without further action, to duty and pay. If no reply was received at the end of three days, or if the reply was unsatisfactory, the officer in charge reported his action, his reasons therefor, and his recommendations in the premises (together with the written answer received by him, if any) to the Surgeon General for the information and action of the Secretary of War. Every appointment, promotion, reduction, or discharge of a civil employee, temporary or permanent, made by an officer of the Medical Department, was required to be reported promptly to the Surgeon General, with the name of the person concerned, the date of change, and citation of the authority therefor. In case of death the date and place of death were given; in case of death or discharge the date to which the

employee was paid and by what officer. Records were kept in each office of the name and address of the nearest relative to be notified of an employee's death.

Each officer under whom the classified employees of the Medical Department were serving, prepared and forwarded to the Surgeon General, on June 30 and December 31 of each year, a report of their efficiency during the preceding six months. Attendance, ability, adaptability, habits, and application, each marked separately on the scale of 100, were the factors considered in determining the efficiency of each employee. The names in each class or grade were entered on the efficiency report in the order of merit, those with the same efficiency rating being arranged in accordance with length of the service in the Medical Department. Promotions in the classified service were made in the order of merit as established in the last semiannual efficiency report, subject to such examination as might be ordered under civil-service rules. Employees who failed during any six months to attain a rating of 70 in efficiency were regarded as deficient in their respective classes and were subject to regrading, and, at the discretion of the officer under whom they were serving, were reported to the Surgeon General for reduction. Those employees whose rating on two consecutive reports fell below 70 were invariably reported for reduction. If the rating of any employee on two consecutive reports fell below 60 in efficiency or below 50 in application, habits, or ability, he was required to be reported for discharge.

The following records and files were required to be kept at all medical supply depots: Correspondence, funds received and expended, purchase orders and contracts given for medical and hospital supplies, articles received, articles expended, requisitions, issues, articles on hand, invoices of packages turned over to the quartermaster for shipment, contents of packages, and employees. A proper return on Forms 17, 17A, and 17C were required to be forwarded at the end of each quarter and a duplicate copy of the return, with a complete set of vouchers retained in the files of the depot. Other reports and returns were made from time to time as required by the Surgeon General.

DEPOT ACTIVITIES

The activities at each depot may be classed under the heads purchasing, receiving, storage, issuing, shipping, finance, returns, and records.¹ These activities were carried on under the supervision of the officer in charge by a chief clerk, a receiving clerk, a shipping clerk who was also in charge of storage or warehousing, a finance clerk, a returns clerk, a chief packer, and such number of clerks, packers, laborers, and watchmen as might be necessary for the volume of business of the particular depot. At the smaller depots two or more of the activities might be supervised by a single clerk. A chief clerk usually assumed the duties of purchasing. He had such assistants for this purpose as he required.

The purchasing department of the depot had charge of all matters relating to the actual purchase of supplies. Here were prepared the circulars of advertisement for the semiannual or other large purchases. The bids were preserved until the day of opening, when they were opened, read, and abstracted and awards made. Contracts were written, and when duly signed were sent to the

contractor for signature; when duly signed by both the contractor and contracting officer, they were forwarded to the Surgeon General for approval. When advice of the approval by the Surgeon General of all contracts pertaining to the articles on a particular circular of advertisement was received, copies of the contract were forwarded to the returns office, Department of the Interior, for file, as required by law. Formal and informal quotations were solicited and purchase orders written when the amounts did not exceed \$500. Records were kept, by commodity, of the date on which the contract or order was placed, the name of the firm to whom the order was given, and the unit price paid. Purchase orders were filed serially and, together with the contracts, provided the basis for the information which was entered on the record of articles purchased. Samples submitted were comparatively the standard sample. Estimates of supplies needed by the depot were prepared in this section and forwarded to the Surgeon General for authority to make the necessary purchase. Copies of contracts and purchase orders were furnished the receiving clerk, who checked against them the bills received from the vendors at the time of delivery of the articles purchased.

The receiving department took charge of all supplies immediately upon their delivery where the vendor checked the quantities against the contract or purchase order and reported the fact to the officer who had charge of inspection. As soon as the supplies were inspected they were turned over to the shipping department for storage or to the issue department for issue, as the case might be. The bills were then forwarded to the chief clerk, who turned them over to the finance clerk for the preparation of necessary vouchers. The shipping department warehoused the supplies which were received for storage and later delivered them to the issue department or marked them for issue in accordance with instructions received from the issue department to fill requisitions. For the issue department there was provided a suitable room and counters for facility in making issues. The common routine, when a requisition was received by the chief clerk, was for one of the packers to collect from the shelves and place on the counter all articles on the requisition where the quantities were less than those contained in the original packages received from the manufacturer. These articles were then assembled by classes and in quantities appropriate to the customary size of packing boxes. The quantities to be placed in each box were determined and a list was prepared to show the articles and quantities in each box. This list was commonly called a packer's list. A copy was retained in the packing room and the original forwarded to the officer to whom the supplies were consigned. A list of original packages was then furnished the shipping department. These packages were collected in the shipping room and marked in accordance with package numbers furnished by the chief packer. As soon as all the articles available in stock had been packed and prepared for shipment the requisition was checked to show the articles and quantities issued and those still due. The requisition was then referred to the return department, where invoices and receipts were prepared and mailed to the consignee. Invoices of packages turned over to the quartermaster were then prepared either by the returns department or the shipping department and delivered to the local depot

quartermaster, who sent the necessary transportation to remove it from the warehouse to the railway station for shipment. One copy of the invoice of packages was receipted by the quartermaster making the shipment, and when the supplies were delivered to him or his representative responsibility of the medical officer for them ceased. The shipping department not only warehoused the supplies received and attended to the shipping but it also kept a record of the package and package numbers contained in each shipment, together with the dates they were delivered to the quartermaster for shipment.

Five copies of the invoice receipt forms, 23, 24, 28, or 31, were prepared. Two copies were signed on the invoice side by the medical supply officer, one copy of which was forwarded to the Surgeon General and one copy, accompanied by two unsigned copies, were forwarded to the consignee. The fifth copy was temporarily retained by the returns department for use in the preparation of the quarterly return of medical property.

The return of medical property was kept on Forms M. D. 17A and 17B. The A series were white sheets and the B series were blue ones. In keeping the return the name of the article was typed at the bottom of the sheet on both the white and blue copies. These sheets were arranged in accordance with the nomenclature and arrangement of the standard supply table, a blue and white one alternating. During the preparation of the return they were kept in a Shannon file of suitable size. Whenever an entry was to be made a carbon would be inserted between the white and the blue sheets of the article to be entered and the entry made on the white sheet with indelible pencil and on the blue sheet by the carbon copy. The entry gave the date of the voucher, the number of the voucher, and the quantity of the article received or issued on that voucher. All vouchers, whether receipts or issues, were numbered in one series. If a single page were not sufficient to provide space for all the entries during the quarter, such additional sheets were added as were necessary. At the end of each quarter the quantities in each column, the issue, and receipts were totaled and the balance remaining placed in the appropriate space at the foot of the last sheet, under each article. The white sheets were then segregated and bound in packages of suitable size, with Form 17 on the face, 17C on the back. The sheets in the return were numbered consecutively from the first to the last, except that additional sheets for any one item bore the same number as the original sheet for that item. The medical supply officer certified on Form 17C of the last package to the correctness of the return. When the return had been properly checked against receipts and issues it was forwarded to the Surgeon General.

When the bills had been received and the property accepted, vouchers for the articles received were prepared by the finance department on Forms 330 or 330A and sent to the contractor for signature. When received back, check was written and the voucher signed by the purchasing officer and the check by the disbursing officer. Before the articles enumerated on the voucher, an invoice of purchase, Form 12, was prepared, which showed the name of the vendor, the articles and quantities purchased, and was signed by the purchasing officer. This invoice of property purchased served to charge the purchasing officer with the responsibility for the property, and one copy of it was delivered

to the returns department for use in the preparation of the quarterly return of medical property. The other copy accompanied the voucher to the Surgeon General's Office, where it was again checked against the purchase voucher and filed with the property accounts of the officer who made it. At the end of each month the finance department prepared an abstract of disbursements, arranged in chronological order, in which the vouchers were paid. A separate abstract was prepared for every appropriation under which supplies were purchased. The abstract contained in brief the name of the vendor, the class of articles purchased, and the gross amount paid on the voucher. The total of each abstract was entered at the foot of the last sheet. In addition there was prepared an account current which showed, by appropriations, the funds remaining on hand from the preceding month, funds received during the month, and funds disbursed during the month, and the balance remaining to the credit of the disbursing officer. The abstracts of disbursement were the basis for the entry of the amounts of funds disbursed during the month. Both abstracts and accounts current were prepared in duplicate, one copy forwarded to the Surgeon General, for administrative examination, accompanied by the substantiating vouchers, and one copy retained at the depot, substantiated by the duplicate copy of the voucher. A record was kept by the finance department of the funds placed to the credit of the disbursing officer during the month whether by warrant or by deposit or proceeds of sales or other collections. Checks were always written on blanks furnished by the Treasury Department. Each check was identified by the entry on its face of the number of the voucher or vouchers for which it was payment.

Army Regulations required that no contract or purchase, on behalf of the United States, should be made unless authorized by law or made under the appropriation adequate to its fulfillment, except for clothing, subsistence, forage, fuel, quarters, and transportation of medical and hospital supplies, which, however, was not to exceed the necessities of the current year. Articles of foreign production or manufacture could not be purchased abroad for importation without special authority from the Secretary of War. Articles of domestic production or manufacture were preferred to those of foreign origin, cost and quality being equal. Supplies and services not personal required for the use of the Army were to be procured where they could be purchased the cheapest, quality and cost and interests of the Government considered. Except where procurements were in small amounts, supplies and services were to be procured only after public notice inviting proposals for the same. The officer charged with the duty of making a contract of purchase is responsible under the laws and regulations for his action.

NEW DEPOTS

On May 24, 1917, the Secretary of War authorized the establishment of additional medical supply depots at Philadelphia, Pa.; Chicago, Ill.; Atlanta, Ga.; and Louisville, Ky. (vicinity of Jeffersonville, Ind.).²

The location of these depots was based upon the approved plans of the War College division of the General Staff³ for the establishment of 1 divisional cantonment in the Northeastern Department; 4 (later reduced to 3) in the

Eastern Department; 11 (later increased to 12) in the Southeastern Department, of which 3 (later increased to 4) were National Army and 9 were National Guard; 5 in the Central Department, all National Army; 6 in the Southern Department, 1 National Army and 5 National Guard; and 3 in the Western Department, 1 National Army and 2 National Guard. The actual sites had not been selected at the time authority to establish the new depots was granted, but the areas within which they were to be located had been sufficiently well determined for the purpose. At this time it was contemplated that the Philadelphia depot would supply the troops in the Eastern and Northeastern Departments, the Chicago depot those in the Central department, and the Atlanta depot those in the Southeastern Department.

As soon as the necessary orders for the transfer to their new stations of the officers selected to take charge of these depots had been issued, a letter of instruction was written to each of them concerning the depot to be under his charge. The letters varied only with regard to matters relating to the territory to be supplied and the amount of floor space for the given depot. The following letter concerning the Chicago depot is similar to the others and contains the purpose of the instructions.

MAY 29, 1917.

From: The Surgeon General.

To: Major ———, Medical Corps, Field Medical Supply Depot, Washington, D. C.

Subject: Medical Supply Depot, Chicago, Ill.

1. You have been designated to take charge of the medical supply depot to be established at Chicago, Ill., and it is desired that you proceed to that point with the least practicable delay upon receipt of your order to select a building suitable for the purpose. Upon arrival you should get in touch with the depot quartermaster at that place and secure his assistance in securing a suitable building.

2. It is expected that your depot will supply the troops stationed, roughly speaking, west of the Alleghanies, north of the Tennessee, Arkansas and Oklahoma line, and east of the Rockies, which will comprise five divisions of the new National Army to be called into service the 1st of September, and such regular organizations as are now or may be formed within those limits. It is estimated that you will require 75,000 square feet of floor space. If you can find this in one building on a railroad spur with suitable approaches for wagons and trucks you will have obtained a most satisfactory location. Care should be taken to secure as nearly a fireproof building as is possible, the floors of which should have a carrying capacity of not less than 300 pounds per square foot. One with a greater carrying capacity would be preferable. If the building is more than one story, adequate elevator service will be necessary. If the building is not already provided with metal shutters for fire protection and an adequate water fire-protective system, an effort should be made to induce the owners of the building to install them and in the event of their refusal application should be forwarded to the department commander for the installation of the necessary apparatus. An estimate of cost should accompany the request. As soon as you have located the building you should secure estimates for the cost of the material and labor necessary to install the shelving and counters in your issue room and any other changes needed. These estimates should be forwarded to the department commander at the earliest practicable date. At the same time you should make application for the installation of the necessary telephone service. For this, consult with the local quartermaster.

3. As soon as you have found a suitable building, inform this office of the street address thereof and instructions will be issued to the New York medical supply depot to send you your initial equipment. Additional supplies as needed will be issued to you on requisitions forwarded through the department surgeon. You should keep your stock replenished by timely requisitions.

4. While it is probable that you will be required to make purchases to meet emergencies, it is not contemplated at the present time that you should act as a disbursing officer. All obligations incurred by you should be properly vouchered and forwarded to this office for payment, through the department surgeon.

5. Your depot will handle all classes of medical supplies—post, field, dental, veterinary, and automobile—as well as blank forms. Should you receive requisitions for which at the time you have not the supplies on hand to fill, a list of the articles not in stock should be forwarded to this office through the department surgeon with the least practicable delay in order that instructions may be issued to ship them from other depots.

6. You are authorized to issue supplies on requisitions approved by department or the division surgeons within your district. It is contemplated in the ordinary issue of supplies that the expendable articles required by regimental and other organizations will be issued by the property officer of the divisional cantonment hospital and that the nonexpendable articles for these organizations will be issued from your depot. Your depot will issue the necessary supplies in bulk to the cantonment or base hospital on requisition.

7. It is contemplated that a cantonment hospital will be established with each division when the troops have reached their training camps. The initial equipment of this hospital is given in the attached list designated "Wolfe base hospital unit." It is not known at the present time exactly where these camps will be nor how soon their equipment will be required. The initial equipment for them will be issued by you upon instruction from the department surgeon. The bulky articles—bedsteads, mattresses, pillows, chairs, and refrigerators—will be issued direct to the hospital from the New York depot or from the contractor. Upon receipt of instructions by you from the department surgeon to issue supplies to any cantonment or base hospital, you should promptly inform the officer in charge of the New York depot of the place and the name of the officer designated to receive these bulky articles.

8. It is contemplated that large quantities of the various classes of supplies will be stored at your depot in addition to the immediate needs for issue, and for this reason you will require the floor space indicated in paragraph 2.

9. The initial personnel for your depot, consisting of a chief clerk, an invoice clerk, a chief packer, and possibly a shipping clerk and laborer, will be ordered to you from other depots upon receipt of information from you that you have secured the necessary building. Other employees will be authorized as required upon request from you stating the number and qualifications. Payment of these employees will be on pay roll duly certified by you and forwarded to this office for payment. Your attention is invited to paragraph 110, Manual for the Medical Department, 1916, relative to the emergency employment of laborers.

10. You should make requisition for the necessary office equipment for your depot at the earliest practicable date in order that it may reach you promptly. You should investigate the local market to determine prices and availability in your vicinity. If the prices be reasonable, authority will be given you to purchase locally. Anything which you can not secure locally or for which the price quoted is unreasonable should be referred to this office.

11. Inasmuch as you will be required to issue blank forms, you should make ample provision in the way of building cabinets for the proper storage and protection thereof while in storage and awaiting issue.

12. It is suggested that the material for shelving, counters, and these cabinets for blanks should be millwork as far as practicable, everything cut ready to assemble when it reaches your depot.

13. Boxes for packing should be purchased locally provided there be an adequate box manufacturer in the vicinity. If not, requisition therefor should be forwarded promptly.

By order of the Surgeon General.

Very little difficulty was experienced in Atlanta and Chicago in securing adequate and suitable storage space to meet the requirements of the letter of instructions. The situation at Philadelphia proved quite difficult. While the warehouse selected was the most suitable of any available in the city, it was not on a railroad siding. The street in front and the alley in the rear were both narrow and congested with traffic.

CONSOLIDATION OF STORAGE

The initial step in the consolidation of storage and issue may be said to have been taken near the end of December, 1917, with the development of an organization within the War Department known as the storage and traffic service.⁴ The function prescribed by this section was:

To provide for the coordination of movement of troops and shipments of munitions and supplies of every kind during manufacture, and after final assembly, and to see that provision is made for the necessary storage and other facilities on the seaboard and at interior points, and to advise and assist the Chief of Staff in reference thereto.

In charge of this organization was a director of storage and traffic. The organization was divided into two branches, one dealing with storage facilities and the other with transportation. The chief of the section dealing with storage facilities was known as the director of storage. While the functions of this section and its relation to other organizations of the War Department varied somewhat during the period of its existence, its chief retained the title of director of storage throughout.

On January 3, 1918, call was made by the director of storage and traffic for information from all the supply bureaus concerning: (a) Present storage facilities—location, capacity in square feet, and character of supplies for which designed; (b) plans made for additional storage; (c) funds available for construction of storage space; (d) localities at which supplies are being manufactured; (e) personnel engaged in connection with storage and transportation of supplies.⁵

Not long after the information called for in this request had been furnished the following instructions were received:

WAR DEPARTMENT,
OFFICE OF THE QUARTERMASTER GENERAL OF THE ARMY,
Washington, January 21, 1918.

Memorandum for Surgeon General.

1. In order that the storage and warehousing facilities of all branches of the service be coordinated so far as is deemed advisable, all matters pertaining to the location and construction of new storage or warehousing facilities are to be submitted for approval to the director of storage before final action is taken.

2. The director of storage is to be furnished with such information and reports relative to storage and warehousing operations as he may from time to time require.

Director of Storage and Traffic.

The first measure looking toward consolidation of storage was contained in a proposed method of operating the New York storage facilities put forward by the director of storage and traffic in March, 1918.⁶ This proposal, made to the Chief of Staff, covered both storage facilities and loading activities related to overseas shipment. That part of the method dealing primarily with storage proposed (1) that the practice of assigning certain definite warehouse space to the several bureaus of the Army be discontinued and that any existing arrangements of this character be canceled; (2) that all storage facilities of the port be operated and controlled by a storage officer, who, as the representative of the director of storage and traffic, was to be on the General Staff Corps;

(3) that all Army supplies arriving in the metropolitan district were to be under the control of the storage officer and by him were to be allocated to piers, shipside, or storage in accordance with instructions issued by the ship control committee and information as to priorities, furnished by the bureau representatives; (4) that the storage officer was to issue a warehouse receipt for all supplies unloaded into storage and that the receipt was to evidence the termination of the accountability of the bureau originating the supplies placed in store.

The director of storage and traffic stated as a reason for the measures proposed that an investigation of the storage situation at the port of New York had developed the fact that the warehouse facilities were only partially utilized, although an actual shortage space existed at the port. This state of affairs had resulted from the prevailing practice of assigning certain warehouses or definite space in warehouses to the several bureaus of the Army, the space assigned ceasing to be available even though unoccupied.⁶

As may have been expected, the proposal met with considerable objection from the supply bureaus. The reasons for these objections were many. Those of the Medical Department included the following:⁷

It is a basic principle of storing that articles of one class and of one kind—that is to say, all packages of any one individual item—should be stowed together. This is absolutely necessary to avoid confusion in handling. It is manifestly impossible to so estimate space that none shall be lost, due to failure of each individual stack to occupy all the space intended for it. If this basic principle be accepted, there is manifestly no advantage in placing one item of medical supplies in one stack and filling in the adjacent space with quartermaster supplies or the supplies of any of the other supply bureaus. It would make for efficiency to have medical supplies in a warehouse by themselves, ordnance supplies in another, quartermaster in another, and so on, assuming, of course, that each warehouse was filled with the same class of supplies.

The lack of utilization of space at the port of embarkation, New York, at the present time is manifestly due to a lack of accumulation, on the part of the supply departments, of the required reserve for the maintenance of the prospective number of troops abroad, rather than to an excess of space allotted to such supply departments. It should not be taken as a criterion of what will obtain when what might be considered as normal conditions of overseas supplies exists. It is believed that having a moderate amount of storage space in excess of the immediate needs is far better than having too little. Economy in storage space is a good thing and can be exercised quite as well by the respective supply departments as by a central warehousing organization. Space remaining unoccupied in any warehouse for any length of time should be taken from the supply department to which assigned and reassigned to another supply bureau whose warehouses appear to be inadequate. Warehousing space to permit of stowing, by classes, should be provided and should be assigned to the respective supply bureau furnishing that class of supplies.

The objections to a central warehousing system are essentially the following:

(a) Lack of familiarity on the part of the operating personnel with the different classes of supplies.

(b) Difficulties incident to the proper handling by inexperienced persons of supplies of the same or similar classes received from different sources at different times.

(c) The liability of inexperienced persons to send out the wrong articles, due to confusion of names. This is particularly true as regards Medical Department supplies. A number of drugs have the same basic element, but are put up in different form, and generally different combinations of chemical substances; for instance, ammonium carbonate and ammonium chloride; sodium bicarbonate, sodium borate, etc. Some are put up in tablet

form, some occur in crystals; some shipments of drugs have the official Latin name stenciled on the box, while others have the commercial name.

(d) The lack of complete familiarity with all the component articles entering into unit equipment, which would result most certainly in the failure to properly check in or check out the number of packages containing a specific equipment of the unit. It is necessary that all articles comprising a unit be stowed in such proximity that the entire unit can be shipped complete. It is necessary that the persons handling this equipment be thoroughly familiar with it so that they may recognize at once any deficiency or discrepancy in the contents of the unit. This can not be entirely overcome by any system of marking which might be adopted.

(e) It is impracticable to order out supplies by numbers and weights of packages, whether they be stored in the same compartment or in different warehouses. It is not at all improbable that boxes of the same numbers and weights, and possibly similar contents, may be received at the warehouse from different depots. One may contain field supplies, another veterinary supplies, and a third post supplies. Unless persons handling the shipment be thoroughly familiar with the equipment, the probabilities of sending out the wrong package are very much greater than the probabilities of forwarding the proper package.

(f) It will be impossible to hold a general warehousing force—men who to-day may handle engineer property, to-morrow Signal Corps, the next day ordnance, and the next day medical—to that fine degree of accuracy which is necessary for the efficient forwarding of supplies which obtains from the personnel handling one class of supplies only.

(g) Besides all this, there would be lacking the facilities for the training of personnel and the handling of Medical Department supplies which now obtains and which will continue to obtain if the warehouses are assigned to the respective supply departments as hitherto.

The plan for the operations of the storage at the port of New York as finally promulgated⁸ provided for a port storage officer, who was to have exclusive control of all storage facilities at the port operated for the joint use of the several bureaus of the Army. He was authorized to exercise coordination and control over the storage facilities operated by the several supply bureaus and shipment of supplies through that port. Each supply bureau was represented by a port supply officer appointed by the chief of the bureau. This port supply officer was a member of the staff of the commander of the port, and was the technical officer and assistant of the port storage officer, on all matters concerning the supplies of his respective bureau. These port supply officers were charged with all provisions necessary for the receipt, storage, preservation, and production of supplies and material pertaining to their respective bureaus at the port. They were to perform their duties under the provision of the port storage officer and in conformity with such regulations as might be issued under the authority of the commander of the port. Supplies intended for shipment overseas were to be invoiced to the proper port supply officer instead of the port storage officer. The port supply officers were to act also as direct representatives of their respective supply bureaus.⁸ In this phase of the development, storage was coordinated but not centralized or consolidated. So far as can be determined the results obtained were entirely satisfactory. Supplies moved with as much dispatch as the state of shipping permitted, and all storage space that was assigned to the Medical Department was fully used.

By the middle of October 1918, plans for a complete consolidation of storage and issue, as well as procurement, were well under way. The order directing the transfer of the supply functions of the Surgeon General's Office to the director of purchase and storage and the director of finance is quoted below:

Supply Circular No. 102.

WAR DEPARTMENT,
PURCHASE, STORAGE AND TRAFFIC DIVISION,
GENERAL STAFF.

Washington, October 24, 1918.

Subject: Transfer of certain branches of finance and supply divisions, Office of the Surgeon General.

1. In accordance with the terms of Supply Circular No. 80 and Supply Circular No. 91, the entire supply branch and supply depots branch of the finance and supply division of the Office of the Surgeon General is hereby transferred to the office of the director of purchase and storage. The administration division of the finance and supply division of the Office of the Surgeon General, in so far as it relates to the work of purchase, storage requisition, and requirements, is hereby transferred to the office of director of purchase and storage.

2. Purchases made by various officers of the office of the Surgeon General for the purpose of experimental and research work shall continue to be made as in the past, provided that as soon as such material adopted as a result of such experimental and research work is standardized the purchase and storage of such material shall thereafter be performed by the office of the director of purchase and storage.

3. The finance branch and disbursing branch, and so much of the administration branch as relates to finances and accounting, of the division of finance and supply of the Office of the Surgeon General are hereby transferred to the director of finance.

4. The personnel, property, stores, supplies, and records of the organizations transferred under the provisions of paragraph 1 hereof are transferred to the office of the director of purchase and storage.

5. The personnel, equipment, and records pertaining to the finances and to the finance and accounting activities of the organizations transferred by paragraphs 1 and 3 hereof, in accordance with Supply Circular No. 98, are hereby transferred to the office of the director of finance.

6. Local emergency purchases by officers of the Medical Department may be continued under existing instructions of the Office of the Surgeon General.

7. This order will take effect November 15, 1918.

By authority of the Secretary of War:

GEO. W. GOETHALS,
*Major General, Assistant Chief of Staff,
Director of Purchase, Storage and Traffic.*

The instructions contained in Supply Circular No. 102 were carried into effect in the field under the following instructions:

Purchase and Storage Notice No. 128.

WAR DEPARTMENT,
PURCHASE, STORAGE AND TRAFFIC DIVISION,
OFFICE OF THE DIRECTOR OF PURCHASE AND STORAGE,
Washington, December 13, 1918.

Subject: Transfer of medical supply depots.

1. In accordance with the terms of Supply Circular No. 102, the medical supply depots transferred to the office of the director of purchase and storage are hereby assigned, with all personnel, warehouses, equipment, records, leases, and other property, as follows:

(a) The medical supply depot at New York City, N. Y., to the zone supply officer, New York City, N. Y.

(b) The medical supply depot at Philadelphia, Pa., to the zone supply officer, Philadelphia, Pa.

(c) The field medical supply depot at Washington, D. C., to the zone supply officer, Washington, D. C.

(d) The medical supply depot at Atlanta, Ga., to the zone supply officer, Atlanta, Ga.

(e) The medical supply depot at Chicago, Ill., to zone supply officer, Chicago, Ill.

(f) The medical supply depot at St. Louis, Mo., to the zone supply officer, St. Louis, Mo.

(g) The medical supply depot at San Antonio, Tex., to the zone supply officer, San Antonio, Tex.

(h) The medical supply depot at San Francisco, Calif., to the zone supply officer, San Francisco, Calif.

2. Requisitions for supplies required by the above medical supply depots will be sent direct to the requisition service branch, domestic distribution division, office of the director of storage, who will refer them to the medical subdivision for indication of action.

3. All matters relating to policy of issue and authorized allowances of medical, dental, and veterinary supplies for use in distribution in the United States will be referred to the medical subdivision, domestic distribution division, office of the director of storage, which will determine such matters, and when necessary will refer them to the Surgeon General's Office for administrative action.

4. Zone supply officers, or other officers in charge of general supply depots, will submit to the domestic operations division, office of the director of storage, such data and questions concerning medical supply depots under their jurisdiction as may be necessary for the information or approval of the chief of the domestic operations division.

R. E. Wood,

Brigadier General,

Director of Purchase and Storage.

General instructions relating to the method of handling medical supplies and the operation of forming medical supply depots are indicated in the following purchase and storage notice:

Purchase and Storage Notice No. 121:

WAR DEPARTMENT,
PURCHASE, STORAGE AND TRAFFIC DIVISION,
OFFICE OF THE DIRECTOR OF PURCHASE AND STORAGE,
Washington, December 11, 1918.

Subject: Supervision of medical supply depots and supplies in the office of the Director of Storage.

1. Effective December 10, 1918, the domestic operations division in the office of the director of storage, will assume the responsibility for and direct the operations of all general medical supply depots, reserve depots, camp medical supply depots, etc., in accordance with paragraph 5, Purchase and Storage Notice No. 34.

2. Effective December 10, 1918, the port operations division in the office of the director of storage, through the port storage officers, will assume responsibility for and direct the movement of all medical, dental, and veterinary supplies through ports of embarkation in accordance with paragraph 7, Purchase and Storage Notice No. 34.

3. (a) Effective December 10, 1918, the statistical record branch, administrative division, in the office of the director of storage, will assume the responsibility for and direct the maintenance of all stock records for medical, dental, and veterinary supplies, except those released to the overseas distribution division for shipment to the American Expeditionary Forces.

(b) General medical supply depots and camp medical supply depots will make regular stock reports at stated intervals of all medical, dental, and veterinary supplies, on prepared stock report sheets forwarded to them by the statistical and record branch, storage administrative division.

(c) Any additional information required from time to time in reference to stocks of medical, dental, and veterinary supplies will be secured through the statistical and records branch, storage administrative division, when required by the divisions in the office of the Director of Storage.

4. (a) Effective December 10, 1918, the overseas distribution division in the office of the director of storage will assume the responsibility for and direct the movements of medical, dental, and veterinary supplies to ports of embarkation when such supplies are for shipment to the American Expeditionary Force.

(b) The work of that part of the finance and supply branch of the Medical Department assigned to the overseas distribution division will continue to follow out the program outlined by the Surgeon General's Office until the completion of the present overseas program. As stock becomes available which is not required for overseas distribution it will be transferred to the jurisdiction of the domestic distribution division and the personnel now in the overseas distribution division will be transferred to the domestic distribution division as the requirements of the former are completed. For the present, constant liaison must of necessity be kept between the overseas distribution division and that part of the former finance and supply division of the Medical Department controlling the overseas program.

(c) The medical subdivision, overseas distribution division, will receive copies of such distribution orders as are issued in its favor by the domestic distribution division, medical subdivision, and will arrange for releases and take such further action as may be necessary for the expeditious loading of material in question in accordance with present procedure.

5. (a) Effective December 10, 1918, the domestic distribution division, office of the director of storage, will assume responsibility for and direct distribution of all medical, dental, and veterinary supplies except those consigned to ports of embarkation for shipment to the American Expeditionary Force.

(b) The requisition service branch will receive all requisitions from general medical supply depots, camp medical supply depots, and Medical Department units at camps, posts, forts, and other stations; will submit them for indication of action to the medical subdivision, domestic distribution division, and take the action indicated by the latter. In addition the requisition service branch will trace shipments and report on deliveries and receipts to the medical subdivision for its information and guidance.

(c) All matters of policy regarding disposition, issue, and storage and authorized allowances of medical, dental, and veterinary supplies, except those consigned to ports of embarkation for shipment to the American Expeditionary Force, will be referred directly to the medical subdivision, domestic distribution division, in the office of the director of storage, which will determine such matters, and when necessary will refer them to the Surgeon General's Office for administrative action.

(d) All matters pertaining to surplus stocks on hand in various depots, camps, posts, forts, and other stations will be referred to the medical subdivision, domestic distribution division, in the office of the director of storage.

(e) Other matters, such as reports and inquiries pertaining to storage space, the operation and maintenance of general medical supply depots and camp medical supply depots, reserve depots, etc., personnel and general policy, will be referred by the medical subdivision, domestic distribution division, to the domestic operations division, which will make report directly to the medical subdivision, domestic distribution division.

(f) All general medical supply depots, camp medical supply depots, Medical Department units at camps, posts, forts, and other stations will forward all requisitions for supplies needed direct to the requisition service branch, domestic distribution division, which will refer them to the medical subdivision, domestic distribution division, for indication of action, and will take the action indicated thereon.

6. All personnel engaged on the above work is hereby transferred to the division of the office of the director of storage, assuming the responsibility for and directing the work in accordance with this notice.

R. E. WOOD,
Brigadier General,
Director of Purchase and Storage.

In order that there might be no cessation in the continuance of the distribution of medical and hospital supplies, the personnel in the Office of the Surgeon General engaged on procurement and distribution were transferred with the records to the office of the director of purchase and storage. In the field the medical supply depots, with their personnel, became sections of zone supply depots. While all depots came under the provision and control

of the zone supply officer under the new plan of operation personnel with technical training required for the proper operation of the depot were not as a rule displaced.⁹ The enlisted personnel of the Medical Department on duty at medical supply depots with a few exceptions were transferred to the Quartermaster Department. Those of the emergency forces were demobilized at the time and in the way prescribed by the War Department. Those belonging to the regular establishment continued in the service as quartermaster personnel until the expiration of their current enlistment or until they secured transfers to the Medical Department.

The new system was placed in operation in accordance with instructions in Circular No. 131, above quoted, and remained in operation until the autumn of 1920, when a return was made to the principle of individual control of the zone depots and the procurement and issue of the zone supplies by the various bureaus of the War Department having supply functions. Experience during the period of its operation had demonstrated that a single supply system is too complicated for general use in providing supplies for the Army. The necessity of an individual initiative of each supply bureau was clearly shown.

USING AGENCIES

The issue of medical supplies was not limited to the personnel and organizations of the Medical Department, but extended to the entire Army. A first-aid packet was provided for the personal equipment of every officer and soldier. Foot powder and adhesive plaster were furnished every organization at the rate of one tin of foot powder and one spool of adhesive plaster per squad (eight men). These articles and quantities were obtained from the surgeon of the organization upon request by the company or other organization commander. When so issued the request was filed and the articles then were dropped by the surgeon from his return of property as expended with the sick. The surgeon of an organization obtained these articles for this purpose in the same manner as he obtained his other supplies.

The Medical Department units may be grouped definitely into two classes, namely, mobile and fixed. The former operate with the combat troops and furnish first-aid and primary treatment. Their supplies are limited because of limited transportation available. Such supplies are put up in the most compact form and ready for use with very few preliminaries. They are packed in containers suitable for transportation and are commonly referred to as "field supplies." Medicines are in tablet form for ready dispensing; surgical dressings are in compressed form and sterilized within their wrappings as protective covering. They were packed, with simple apparatus for the treatment of wounds, in cases especially designed for them, the object being to reduce weight and bulk. During the war the mobile units included medical detachments, with regiments and smaller organizations, sanitary trains (ambulance companies, and field hospitals), and evacuation hospitals. They moved with the troops they served. Even the evacuation hospitals remained in a given location only long enough to give primary treatment to the wounded of the troops they served and evacuated them to fixed hospitals in the rear. The equipment of

these units is given in the appendix under the titles, combat equipment, camp infirmaries, camp infirmary reserves, ambulance companies, field hospitals, and evacuation hospitals.

During the war fixed units were post hospitals, general hospitals, base hospitals, convalescent and other special hospitals. These units provided definitive treatment and care for the sick and wounded until restored to duty or separated from the service. The equipment of such units was necessarily elaborate and bulky. Their supplies were provided in the usual commercial containers. Medicines were supplied in crystal, powder, or liquid form to be prepared for dispensing by the pharmacies of such institutions. Dressings were supplied in bulk and nonsterile to be prepared in such form as required and sterilized at the hospital. In short, the equipment and supplies conformed to those of standard civilian institutions of like character.

All supplies required by mobile and fixed units were obtained with few exceptions upon requisitions prepared on the standard forms and forwarded through the prescribed channels. This applies as well to articles of equipment furnished by other supply services as to the supplies and equipment furnished by the Medical Department. In peace time requisitions were divided into two classes, annual and special. Special requisitions were again divided into annual, quarterly, and emergency. Articles were grouped into post, field, and dental medical supplies. Separate requisitions were required for each group. The rules (Manual for the Medical Department) governing their routine preparation and channels of transmission appear in the appendix (p. 856).

The requisition having been forwarded through the prescribed channels, the officer who forwarded it was advised by the approving authority of the action taken by him upon it and of its transmittal to a medical supply depot, the location of which was stated, for issue subject to the modifications, if any, in his office. In due time he received from the medical supply depot a signed invoice of the articles issued accompanied by a packer's list and two receipts (exact copies of the signed invoice, generally carbon copies) for his signature. The shipment was received by the local quartermaster and delivered to the officer to whom consigned. All original packages in the shipment were segregated and the packed boxes unpacked and the contents checked against the packer's list. When the shipment had all been verified the receiving officer signed the two copies of the receipts and forwarded one copy to the Surgeon General and the other to the depot from which the shipment came.

The invoice and the receipts were given the receiving officer's voucher number. The articles on the invoice were then entered on the return and the invoice filed in its proper place as a voucher to the return. Whenever there was a discrepancy between the articles received and the invoice, the difference was usually settled by correspondence between the two before the receipt was accomplished.

As soon as the receipt was mailed the receiving officer became accountable for all the articles enumerated therein and rendered a return for them at the prescribed period, generally when his accountability terminated by transfer to another officer.

REFERENCES

- (1) Based upon reports of the activities of the various medical supply depots made by the officers in charge. Copies on file, Historical Division, S. G. O.
- (2) First indorsement from The Adjutant General to the Surgeon General, May 24, 1917. On file, A. G. O., 2596673 (Old Files).
- (3) Memorandum from Chief of War College Division, General Staff, to Chief of Staff, May 4, 1917. Subject: Designation of camp sites for training of new troops. On file, Record Room, A. G. O., Correspondence Files 2593945 (Old Files).
- (4) G. O. No. 167, War Department, December 28, 1917.
- (5) Letter from the Director of Storage and Traffic to the Surgeon General of the Army, January 3, 1918. Subject: Storage facilities. On file, Finance and Supply Division, S. G. O., $\frac{713 \text{ Misc.}}{8}$.
- (6) Letter from the Director of Storage and Traffic to the Chief of Staff, March 8, 1918. Subject: Proposed method of operating New York storage facilities. On file, Finance and Supply Division, S. G. O., $\frac{750-268 \text{ G. S.}}{3}$.
- (7) Letter from the Surgeon General to the Director of Operations, General Staff War Department, April 1, 1918. Subject: Proposed method of operation of New York storage facilities. On file, Finance and Supply Division, S. G. O., $\frac{750-268 \text{ G. S.}}{3}$.
- (8) G. O. No. 54, War Department, June 3, 1918.
- (9) Memorandum for Office of the Surgeon General from Director of Storage, November 21, 1918, relative to operation of medical supply depots. On file, Finance and Supply Division, S. G. O., $\frac{713-750 \text{ Wash.}}{509}$.

SECTION II
PROCUREMENT

CHAPTER III

ESTIMATES AND APPROPRIATIONS

The procurement of supplies is generally predicated upon the availability of sufficient funds, either immediately or in the near future, with which to liquidate the indebtedness arising from the purchase. Since the adoption of the Constitution, the necessary funds have been provided by annual grants made by the Federal Congress and commonly called appropriations. The earlier appropriations were few and quite simple. Those of later years have been numerous and complex or detailed. In the earlier appropriations the details of distribution and application of the funds were left to the discretion of the heads of departments for which they were made. This soon gave place to an itemization by the Congress of the purposes to which the funds could be applied and the amount which could be expended for them. The extent to which appropriations have been itemized has increased with each decade until at the present almost complete details are required, although "lump sum" appropriations are still made. In lump-sum appropriations the details required in the estimates equal those of the itemized appropriations, but the grant itself, when made, specifies the sum for the whole but does not prescribe the amounts for the various headings of expenditure authorized therein.

For many years the title appears to have been considered sufficiently descriptive and limiting to require no language in it other than the title. Of late years, and particularly since 1898, the tendency has grown to include language more particularly defining the purposes for which it may be used. Some of the language has made this appropriation applicable to border-line cases, some of it has confirmed existing practices, while some of the language serves to limit the purposes to which it may be applied.^a The language of the appropriation under the title "Medical Department," as it obtained during the World War follows:¹

^a The funds which provided for the construction, repair, and operation of hospitals as distinguished from the care of the sick were contained in appropriations administered by the Quartermaster General. They include, in general, costs of construction; maintenance of roads and sewers; heating, lighting, and water; pay and allowances of officers, nurses, and enlisted personnel; and subsistence of nurses, enlisted personnel, and patients. They were contained under the appropriation titles, "Pay, and so forth, of the Army"; "Subsistence of the Army"; "Regular supplies, Quartermaster Corps"; "Transportation of the Army and its supplies"; "Waters and sewers at military posts"; "Barracks and quarters"; "Roads, walks, wharves, and drainage"; and "Construction and repair of hospitals."

MEDICAL DEPARTMENT

Medical and Hospital Department: For the manufacture and purchase of medical and hospital supplies, including gas masks, motor ambulances, and motor cycles for medical service, their maintenance, repair, and operation, and disinfectants, and the purchase and exchange of typewriting machines for military posts, camps, hospitals, hospital ships, and transports, and supplies required for mosquito destruction in and about the military posts in the Canal Zone: *Provided*, That the Secretary of War may in his discretion select types and makes of motor ambulances for the Army and authorize their purchase without regard to the laws prescribing advertisement for proposals for supplies and materials for the Army; for the purchase of veterinary supplies and hire of veterinary surgeons; for expenses of medical supply depots; for medical care and treatment not otherwise provided for, including care and subsistence in private hospitals, of officers, enlisted men, and civilian employees of the Army, of applicants for enlistment, and of prisoners of war and other persons in military custody or confinement, when entitled thereto by law, regulation, or contract: *Provided further*, That this shall not apply to officers and enlisted men who are treated in private hospitals or by civilian physicians while on furlough; for the proper care and treatment of epidemic and contagious diseases in the Army or at military posts or stations, including measures to prevent the spread thereof, and the payment of reasonable damages not otherwise provided for, for bedding and clothing injured or destroyed in such prevention; for the pay of male and female nurses, not including the Nurse Corps (female), and of cooks, and other civilians employed for the proper care of sick officers and soldiers, under such regulations fixing their number, qualifications, assignment, pay, and allowances as shall have been or shall be prescribed by the Secretary of War; for the pay of civilian physicians employed to examine physically applicants for enlistment and enlisted men, and to render other professional services from time to time under proper authority; for the pay of other employees of the Medical Department; for the payment of express companies and local transfers employed directly by the Medical Department for the transportation of medical and hospital supplies, including bidders' samples and water for analysis; for supplies for use in teaching the art of cooking to the enlisted force of the Medical Department; for the supply of the Army and Navy Hospital at Hot Springs, Arkansas; for advertising, printing, binding, laundry, and all other necessary miscellaneous expenses of the Medical Department, \$267,408,948.

To provide for the needs of the Medical Department during the fiscal year ending June 30, 1917, the following sums had been made available: \$1,584,000, deficiency (act of July 1, 1916), and \$4,500,000, fiscal year, 1917 (act of August 29, 1916). Of these sums the former had been requested principally for the purpose of providing motor ambulances and motor cycles to the medical units on the Mexican border, but the text of the appropriation extended it to all other purposes of the Medical Department. The purchase of motor vehicles was temporarily suspended July 25, 1916, by instructions from the Secretary of War,² and the purchase had not been resumed on April 6, 1917. Of the latter appropriation the sum of \$500,000 was authorized for use, under the direction of the Secretary of War, in the erection or rental of temporary buildings for the care and shelter of the sick and wounded. The burdens during the early part of the year had been heavy and the obligations incurred against these funds had been extensive so that there remained available to the Medical Department at the end of January, 1917, an unobligated balance of but \$1,321,000.³ The Adjutant General was advised in February that more than \$22,954,186 would be required to meet the needs of the Medical Department in the event of war.⁴ This was stated later at \$24,780,000, and the formal estimate in the following details was submitted as of March 31, 1917.⁵

154905-G-1

Estimates March 31, 1917 (1,000,000 men)

“Medical and Hospital Department, 1918” (to be immediately available):

Initial medical equipments:

Volunteers, 500,000.....	\$6, 984, 619. 20	
Militia, war strength, 325,000, in addition to equipments now in their hands.....	2, 873, 989. 10	
Regulars, from stores now on hand.....	0. 00	
		\$9, 858, 608. 30

Veterinary supplies, 1918, at \$1 per animal.....		616, 178. 00
Mosquito destruction, Canal Zone posts, 1918.....		50, 000. 00
Current medical upkeep, 1,000,000 men, less 250,000 provided for by appropriations already made, net 750,000 men, for 3 months from April 1, 1917, at the rate of \$12 a year per man.....		2, 250, 000. 00
Current medical upkeep, 1,000,000 men, 1918.....		12, 000, 000. 00

Total..... 24, 774, 786. 30

Or, in round numbers..... 24, 780, 000. 00

S. G. O.

MARCH 31, 1917.

Cost of field equipment (medical supplies only) for 500,000 men

[Organization as suggested by General Bliss: 21 Infantry divisions, 7 Cavalry divisions, Army troops]

Unit	Quantity	Unit price	Total cost
Brassards, 10 per cent (Hospital Corps, chaplains, etc.).....	60, 000	\$0. 08	\$4, 800. 00
First-aid packets, 100 per cent and reserve.....	1, 000, 000	. 28	280, 000. 00
Medical officers' belts, equipment, 1 per cent and reserve.....	7, 000	8. 20	57, 400. 00
Enlisted men's belts, equipment, 10 per cent and reserve.....	75, 000	3. 40	255, 000. 00
Regimental combat equipment (Infantry), medical supplies only, 315 regimental and reserve.....	500	316. 14	158, 070. 00
Camp infirmaries, including par. 869 and par. 871, 4 for each of 30 divisions and reserve.....	150	956. 18	143, 427. 00
Ambulance companies, 133 and reserve.....	175	1, 666. 44	291, 627. 00
Field hospitals, 91 and reserve.....	150	3, 299. 04	494, 856. 00
Medical reserve supplies, par. 891, 2 for each of 30 divisions.....	60	5, 280. 46	316, 827. 60
Motor ambulances, three-fourths of ambulance companies and reserve.....	1, 500	2, 000. 00	3, 000, 000. 00
Hospital trains (equipment only).....	10	2, 893. 00	28, 930. 00
Evacuation hospitals, 2 for each division.....	60	15, 240. 66	914, 439. 60
Base hospitals, 1 for each division.....	30	23, 141. 40	694, 242. 00
Dental outfit, portable.....	600	500. 00	300, 000. 00
Dental outfit, base.....	30	1, 500. 00	45, 000. 00
Total.....			6, 984, 619. 20

154905-G-1

Militia—To complete field equipment

[Present strength, 171,319; war strength, 325,304; 12 division at present equipped; ambulance companies, 25; field hospitals, 38]

Unit	Estimate		
	Quantity	Unit price	Total cost
First-aid packets, 100 per cent.....	325, 000	\$0. 28	\$91, 000. 00
Medical officers' belt (contents), 1 per cent.....	3, 300	8. 20	27, 060. 00
Enlisted men's belts (contents), 10 per cent and reserve.....	40, 000	3. 40	136, 000. 00
Regular combat equipment (Infantry), 144 regiments and reserve.....	150	316. 14	47, 421. 00
Camp infirmaries, including par. 869 (\$368.54, medical property only) and par. 871 (\$587.64), four times 12 divisions and reserve.....	60	956. 18	57, 370. 80
Ambulance companies (“C” equipment, medical only), 35 to complete and reserve.....	65	1, 666. 44	108, 318. 60
Field hospitals (“C” equipment, medical only), 10 to complete and reserve.....	35	3, 299. 04	115, 466. 40
Medical reserve supplies (par. 891), 2 for each of 12 divisions.....	25	5, 280. 46	132, 011. 50
Motor ambulances, three-fourths of ambulance companies and reserve.....	600	2, 000. 00	1, 200, 000. 00
Evacuation hospitals, 2 for each of 12 divisions and reserve.....	30	15, 240. 66	457, 219. 80
Base hospitals, 1 for each division and reserve.....	15	23, 141. 40	347, 121. 00
Dental outfits, portable.....	250	500. 00	125, 000. 00
Dental outfits, base.....	20	1, 500. 00	30, 000. 00
Total.....			2, 873, 989. 10

Motor ambulances and motor cycles having been omitted from the original estimate, a supplemental amount in the sum of \$5,000,000 for that purpose was submitted May 5, the appropriation bill still pending, and incorporated in the bill.⁶ This bill became a law on June 15, 1917, 70 days after the declaration of war.⁷ The money in this appropriation was available immediately upon its approval by the President. In the meantime, the estimates submitted the previous year in the sum of \$1,450,000 had received the consideration of Congress and were approved in the sum of \$1,000,000. The appropriation for the year 1918 became law May 12, 1917, but the funds granted therein did not become available until July 1, 1917.⁸ There was in sight, then, for the period from the declaration of war until June 30, 1918, the gross sum of \$32,000,000, representing the appropriations passed in May and June, 1917, and the balance remaining from previous appropriations. By the time the deficiency appropriation for 1917-18 (act of June 15, 1917) had been passed the requirements of the War Department in the matter of equipment and supplies, as well as pay of troops, had become quite clear. It was manifest that the sums carried in the deficiency act of June 15 were inadequate and that another appropriation would be necessary in the near future. The Secretary of War gave instructions on June 18, 1917, that estimates be submitted to cover deficiencies in appropriations for the fiscal year ending June 30, 1917, and additional appropriations required for the fiscal year 1918, if any.⁹ Acting under these instructions, an estimate to the amount of \$100,026,000 in the following detail was submitted June 26, 1917, under Medical and Hospital Department.¹⁰ The Secretary was advised June 30, 1917, that the estimate already forwarded included all the estimates to be submitted for action at that session of Congress and that additional estimates would not be submitted.¹¹

*Memorandum re supplemental estimates under "Medical and Hospital Department, 1918,"
submitted June 26, 1917*

WAR DEPARTMENT,
SURGEON GENERAL'S OFFICE,
June 26, 1917.

Initial medical equipments for second million men, not covered by previous estimates, viz:

Motor ambulances, spare parts and accessories.....	\$6, 840, 000
Motor cycles for medical service.....	384, 000
Cooking utensils and tableware.....	450, 000
Fabrics and textiles.....	4, 500, 000
Foods, beverages, and condiments.....	440, 000
Hardware and metal articles.....	350, 000
Medical and surgical instruments and appliances.....	880, 000
Medicines, antiseptics, and disinfectants.....	3, 400, 000
Rubber goods.....	290, 000
Stationery.....	126, 000
Surgical dressings and sutures.....	9, 750, 000
Tin containers.....	160, 000
Wooden articles.....	995, 000
Miscellaneous supplies.....	1, 250, 000
	<hr/>
	\$29, 815, 000

Gas masks, trench sprayers, and oxygen apparatus for 2,000,000 men, at \$10 each, \$20,000,000, plus \$2,000,000 for a 10 per cent reserve, plus \$2,000,000 for refilling and repairs, less \$1,000,000 allowed on previous estimates.....	\$23, 000, 000
Medical Department belts, 30,000 officers, at \$3.50 each, \$105,000, plus 300,000 enlisted men, at \$5.50 each, \$1,650,000.....	1, 755, 000
Current medical upkeep during the year, at \$25 per year per man, 1,000,000 men for an entire year, \$25,000,000, plus 500,000 men for 9 months, \$9,375,000, plus 500,000 men for 6 months, \$6,250,000, less \$12,000,000 allowed on previous estimates.....	28, 625, 000
Veterinary supplies, allowed on previous estimates.....	000, 000
Mosquito destruction, Canal Zone posts, allowed on previous estimates.....	000, 000
Machinery for four steam laundries.....	160, 000
Total.....	83, 355, 000
Additional 20 per cent for wastage, losses at sea, etc.....	16, 671, 000
Grand total.....	100, 026, 000

Surgeon General, United States Army.

These estimates were included in the first deficiency bill of 1918 in the sum of \$100,000,000. This bill was passed and signed by the President, October 6, 1917.¹² With the approval of this bill there was available to the Medical Department until the end of the fiscal year 1918, the gross sum of \$130,780,000, appropriated between April 6 and October 7, and the balance remaining from the appropriations made in 1916. It became evident by the end of April, 1918, that these sums would be inadequate. The augmentation in the number of troops to be provided for and the increased expense because of epidemics and new equipment were greater than had been anticipated. On April 20, 1918, \$27,996,798.25 of the amount appropriated June 15, 1917, and \$77,810,099.17 of the amount appropriated October 6, 1917, had been obligated. Of the remainder, \$7,000,000 was required for the finance division, \$5,000,000 for the American Expeditionary Forces for local purchases, leaving an unobligated balance of \$11,189,900.83 in the appropriations for the fiscal year 1918. The requirements of the Gas Defense Service for the balance of the year were estimated at more than \$10,000,000. Contracts then being negotiated for gauze, muslin, instruments, etc., approximated \$17,000,000.¹³ Additional estimates were put forward by the Surgeon General on April 30, 1918,¹⁴ in the sum of \$33,000,000. Congress, by act of June 4, 1918, authorized the Secretary of War to enter into contracts and otherwise incur obligations on behalf of the Medical Department not to exceed \$33,000,000, in addition to the appropriations theretofore made.¹⁵ This permitted the Surgeon General to enter into contracts to the extent of the sum specified but provided no money to extinguish the obligations when incurred. A deficiency estimate of \$33,000,000 in the following detail was forwarded June 20, 1918,¹⁶ to cover the contracts authorized by the preceding act.^a The estimate was included in the deficiency act then pending and became a law on July 8, 1918.¹⁷

^a The several schedules mentioned in the estimate are in complete detail as to articles, quantities, prices, totals, and aggregate amounts. Because of the number of articles enumerated in them the schedules are omitted.

Estimate of deficiency, Medical and Hospital Department, fiscal year 1918

Obligations to be incurred-----		\$51, 145, 116. 04
Motor vehicles (Schedule 1)-----	\$4, 235, 000. 00	
Printing and binding-----	100, 000. 00	
Veterinary supplies and equipment-----	724, 116. 04	
Medicines and antiseptics (Schedule 2)-----	\$269, 019. 00	
Dressings (Schedule 3)-----	142, 824. 12	
Surgical instruments (Schedule 4)-----	67, 272. 92	
Horse blankets, 35,000, at \$7--	245, 000. 00	
Gas masks-----		12, 257, 000. 00
Supplies, equipment and incidentals-----	\$11, 000, 000. 00	
Employees and operatives-----	257, 000. 00	
Other medical and hospital supplies-----		28, 000, 000. 00
Textiles (Schedule 5)-----	\$6, 000, 000. 00	
Medicines, antiseptics, etc. (Schedule 6)-----	5, 000, 000. 00	
Surgical dressings and sutures (Schedule 7)-----	14, 000, 000. 00	
Hospital equipment and supplies (Schedule 8)-----	1, 600, 000. 00	
Surgical instruments (Schedule 9)-----	900, 000. 00	
Litters, pack saddles and chests (Schedule 10)-----	500, 000. 00	
Miscellaneous (to cover civilian employees, civilian medical services, laundry of hospital linen, and sundry expenses)-----		2, 229, 000. 00
Advances to disbursing officers in France-----		3, 600, 000. 00
		<hr/>
Deduct unobligated appropriations-----		18, 233, 305. 39
Total appropriations-----	130, 780, 000. 00	
Act May 12, 1917-----	\$1, 000, 000. 00	
Act June 15, 1917-----	29, 780, 000. 00	
Act Oct. 6, 1917-----	100, 000, 000. 00	
Less amount obligated-----	112, 546, 594. 61	
		<hr/>
Deficiency (in round numbers, \$33,000,000)-----		32, 911, 810. 65

When the estimates for the fiscal year 1919 were submitted there was great uncertainty as to the probable strength of the Army during that period. The estimates finally submitted gave details for forces varying between 1,500,000 and 3,000,000 men.¹⁸ These estimates were submitted in September, 1917, and were necessarily uncertain as to amounts that would be required a year in advance in a war of magnitude. It was necessary to prepare them on a sliding scale. The sum actually appropriated for 1919 was based upon a force of 2,600,000 men averaged for the year.¹⁹ The estimate finally included in the bill was \$267,408,948 on the basis of that strength. This sum was appropriated July 9, 1918, and became at once available.²⁰

Shortly after this appropriation had been made the military program was extended to include an average force somewhat in excess of 3,500,000 for the year.²¹ To maintain such a force additional funds would be required. Acting

upon instructions received from the War Department on July 25, 1918,²² an additional estimate was prepared in detail to cover this increase in military force. This estimate was submitted under date of August 5, 1918, in the sum of \$95,000,000. In detail the estimate conformed to that of June 20, 1918, above described, and will not be entered here. The deficiency act approved November 4, 1918, appropriated \$30,000,000 under the title "Medical and Hospital Department," for the usual purposes, exclusive of gas masks, and granted authority to incur obligations for those purposes not to exceed \$65,000,000 in addition to the appropriations therein and theretofore made.²³ The signing of the armistice on November 11, 1918, obviated the need to utilize this authority.

TRANSFERS OF APPROPRIATIONS

Effective as of July 1, 1918, the Chemical Warfare Service was organized. To it was transferred the Gas Defense Service of the Medical Department, and with it the funds appropriated for gas masks and materials. Effective as of September 1, 1918, the Motor Transport Corps was organized, and the motor ambulances and motor cycles required for the mission of the Medical Department were transferred to that corps. With the control and operation of those vehicles went the funds appropriated for their purchase and maintenance. The sums actually transferred for the above purposes were:²⁴

Chemical Warfare Service:		
Appropriations, fiscal year 1918.....	\$12, 105, 000. 00	
Appropriations, fiscal year 1919.....	68, 697, 000. 00	
Total.....		\$80, 802, 000. 00
Motor Transport Corps:		
Appropriations, fiscal year 1918.....	\$1, 750, 393. 45	
Appropriations, fiscal year 1919.....	23, 117, 614. 79	
Total.....		24, 868, 008. 24

SUMMARY OF APPROPRIATIONS

Available during fiscal year 1917:		
Act of July 1, 1916, fiscal year 1916-17.....	\$1, 584, 000. 00	
Act of August 29, 1916, fiscal year 1917.....	4, 500, 000. 00	
Act of June 15, 1917, fiscal year 1917-18.....	29, 780, 000. 00	
Replacing medical supplies, 1916-17.....	110, 217. 02	
Total fiscal year 1917.....		35, 874, 217. 02
Available during fiscal year 1918:		
Act of May 12, 1917, fiscal year, 1918.....	\$1, 000, 000. 00	
Act of October 6, 1917, deficiency 1918.....	100, 000, 000. 00	
Act of July 8, 1918, deficiency 1918.....	33, 000, 000. 00	
Replacing medical supplies, 1917-18.....	141, 453. 47	
Total fiscal year 1918.....		134, 141, 453. 47
Available during fiscal year 1919:		
Act of July 9, 1918, fiscal year, 1919.....	\$267, 408, 948. 00	
Act of November 4, 1918, deficiency, 1919.....	30, 000, 000. 00	
Replacing medical supplies, 1918-19.....	409, 478. 47	
Total fiscal year 1919.....		297, 818, 426. 47

Refundments and transfers of charges by United States

Treasury:

Appropriation, fiscal year, 1916-17-----	\$121. 90
Appropriation, fiscal year, 1917-----	2, 840. 19
Appropriation, fiscal year, 1917-18-----	17, 133. 69
Appropriation, fiscal year, 1918-----	375, 859. 69
Appropriation, fiscal year, 1919-----	266, 186. 20
Total refundments, etc-----	\$662, 141. 67
Total funds available (three years)-----	<u>468, 496, 238. 63</u>

DISPOSITION OF FUNDS ACCRUING TO THE MEDICAL DEPARTMENT ^a

Disbursed:

For medical and hospital equipment and supplies-----	\$153, 275, 071. 79
For Medical Department motor vehicles, spare parts, and equipment..	^b 9, 440, 189. 40
For gas masks, parts, and manufacture of-----	^c 18, 498, 644. 14
For medical care and attendance where the services of the Medical Department were not obtainable-----	1, 709, 618. 65
For hospital laundry-----	3, 186, 902. 17
For personal services (civilian employees)-----	6, 196, 675. 25
For other authorized purposes-----	2, 743, 627. 02
Total disbursed under Medical Department, in United States..	<u>195, 050, 728. 42</u>

Transferred to other departments for disbursement:

Without credit to medical department—

To Quartermaster's Department, shelter of sick etc-----	310, 000. 00
To Ordnance Department-----	912, 500. 09
To Chemical Warfare Service, gas masks, etc-----	80, 802, 000. 00
To Motor Transport Corps, ambulances, etc-----	24, 868, 098. 24
Total transferred without credit-----	<u>106, 892, 508. 24</u>

On Interbureau Procurement—

To Quartermaster Corps-----	25, 377, 863. 44
To Chief of Finance-----	6, 226, 020. 28
To Ordnance Department-----	72, 664. 82
To Bureau of Aircraft Production-----	63, 440. 00
To Construction Division-----	5, 728. 09
To Department of Agriculture-----	5, 000. 00
Total transferred for supplies-----	<u>31, 750, 716. 63</u>

Returned to the United States Treasury:

Repealed by act of Feb. 25, 1919-----	54, 145, 513. 73
Through lapses of appropriations-----	79, 804, 857. 57
By adjustments of appropriations-----	1, 549, 068. 36
Total Treasury-----	<u>135, 499, 439. 66</u>

^aThe details relative to disposition of appropriations available to the Medical Department are taken, except for motor ambulances, from the Annual Report of the Surgeon General for the years 1917 to 1921, inclusive, and are believed to represent the best data obtainable outside the Office of the Comptroller General of the United States. The records in the latter office have not been consulted.

^bThe total disbursement for motor vehicles for the Medical Department was \$15,802,424.11, the remainder being disbursed after the transfer of that activity to the Motor Transport Corps. (See chapter on ambulances for details.)

^cThis does not include the sum disbursed for this purpose under the Chief of the Chemical Warfare Service.

Transferred to American Expeditionary Forces for disbursement under Chief Surgeon; not accounted for to or through the Surgeon General:	
Appropriations, fiscal year 1917-18.....	\$27, 222, 760. 55
Appropriations, fiscal year 1919.....	8, 431, 000. 00
Total to American Expeditionary Forces.....	35, 653, 760. 55
Total disbursements in United States under Surgeon General.....	195, 050, 728. 42
Transferred to American Expeditionary Forces for disbursement.....	35, 653, 760. 55
Transferred to other departments for supplies.....	31, 750, 716. 63
Transferred to other departments without credit.....	106, 892, 508. 24
Returned to United States Treasury.....	135, 499, 439. 66
Total record of disposition.....	504, 847, 153. 50
Less funds transferred but not expended.....	36, 350, 914. 87
Equals total funds available for three years.....	468, 496, 238. 63

DEFICIENCIES

Congress, by the deficiency act of April 17, 1917, appropriated \$100,000,000 for the national defense to be expended at the discretion of the President.²⁵ On April 23, 1917, The Adjutant General called for a statement from the Surgeon General showing what part of the \$100,000,000 was immediately needed by the Medical Department, but specified that the statement should not include items that can be purchased from ordinary appropriations.²⁶ By indorsement thereon, April 24, 1917, the Surgeon General requested \$3,421,500, for the following purposes:

Mosquito bars, 100,000, at \$4.80.....	\$480, 000
Canvas cases for bedding:	
Large, 25,000, at \$6.....	6150, 000
Small, 7,000, at \$4.....	28, 000
Blankets, 250,000, at \$5.50.....	1, 375, 000
Litters, 60,000, at \$6.....	360, 000
Paeksaddles, 2,000, at \$63.....	126, 000
Cots, 120,000, at \$4.....	480, 000
Chairs, folding, 34,000, at \$0.75.....	25, 500
Tables, bedside, folding, 30,000, at \$0.90.....	27, 000
Vials.....	35, 000
Books for instruction.....	335, 000
Total.....	3, 421, 500

On May 10, 1917, The Adjutant General informed the Surgeon General that the Secretary of War had decided not to ask the President for allotments under this fund except for extraordinary objects not embraced in estimates before Congress.²⁷

While awaiting information concerning the apportioning of this national defense fund, the Surgeon General applied to the Secretary of War for authority to incur a deficiency under section 3732, Revised Statutes, in the amount of \$3,421,500, covering the same items as above listed.²⁸ This request was granted and the Surgeon General was informed thereof by The Adjutant General under date of May 1, 1917. On May 2, 1917, the Surgeon General requested a written confirmation of the verbal authority given him that day by the Secretary of War to incur a deficiency of \$5,000,000 for motor ambulances. Advice was

received from The Adjutant General on May 10, 1917, that no further action was necessary, the estimates covering this item being before Congress.²⁹

On May 18, 1917, the Surgeon General requested authority to proceed at once, in advance of the passage of the deficiency bill, to place orders for medical supplies needed for an army of a million men, estimating the cost of those supplies at \$25,000,000.³⁰ The reasons cited were: It was becoming increasingly difficult to obtain supplies of all kinds, and prices were constantly advancing. It was considered desirable that the manufacturers have definite orders so that they could systematize their resources and production and begin at once the manufacture of the goods. It was desirable that the orders be placed at once because of the time required to manufacture the supplies. This request was returned May 25 with the information that the Secretary of War, after a personal consideration, in view of the probable passage of the deficiency bill in a few days, did not feel that he could give blanket authority to place orders which would involve a deficiency such as that requested.³¹ As already noted, that bill did not become a law until June 15. Until that date the Medical Department had to depend upon its unobligated balances of the 1917 appropriations, plus the deficiencies authorized by indorsement of May 1 and verbally May 2. Obligations under the former were placed for the articles above listed. Under the latter the following obligations were incurred:³²

DECEMBER 20, 1917.

Obligations incurred for medical and hospital supplies in advance of appropriation, from May 18, 1917, when all balances then on hand had been pledged, to June 15, 1917, when the appropriations made in the deficiency act of that date became available:

Dental equipment and supplies.....	\$18, 098. 60
Dishes, kitchen equipment, enamel ware.....	18, 616. 87
Dressings, including gauze, cotton, sutures, adhesive plaster, splints:	
Human.....	18, 316. 80
Veterinary.....	5, 200. 00
Field chests, litters, packsaddles.....	460, 715. 00
Hospital furniture exclusive of metal beds, including cabinets, cots, stools, chairs, food carts.....	432, 486. 22
Instruments:	
Human.....	46, 220. 00
Veterinary.....	9, 200. 00
Medicines, antiseptics, disinfectants:	
Human.....	11, 095. 02
Veterinary.....	5, 100. 00
Metal beds, mattresses, cotton pads, pillows.....	145, 196. 00
Motor vehicles and spare parts for same.....	334, 278. 00
Rubber goods.....	1, 137. 33
Stationery, typewriters, diagnosis tags.....	18, 187. 00
Sterilizers and boilers for same.....	3, 768. 45
Textiles, including blankets (human and veterinary), sheets, bed sacks, pillow sacks, towels, pajamas, shirts, bath robes, mosquito bars.....	3, 520, 721. 36
X-ray equipment and supplies.....	3, 168. 15
Miscellaneous hospital supplies, including soaps; urinals and bedpans and racks for same; brooms and brushes; glassware, including bottles, flasks, ampoules, and vials; clinical thermometers; toilet paper; slippers; screens for beds, etc.....	188, 006. 19
Total.....	<u>5, 239, 510. 99</u>

Deliveries on instruments and dressings were specified to begin within 30 days and to be completed by January 1, 1918.

Deliveries on dental equipment were to begin within 30 days and to be completed by June 30, 1918.

Deliveries on blankets, pajamas, and towels were to begin within 30 days and to be completed by January 1, 1918.

Deliveries on all other articles were to begin within 30 days and to be completed within six months at the most.

The deliveries specified have been met by the contractors with but few exceptions.

The funds appropriated June 15 practically all were obligated by the middle of July without satisfying the demand for supplies. Additional funds or authority to purchase had become necessary. The deficiency estimates submitted June 26 had not eventuated into an appropriation. On July 20, the Surgeon General requested authority through The Adjutant General, to proceed at once, under the authority of section 3832, Revised Statutes, with the purchase of supplies as follows:³³

Gas masks (devolved upon the Medical Department to provide) ..	\$12,000,000
Surgical dressings	10,000,000
Veterinary instruments and supplies	1,000,000
Various hospital supplies	6,000,000
Total	29,000,000

This request was approved by the Secretary of War July 23, 1917.³³

Owing to the delay in the passage of the deficiency bill, additional authority to purchase supplies became necessary in September, 1917. On September 12 the Secretary of War authorized the Surgeon General to proceed with the purchase of the following articles under section 3732, Revised Statutes, as amended:³⁴

Cooking utensils and tableware	\$700,000
Fabrics and textiles	5,000,000
Hardware and metal articles	350,000
Medical and surgical appliances	550,000
Medicines and antiseptics	300,000
Rubber goods	350,000
Stationery	150,000
Surgical dressings	8,000,000
Tin containers	200,000
Wooden articles	1,000,000
Miscellaneous supplies	900,000
Total	17,500,000

The obligations, which had been incurred for medical and hospital supplies in advance of appropriations from August 9, 1917, when all balances then on hand had been pledged, to October 6, 1917, when the appropriations made in the deficiency act of that date became available, were as follows:

Books	\$49,292.80
Dental equipment and supplies	471,525.69
Dishes, kitchen equipment, enamel ware	111,245.44
Dressings, including gauze, cotton, sutures, adhesive plaster, splints:	
Human	942,200.63
Veterinary	396,018.00

Field chests, litters, packsaddles.....	\$850, 823. 25
Gas mask parts and assembling of same.....	1, 844, 150. 00
Hospital furniture exclusive of metal beds, including cabinets, cots, stools, chairs, food carts.....	587, 426. 77
Instruments:	
Human.....	1, 006, 000. 00
Veterinary.....	270, 250. 00
Laboratory equipment and supplies.....	40, 198. 76
Medicines, antiseptics disinfectant:	
Human.....	1, 106, 713. 44
Veterinary.....	342, 000. 00
Metal beds, mattresses, cotton pads, pillows.....	1, 212, 355. 00
Motor vehicles and spare parts for same.....	1, 489, 247. 60
Rubber goods.....	22, 992. 87
Stationery, typewriters, diagnosis tags.....	156, 275. 54
Sterilizers and boilers for same.....	107, 768. 22
Textiles, including blankets (human and horse), sheets, bed sacks, pillow sacks, towels, pajamas, shirts, bath robes, mosquito bars.....	9, 311, 523. 48
X-ray equipment and supplies.....	111, 781. 98
Miscellaneous hospital supplies, including soaps; urinals and bedpans; racks for urinals and bedpans; brooms and brushes; glassware, includ- ing bottles, flasks, ampoules, and vials; clinical thermometers; toilet paper; slippers; screens for beds, etc.....	275, 334. 99
	20, 707, 124. 46

The shortage of funds which threatened in May, 1918, was met by the authorization of Congress on June 4 to enter into contracts and incur obligations not to exceed \$33,000,000 in addition to existing appropriations.³⁵

REFERENCES

- (1) Act of July 8, 1918 (40 Stats. 821).
- (2) Letter from the Surgeon General to the department surgeon, Southern Department, August 10, 1916, relative to equipping other ambulance companies with motor equipment. On file, Finance and Supply Division, S. G. O., 11,220-67-1.
- (3) Letter from the Surgeon General to Chief Clerk, War Department, February 14, 1917, relative to withdrawals from Treasury and obligations of appropriations for fiscal year 1917. On file, Record Room, S. G. O., 152,239-5-B (Old Files.)
- (4) First indorsement, Surgeon General's Office to The Adjutant General, February 2, 1917, relative to estimates for an army of 1,000,000 men. On file, Record Room, S. G. O., Old Files, 154,905.-B.
- (5) First indorsement, Surgeon General's Office, to The Adjutant General, March 31, 1917, relative to estimates for the equipment of 1,000,000 men, and formal estimate of March 31, 1917. On file, Record Room, S. G. O., 154,905-G-1 (Old Files).
- (6) Second indorsement, Surgeon General's Office, to The Adjutant General, May 5, 1917, relative to deficiency and estimates. On file, Record Room, S. G. O., 152,239-7 (Old Files).
- (7) Act of June 15, 1917 (40 Stats. 182).
- (8) Act of May 12, 1917 (40 Stats. 40).
- (9) Letter from Assistant and Chief Clerk, War Department, to the Surgeon General, June 18, 1917, relative to additional estimates. On file, Record Room, S. G. O., 152,239.-8 (Old Files).

- (10) Supplemental estimates, Medical and Hospital Department, 1918. On file, Record Room, S. G. O., 111.1 (f. y. 1918).
- (11) First indorsement, Surgeon General to the Assistant and Chief Clerk, War Department, June 30, 1917, relative to additional estimates. On file, Record Room, S. G. O., 158,777.10 (Old Files).
- (12) Act of October 6, 1917 (40 Stats. 345).
- (13) Obligations incurred against Medical and Hospital Department, 1918, of April 20, 1918, filed with estimates Medical and Hospital Department, April 30, 1918. On file, Record Room, S. G. O., 111.1 (f. y. 1918).
- (14) Letter from the Surgeon General to the Secretary of War, April 30, 1918. Subject: Deficiency estimates, fiscal year 1918. On file, Record Room, S. G. O., 111.1 (f. y. 1918).
- (15) Act of June 4, 1918 (40 Stats. 594).
- (16) Letter from the Surgeon General to the Director of Operations, Chief of Staff, Room 344, State, War, and Navy Building, June 20, 1918. Subject: Deficiency estimates 1918. On file, Record Room, S. G. O., 111.1 (f. y. 1918).
- (17) Act of July 8, 1918 (40 Stats. 821).
- (18) Letter from the Surgeon General to the Secretary of War, September 15, 1917, and to Chief of Staff, May 16, 1918. Subject: Estimates of appropriations 1919. On file, Record Room, S. G. O., 166,322-K, and 111.1 (f. y. 1919) (Old Files).
- (19) First indorsement, The Adjutant General's Office, to the Surgeon General, May 21, 1918, relative to strength of Army under estimates for 1919. On file, Record Room, S. G. O., 111.03 (Med. Dept.).
- (20) Act of July 9, 1918 (40 Stats. 845).
- (21) Approved Military Program, 80 divisions, received from Chief of Staff, July 25, 1918. On file, Finance and Supply Division, S. G. O., confidential files.
- (22) Letter from the Director of Operations, General Staff, to the Surgeon General, July 25, 1918. Subject: Military programs for fiscal year 1918-19. On file, Finance and Supply Division, S. G. O., confidential files.
- (23) Act of November 4, 1918 (40 Stats. 1020).
- (24) Annual Report of the Surgeon General, U. S. Army, 1919, Vol. II, 1191-1193.
- (25) Act of April 17, 1917 (40 Stats. 28).
- (26) Letter from The Adjutant General to the Surgeon General, April 23, 1917. Subject: Statement of funds needed for emergency purposes. On file, Record Room, S. G. O., 169,966 (Old Files).
- (27) Memorandum from the Chief of Staff through The Adjutant General, to the Surgeon General, May 10, 1917. Subject: Statement of funds needed for emergency purposes. On file, Record Room, S. G. O., 169,966 (Old Files).
- (28) Letter from the Surgeon General to The Adjutant General, April 25, 1917. Subject: Authority to incur a deficiency for medical and hospital supplies. On file, Record Room, S. G. O., 152,239-6 (Old Files).
- (29) First indorsement, The Adjutant General to the Surgeon General, May 10, 1917, relative to a deficiency for motor ambulances. On file, Record Room, S. G. O., 152,239-7.
- (30) Letter from the Surgeon General to The Adjutant General, May 18, 1917. Subject: Medical supplies for an army of a million men. On file, Finance and Supply Division, S. G. O., 14,727-B.
- (31) First indorsement, The Adjutant General to the Surgeon General, May 25, 1917, on the foregoing letter. On file, Finance and Supply Division, S. G. O., 14,727-B. (A. G. O. 2600272).
- (32) Memorandum prepared by Col. H. C. Fisher, M. C., Surgeon General's Office, December 20, 1917, regarding Medical Department supplies. On file, Record Room, S. G. O., 111.1 (f. y. 1918).

- (33) Letter from the Surgeon General to The Adjutant General, July 20, 1917. Subject: Authority to incur a deficiency for medical and hospital supplies, with the approval of the Secretary indorsed thereon. On file, Record Room, S. G. O., 152,239-8A (Old Files).
- (34) Letter from the Surgeon General to the honorable the Secretary of War, September 10, 1917. Subject: Authority to incur a deficiency for medical and hospital supplies. On file, Finance and Supply Division, S. G. O., $\frac{750-660}{4}$. Secretary's approval is indorsed thereon.
- (35) Act of June 4, 1918 (40 Stats. 594).

CHAPTER IV

REQUIREMENTS

In the procurement of supplies, whether public or private, the first factor to be determined is the articles and quantities needed. The term requirements has, in recent years, come into use relative to this factor. It indicates the things to be purchased and the quantities required. The term estimates, on the other hand, relates to the funds required to pay for the things purchased or the services employed. The articles having been determined, the quantities to be ascertained then represent the needs for a definite period. In military affairs the quantities required depend further upon the number of troops to be supplied. The term requirements, then, covers three factors—articles, period of time, and number of troops. As a rule the articles to be purchased are those included in the standard supply table of the bureau using them or making the purchases. These form the bulk of the purchases. To them are added such new articles as the needs of the period indicate.

The paraphernalia required by the Medical Department for the successful performance of its mission necessarily covers a wide range of articles and involves many commodities and industries. Since the very beginning of the medical establishment of the Army these articles have been divided into two more or less definite and distinct groups. The first group represents the articles required on the field of battle and its immediate environs in rendering the primary or first-aid treatment of the wounded and in preparing them for evacuation to the rear. The second group includes the articles required in the more or less permanent and fixed hospitals of the rear and the home territory for the continuing or definitive treatment so long as that treatment is needed. In times of a major emergency new needs always develop and articles not previously considered needful must be furnished. The question of the articles required is a comparatively simple one. The question of quantities is much more difficult of determination. For example, in the treatment of the wounded during and after a battle the articles required to dress the wounds, check hemorrhage, control shock, relieve pain, and immobilize fractures are well known. The quantities of these same articles are dependent upon several factors, none of which can be anticipated accurately. The number of persons wounded, the locality, character, and extent of the wound, the degree of shock, the probability of tetanus and gas gangrene, and the physical state of the individual at the time he was wounded, all affect the treatment and the quantity of supplies required. In camp or bivouac the presence or absence of epidemics and the kinds of disease present likewise are determining factors in the calculation of requirements. However, in this the observations and experience of years point the way. In times of warfare and assemblages of large bodies of troops into camps experience of peace time can be used as a guide but can not be observed as to quantities.

Here the utmost liberality must be given to the quantities purchased. The morbidity rate from disease and injury other than battle casualties rises rapidly and tends to be more serious. The morbidity from battle casualties has a tendency to rise with each succeeding conflict due to the increase in destructiveness of enginery of war. Much, therefore, must be left to the judgment of the person preparing the estimates, both of the quantities likely to be required during the conflict or any given period of it and of the cost of the materials. While care should be taken to approximate the requirements to actual usage of the supplies, much less criticism will obtain from having a moderate excess than from an actual shortage however slight.

Supplies are divisible again into the expendable, or those which are consumed daily, and the nonexpendable, or those that may be used for long periods without wearing out. In the former class are medicines, surgical dressings, stationery, and many similar articles. In the latter class are furniture, surgical instruments, operating-room equipment, etc. Between these extremes is a great group of articles which neither are consumed daily nor last indefinitely but wear out after varying periods of service. This group may be illustrated by the ward linen, sheets, pillow cases, towels, operating gowns, etc. Every article provided has a definite period of usefulness, but this period is variable, depending upon the care taken in its use. It becomes necessary, therefore, in calculating the requirements of medical supplies, to determine the period of service which may be expected of any given article which is to be supplied. The rate of wastage must either be based upon observation and actual usage over a period of years or be estimated, due account being taken of the article, the purpose for which intended, and the manner of usage. Account must also be taken of the troops to be supplied, whether they be recruits or seasoned veterans. The observations of many years have shown that the morbidity rate from all causes is much higher among recruits than in older soldiers. It is higher also when troops are in camp than when they are in campaign.

Accurate records of the quantities used have been kept of the articles on its standard medical supply table by the Medical Department for the last hundred years. The Surgeon General in 1819, initiated the requiring, from all medical officers to whom supplies were issued, of definite returns at stated intervals of all medical property which came into their custody.¹ The annual rate of consumption was more or less fixed. The allowances were based on average conditions and increases were granted to provide for such contingencies as epidemics. By consolidating the quantities reported on these returns as "Expended with the sick," the total consumption of the expendable articles reported under that head was determined. By dividing this total by the number of troops in thousands, or hundreds, the requirements per thousand or per hundred for 12 months could be obtained. The quantities required for a longer or shorter period could be readily determined by multiplying by a factor representing the ratio of the period desired to the 12-month period.

These property returns showed for the nonexpendable articles listed therein the quantities "worn out or unfit for use." The aggregate of these articles reported from all stations over a definite term of years divided by the number of troops in thousands or hundreds, and that by the number of years, gave the

wastage per thousand or per hundred per year. In addition to the articles expended with the sick and worn out by fair wear and tear, there was always a certain amount lost, stolen, or destroyed by unavoidable accident. The sum of the wastage of any article from all causes during any period represented ordinarily the quantities of that article to be purchased during the next ensuing like period. By this means the peace-time requirements for any article, period, or number of persons can be calculated.

It is true that in time of peace a percentage of the military force in service will be recruits. In a well organized and disciplined force this percentage will be small because the losses from failure to reenlist are comparatively small. In time of war practically all the force will, in the beginning, be without military training and a knowledge of the principles of self-preservation gained thereby. The requirements factor of such a force will be proportionately higher than that of the well-trained force in time of peace. Another element, and one of only a little less importance, is the inexperience and lack of knowledge of military sanitation and conservation of supplies on the part of the medical officers called from civil practice to look after the health of the untrained troops called to the colors. Greater waste of supplies will also occur under war conditions.

It must be evident, therefore, that calculation of the quantities of supplies needed by the medical service of an army in time of war is at best a complicated problem which can not be solved by any known mathematical or other rule. In the last analysis the solution must depend, to a large extent, upon the experience, judgment, and intelligence of those charged with the responsibility. The statistics of our own and foreign armies are valuable aids to the solution of the problem.

In addition to the wastage factor which calls for replacement and replenishment, there is to be considered the initial equipment. In time of war more and larger hospitals are required proportionately than in time of peace. Many of them are special hospitals devoted to a single class or type of disability, such as tuberculous, neuropsychiatric, maxillofacial, and fracture, for which special equipment is required. Tables of unit equipment must be developed to provide for all these types of hospitals as well as for general hospitals. The probable number of each type of institution must be determined. Once the tables of unit equipment have been developed and the number of each to be provided, the question of the quantities of the component articles, or the requirements for initial equipment is one easy of solution. Because of the difficulty of procuring the vast quantities of supplies needed for initial equipment and replenishment, the number of such units must be determined early. In calculating requirements for medical supplies, whether initial equipment or replenishment, it is well to remember that the unexpected always happens and that "a little too much is just right."

For a number of years prior to the World War estimated requirements were used in preference to requisition requirements. By this method the supplies could be obtained before the need for them arose and requisitions from organizations could be filled promptly. The average quantities issued during a definite period formed the basis of the requirements for the ensuing

period. Under this method the several supply depots were required to furnish the Surgeon General a statement of their probable needs for the next six months. The sum of these needs gave the quantities to be purchased. In arriving at their prospective needs the medical supply officers went carefully over their stock records, ascertained the quantity of each article issued during the preceding two years, divided it by 4, and compared the result with the stock of that article on hand. If the quantity in stock were equal to or greater than the average issues, none was requested. If the stock were less than the average issues, a quantity representing the difference would be requested. Because of the delay in securing the articles by purchase it became necessary to carry a greater stock. This involved but slight change in the method of determining the requirements. A six months' requirement was deducted from the stock on hand before a comparison was made between the average issues and the free balance. If the balance of the stock after deducting the six months' supply equaled or exceeded the six months' issues, none was requested; if less than the six months' issues, a sufficient quantity was requested to bring the stock up to a year's supply.

The continuing study of actual issues resulted from time to time in modifications of allowances in the standard medical supply table and materially assisted in the revisions of that table as they became necessary. The quantities of some articles, which experience had shown to be little used, were reduced. Other articles were eliminated. The tendency, however, in a great majority of the articles was toward an increase in the quantities allowed. In the last revision of the supply table published in 1916 in the Manual for the Medical Department, the quantities of all articles appear to be quite liberal, at least for peace-time usage.

When war was declared on April 6, 1917, the Surgeon General felt that there was no time in which to receive estimates from the several depots. Nor did the time permit, had the personnel been available, to compile the war requirements from either the property returns or from theoretical premises. The multitude of factors entering into the expenditure of medical supplies prevented the estimate from being made on an exact basis, as in the case of subsistence supplies where the quantities to be procured represented the number of troops multiplied by the number of days and that by the quantities of the several components of the ration. Some ready and fairly accurate method had to be found at once for calculating war requirements. A very simple expedient was adopted. The standard medical supply table prescribed the allowance as equipment and a year's maintenance of the articles authorized for hospitals at military posts having an official population of 1, 000.²

In translating this principle into actual requirements it was found by experience early in the World War that the quantities of many articles were inadequate, while a few were in excess. Some of the deficiencies were anticipated in the purchase, but others did not develop until later. On the whole, the requirements calculated by this method gave as satisfactory results, it is thought, as could have been obtained by a more detailed and complex method of computing them. Since they were based on peace-time experience it was necessary, of course, that they be corrected for war-time requirements

when sufficient experience had been accumulated. They served as the basis for procurement of a majority of all articles supplied by the Medical Department until well along in 1918, when a new basis was introduced, that of the automatic supply table evolved by the chief surgeon, A. E. F.³

The procedure necessary to determine the quantities of field supplies and equipment which would be needed was not quite so simple. At no time since 1865 had any large bodies of troops of the United States forces served for a considerable length of time under actual field conditions. Consequently there were available no records of the quantities of supplies used under such conditions during any definite period. The types, too, of the equipment used under such conditions varied with the particular units of the Army which were mobilized. In developing the various units of medical equipment for field service much attention had been given to the period of time which the several components of the unit might be expected to last under normal service conditions. It was expected that replenishments could be effected within 10 days, or within 25 days at the longest. In determining the quantities of field supplies to be procured, the quantity of every article required for a division was first ascertained. This was accomplished by calculating the quantities required by each medical unit of the division as initial equipment and as maintenance for one year. The quantities of each article so obtained were consolidated and gave the total requirements for the division. The number of divisions being known, it remained only to multiply the quantity of each article required for a division by the number of divisions to be organized to ascertain the total requirements. Such a table of requirements for a division of Infantry as then authorized was prepared at the field medical supply depot early in 1917, and served as the basis for determining the quantities to be purchased for the first 1,000,000 men of the World War Army. After that the automatic supply table was largely used as a basis.

At the beginning of the World War the determination of the veterinary requirements, now a function of the Medical Department by reason of the national defense act of June 3, 1916, proved to be the most difficult. There was neither a standard veterinary supply table available, nor any definite record of supplies issued per thousand or smaller unit of animals for a year or other period. For many years, the providing of veterinary supplies had been a responsibility of the Quartermaster General's Office, wherein the custom had obtained of allowing \$1 per animal per year for veterinary supplies. Purchases had been made of such articles as the veterinary surgeons requested. Tentative supply tables were prepared and published as paragraphs 904, 966-997 of the Manual for the Medical Department, Changes No. 4, November 19, 1917. These tables soon proved inadequate, and, on the request of the Surgeon General, the British War Office lent a complete set of veterinary chests and wallets, which were used as models for those adopted for our service in the new supply tables compiled in the Surgeon General's Office and approved by the Chief of Staff on January 22, 1918.⁴ The total quantities to be procured were then calculated from these tables of allowances. These tables had hardly been put into circulation, however, before they gave place to a revision which added a few articles and deleted many. They were again modified some

months later. Another difficulty experienced in determining the requirements of veterinary supplies was the uncertainty of the number of animals to be provided for. The extensive use of the motor truck and other motorized vehicles greatly reduced the number of animals required. After May, 1918, the requirements in veterinary supplies were calculated on the basis of the automatic supply table.

The requirements of medical and hospital supplies calculated from the supply table of annual allowances per thousand men were used as the basis of purchase during 1917, and especially in the earlier contracts. The first variant came during the latter part of May, 1917, when the Surgeon General decided that lying-down accommodations would be required for 25 per cent of the military forces sent overseas. This included all such accommodations from the field hospitals of the divisions at the front to the general hospitals in the rear. To meet these requirements it was deemed expedient to procure 3,000 ward units of 50 beds each in addition to the 85,000 beds already purchased under the supply table allowances.

The quantities specified in the original statement of requirements based on supply table allowances did not prove entirely satisfactory and were not fully in accord with the estimate of the situation as it presented itself to the officer in charge of the finance and supply division. In the latter part of December, 1917, and early part of January, 1918, the requirements were computed anew, item by item. The results of this computation were furnished the purchasing depots in January, 1918, as the new schedules of procurement. In some items the quantity was increased. A number of new articles, which had been added to the supply table subsequent to the declaration of war, were included in the requirements and the quantities specified. The quantities of all articles on the new schedule of procurement were still based on an army of a million men.

By the end of February, 1918, the military force in the service of the United States exceeded 1,500,000 men.⁵ In March, 1918, the military program contemplated that this force would be increased to 1,725,000 men by the end of June of that year.⁵ This number was increased in May, 1918, to 2,230,000 by June 30, 1918, 2,500,000 by December 31, 1918, 3,010,000 by June 30, 1919, and 3,560,000 by the end of 1919.⁶ Even the latter program was exceeded, for there were 2,500,000 men under arms on June 30, 1918.⁷ A new military program was promulgated in the latter part of July, 1918, which contemplated a force of 3,675,000 troops by the end of December, 1918, and 4,850,000 by the end of June, 1919.⁷ This program called for 2,350,000 troops in France by December 31, 1918, and 3,360,000 June 30, 1919. In September, 1918, the contemplated military program for the period July 1, 1919, to June 30, 1920, was promulgated to the supply bureaus.⁸ This program contemplated that the military force would reach 5,225,000 by December 31, 1919, and 5,550,000 by June 30, 1920. Of these forces it was intended that 4,260,000 would be maintained in the American Expeditionary Forces.

These successive increases in the military program necessarily called for corresponding changes in the schedule of requirements and in the production program to meet them. The basis for calculating requirements remained essentially the standard supply table with such modifications as had been

recommended by the chief surgeon, A. E. F., until the receipt in May, 1918, of an automatic supply schedule from headquarters, A. E. F.⁹ For overseas shipment many articles had been eliminated. In September, 1917, the supply of alcohol, ether, chloroform, rubber gloves, surgical needles, adhesive plasters, and all sutures were increased to ten times and gauze and surgical dressings to twenty-five times the allowances on the standard supply table.¹⁰ The articles eliminated were principally heavy furniture and bulky articles not of great importance in the operation of hospitals.¹¹

The basis of the automatic supply schedule was a unit of 25,000 men representing a mixed force of front and rear troops but without reference to an organized division.¹² The period during which it was estimated that the quantities of each article on this schedule would last was one month. These quantities, for the greater part of the articles on the schedule, were materially greater than one-twelfth of the supply table allowances for that number of troops. A considerable increase in requirements and in the procurement schedule was made necessary by these increases. The quantities stated in this automatic schedule appeared unduly large, especially those of surgical instruments of all kinds. This led to an exchange of views between the Surgeon General's Office and the chief surgeon, A. E. F.¹³ The conclusion was to let the quantities stand until a reserve had been accumulated in France, when the quantities would be revised. This revision was made August 20, 1918, and in it the quantities of surgical instruments were materially reduced.¹⁴ By that time large quantities of such instruments had been shipped to France, and the depot there was beginning to have enough. The quantities stated in the automatic schedule of supply were utilized during the remainder of the war as the basis for calculating requirements. The revision of the surgical instrument schedule was received September 28, 1918, too late to have any marked effect in the purchases made or in the quantities contracted for. By that time the bulk of the contracts had been placed and were allowed to stand.

REFERENCES

- (1) Military Laws, Rules, and Regulations of the Army of the United States, January, 1820, 185.
- (2) Manual for the Medical Department, 1916, pars. 842-848½.
- (3) Report of the activities of the supply division, chief surgeon's office, A. E. F., made to the chief surgeon, A. E. F., May, 1919, by Col. N. L. McDiarmid, M. C. On file, Historical Division, S. G. O.
- (4) First Indorsement from The Adjutant General to the Surgeon General, January 22, 1918. On file, Finance and Supply Division, S. G. O., 742.
- (5) Tentative strength table for requirements and supply estimates only, March 19, 1918. On file, Finance and Supply Division, S. G. O., $\frac{750-714 \text{ S. G.}}{S-10}$.
- (6) Memorandum for the Finance and Supply division, S. G. O., from the Purchase and Supply Division, General Staff, May 14, 1918. Subject: Revised Army program. On file, Finance and Supply Division, S. G. O., $\frac{750-714 \text{ S. G.}}{S-10}$.
- (7) Memorandum for the Surgeon General from the Director of Operations, Office of Chief of Staff, July 25, 1918. Subject: Military programs for fiscal year 1918-1919. On file, Finance and Supply Division, S. G. O., $\frac{750-714 \text{ S. G.}}{S-10}$.

- (8) Letter from the Chief, Statistical Section, Administrative Branch, Office of the Chief of Staff, to the Surgeon General of the Army, September 11, 1918. Subject: Extension of military program. On file, Finance and Supply Division, S. G. O., $\frac{750-714 \text{ S. G.}}{8-10}$.
- (9) Letter from the Chief Surgeon, A. E. F., to the Surgeon General, U. S. Army, April 2, 1918, (received in S. G. O. May 10, 1918). Subject: Automatic supply. On file, Finance and Supply Division, S. G. O., $\frac{713-750}{15}$.
- (10) Cablegram No. 155, par. 7, from commander in chief, H. A. E. F., Chaumont, to The Adjutant General, relative to medical supplies.
- (11) Cablegram No. 232, par. 2. A, from H. A. E. F., France, to The Adjutant General, Washington, October 20, 1917, relative to medical and hospital supplies.
- (12) Cablegram No. 145, par. 5-2, H. A. E. F., France, to The Adjutant General, September 7, 1917, relative to automatic supply.
- (13) Cablegram No. 1197, par. 7, H. A. E. F., France, to The Adjutant General, Washington, May 29, 1918, relative to surgical instruments, chests and cases.
- (14) Letter from the Chief Surgeon, A. E. F., France, to The Surgeon General, U. S. Army, August 20, 1918. Subject: Revised list of surgical instruments. On file, Finance and Supply Division, S. G. O., $\frac{250 \text{ France}}{564}$.

CHAPTER V

ADVERTISING FOR BIDS

As noted elsewhere, the laws and regulations governing the purchase of supplies for the Military Establishment require that information concerning the articles and quantities to be purchased be made public. The prescribed publicity was obtained by advertisements inserted in newspapers and other periodicals; by circulars of advertisement sent to prospective bidders and posted in public places such as post offices, courthouses, and other Federal buildings; by written and telephonic requests for quotations; and by other means. Advertisements in daily newspapers did not appear daily as a rule, but a sufficient number of insertions appeared at stated intervals during the period preceding the closing of the bids to insure adequate circulation of the information. In the more formal methods of advertising, a day and hour is specified, prior to which offers will be received. The time which is required to elapse between the original issue of the advertisement and the date set for the closing of bids varies between 10 and 60 days, according to the class of articles, the quantity, and the urgency of the need for them.¹ If the need be very urgent periods of less than 10 days may be authorized. In its purchases the Medical Department very rarely resorted to newspaper advertising for bids. The circular of advertisement was customarily used for purchases of supplies in quantity, and written and telephonic requests for quotations for purchases in small quantities.

As the daily business of the purchasing bureaus increased, the original requirement that all public supplies be purchased after advertising became onerous and irksome, especially in the routine of small purchases. The delay incident to this requirement was often very inconvenient and relief was sought. The stringency was relieved in 1906 by the authority to make purchases in amounts less than \$500 according to commercial practice and without advertising.² This enactment permitted the less formal methods of obtaining quotations just mentioned.

The basic law which required advertising as a necessary preliminary to the purchase of supplies contained also a proviso whereby that requirement could be dispensed with in time of public emergency. In April, 1917, the Secretary of War decided that such an emergency existed within the meaning of this law and authorized the purchase of supplies without advertising.³

This, however, in so far as it concerned the Medical Department, changed only the method of communicating the need to the prospective bidders, who under conditions then existing were necessarily the manufacturers. It was manifest at that time that only by every manufacturer of the articles required

producing to his utmost capacity could the quantities needed be furnished within the time available. The extent of the need for medical and hospital supplies was fully presented at a meeting of manufacturers held in Washington, April 9, 1917. The requirements by commodities were furnished the executive committees of the respective associations of manufacturers of the commodities involved. These committees, with the exception of the pharmaceutical manufacturers, undertook to distribute those requirements among the members of their associations in accordance with their abilities to produce. The prices to be paid for the articles were furnished the purchasing officers by the manufacturers either directly or, more commonly, through the committee. The manufacturers of pharmaceuticals desired the publicity to be given through advertising in the customary manner, but for smaller quantities at comparatively frequent intervals, in order that the drug market would not be upset.

The placing of orders for supplies through manufacturers' committees as originally constituted failed to meet the approval of Congress and the method was discontinued. Advertising as a preliminary to the purchase of supplies was thereupon resumed by the Medical Department, and the requirement was observed during the remainder of the war. Full publicity, early in August, 1918, was required by the War Department to be given to proposed purchases and to award of contracts by the various supply bureaus. This decision was the result of the following proviso in the appropriation act approved July 9, 1918:⁴

Provided, That where practicable to do so, no work be done on contract made under or by authority of any provision of this act on or under a percentage or cost-plus percentage basis, nor shall any contract, where circumstances so permit, be let involving more than \$1,000 until at least the responsible competing contractors shall have been notified and considered in connection with such contract, and all contracts to be awarded to the lowest responsible bidder, the Government reserving the right to reject any and all bids.

Such publicity, however, could not be used indiscriminately without disclosing information which would be of value to the enemy. To prevent this each bureau was required to furnish the director of purchases and supplies a list of all the articles purchased by it and to indicate thereon those articles concerning which the information usually contained in circulars of advertisement to the trade would be of substantial military value to the enemy and the reasons therefor. The names of all articles which were determined by the military intelligence division of the General Staff as being likely to convey such information to the enemy were deleted and the censored list returned to the supply bureau originating it. Thereafter whenever articles on the censored list were to be purchased circular proposals were issued and the full publicity required was given to the purchase. If any doubt arose about the propriety of publicity of the quantities, specifications, or other details concerning an article on the censored list the circulars were not issued until cleared by the military intelligence division. There was the possibility that, even after the bids had been opened, information might be conveyed by making public the award. To prevent this the abstract of bids and proposed awards were cleared through the military intelligence division, after which full publicity was given.⁵

FORM OF CIRCULAR ADVERTISEMENT

Among other forms required by the Medical Department one had been provided for circular advertisements, or circular proposals, as they were often called. This form was used by hospitals when purchases requiring advertisement were authorized to be made locally. It was not prescribed for depot use. At each depot a somewhat different form of circular had developed as a result of individual experiences in the purchase of supplies, but the differences were not material. The general arrangement and requirements of this form are shown in that of the general purchasing office, Medical Department, which appears below. The conditions and instructions stated in these circulars varied with the commodity being purchased. As a rule, during the war, each circular was limited to a single commodity or to two or three at most. This arrangement made distribution more convenient. The pages containing the stipulation or conditions were mimeographed or multigraphed except for the date and number, which were added as needed. The schedule for each commodity was prepared separately for the convenience of the bidders. Separate circulars according to commodity required little if any more time for preparation than a consolidated schedule.

GENERAL PURCHASING OFFICE, MEDICAL DEPARTMENT, UNITED STATES ARMY

Unit F, Wing 3, Seventh and B Streets NW., Washington, D. C.

To be opened 10 a.m., June 20, 1918.

Circular No. 3.

The Medical Department of the Army requires the materials on the attached lists in the quantities indicated. Bids submitted should quote prices f.o.b. cars or f.a.s. wharf (at the option of the Government), in the city in which contractor's works are located, and must state the amounts that can be delivered in 30, 60, 90 days from date of notice of award. Bids for any part of any or all items will be considered.

Quotations must be submitted in duplicate and must be mailed in time to reach this office by the time set for opening.

Bidder's name-----

Office address-----

[Signature of responsible officer of firm.]

Address of factory-----

CONDITIONS AND INSTRUCTIONS

1. Proposals will be received for one or more of the items specified.
2. The Government reserves the right to reject any or all bids or any part thereof; also, in accepting a bid, to order less quantities of any or all items than those specified, or with the bidder's consent, greater quantities, not exceeding, however, in any one item, an increase of 50 per cent.
3. The net price is to be stated, per bottle, pound, or other unit, as indicated after each item, after all deductions for cash or any discount.
4. Excess space in bottles containing pills and tablets must be filled with cotton, clipped paper, or other suitable material.
5. In view of present shipping and economic conditions, the former regulations requiring shipping cases to be made of 3/4-inch material will not be adhered to where the contractor is able to furnish a lighter container which shall be of sufficient strength and rigidity to transport supplies in good condition and withstand reshipment.

6. The price is to include all necessary bottles, tins, cartons, boxes, packings, etc., and delivery f. o. b. works. The containers and packings are to be new and of uniform and appropriate make and size. Each shipping package must be marked with the number of the purchase (or contract) order, the name of the contractor, and a list showing the exact contents of the package; these marks are necessary for identification.

7. Articles bought on sample must be equal to it. The quality and character of preliminary samples will be ascertained by such tests as the Government may choose, conducted by its officers. The quality and character of all articles delivered under awards made under this circular will be ascertained by similar tests of samples taken by the Government at random from lots delivered. Drugs and medicines for which a standard is established by the latest edition of the United States Pharmacopoeia must be in accordance therewith. Other articles must conform to the specifications. All articles will be subjected to rigid inspection before acceptance.

8. Preference will be given to articles of domestic production or manufacture, conditions of quality and price (including in the price of foreign production and manufacture the duty thereon) being equal.

9. Each proposal should give the place of business and post office address of the bidder, with county, State or Territory, and should be signed by the bidder with his usual signature in full.

10. A proposal by a person who affixes to his signature the word "President," "Secretary," "Agent," or other designation without disclosing his principal is the proposal of the individual. That by a corporation should be signed with the name of the corporation, followed by the signature of the responsible officer authorized to bind it in the matter. That by a firm should be signed with the firm name by one of the members of the firm.

11. No erasures, alterations, or additions should be made in the specifications. Bidders may submit alternate proposals or make explanations by letter filed with their proposals in the blank spaces on the latter. On items specifying alternate packing, bidders must state container they propose to furnish. Prices quoted opposite the items without qualifications or remark will be understood as for the identical articles listed.

12. Bidders must state the time when they propose to make deliveries on each and every item.

13. When the amount accepted under any bid exceeds \$500, and delivery thereunder is not to be immediate, the bidder will be required to enter into formal contract, and in proper cases to give bond, with good and sufficient sureties, to secure its performance.

14. Transfers of contracts, or of interests in contracts, are prohibited by law.

15. Proposals must be in the possession of the officer addressed before the hour appointed for the opening. No responsibility will attach to the officer for the premature opening of any proposal not so indorsed as to clearly show its character.

16. Proposals received prior to the time of opening will be securely kept. The officer whose duty it is to open them will decide when that time has arrived, and no proposal received thereafter will be considered except that when a proposal arrives by mail after the time fixed for opening, but before the award is made and it is clearly shown that the non-arrival on time was due solely to delays in the mails for which the bidder was not responsible, such proposals will be received and considered.

17. Bidders must, if called upon by the awarding officer, furnish satisfactory evidence before the award is made, of their ability to carry their proposals into effect.

18. Before the time for opening bids any bidder may, without prejudice, withdraw from competition by giving written notice of his decision to the officer holding his bid, and when his bid is reached at the opening it will be returned to him or his authorized agent unread.

19. All tablets must conform to the following general specifications: Tablets must be well made, of uniform size, and accurate as to quantity of active ingredients. They must be of medium friability, neither too fragile for rough handling in transportation nor so hard as to powder with difficulty, and equal to the standard in every respect. When furnished in bulk they must be well packed in suitable tin containers.

20. All items advertised as "per sample" can be examined at this office.

21. Samples, when required, or when voluntarily forwarded by the bidders when they propose to furnish articles other than advertised for, must be furnished free of all expense to the Government and must be forwarded in time to reach this office prior to the opening of the bids. A duplicate memorandum invoice will be prepared, one copy to be packed with the samples and the other copy to be inclosed with the proposal. This office will not be responsible for samples unless such invoice is furnished. Samples will, upon request, be returned at the expense of the bidders, except that in any case the right is reserved to destroy any samples submitted whenever it may be considered necessary to do so for the purpose of testing, and no allowance will be made for such samples. Samples must be plainly marked with the name of the dealer and the number of item to which they pertain. Samples must not be inclosed with proposals.

22. Alternate proposition may be submitted. Variations from standard goods or specified packings must be cited.

FORM OF BID

It will be observed from this form that the circular became a bid, or proposal, when the bidder entered his quotations and times of delivery in the appropriate columns opposite the article or articles he proposed to furnish, modifying the quantities to suit his ability if unable to undertake the entire amount, and signing his name in the space provided for that purpose.

DISPOSITION OF BIDS RECEIVED

In conformity with the general regulations already quoted, the bids were securely kept until the time specified in them for the opening. When that hour had arrived the bids were opened in the presence of such bidders as desired to be present. The abstract of them was made and consideration given to the matter of award. When the award had been made and the contracts signed, one copy of the bid was forwarded to the returns office, Department of the Interior, together with the copy of the contract required by that office.⁶ The other copy was retained until the contract had been fulfilled, when it was destroyed.

AWARDS

The law contemplated that the award should be made to the lowest responsible bidder. This principle was followed, as a rule, in the purchase of pharmaceuticals because the specifications were definite and the standard thoroughly well known to the trade. For other articles the principle was followed as far as practicable. The low bidder does not always bid on the article specified in the circular and his bid can not be accepted for that reason. During the World War it seldom happened that any one manufacturer could furnish the entire quantity within the time limit fixed by the military conditions, and it became necessary to divide the award among several or all the bidders on some particular article. If the quantities were such as to require the combined efforts of all the bidders and there were no other sources of supply, no discretion was necessary in making the award; every one received all he could produce. But in cases where production exceeded the requirements it was necessary to determine whether the award should be made to the lowest bidder or otherwise. Until the summer of 1918 the making of awards had been left entirely to the judgment of the purchasing officers in the depots. They were generally supervised by the officer in charge. After production had

been speeded up during 1917, and especially after industry had been divided by the War Industries Board into essential and nonessential, competition for bids became more keen. There was a tendency to criticize awards when not made to the lowest bidder. It happened not infrequently that the new bidders were not qualified by experience or equipment to produce the articles upon which they bid and it was necessary to reject their bids. To overcome this criticism, instructions were issued by the Surgeon General in July, 1918, to the purchasing agencies of the Medical Department directing that boards of award be appointed.⁷ These boards were to be composed of two or more qualified officers to whom all bids entailing an outlay of more than \$500 were to be submitted for consideration and approval before the purchase order was placed. These boards were appointed at the depots in New York City, Washington, St. Louis, and San Francisco, and in the general purchasing office in Washington, and continued to function until the need for purchases was ended by the armistice.

REFERENCES

- (1) Act of July 5, 1884 (22 Stats. 109).
- (2) Act of June 6, 1906 (34 Stats. 258).
- (3) G. O. No. 49, War Department, April 28, 1917.
- (4) Act of July 9, 1918 (40 Stats. 845).
- (5) Supply Circular No. 75, Purchase and Supply Branch, Purchase, Storage, and Traffic Division, General Staff, August 3, 1918. Subject: Publicity of War Department contracts and awards.
- (6) Section 3744, Revised Statutes.
- (7) Letter from the Surgeon General to the officer in charge, Field Medical Supply Depot, Washington, D. C., July 11, 1918. Subject: Appointment of board of awards. On file, Finance and Supply Division, S. G. O., $\frac{713 \text{ Misc.}}{59}$.

CHAPTER VI

CONTRACTS

AUTHORITY TO MAKE CONTRACTS

By legislative enactment the Secretary of War is the source of all authority to make contracts or purchases in all branches of the military establishment.¹ It was foreseen when this authority was conferred upon the Secretary that he would be unable personally to supervise the making of the vast number of contracts and must delegate the authority to subordinates in the War Department. Accordingly, it was provided that all purchases and contracts for supplies and services for the military service were to be made by or under his direction. Under the authority conferred upon the Surgeon General to procure medical supplies,² the actual making of contracts and purchases thereafter was done by representatives of the Surgeon General.³ The variety and number of articles on the standard supply table increased in accordance with the development of the medical sciences, but the authority to procure remained in the Medical Department otherwise unchanged until November, 1918, when all procurement activities were consolidated under the Director of Purchase and Storage.⁴

The legislative enactments particularly applicable to the procurement of supplies and services not personal for the Military Establishment require that no contract or purchase on behalf of the United States be made unless it be authorized by law or made under an appropriation adequate to its fulfillment, except for clothing, subsistence, forage, fuel, quarters, transportation, or medical and hospital supplies;⁵ that, except in cases of emergency or where competition is impracticable, the purchase of all supplies for the various departments and branches of the Army be made only after advertisement, where the articles can be had the cheapest, quality, cost of transportation, and the interests of the Government considered;⁶ that such purchases, except in case of emergency, be made by contract;⁷ that the award in every case be made to the lowest responsible bidder for the best and most suitable article;⁷ that purchase of supplies and procurement of nonpersonal services may be made in open market, in the manner common among business men, when the aggregate does not exceed \$500;⁸ and that all open-market purchases be reported to the Secretary of War for approval under regulations prescribed by him whenever the amount exceeds \$100.⁹ It has been held by the Attorney General that this legislation contemplates one general mode of purchase, namely, by contract, after advertisement, with "the lowest responsible bidder for the best and most suitable article," with but a single exception, and that is where an emergency exists requiring the purchase to be otherwise made.

FORMS OF CONTRACT

It is mandatory for the War Department that all contracts not especially excepted therefrom by act of Congress be formal contracts in writing, and signed by the contracting parties with their names at the end thereof. This is the form usually meant when the term contract is used, and so used in this volume.

The term informal contract is applied to the forms of agreement less formal than those included under the term formal contract. Usually these forms of agreement are written proposals and written acceptances, or verbal agreements where the delivery of the article or rendering of service is immediate. Written proposals are usually replies by letter to, or by indorsement on, a request from a purchasing officer to a manufacturer or vendor for a price on the articles stated in the request. The written acceptance is usually the written purchase order; that is, a specific request to the vendor to deliver to the purchasing officer at a particular place the articles and at the prices specified in the order. Verbal agreements are usually telephonic requests for the immediate delivery of some particular article where time is an important element in the consideration. The conditions under which these two forms of contracts may be used by the Medical Department are stated in the following legislation:¹⁰

Hereafter, whenever contracts which are not to be performed within sixty days are made on behalf of the Government by the Surgeon General or by officers of the Medical Department authorized to make them, and in excess of \$500 in amount, such contracts shall be reduced to writing and signed by the contracting parties, but in all other cases contracts shall be prepared under such regulations as may be prescribed by the Surgeon General.

The form of the purchase order or informal contract had never been specifically prescribed by the Surgeon General. Definite forms of purchase orders were in general use at the several medical supply depots when the act was passed authorizing the Surgeon General to prescribe them.¹⁰ The forms then in use had been the result of years of experience and were believed to be those most convenient for the individual depot, consequently they were continued in use without change. While the form of these orders at the several depots differed in minor details, they all contained the essential stipulations, such as the articles and quantities ordered, the prices to be paid, the place of delivery, the authority for the purchase, and the manner of packing when it was necessary to prescribe it.

The standard formal contract was of much greater importance and the form of that instrument was carefully considered and prescribed by the Surgeon General, with the approval of the Secretary of War and the Comptroller of the Treasury. The form of the contract was kept as simple and the stipulations as few as possible consistent with effectiveness. The form was printed on thin paper so that the required number of copies could be made at one time on the typewriter. The same form was used without change for all purchases made until about July, 1918, except for the purchase of surgical dressings in the summer of 1917, for which a special form was used. The form of the contract appears below.

Form 41

These articles of agreement, entered into this _____ day of _____, nineteen hundred and _____, between _____, United States Army, hereinafter designated as the contracting officer, acting for and on behalf of the United States of America, of the first part, and¹ _____, of the city of _____, county of _____, State of _____, hereinafter designated as the contractor, of the second part, witness, that the said parties do mutually agree, to and with each other, as follows:

ARTICLE I. That the said contractor shall furnish and deliver, free of all extra charges whatsoever, to the Medical Department of the United States Army, at _____, the articles below enumerated, at the prices herein stated, viz:

* * * * *

ARTICLE II. That all articles herein contracted for, for the preparation of which instructions are provided by the U. S. Pharmacopœia, latest edition, shall be made in accordance therewith, and be equal to the standard thereby established, and that all other articles shall be of the best grades on the market, unless otherwise specified, and be equal to the original samples furnished or the specifications, as the case may be, upon which this contract is based.

ARTICLE III. That before delivering the articles aforesaid the contractor shall put them up securely in the necessary bottles, cartons, tins, boxes, crates, sacks, and other like containers and coverings, and pack them suitably for Army transportation and storage in such packing cases as may be required by the contracting officer or his authorized successors. The said contractor shall furnish the said packing cases in every instance, and the said containers except as otherwise specified in Article I. The said packing cases and containers so furnished by said contractor are to be new and of uniform and appropriate make and size as determined by said contracting officer or his successors. The contractor shall plainly mark his name and the contents on each packing case and affix a label showing his name and the contents on each bottle, carton, tin, box, etc., so packed as aforesaid. The prices enumerated in Article I of this contract shall be full compensation for the services rendered and the packing cases, containers, and labels furnished under the stipulations of this article, and no extra charge therefor shall be made or allowed.

ARTICLE IV. That the quantities hereinbefore specified, in the case of all or any of the articles aforesaid, may, at the option of the United States, be increased or diminished not exceeding² _____ per cent thereof, upon notice of such increase or decrease served upon the contractor by the contracting officer or his authorized successors at any time not less than _____ days before the date set for the completion of this contract.

ARTICLE V. That deliveries under this contract shall _____ commence within _____ days after the date of its approval, of which timely notice shall be given to the contractor, and shall be completed _____

ARTICLE VI. That the articles furnished and delivered hereunder, including packings and containers, shall be examined and inspected without unnecessary delay by a person or persons to be designated by the United States, and if found equal to the _____ shall be accepted and become the property of the United States. The said examination may, at the option of the United States, be made by means of samples selected at random from lots delivered. If any of the articles shall be found on said examination to be not equal to the quality herein stipulated for they shall be rejected, and the contractor shall remove them from the premises within ten days after notice thereof.

ARTICLE VII. That payments under this contract shall be made to the contractor as soon as practicable after the delivery and acceptance of the articles aforesaid.

¹ Insert here the legal name of the principal intended to be bound as party of the second part—if an individual, his personal name, with one given name in full; if a firm, the personal names of all the partners, with the recitation that they are partners, and compose the firm, naming it by its usual firm name; if a corporation, the corporate name, reciting that the party is a corporation, and naming the State where it was incorporated.

² This stipulation can be made in contracts under advertisement in which the right so to do is expressly reserved, and in open-market contracts. In other cases the blank space should not be filled in.

ARTICLE VIII. That in case of failure of the contractor to fulfill the stipulations of this contract according to their true intent and meaning, the contracting officer or such other officer as may be designated by proper authority may cause the services to be performed and the articles to be furnished by any other person or persons, in open market without advertising therefor or otherwise, and the said contractor shall pay to the United States the additional cost or expense thus incurred.

ARTICLE IX. The contractor further agrees to hold and save the United States, their officers and agents, harmless from and against all and every demand or demands, of any nature or kind, for or on account of the use of any patented invention, article, or process, included in the articles hereby agreed to be furnished and the work to be done under this contract.

ARTICLE X. Neither this contract nor any interest therein shall be transferred any to other party or parties, and in case of such transfer the United States may refuse to carry out this contract, either with the transferor or the transferee, but all rights of action for any breach of this contract by the contractor are reserved to the United States.

ARTICLE XI. No Member of or Delegate to Congress, nor any person belonging to or employed in the military service of the United States, is or shall be admitted to any share or part of this contract, or to any benefit which may arise herefrom.

ARTICLE XII. This contract shall be subject to the approval of the Surgeon General, U. S. Army.

ARTICLE XIII. The erasures and interlineations hereinbelow specified were made in this instrument before the signatures of the contracting parties were affixed hereto, to wit: Line

In witness whereof the parties aforesaid have hereunto placed their hands the date first hereinbefore written.

Witnesses: _____ Principals:
_____ as to _____
_____ as to _____, U. S. Army.
_____ as to _____
_____ as to _____
_____ as to _____

(Executed in triplicate)

AFFIDAVIT ⁴

I do solemnly swear that the copy of contract hereto annexed is an exact copy of a contract made by me personally with _____; that I made the same fairly without any benefit or advantage to myself, or allowing any such benefit or advantage corruptly to the said _____, or any other person; and that the papers accompanying include all those relating to the said contract, as required by the statute in such case made and provided.

Subscribed and sworn to before me this _____ day of _____, 19__
_____, U. S. Army.

CERTIFICATE ⁵

I certify that the award of the foregoing contract was made to the lowest responsible bidder for the best and most suitable articles and service, on proposals received in response to advertisement which was published for _____ days by poster and circular letter dated _____

_____, U. S. Army,
Contracting Officer.

⁴ This affidavit is required only on the copy of contract for the returns office, Department of the Interior.
⁵ When the contract is entered into upon award on proposals received in response to a public advertisement this certificate will be given by the contracting officer on the two original numbers of the contract for the Surgeon General and the Auditor for the War Department.

CERTIFICATE⁶


I certify that this contract was entered into in open market, without previous advertisement, that course being necessary because -----

-----, *U. S. Army,*
Contracting Officer.

NOTES

NOTE A.—Three original numbers of this contract are to be executed, and two copies made, for disposition as prescribed in Army Regulations.

NOTE B.—Erasures, interlineations or other irregularities in this instrument must be explained over the signatures of the parties thereto.

 THIS CONTRACT NEED NOT BE EXECUTED UNDER SEAL

The general arrangement of the form and the stipulations quoted above had remained unchanged for many years. It had demonstrated its effectiveness by long usage. It had proved entirely satisfactory to the Medical Department and, so far as can be determined, was equally acceptable to the accounting officers of the Treasury. Early in 1918 supervisory bodies began to be placed over the supply bureaus of the War Department. Consolidation of procurement became the accepted policy of the War Department. As the consolidation proceeded, additional supervisory bodies were added in increasing numbers. Change was in the air, and it was inevitable that change should extend to contract forms. Stipulations were added and some of the original stipulations modified. The contract form became longer and more voluminous. In September the following stipulations were added and modifications made to the form above quoted:¹¹

cases and container so furnished by said contractor are to be new, and of uniform and appropriate make and size as determined by said contracting officer or his successors. The contractor shall plainly mark his name and the contents on each packing case, and affix a label showing his name and the contents on each bottle, carton, tin, box, etc., so packed as aforesaid. The prices enumerated in Article I of this contract shall be full compensation for the services rendered, and the packing cases, containers, and labels furnished, under the stipulations of this article, and no extra charge therefor shall be made or allowed.

ARTICLE IV. That the quantities hereinbefore specified, in the case of all or any of the articles aforesaid, may, at the option of the United States, be increased or diminished not exceeding ----- per cent thereof, upon notice of such increase or decrease served upon the contractor by the contracting officer or his authorized successors at any time not less than ----- days before the date set for the completion of this contract.

ARTICLE V. That deliveries under this contract shall ----- commence within ----- days after the date of its approval, of which timely notice shall be given to the contractor, and shall be completed -----

ARTICLE VI. The articles or work are subject to observation, inspection, and tests by the United States at any and all times during manufacture or performance in order to determine their compliance with the requirements of this contract, and are subject to acceptance or rejection by the United States at ----- For these purposes the United States may maintain an inspector or inspectors at the plants or places where and during the time this contract is being performed. Such inspectors may reject any and all articles or work, or components thereof, and materials found not to be in compliance with the requirements of this contract. No preliminary test or acceptance shall preclude the

⁶ When the contract is entered into in open market this certificate will be given in lieu of the preceding.

United States from rejecting any articles or work upon final inspection or test at completion. The contractor shall furnish all reasonable facilities and assistance requested by such inspectors for the performance of their duties. Inspections and tests by the United States shall be carried out in such a manner as not unduly to delay the performance of this contract by the contractor. Nothing contained in this article shall limit or annul any inspection or test which may be called for by the drawings and specifications and forming a part of this Contract. No inspection, acceptance, or payment under this contract shall deprive the United States of any claim against the contractor hereunder by reason of fraud or deception, or by reason of latently defective articles, materials, or workmanship.

ARTICLE VII. That payment under this contract shall be made to the contractor as soon as practicable after the delivery and acceptance of the articles aforesaid.

ARTICLE VIII. That in case of failure of the contractor to fulfill the stipulations of this contract according to their true intent and meaning, the contracting officer or such other officer as may be designated by proper authority may cause the services to be performed and the articles to be furnished by any other person or persons, in open market without advertising therefore or otherwise, and the said contractor shall pay to the United States the additional cost or expense thus incurred.

ARTICLE IX. The contractor agrees to hold and save the United States and its representatives harmless against all liability and damage arising by reason of the infringement or alleged infringement of letters patent of the United States relating to the articles or work herein contracted for which are owned or controlled either by assignment, license, or otherwise, by the contractor, its officers or employees, or persons in privity with the contractor, and by reason of the infringement or alleged infringement of letters patent of the United States which cover or relate to any materials, parts, or processes of manufacture not specifically prescribed by the United States for the performance of this contract. The United States agrees to hold and save the contractor and its representatives harmless against all liability and damage arising by reason of the infringement or alleged infringement of letters patent of the United States relating to the articles or work herein contracted for which are not owned or controlled, either by assignment, license, or otherwise, by the contractor, its officers or employees, or persons in privity with the contractor, and which cover materials, parts, or processes of manufacture specifically prescribed by the United States for the performance of this contract: *Provided*, Immediate notice of any claim of infringement or of any legal proceedings in connection therewith is given in writing by the contractor to the chief of the bureau; *And provided further*, That the United States is permitted to intervene in any such claim or proceeding and in its discretion to defend the same or to make settlement thereof, in which events the contractor shall furnish all information and assistance requested by the United States.

ARTICLE X. Neither this contract, nor any interest herein, shall be transferred by the contractor to any other party, except to the extent permitted by section 3477, United States Revised Statutes.

ARTICLE XI. No Member of or Delegate to Congress, or Resident Commissioner, is or shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom; but this article shall not apply to this contract so far as it may be within the operation or exceptions of section 116 of the act of Congress approved March 4, 1909 (35 Stats. 1109).

ARTICLE XII. No contract shall be made by the contractor with any other person for furnishing any of the completed or substantially completed articles or work herein contracted for, without the written approval of the contracting officer. Every contract and subcontract made by the contractor in contemplation of or in connection with the performance of this contract shall state that it relates to this contract and shall contain a provision that its unperformed portion may be assigned at any time by the contractor to the United States, or its nominee.

ARTICLE XIII. The contractor expressly warrants that it has employed no third person to solicit or obtain this contract in its behalf, or to cause or procure the same to be obtained upon compensation in any way contingent, in whole or in part, upon such procurement;

and that it has not paid, or promised or agreed to pay, to any third person, in consideration of such procurement, or in compensation for services in connection therewith, any brokerage, commission, or percentage upon the amount receivable by it hereunder; and that it has not, in estimating the contract price or compensation demanded by it, included any sum by reason of any such brokerage, commission, or percentage; and that all moneys payable to it hereunder are free from obligations to any other person for services rendered, or supposed to have been rendered, in the procurement of this contract. The contractor further agrees that any breach of this warranty shall constitute adequate cause for the annulment of this contract by the United States, and that the United States may retain to its own use from any sums due or to become due hereunder an amount equal to any brokerage, commission, or percentage so paid or agreed to be paid.

ARTICLE XIV. The contractor shall take all reasonable precautions for the protection of the plant and property to be used in the performance of this contract and the work in progress hereunder, against espionage, fire, explosion, acts of war, and acts of enemy aliens, and shall provide such additional watchmen and devices, and adopt such particular measure for the protection of such plant, property, and work as the contracting officer shall from time to time direct. The contractor shall, when required, report to the contracting officer the citizenship, country of birth, or alien status of any or all of its employees. When required by the contracting officer, the contractor shall refuse to employ, or if already employed, shall forthwith discharge from employment and exclude from its plants, any person or persons designated by the contracting officer, for cause, as undesirable for employment in a plant engaged on work for the United States. Failure to comply with any or all of the provisions of this article shall render the contractor responsible for all loss or damage to the United States arising from any of the hazards herein sought to be guarded against and shall also be cause for the cancellation of this contract. The United States shall pay to the contractor as an addition to the contract price or compensation, or as part of the cost of the articles or work herein contracted for, any additional expense incurred by the contractor, which, in the opinion of the contracting officer, is an additional expense created by the enforcement of this article and resulting from action taken by the contractor beyond or in addition to said above-mentioned reasonable precautions.

ARTICLE XV. Except as otherwise specifically provided in this contract, any claims, doubts, or disputes which may arise under this contract, or as to its performance or non-performance, and which are not disposed of by mutual agreement, may be determined, upon petition of the contractor, by the Secretary of War or his duly authorized representative or representatives. If the Secretary of War selects a board as his authorized representative to hear and determine any such claims, doubts, or disputes, the decision of the majority of said board shall be deemed to be the decision of the board. The decision of the Secretary of War or of such duly authorized representative or representatives shall be final and conclusive on all matters submitted for determination: *Provided*, That where the decision is rendered by such representative or representatives, the Secretary of War, may, at his option, either upon his own motion or upon petition filed with him by the contractor within 20 days after notice of the decision of such duly authorized representative or representatives has been served upon him, review the action of such representative or representatives and render his decision thereon. Any sum or sums allowed to the contractor under the provisions of this article shall be paid by the United States as part of the cost of the articles or work herein contracted for and shall be deemed to be within the compensation of this contract.

ARTICLE XVI. In the event that labor disputes shall arise directly affecting the performance of this contract and causing or likely to cause any delay in making the deliveries, and the Secretary of War or his representative shall have requested the contractor to submit such disputes for settlement, the contractor shall have the right to submit such disputes to the Secretary of War for settlement. The Secretary of War may thereupon settle or cause to be settled such disputes, and the parties hereto agree to accede to and to comply with all the terms of such settlement.

If the contractor is thereby required to pay labor costs higher than those prevailing in the performance of this contract immediately prior to such settlement, the Secretary of War or such representative in making such settlement and as a part thereof may direct that a

fair and just addition to the contract price shall be made therefor: *Provided, however,* That the Secretary of War or his representative shall certify that the contractor has in all respects lived up to the terms and conditions of the contract or shall waive in writing for this purpose only any breach that may have occurred.

If such settlement reduces such labor cost to the contractor, the Secretary of War or his representative may direct that a fair and just deduction be made from the contract price.

No claim for addition shall be made unless the increase was ordered in writing by the Secretary of War or his duly authorized representative and such addition to the contract price was directed as part of the settlement.

Every decision or determination made under this article by the Secretary of War or his duly authorized representative shall be final and binding upon the parties hereto.

ARTICLE XVII. All work required in carrying out this contract shall be performed in full compliance with the laws of the State, Territory, or District of Columbia where such labor is performed: *Provided,* That the contractor shall not employ in the performance of this contract any minor under the age of 14 years or permit any minor between the ages of 14 and 16 years to work more than eight hours in any one day, more than six days in any one week, or before 6 a.m. or after 7 p.m. Nor shall the contractor directly or indirectly employ any person undergoing sentence of imprisonment at hard labor which may have been imposed by a court of any State, Territory, or municipality having criminal jurisdiction: *Provided, however,* That the President of the United States may by Executive order modify this provision with respect to the employment of convict labor and provide the terms and conditions upon which such labor may be employed. These provisions shall be of the essence of the contract.

ARTICLE XVIII. The contractor shall from time to time, and whenever so requested, furnish to the chief of the bureau or to such person as the chief of the bureau may designate statements and reports on the progress of the performance of this contract and full information on all factors relating to deliveries or performance hereunder. Representatives of the United States shall have the privilege of visiting all offices and plants of the contractor for the purpose of ascertaining the progress of the performance of this contract under regulations prescribed by the chief of the bureau.

Any notice to the contractor under this contract, when not actually delivered in writing to the contractor, shall be deemed to have been sufficiently given when mailed in a sealed, post-paid wrapper addressed to the contractor at the address above set forth. Any notice to the United States under this contract, when not actually delivered in writing to the chief of the bureau, shall be deemed to have been sufficiently given when mailed in a sealed, post-paid wrapper addressed to the chief of the bureau, War Department, Washington, D. C.

ARTICLE XIX. This contract shall be subject to the approval of the Surgeon General, U. S. Army.

ARTICLE XX. The erasures and interlineations herein below specified were made in this instrument before the signature of the contracting parties were affixed hereto, to wit: Line

In witness whereof the parties aforesaid have hereunto placed their hands the date first hereinbefore written.

Witnesses: _____ Principals: _____
----- as to -----
----- as to ----- U. S. Army.
----- as to -----
----- as to -----

(Executed in triplicate)

This form of contract was used in the purchase of supplies only. For other needs the Medical Department had special forms of contracts. There

were special forms for laundry work,¹² for services as a nurse,¹³ with a private physician,¹⁴ and with an acting dental surgeon.¹⁵ Civilian employees, hired for the service of hospitals and supply depots, for the most part were given a form of appointment but were not required to sign a formal agreement.

In the spring of 1917 a form of contract based on the cost of manufacture of the articles or the performance of the work, plus a reasonable profit to the manufacturer, was favored but not specifically ordered by the Secretary of War in the procurement of supplies for the Military Establishment. This form was also favored by the Council of National Defense. It was contemplated that the actual cost of production, raw materials, and labor, etc., would be paid the contractor for the articles furnished and to this cost would be added a profit of 10 per cent. Theoretically the principles upon which it was based were sound if properly applied and if surrounded with sufficient safeguards. It assumed that the contractor would use his best endeavors to keep his costs at the minimum consistent with efficiency inasmuch as he was assured of a fair profit and relieved of all risk. Many of the contractors were undertaking work with which they were unfamiliar and were without experience upon which to calculate their costs. The transformation of their plants and processes would be expensive, and it appeared just that these expenses be borne by the Government and included in the cost of the articles. A definite profit in the transaction was assured them, and the hope of gain which is so essential to any business venture was not withheld. The cost-plus contract, then, appeared to be fully justified and worthy of general use. It filled a large place in the procurement of supplies during the war. The abuses to which it was soon to be subjected brought it into general disrepute, its use became less general during the early part of 1918, and was discontinued August 1, 1918, except for very special cases.¹⁶

The manufacturers of surgical dressings saw, when the vast quantities of surgical dressings required by the Medical Departments of the Army and Navy were presented to them, that they were to embark upon a production schedule far beyond anything previously attempted or even conceived. Additional facilities would be required and personnel must be greatly augmented. They were sensitive to the charge of profiteering and desired to be absolved from the criticism of high prices for the articles which they were to furnish. The cost-plus form of contract appeared to accomplish this end, to assure the Government the supplies at a reasonable cost and the manufacturers a reasonable profit. The proposal for this form of contract was taken up with the Council of National Defense. By cooperation of the legal and accountancy sections of the council, the representatives of the manufacturers and their attorneys, and the Surgeon General's Office, a form of cost-plus contract was evolved which amply protected the Government and the manufacturer and which stood the acid test of experience. The safeguards with which it was surrounded proved effectual. Because of difficulties in accountancy and for various other reasons, this form of contract fell into disuse when subsequent contracts were made for surgical dressings. By the time deliveries on the first contracts had been completed and it became necessary to purchase additional surgical dressings, the cost of production in the several plants was sufficiently well known to the Surgeon General's Office to

judge whether subsequent bids were reasonable. The fixed-price contract was thereupon resumed for all purchases, but many of them contained provisions for adjustment of price to cover advances in cost of material and labor. There were two variations in the form of the cost-plus contract to adapt its provisions to the requirements of different manufacturing establishments for accountancy purposes. In general this contract conformed to the following:¹⁷

These articles of agreement entered into this 23d day of June, nineteen hundred and seventeen (XVII), between C. R. Darnall, Lieut. Colonel, Medical Corps, United States Army, hereinafter designated as the contracting officer, acting for and on behalf of the United States of America, of the first part, and Johnson and Johnson, a corporation under the laws of the State of New Jersey, of the city of New Brunswick, county of Middlesex, State of New Jersey, hereinafter designated as the contractor, of the second part.

Witnesseth: That the said parties do mutually agree to and with each other, as follows:

ARTICLE I. The contractor shall furnish and deliver to the contracting officer, free of all extra charges whatsoever (except as hereinafter stated), f. o. b. contractor's works, and the contracting officer acting for and on behalf of the United States agrees to purchase at the prices and subject to the stipulations and conditions herein set forth, the articles enumerated below, at the prices stated in the following schedule. The contractor, if requested by the contracting officer, will make delivery at points other than the contractor's works, and any additional cost of such delivery to such other points, such as freight, cartage, or other special charges, shall be paid by the contractor (unless the contracting officer shall otherwise provide) and shall be reimbursed to the contractor.

SCHEDULE OF ARTICLES, PRICES, QUANTITIES, AND DELIVERIES

Two hundred and fifty thousand (250,000) gross bandages, gauze, compressed, as per specifications, a copy attached hereto which is hereby made part of this contract, at \$6.56 per gross (six dollars and fifty-six cents per gross).

Delivery: 30,000 gross to be delivered in 4 months from date of approval of contract in monthly shipments of proportionate quantities, balance in one year.

Twenty-one million five hundred thousand (21,500,000) packages gauze, absorbent, sublimated, 2 half-yard lengths in package, as per specifications, a copy attached hereto which is hereby made part of this contract, at \$72.08 per 1,000 (seventy-two dollars and eight cents per thousand).

Delivery: 1,500,000 packages to be delivered in 4 months from date of approval of contract in monthly shipments of proportionate quantities, balance in one year.

Five hundred thousand (500,000) cartons sponges, gauze, compressed, 12 in carton, as per specifications, a copy attached hereto which is hereby made part of this contract, at \$45.89 per 1,000 cartons (12 in carton) (forty-five dollars and eighty-nine cents per thousand cartons).

Delivery: 100,000 to be delivered in 4 months from date of approval of contract in monthly shipments of proportionate quantities, balance in one year.

Eight million five hundred thousand (8,500,000) packages cotton, absorbent, sterilized, in 1-oz. packages, as per specifications, a copy attached hereto which is hereby made part of this contract, at \$37.76 (thirty-seven dollars and seventy-six cents) per thousand cartons.

Delivery: 750,000 pkgs. to be delivered in 4 months from date of approval of contract in monthly shipments of proportionate quantities, balance in one year.

Three hundred sixty thousand (360,000) spools plaster, adhesive, zinc-oxide, one inch by 5 yards, each spool in carton, at \$1.02 per dozen (one dollar and two cents per dozen) or \$85.00 (eighty-five dollars) per thousand.

Delivery: 85,000 spools to be delivered in 4 months from date of approval of contract in monthly shipments of proportionate quantities, balance in one year.

The prices aforesaid, all and singular, will be revised every three months at the request of either party (the first revision, if any, to be made on or about-----), and in the event of such revision said prices shall be decreased or increased for the three

months next ensuing, by subtracting therefrom or adding thereto the decrease or increase, if any, in the cost of such material and/or of such labor as defined in paragraphs 1 and 2 hereunder.

The contractor guarantees that the prices fixed herein shall not exceed the sum of the four following items:

(1) Cost of material definitely ascertainable as devoted exclusively to said articles:

The basis of cost of raw cotton used shall be 20.70 per pound.

The cost of gray goods used shall be:

36-inch, 44 x 40, weight 8.5 yards per pound, 5 $\frac{5}{8}$ c. per yd.

38 $\frac{1}{2}$ -inch, 44 x 40, weight 8.2 yards per pound, 5 $\frac{7}{8}$ c. per yd.

40-inch, 44 x 40, weight 8.0 yards per pound, 6 $\frac{1}{16}$ c. per yd.

36-inch, 32 x 28, weight 13.0 yards per pound, 3 $\frac{7}{8}$ c. per yd.

36-inch, 28 x 24, weight 15.0 yards per pound, 3 $\frac{1}{2}$ c. per yd.

36-inch, 24 x 20, weight 17.0 yards per pound, 3c. per yd.

36-inch, 20 x 16, weight 21.0 yards per pound, 2 $\frac{1}{2}$ c. per yd.

36-inch, 56 x 56, weight 4.25 yards per pound, 9 $\frac{3}{4}$ c. per yd.

36-inch, 22 x 18, weight 19.0 yards per pound, 2 $\frac{3}{4}$ c. per yd.

(2) Cost of direct labor applied to said articles by the contractor, meaning thereby cost of labor definitely ascertainable as devoted exclusively to said articles.

(3) Nineteen (19) per cent of the sum of (1) plus (2)—which percentage is herein referred to as the specified overhead percentage—to cover indirect costs, overhead, and burdens, such as a proper allowance for depreciation and amortization, rent, interest at the rate of 6 per cent on the value of the plant, equipment, and inventories, and all expenses except those incurred for advertising, selling, credit losses, customers' discounts, and collections, and except income, profits, franchise, and capital-stock taxes; and the contractor guarantees that the specified overhead percentage does not exceed the percentage which the total expenses of the kinds comprised in (3) bear to the total costs comprised in (1) plus (2) in the total business of the contractor in articles of the general kind and character specified in this contract for the fiscal year preceding the date of the execution of this contract.

(4) Ten per cent of the sum of (1) plus (2) plus (3).

As the experience of the contractor in regard to indirect costs, overhead, and burdens while manufacturing the articles furnished hereunder may differ from the rate per cent specified in paragraph (3), and there defined as the specified overhead percentage, it is agreed that the actual overhead percentage of the contractor in manufacturing the articles to be furnished under this contract shall be taken as the ratio which the total expenses of the kinds comprised in (3) bear to the total costs comprised in (1) plus (2) in the total business of the contractor in articles of the general kind and character specified in this contract for the fiscal period beginning on July 1, 1917, and ending on the inventory or fiscal closing date next subsequent to the conclusion of the manufacture of articles to be furnished under this contract; and that if the actual overhead percentage shall fall below 95 per cent of the specified overhead percentage, an adjustment and decrease of compensation of the contractor shall be made by calculating the prices of the articles furnished hereunder including the actual overhead percentage on the sum of (1) plus (2), in lieu of the specified overhead percentage, and 10 per cent on that sum. The difference between the amounts calculated at the two prices shall be credited or refunded to the United States, except that the contractor shall be allowed as compensation, in addition to all other compensations herein provided for, the following proportion of the amount here provided to be credited or refunded to the United States: If the actual overhead percentage is less than 95 per cent of the specified overhead percentage, the contractor shall be allowed 25 per cent of the difference; if the actual overhead percentage is less than 90 per cent of the specified overhead percentage, the contractor shall be allowed 30 per cent of the difference; if the actual overhead percentage is less than 85 per cent of the specified overhead percentage, the contractor shall be allowed 35 per cent of the difference; if the actual overhead percentage is less than 80 per cent of the specified overhead percentage, the contractor shall be allowed 40 per cent of the difference; if the actual overhead percentage is less than 75 per cent of the specified overhead percentage, the contractor shall be allowed 45 per cent of the difference; if the actual overhead percentage is less than 70

per cent of the specified overhead percentage, the contractor shall be allowed 50 per cent of the difference.

For example, taking the specified overhead percentage as 20 per cent, the following would be the schedule:

Actual overhead percentage:	Percentage of difference in price, to which contractor would be entitled
Less than 19%, but not less than 18% -----	25%
Less than 18%, but not less than 17% -----	30%
Less than 17%, but not less than 16% -----	35%
Less than 16%, but not less than 15% -----	40%
Less than 15%, but not less than 14% -----	45%
Less than 14% -----	50%

In making any investigation or verification as to costs, overhead expenses, outlays, or profits, the Surgeon General of the United States Army may employ a public accountant or accountants to be designated by him. The fees, if any, of such accountants shall, at the option of the contracting officer, be paid by the contractor and reimbursed to him as an extra charge.

The accounts and records and all original entries, vouchers, and supporting papers shall be preserved for a period of two years after the completion or cessation of work under this contract and shall be open at all reasonable times to the contracting officer or the Compensation Revision Board or other representative of the Council of National Defense. All information obtained from the contractor's accounts and records shall be treated as confidential.

ARTICLE II. That all articles herein contracted for, for the preparation of which instructions are provided by the U. S. Pharmacopœia, latest edition, shall be made in accordance therewith, and be equal to the standard thereby established, and that all other articles shall be of the best grades on the market, unless otherwise specified, and be equal to the original samples furnished, or the specifications, as the case may be, upon which this contract is based.

ARTICLE III. That before delivering the articles aforesaid, the contractor shall put them up securely in the necessary bottles, cartons, tins, boxes, crates, sacks, and other like containers and coverings, and pack them suitably for Army transportation and storage in such packing cases as may be required by the contracting officer or his authorized successors. The said contractor shall furnish the said packing cases in every instance, and the containers except as otherwise specified in Article I. The said packing cases and containers so furnished by said contractor are to be new, and of uniform and appropriate make and size as determined by said contracting officer or his successors. The contractor shall plainly mark his name and the contents on each packing case, and affix a label showing his name and the contents on each bottle, carton, tin, box, etc., so packed as aforesaid. The prices enumerated in Article I of this contract shall be full compensation for the services rendered, and the packing cases, containers, and labels furnished, under the stipulations of this article, and no extra charge therefor shall be made or allowed.

ARTICLE IV. Unless prevented by strikes or circumstances beyond the control of the contractor, deliveries under this contract shall commence within thirty days or earlier, if possible, after notice to the contractor of the approval of this contract, and shall be completed according to the foregoing schedule of quantities and deliveries, which are estimated but not guaranteed by the contractor, but which the contractor shall use its best efforts to accomplish, giving the preference in its plant or plants to work hereunder or under similar contracts for the United States of America.

ARTICLE V. The contracting officer shall at all times be afforded proper facilities for inspection of the work and materials and have access to the premises, the work and materials. The contractor shall furnish to the contracting officer such assistance as may be required by him in order to determine the character of workmanship applied and the quality of materials.

ARTICLE VI. The articles furnished and delivered hereunder, including packings and containers, shall be examined and inspected without unnecessary delay by a person or persons

to be designated by the United States, and if found equal^o to the conditions herein set forth, shall be accepted and become the property of the United States. The said examination may at the option of the United States be made by means of samples selected at random from lots delivered. If any of the articles shall be found on said examination to be not equal to the quality herein stipulated for they shall be rejected and the contractor shall remove them from the premises within ten days after notice thereof.

All articles which are not examined and inspected within fifteen days after notice that the same are ready therefor, shall be accepted without examination or inspection.

ARTICLE VII. In the event that the contractor shall not receive shipping instructions in accordance with the foregoing schedule of quantities and deliveries, the contractor may store the articles awaiting such instructions, and add the cost of such storage as an extra charge to the price specified herein.

ARTICLE VIII. Payments under this contract shall be made to the contractor as soon as practicable after the delivery and acceptance of the articles aforesaid; but at least as frequently as once a month, and not later than ten days after statements shall have been rendered by the contractor covering the articles delivered and accepted during the preceding calendar month and the price thereof as hereinbefore provided, and any extra charges applicable thereto. And no payment under this contract shall be delayed or deferred pending any investigation or verification of any guarantee or representation of the contractor herein any difference disclosed by such investigation or verification to be adjusted on subsequent payments which may become due hereunder.

ARTICLE IX. The contractor agrees for itself and on its account, and this contract is upon the express condition that, no lien, or rights in rem of any kind, shall lie or attach upon or against the articles to be furnished hereunder, or machinery, equipment or materials used in the manufacture thereof for or on account of any cause or thing, or any claim or demand of any kind except the claim of the United States of America.

ARTICLES X. Unless this provision is waived by the contracting officer, the contractor agrees that every contract made by it for the furnishing to it of materials, supplies, machinery and equipment, or the use thereof, for the purposes of manufacturing the articles agreed to be furnished hereunder, may be assignable to the Government.

ARTICLE XI. In the event of any dispute with reference to wages, hours, or other conditions appertaining to said work, between the contractor or any subcontractor and labor employed by him in connection with furnishing the articles contracted to be furnished hereunder, the contractor or subcontractor shall immediately notify the contracting officer of the existence of such dispute and the reasons therefor.

ARTICLE XII. That in case of failure of the contractor to fulfill the stipulations of this contract according to their true intent and meaning, the contracting officer or such other officer as may be designated by proper authority may cause the services to be performed and the articles to be furnished by any other person or persons, in open market, without advertising therefor or otherwise, and the said contractor shall pay to the United States the additional cost or expense thus incurred.

ARTICLE XIII. The contractor further agrees to hold and save the United States, their officers and agents, harmless from and against all and every demand or demands, of any nature or kind, for or on account of the use of any patented inventions, article, or process included in the articles hereby agreed to be furnished and the work to be done under this agreement.

ARTICLE XIV. Neither this contract nor any interest therein shall be transferred to any other party or parties, and in case of such transfer the United States may refuse to carry out this contract either with the transferor or the transferee, but all rights of action for any breach of this contract by the contractor are reserved to the United States.

ARTICLE XV. No Member of or Delegate to Congress, nor Resident Commissioner, nor any other person belonging to or employed in the military service of the United States is, or shall be, admitted to any share or part of this contract, or to any benefit that may arise therefrom, but this article shall not apply to any contract within the operation or exception of section 116 of the act of Congress approved March 4, 1909 (35 Stats. 1109).

ARTICLE XVI. No person or persons shall be employed in the performance of this contract who are undergoing sentence of imprisonment at hard labor imposed by the courts of any of the several States, Territories, or municipalities having criminal jurisdiction.

ARTICLE XVII. It is understood and agreed that wherever the words "contracting officer" are used herein they shall be construed to mean the contracting officer executing this agreement, his successor in office, or any other person delegated by the Secretary of War to assume the duties incumbent upon such contracting officer, and any duly appointed representative of said contracting officer.

ARTICLE XVIII. No extra charge, e. g., for transportation beyond contractor's works or for storage, shall be included in the items of cost enumerated in Article I, subdivisions (1)-(3) hereof.

ARTICLE XIX. This contract shall be subject to the approval of the Surgeon General, U. S. Army.

In witness whereof, the parties aforesaid have hereunto placed their hands the date first hereinbefore written.

Witnesses:

(Signed)

WM. PAUL YOUNG.

CHAS. M. WALTON, Jr.

Principals:

(Signed)

C. R. DARNALL,

Lt. Colonel, Med. Corps, Contracting Officer.

JOHNSON & JOHNSON.

COPIES REQUIRED

Prior to 1917, in writing up contracts six or seven impressions were made of each sheet of the contract form. Of these the first three were signed by the contractor and the contracting officer in the place prescribed on the form. The three thus signed were denominated *numbers* to distinguish them from the unsigned *copies*. Whenever the term *number* was used it referred to the signed instrument. When the term *copy* was used it referred only to the unsigned instrument. In August, 1917, an additional copy was called for in order that data concerning the articles and quantities being purchased might be furnished the War Industries Board of the Council of National Defense.¹⁸ In 1918, another copy was required for the inspection service. Additional copies were added from time to time to meet new requirements as they arose. By the end of 1918 the number of copies required had about reached the limit of the typewriter to produce in clear impressions.

DISPOSITION OF NUMBERS AND COPIES

Of the numbers of contracts, one went to the Auditor for the War Department, one to the contractor, and the third to the Surgeon General's Office. Two or three were for interdepot use. One, with the required affidavit of the contracting officer attached, went to the returns office, Department of the Interior, in conformity with law. One copy went to the War Industries Board, Council of National Defense. One copy was furnished the customs service for use of the inspectors of medical and hospital supplies. Later a copy was required for the zone finance officer, the director of finance.

CONTRACT REVIEW

ADMINISTRATIVE

A contract entered into by a contracting medical officer required the approval of the Surgeon General before it became effective.¹⁹ If an emergency existed and time was a vital element in initiating work under the contract, authority occasionally was given by the Surgeon General to the contracting

officer to waive Article XII of the contract, Form 41, which required this approval. In such cases the contract became effective immediately upon receiving the signature of both contracting parties. This authority often was granted and was not extended during the World War. After the three numbers of the contract, accompanied by a performance bond, when that was required, had been received in the Surgeon General's Office they were subjected to close scrutiny for any possible errors. If any were found which were material, the contract or bond or both were returned to the contracting officer for correction. If no material errors were found the contract formally was approved and the approving officer inscribed his signature to the appropriate indorsement on the second fold of the reverse side of the last sheet of the form of all three numbers. One of these numbers was thereupon returned to the contracting officer for transmittal to the contractor. The second number, accompanied by one copy of the bond, if one were furnished, was sent to the Auditor for the War Department, Treasury Department. The third number and the remaining copy of the bond were filed in the Surgeon General's Office. To this number was attached a schedule of deliveries and disbursements.

NUMBERING

Prior to June, 1917, the contracts were given the file number of the contractor with whom they were made and an appropriate subnumber. For example, if the file number were 14501, the contract would be numbered 14501-A, or another subnumber. This system was discontinued with June 15, 1917, and a serial system begun. The first contract approved on June 16 was given the number 1. Thereafter each succeeding contract approved was given a corresponding serial number. This series of numbers was continuous without reference to the fiscal year.²⁰

BOARDS OF REVIEW

In January, 1918, there was created in the office of the Chief of Staff a purchase service²¹ under a director of purchases, charged, among other things, with the supervision of all activities having to do with the placing of purchase orders for manufactured products and the drawing of contracts. This service became, in February, 1918, the purchase and supply division of the General Staff,²² and in April, 1918, the purchase branch of the purchase, storage, and traffic division of the General Staff.²³ Under the director of purchases and supplies was created the office of surveyor general of supplies, charged with correlating the purchase, procurement, and production of munitions and other supplies for the use of the Army with the industrial resources of the country.²² The surveyor general became Second Assistant Secretary of War, charged with all questions of purchase and supply for all bureaus of the War Department²⁴ and the office of surveyor general of supplies was abolished in April, 1918.²³

Under these supervisory agencies many new methods based on civilian commercial practice, changes, and innovations began to appear in the purchase of supplies for the Military Establishment. Not the least among them were the requirements introduced relating to awards, forms of contracts, and safeguards in the matter of placing contracts. Early in July, 1918, the Second

Assistant Secretary of War directed consideration of a plan for the establishment of boards of contract review in the several supply bureaus for the consideration of all contracts in excess of \$5,000 before such contracts were finally executed.²⁵ The instructions of the Second Assistant Secretary on this subject as finally promulgated to the service are contained in the following supply bulletin:

Supply Bulletin No. 21.

WAR DEPARTMENT,
PURCHASE, STORAGE AND TRAFFIC DIVISION, GENERAL STAFF,
PURCHASE AND SUPPLY BRANCH,
Washington, August 16, 1918.

Subject: Boards of contract review in supply bureaus.

1. A board of contract review is hereby constituted in each supply bureau of the War Department. Each such board shall consist of preferably 5 and not over 7 members, including a representative of the finance section.

2. The duties of each such board shall be as follows:

(a) To approve or disapprove of the final form of proposed purchase transactions, bearing in mind particularly the necessity of protecting the interests of the Government as to price, terms, and conditions in the following classes of cases.

(1) All awards over \$5,000.

(2) All cost-plus transactions.

(3) All awards where in cases of formal competitive bidding the award is recommended to anyone other than the low bidder.

(4) Such other classes of cases as the board may consider desirable or as may, from time to time, be designated by higher authority.

(b) To consider questions of purchase and contract policy within the bureau.

3. Minutes shall be kept showing the time and place of each meeting, the members present, and as to all purchase transactions approved the following facts:

(a) Number of transaction.

(b) Name of contractor.

(c) Address of contractor.

(d) Subject matter.

(e) Total amount, actual or estimated.

Each cost-plus transaction and each award to other than the low bidder shall be indicated on the minutes by appropriate reference. If any purchase transaction is disapproved a statement thereof, together with its disposition, should appear on the minutes. If there is a dissenting vote with reference to any purchase transaction, the vote thereon should be recorded. A copy of the approved minutes should be transmitted daily to surveyor of contracts, purchase and supply branch, purchase, storage, and traffic division, General Staff.

By authority of the Secretary of War:

GEO. W. GOETHALS,
Major General, Assistant Chief of Staff,
Director of Purchase, Storage and Traffic.

On June 1, 1918, in order to provide for a more careful and effective scrutiny of contracts before they were submitted to the approving officer for signature, there was established in the Surgeon General's Office a contracts and authorization section in the finance and supply division.²⁶ The duties devolved upon this section were the keeping of adequate records of authorizations granted for the purchase of supplies and of the articles purchased under those authorizations; to scrutinize the contracts submitted for approval to discover whether they were authorized, whether they were technically correct as to form, nomenclature, specifications, packing instructions, points of delivery,

etc., and expressed, so far as could be determined from them, the real covenants between the contracting parties; that the requirements of Army Regulations relative to authority of the signer had been observed; that proper performance bond had been furnished or other security provided whenever necessary; and that funds were available to cover the expenditures contemplated in the contract.

Shortly after the middle of July, 1918, a board of review for Medical Department contracts was established in the finance and supply division of the Surgeon General's Office, in compliance with the suggestion of the Second Assistant Secretary of War above noted.²⁷ This board absorbed the duties of the contracts and authorization section, and continued to function until the armistice was signed. In order that it might have sufficient information to enable it to act intelligently upon the contracts the following instructions were sent to the purchasing officers of the Medical Department on July 26, 1918.²⁸

1. It is directed that in future all contracts, purchase orders, or interbureau procurement requisitions from your depot contain the following information:

- (a) File number under which authorization for purchase is given.
- (b) Reference to bids or quotations on the basis of which material was purchased.
- (c) Statement to the effect that purchase was made from lowest bidder or, if not placed with lowest bidder, the reasons why it was not so placed must be stated in memorandum attached to contract or purchase order.

2. Abstract of circular bids must be forwarded promptly for checking against purchases made.

3. No purchase shall be made on the basis of verbal quotation. If quotation is made by telephone or verbally, the bidder must confirm by letter in order that written quotation may be available if called for.

The following form, adopted August 2, 1918, properly filled in,²⁹ was required to be attached to each contract or purchase order submitted to the board for approval.

To: The Surgeon General.

REASONS FOR AWARDED ATTACHED CONTRACT OR PURCHASE ORDER

* * * * *

The firm to whom the attached order is to be issued is as follows:

- 1. A manufacturer who will manufacture the material specified.
- 2. A dealer who has in stock the material specified.
- 3. A dealer who partially owns or controls the output of the firm manufacturing the materials.

Contractor..... Contract date.....

Circular proposal		Open market	
1. Award made to low bidder.....	Yes; no.	1. Competition obtained and award made as follows:	Yes; No.
2. Award made to other than low bidder for the following reasons:		(a) Low bidder.....	
(a) To guaranty requirements.....		(b) Other than low bidder for the following reasons:	
(b) Low bid not in accordance with specification.....		1. To guaranty requirements.....	
(c) Low bid quality unsatisfactory.....		2. Low bid quality unsatisfactory.....	
(d) Low bid delivery unsatisfactory.....		3. Previous dealings with low bidder unsatisfactory.....	
(e) Previous dealings with low bidder unsatisfactory.....		4. Low bid delivery unsatisfactory.....	
(f) Other reasons (give detail).....		5. Other reasons (give detail).....	

Signed

Contracting Officer.

The establishment of bureau boards of contracts review failed to complete the chain of superior agencies created to sit in judgment upon contracts for supplies for the Military Establishment. There was still needed, in the scheme of organization, another agency to supervise and direct the bureau boards of contract review.³⁰ The establishment of this agency could not long be held in abeyance. It made its appearance under the title of superior board of review. The organization and duties of this board and the date of its establishment are given in the following supply bulletin:

Supply Bulletin No. 14.

WAR DEPARTMENT,
PURCHASE, STORAGE AND TRAFFIC DIVISION, GENERAL STAFF,
PURCHASE AND SUPPLY BRANCH
Washington, July 30, 1918.

Subject: Superior board of contract review.

1. A superior board of contract review is hereby constituted in the purchase and supply branch, division of purchase, storage, and traffic, General Staff. This board shall consist of the director of purchases and supplies, the surveyor of contracts, and either the chief procuring officer of each supply bureau or a member of the board of contract review of each bureau as may be designated by the bureau chief.

2. It shall be the duty of the superior board of contract review to consider the form and policy of contracts and contracting methods of the various bureaus, to pass upon particular contracts or other matters relating to purchase that may be referred to it by the various bureaus or higher authority, and to recommend its conclusions to the director of purchase, storage, and traffic.

3. Questions arising within a bureau and requiring the attention of the superior board of review, as specified in the preceding paragraph, shall be submitted, after consideration by the bureau board of contract review, to the superior board hereby constituted.

By authority of the Secretary of War.

GEO. W. GOETHALS,
*Major General, Assistant Chief of Staff,
Director of Purchase, Storage, and Traffic.*

REFERENCES

- (1) Act of July 16, 1798 (1 Stats. 610). Section 3714, Revised Statutes.
- (2) Military Laws, Rules, and Regulations for the Army of the United States, Adjutant and Inspector General's Office, January, 1820, p. 102.
- (3) *Ibid.*, p. 105.
- (4) Supply Circulars Nos. 99, 102, 103, 110, 120, Purchase, Storage, and Traffic Division, General Staff; October 11–Nov. 29, 1918.
- (5) Section 3732, Revised Statutes as amended by act of June 12, 1906 (34 Stats. 255).
- (6) Act of March 2, 1901 (31 Stats. 905).
- (7) Act of July 5, 1884 (23 Stats. 109).
- (8) Act of June 12, 1906 (34 Stats. 258).
- (9) The Military Laws of the United States, 1915, fifth edition, Government Printing Office, 1917, 438.
- (10) Act of August 29, 1916 (39 Stats. 639).
- (11) Supply Circular No. 88, Purchase, Storage, and Traffic Division, General Staff, September 7, 1918.
- (12) Form 42, Medical Department.
- (13) Form 43, Medical Department.
- (14) Form 44, Medical Department.
- (15) Form 45, Medical Department.
- (16) Supply Bull. No. 11, Purchase and Supply Branch, Purchase, Storage, and Traffic Division, General Staff, August 1, 1918.

- (17) Copy of contract between Lient. Col. C. R. Darnall, M. C., and Johnson and Johnson, June 23, 1917. On file, Medical Supply Depot, New York, Field Medical Supply Depot files.
- (18) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, Mo., August 25, 1917. Subject: Extra copy of contracts. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{64}$.
- (19) Form 41, Medical Department, Article XII.
- (20) Letter from the Surgeon General to the Director of Purchases and Supplies, Mills Building, Washington, D. C., July 5, 1918. Subject: System of numbering contracts. On file, Finance and Supply Division, S. G. O., $\frac{750-198 D. P.}{87}$.
- (21) General Orders, No. 5, War Department, January 11, 1918.
- (22) General Orders, No. 14, War Department, February 9, 1918.
- (23) General Orders, No. 36, War Department, April 16, 1918.
- (24) General Orders, Nos. 25 and 44, War Department, March 11, and May 7, 1918.
- (25) Letter from the Second Assistant Secretary of War to Brig. Gen. Hugh S. Johnson, Director of Purchases and Supplies, July 10, 1918, relative to boards of review. On file, Finance and Supply Division, S. G. O., $\frac{750-198 D. P.}{132}$.
- (26) Division order of Col. C. R. Darnall, M. C., to Chief of Finance and Supply Division, May 29, 1918. Contract and Authorization Section. On file, Finance and Supply Division, S. G. O., $\frac{750-714 S. G.}{321-A}$.
- (27) First indorsement from the Surgeon General to the Chief of Staff, July 19, 1918, relative to boards of contract review. On file, Finance and Supply Division, S. G. O., $\frac{750-198 D. P.}{132}$.
- (28) Letter from the Surgeon General to the officer in charge, Field Medical Supply Depot, Washington, July 26, 1918. Subject: Contracts, etc. On file, Finance and Supply Division, S. G. O., $\frac{713-Misc.}{64}$.
- (29) Letter from the Surgeon General to the officer in charge, Field Medical Supply Depot, Washington, August 2, 1918. Subject: Contracts, etc. On file, Finance and Supply Division, S. G. O., $\frac{713-Misc.}{64}$.
- (30) Letter from the Director of Purchase, Storage, and Traffic to Maj. Gen. W. C. Gorgas, Surgeon General of the Army, July 24, 1918. Subject: General Board of Contract Review. On file, Finance and Supply Division, S. G. O., $\frac{750-198 D. P.}{132}$.

CHAPTER VII

FACTORS AFFECTING PRODUCTION OF SUPPLIES

Many difficulties of greater or less magnitude confronted the manufacturers of medical and hospital supplies in the production of the articles which they had undertaken to furnish. Many of these difficulties were doubtless unavoidable. Some of them were due to regulations which, while justifiable in principle, appeared to be applied without sufficient discrimination and latitude. If some of the manufacturers complained of these difficulties and restrictions, they were not without justification. While the difficulties were legion, the more important, stated in the order of their development, were shortages of skilled labor, fuel, power, transportation, raw materials, and semifinished products, augmented by the control exercised over distribution.

LABOR

One of the most unfortunate but common conditions which confront industry in times of peace is the labor turnover. This turnover is more or less periodic and varies with the year, the season, the locality, the individual factory, and the industry. The causes are numerous, but the condition is chronic. It is apt to be exaggerated by unsettled or unusual conditions and to become acute when a shortage threatens. The lure of higher wages reported to be paid elsewhere creates unrest and a desire for a change, and engenders a roving disposition. This is particularly noticeable during war periods when the turnover is apt to be rapid and wasteful and to remain high during the entire period in spite of efforts to prevent it. This condition obtained during the years 1917-18.¹

The shortage of skilled labor in certain of the trades supplying the Medical Department began to manifest itself early in June, 1917. It was due in part to the high wages being paid in other industries, at navy yards and at the cantonment construction camps.² It was influenced to no small extent by the entry of employees within the draft age into the military service. Many of these men preferred to enlist, while enlistments were permitted, to being called in the draft.³ The first draft was made without regard to the importance to industry of the men drafted or consideration of the part industry was destined to play in winning the war. Men had to be provided for the Army and time did not permit a selection to be made. Accordingly, selections were made by lot. Later on the selections for the draft gave more consideration to the needs of industry. It was not the intention, even in the first draft, to reduce the efficiency of any manufacturer producing supplies for the Military Establishment. But general exemption could not be made to include any particular industry or class of workers.

Each case was considered on its own merits.⁴ Exemptions could be had in individual cases by the individual himself claiming exemption and stating the reason for his claim. The manufacturer supported the claim with an affidavit setting forth the fact that the individual was engaged upon work for the Government and furnished such other information as the local district appeals board considered necessary.⁵ If the board considered the claim meritorious the exemption was granted and the man remained at his task.

In so far as medical supplies were concerned, the surgical-instrument industry was, perhaps, the most sensitive to fluctuations in the the labor situation and to losses of skilled workmen. The reasons for this sensitiveness are given in greater detail in the chapter on surgical instruments. Even in peace times the number of such workmen is inadequate. The prospect of meeting the war requirements was very doubtful. Those requirements could be met only by conserving the skilled workmen as much as possible and by utilizing them as instructors and supervisors of the new workmen employed in the industry. Consequently strenuous efforts were made to retain the skilled workmen in this industry. Every assistance which could be given by the Surgeon General to retain these men was given. Manufacturers were informed of the procedures to be followed in securing the exemption of their workers. Applications from men in Class I, liable to be called by the draft, were forwarded through the Surgeon General's Office, where measures were initiated to have such men placed in a deferred classification. If the men actually were called in the draft they could be transferred to the enlisted reserve corps, placed on the inactive list, and returned to their employers.⁶

As the available workmen became fewer in number contractors began to compete with one another, advertising more and more favorable conditions and wages.⁴ Employment agencies were established in various cities for recruiting labor. The Post Office Department cooperated in the effort to bring employers and employees together.⁷ But these efforts were not always well considered or the agencies well coordinated in this matter. The activities sometimes conflicted with the interests of local factories engaged upon Government contracts, and skilled workmen were lost through such measures. In May, 1918, complaint was received from a factory in Erie, Pa., that special efforts were being made to engage the skilled mechanics in that vicinity, where the bulk of production was on Government contracts, for employment in other cities on other Government contracts.⁸ Prompt representation was made to the Labor Administration of this state of affairs with request that the condition be remedied.

Just as the Railroad, Food, and Fuel Administrations were brought into being to conserve and the more effectively distribute transportation, food, and fuel, so the United States Employment Service was established early in January to conserve and distribute the existing supply of labor. This service consisted of a labor administrator with an able advisory council in Washington and a labor administrator in every State.⁹ Its continuing effort was to reduce the labor turnover, to prevent competition in the employment of labor, and to assist industries engaged upon Government contracts in securing needed workmen. Near the end of May, 1918, a complaint was received by the Surgeon General from a manufacturer in Boston, Mass., to the effect that sufficient

labor could not be had locally to make possible the production of the quantities stipulated in his contract.¹⁰ This complaint was promptly referred to the United States Employment Service by the Surgeon General, with request for assistance and relief.¹¹ So far as is known the shortage was relieved through the efforts of this service.¹²

Just as priorities were established in industry to provide munitions and the industries were arranged on a preference list, so measures were instituted to control the flow and supply of labor. The classifications of industries and automatic ratings applied by the priorities commissioner came, in the fall of 1918, to be the rules observed in guiding the flow of labor.¹³

FUEL

Production during the greater part of the year 1917 was uneventful save for the dislocation incident to labor changes and transportation. Fuel was had in sufficient quantities and with reasonable dispatch. The winter of 1917-18 set in early and was unusually severe throughout the entire United States. Heavy snows interfered with the mining of coal and greatly impeded railway traffic. Seaboard terminals and junction points of the railways were congested with east bound overseas traffic. The distribution of supplies, including coal, was in a fair way to be paralyzed. By the end of December conditions east of the Mississippi River were such that a fuel famine impended. To prevent this, prompt and vigorous action was necessary. Fuel was placed entirely under Federal control. The agency set up for this purpose was designated the Fuel Administration, under a chief called the Fuel Administrator, located at Washington, D. C. Local fuel administrators were appointed in various large cities and particular districts assigned to each of them. Stringent regulations were promulgated concerning the conservation and use of coal and other fuel. Certain mines or groups of mines were designated to supply similar designated areas. Soon the control became absolute. Fuel was placed on an allowance or ration basis. Only a limited quantity was allowed to any consumer. Orders issued by the Fuel Administrator on January 16 required the closing of industrial establishments on Monday of each week during January, February, and March.¹⁴

Since certain supplies for the Army were of such vital importance that any cessation of production would interfere with the military program, arrangements were made to exempt the manufacturers of such articles from the closing order. The number of these articles, however, was limited. To obtain this exemption for any factory it was necessary for the chief of the supply bureau to make application therefor and to submit a certificate as to the urgency of the need for the articles manufactured at the particular factory. The Secretary of War directed the fuel and forage division of the Quartermaster General's Office to handle all matters relating to fuel for the Military Establishment and War Department and to assist the contractors of the various supply bureaus to secure their fuel requirements in cases of emergency.¹⁵ The procedure for obtaining fuel and closing exemption for contractors is indicated in the following copy of the blank form provided for the purpose:

No. _____.

Office of _____,
 Washington, D. C., _____, 1918.

Memorandum for the Secretary of War:

I certify that in my opinion the contractors set forth in the list annexed hereto are engaged upon the production of supplies for the war emergency, of such immediate importance that any delay in the continuity of such production would seriously interrupt the program of this department:

Names of contractors: _____ Articles manufactured: _____

(Signature) _____

(Rank) _____

(Certificate to be signed in *duplicate* by Chief of Bureau, and transmitted to the fuel and forage division, Q. M. G. O., Room 490, War Department)

OFFICE OF THE QUARTERMASTER GENERAL
 FUEL AND FORAGE DIVISION,
 Washington, D. C., _____, 1918.

Respectfully transmitted to the Secretary of War, for his action.

 Lieut. Colonel, Q. M. Corps.

OFFICE OF THE SECRETARY OF WAR,
 Washington, D. C., _____, 1918.

Respectfully transmitted to the Fuel Administration, recommending that firms above named be exempted from the provisions of any orders which would interfere with the continuity of production of articles set forth.

 Authority was granted by the national Fuel Administrator in January, 1918, for the exemption from the closing order of manufacturers of surgical instruments, surgical dressings, biologicals, and medicines. The Secretary of War declined to consider exemption for other manufacturers of supplies for the Medical Department. While these manufacturers were placed in the exempted class by the national Fuel Administrator, the actual exemptions were obtained through the local fuel administrators. As frequently happens in a newly formed organization, there was a material difference of opinion between different administrators over the granting of these exemptions. Some of the administrators granted the exemption upon the request of the medical supply officer, while others refused to grant exemption without direct instructions from the Chief Fuel Administrator.¹⁶ Adjustments finally were made, and by judicious use of the quantities of fuel allowed production went on with very little diminution or inconvenience.

The following instructions were received by the Surgeon General, January 19, 1918, to guide in the preparation of requests for assistance in securing fuel for contractors:¹⁷

In cases of necessity, contractors and subcontractors having contracts for furnishing supplies for the War Department should make application to the Army officer with whom they have a contract, or with whom their principal has a contract, for the necessary fuel

for the running of their establishment, stating the quantity needed. They should also state the percentage of their output covered by Army contracts.

The Army officer concerned will check up these requests and satisfy himself of the necessity for same. Having done so, he will transmit the requests promptly to the chief of his corps or department especially designated to handle fuel matters, who will examine the requests and see that they are not duplicated within his corps or department. This officer will, each day, transmit the requests to the chief of the fuel and forage division of the Quartermaster General's Office, indicating their relative order of emergency.

The chief of the fuel and forage division, Quartermaster General's Office, will examine these requests, with a view to seeing that there is no duplication among the several departments, and will have an officer of his division especially detailed for the purpose, present them personally to the proper official of the Fuel Administration and cooperate with the transportation division with a view to having cars provided for this fuel.

This will avoid the present confusion resulting from having a large number of different officers from different bureaus all dealing independently with the Fuel Administration.

Information should be sent to all contracting officers of the War Department, giving them the information, and they should be instructed to notify all their contractors accordingly.

Additional instructions from the Quartermaster General's Office required the following information with every application from a contractor for assistance in securing fuel: Location of the plant; railroad connections at the plant; kind of fuel required; quantity of fuel required, weekly, for production of War Department supplies only; existing contracts, if any (state with whom); current purchases (with whom placed); quantity of fuel on hand; quantity of fuel in transit; percentage of production on War Department contracts.

ELECTRIC POWER

On January 15, 1918, the Surgeon General was advised by the Council of National Defense that there had developed a shortage of electric power in the State of New Jersey for manufacturing purposes.¹⁸ Since current there could be supplied for only the most urgent needs, some manufacturing industries must do without. In order to distribute the available power to the most urgent needs of the various supply bureaus, lists of manufacturers were called for showing the location of the plants engaged upon the most urgent war work in New Jersey.¹⁸ Only those plants were to be included in the lists whose products were absolutely necessary and could not withstand a delay of a week or 10 days. After a careful sifting of the applications for power the approved lists were furnished the Power Co. of New Jersey by the Council of National Defense.

The Medical Department at that time had contracts with 35 manufacturers in New Jersey. In the list submitted by the Surgeon General in compliance with the instructions above referred to, these 35 factories were divided into 4 groups in accordance with the urgency of the need for the articles which they respectively produced.¹⁹ Group I included only the makers of gas-mask parts, of whom there were 10. Group II included only glassware. There were four firms in this group. Group III included 8 manufacturers, of whom 3 produced medicines, 1 surgical instruments, 1 hypodermic syringes and thermometers, 2 surgical dressings, and 1 tin cans for containers. Group IV included manufacturers of splints, mattresses, gatch frames, blankets, duck, ophthalmoscopes, and ambulance boxes. The products of the manufacturers not included in the

list were not considered of such urgency that the delay anticipated would interfere with the military program.

A shortage of electric power developed in the district about Worcester, Mass., at the end of January, 1918. This district extended into the near-by parts of Vermont, New Hampshire, and Rhode Island. Restrictive measures similar to those applied to New Jersey were applied to this district also. Fortunately the urgent needs of the Medical Department in this area were limited to two firms in Providence, R. I. One of these firms made surgical needles, the other caustic soda for the Gas Defense Service.

There was a chronic shortage of electric power throughout the "congested area" until the end of the war. This area was bounded by the Atlantic Ocean and a line drawn through the Chesapeake Bay, Baltimore, Harrisburg, Altoona, Binghamton, Schenectady, the Hudson River, and the northeastern boundary of New York State. Similar shortages persisted in the districts supplied by power companies at Canton, Baltimore, Massillon, Alliance, Niagara Falls, Pittsburgh, Connellsville, Wheeling, Youngstown, and Akron. In these localities clearance was required for all orders placed therein.

TRANSPORTATION

Difficulties in securing freight cars for the transportation of raw and semi-finished materials to the contractors' factories and of the finished products to destination began early and continued throughout the war. Requests for assistance in securing transportation received in the Surgeon General's Office were numerous. The efforts to provide the cars requested were generally successful, but the delay in securing them was often irksome to the manufacturers, whose employees were often dependent upon the prompt delivery of the material to the plant for a continuation of their employment. There was close liaison between the transportation branch of the finance and supply division of the Surgeon General's Office and various railway officials prior to the amalgamation of all railroads under the Railroad Administration, and with the officials of that administration after the consolidation. By reason of this liaison it was possible to obtain cars with a minimum of difficulty.

RAW MATERIALS

The Medical Department was not seriously disturbed in the accomplishment of its mission by shortages of raw materials. At times these materials were scanty and difficult to secure. The Medical Department, in common with other supply bureaus, experienced many inconveniences arising from a supply of certain raw materials inadequate to the demand. The most prominent among these materials were steel, wool, cotton linters, nonferrous metals, and certain basic chemicals required in the manufacture of medicinal agents. The term "raw materials" as used here includes all those materials, whether the untreated products of nature or the semifinished products of other manufacturers, utilized within the factories of the makers of medical and hospital supplies and equipment in the fabrication of the finished article. Delays frequently were experienced by manufacturers in securing needed materials from lack of suitable priorities. This was particularly true of steel plates for

the manufacture of steam boilers for the hospital sterilizing sets and the portable disinfectors. Fortunately the delays and difficulties experienced in securing raw materials did not at any time prevent the delivery of needed equipment and supplies to the hospitals and in the field in time to meet the expected need. Oftentimes the margin between supply and shortage was very narrow, but somehow the supplies arrived before the need became acute. If it were not practicable to obtain the exact articles desired, the nearest substitute was accepted. In general the question of production depended far more upon facilities and labor than upon the supply of raw materials.

Shortages in both basic raw materials and in manufacturing facilities for certain pharmaceuticals were noticeable during the early procurements of the war. As the prices of these articles were very high, their purchase was discontinued until the prices reached a level at which the articles could be purchased. Meanwhile substitutes were provided. Thus phenacetin (acetphenetidinum) was quoted at \$16 per pound in the early part of 1917 and acetanilid was substituted. When manufacturing processes had become sufficiently available to produce phenacetin at a reasonable price its purchase was resumed. Thymol was displaced by oil of chenopodium in the treatment of hookworm. The supply of atropine and homatropine was very scanty and the prices were almost prohibitive during the early months of the war.²⁰ The alkaloids of stramonium were substituted. Later, manufacturing processes were perfected whereby atropine was obtained directly from stramonium seed. Novocaine, later termed procaine in the United States, was unavailable for a time due to lack of manufacturing facilities. These articles will be referred to again under pharmaceuticals.

For a number of medicinal agents the raw materials or crude drugs are obtained wholly or in part by importations from abroad. It was among this class of pharmaceuticals that the chief difficulties developed from the standpoint of raw materials. Some of the most important remedies belong to this group, notably opium and its alkaloids, quinine, camphor, and iodine. The bulk of the opium, quinine, and native camphor comes from the Orient. Iodine comes from the nitrate beds of Chile. The critical period for opium and quinine occurred early during the war. The camphor and iodine situation became acute near the end of the war.

Quinine comes mostly from the Dutch East Indies. Although a small quantity comes from South America, the East Indies product is preferable. The earliest purchases of quinine in 1917 were made without difficulty. Subsequent purchases became more difficult because of the limited quantity of cinchona bark which arrived in the United States. Through limiting the quantities to be purchased and by cooperation with the firms importing cinchona bark²¹ the situation was tided over until better arrangements could be made with the Government of Holland for the export of that commodity. The agreement with that Government became effective in April, 1918, and thereafter the quinine situation improved.²² By autumn the importers were able to advise the Surgeon General that all Army requirements could be met.²³

The requirements for opium, morphine, and codeine for the first purchase of pharmaceuticals during the summer of 1917 were met without difficulty from

existing stocks. Thereafter it became increasingly difficult to obtain them at reasonable prices. Arrangements were made with the Customs Bureau of the Treasury Department for the transfer of approximately 4,000 pounds of smoking opium²⁴ which had accumulated from seizures for attempted smuggling. The contained alkaloids were extracted from this lot of opium and yielded 3,500 ounces of morphine and 1,470 ounces of codeine.²⁵ Orders were placed in England in December, 1917, under instructions from the Surgeon General, for 5,000 ounces of codeine and 8,000 ounces of morphine.²⁶ Delivery of these supplies was made to the New York medical supply depot, 2,000 ounces of codeine and 2,500 ounces of morphine in February, 1918, and the balance during July of the same year.²⁷ With these supplies the opium-morphine-codeine situation was satisfactorily met. The question of growing the poppy in the United States and the extraction of the morphine from the dried pods was considered but was abandoned in deference to popular prejudice.

The early requirements in camphor had easily been met, but with the advent of the automatic supply table from France and the rapidly increasing number of troops in the American Expeditionary Forces quantities in excess of the supply began to become manifest. The automatic supply table called for a monthly shipment of 500 pounds per month for every unit of 25,000 men.²⁸ Camphor was used largely in the preparation used to prevent "trench foot." The estimates of May 27, 1918, called for 125,000 pounds of camphor for the following six months.²⁹ By September the estimates had risen to 170,000 pounds for September and October alone.³⁰ Those for the six months ending with February amounted to 600,000 pounds.³¹ Synthetic camphor was not produced in the United States in sufficient quantities to meet the needs of the celluloid industry, and dependance had to be placed upon the imported natural product. Natural camphor is obtained almost exclusively from Formosa. Its export from Japan is controlled by the Japanese Monopoly Bureau,³¹ which, for trade reasons, limits the quantity which can be exported to any country. The requirements exceeded the import allowance and it became necessary to take up with the Japanese ambassador the question of increased import of crude camphor.³¹ This was done in September, 1918.

The principal sources of supply of iodine, as already noted, are the nitrate beds of Chili. Since, during the year 1917, more than 700,000 pounds of iodine were shipped into the United States,³² the requirements of the Medical Department for this substance during 1917 were met without difficulty. However, as more and more tonnage was diverted to the transportation of men and supplies to the American Expeditionary Forces during 1918, less tonnage was available for imports of nitrates. This limited materially the quantity of iodine which could be shipped, and the probabilities of a shortage became increasingly greater. The need for nitrates for munitions and fertilizers had stimulated their production from seaweed on the California coast. Plants were erected for the extraction of nitrates and iodine from the ash of the seaweed, and gave promise of being a valuable adjunct to the supply of those articles. The market situation on iodine eased off before the armistice was signed and the threatened shortage did not develop.

IRON, STEEL, AND THEIR PRODUCTS

It was manifestly impossible for all industries using steel and iron in their activities to obtain their normal supply. It accordingly became necessary to curtail the consumption of iron and steel by the various industries and to limit the output so far as practicable to essential uses without destroying or seriously injuring any industry. Much was done to conserve the supply by reducing the needless lines, varieties, and sizes of products. This resulted in economy in manufacture and reduced the volume of stocks to be carried. Wasteful styles, models, and methods were eliminated. Substitutes in products and materials were provided wherever practicable for those needed in war work which conserved the latter and did not reduce production. Measures were taken, therefore, for the rationing of industry.³³ The manner in which this was accomplished is described in the following chapter. Marked reduction in the quantities consumed by nonwar industries was required, amounting in many cases to 50 per cent or more. The allowance to some industries was practically nil. To those considered more or less essential, allowances were made in proportion to their estimated importance to the public welfare.

The allowances to industries supplying articles required for war purposes were covered by priorities as already described. Therein lay the only difficulty experienced by the Medical Department in the production of equipment for its personnel and the performance of its mission. Probably because of the kind of steel, the comparatively small quantity required for the purpose, and the urgency of the need, so far as can be learned there was never any difficulty in securing steel for surgical and dental instruments and appliances. Clearances were promptly granted and satisfactory priorities given. Deliveries were made without delay. Nor did there arise material difficulty in securing an adequate supply of steel for operating-room furniture and enamel ware for cooking and serving food. When it came to steel plates for boilers for portable disinfectors and sterilizing apparatus for hospitals quite a different situation obtained. Here delay followed delay and the priorities granted did not seem to be sufficiently high to provide deliveries in a reasonable time.³⁴ The first difficulty in securing boiler plate occurred on the contracts of December, 1917. These contracts were placed before the priorities regulations had become fully effective. Nor did the situation improve greatly after the priority system was in full swing.³⁴

A material delay was experienced in the autumn of 1918 in securing hospital beds at a time when the hospital situation both in the United States and in France was critical. The estimates were for 300,000 beds. The interbureau procurement requisition system was in force. Because of the emergency, a contract for 100,000 bedsteads was placed fairly promptly by the procuring bureau and deliveries were made within a satisfactory period. The procurement of the remaining 200,000 did not proceed rapidly or smoothly. A controversy arose over the type of finish, the contractor, and the priority on them. These beds were of a type in which the head and foot pieces folded under the body of the bedstead for shipment. The white-enamel finish had been tried out and found unsatisfactory due to the readiness with which it

chipped in handling. An electro-galvanized finish, which did not have this undesirable quality, was adopted instead of the white enamel. It could be had at practically the same price and was very much more durable. The director of purchases and supplies, however, disapproved the finish on the grounds that beds with that finish could be made by only two manufacturers, and directed that an aluminum paint finish be substituted for it.³⁴ The Surgeon General protested against this ruling, but in vain.³⁵ When it came to place the contract for the 200,000 beds the manufacturer who had already produced a great number of them offered to make the entire amount and to make deliveries at the rate of 100,000 per month. A controversy arose over the price to be paid for the beds. The procuring bureau thereupon placed a mandatory order against the manufacturer for them. When it came to securing a priority for the steel tubing the War Industries Board decided that the manufacturer had exceeded the 50 per cent civilian business allowed under a priorities ruling and refused to grant the priority. A meeting of all the bedstead manufacturers was then called and the matter discussed at length.³⁶ The final result was that the manufacturer who had offered to make the entire lot was granted the priority, and production started more than two months after the interbureau requisition was placed.

Clearance was requested on August 24, 1918, for the purchase of 3,000 wheeled hospital litter carriers. These carriers were made entirely of steel except the rubber tires of the wheels. In the manufacture of that number of carriers 120,750 pounds of steel were required. The request was put forward at a time when the prospective need of this device in France was becoming daily more urgent. These carriers were designed to receive the patient on the litter as he came from the ambulance or train, to utilize the litter as an operating table, to finish the operation or dressing upon it, and finally to transfer the patient to the ward without removing him from the litter or the litter from the carrier during the entire process. Clearance was at first refused in the effort to conserve steel. A wooden model was proposed by the clearance committee of the War Industries Board. The representatives of the Surgeon General in conferences with the committee refused to accept the substitute for structural and sanitary reasons. A tentative clearance on 1,500 carriers was granted by the committee. The representatives of the Surgeon General considered that 3,000 was the minimum requirement and request for that number was renewed. The request was finally granted by the committee, after a forcible presentation by the chief of the finance and supply division, Surgeon General's Office, of the results and complaints which would ensue from a failure to provide the required number of carriers.³⁷

NONFERROUS METALS

Of this group, the metals which were of importance to the Medical Department were aluminum, antimony, copper, manganese, mercury, nickel, platinum, potassium, silver, tin, and zinc. No large quantities of any of them were required. Probably the largest requirements were in aluminum, copper, nickel, tin, and zinc.

Aluminum was used extensively for large-sized cooking utensils and for mess equipment. In the field equipment aluminum bowls, plates, and saucers

originally were provided for the chests of tableware. Since experience proved that enamel ware could be substituted for the aluminum ware in these articles to advantage and at a considerable saving in cost, later procurements of these chests were provided with enamel ware instead of aluminum ware.³⁸ For the very large pots (coffee boilers and stock pots of 36 to 40 size), hotel sauce pans, trays, etc., where they were subjected to rather hard usage aluminum ware was found the more satisfactory. The total purchases of aluminum vessels during the six months ending July, 1918, contained approximately 40,000 pounds of aluminum.³⁹ The estimate for the succeeding six months was 55,000 pounds.⁴⁰

Antimony was used only in the official antimony and potassium tartrate of the standard supply table. Of this preparation, however, only 11,500 bottles containing one-half ounce each were purchased. So little of it was used that it never became a problem to procure the needed quantity.

Copper was required for the shells of the sterilizers and water tanks of the standard sterilizer outfits for hospitals. Alloyed with zinc, it appeared in the manufacture of the hollow instruments used in surgery. Alloyed with zinc and nickel, it appeared as nickel silver in the tableware supplied for hospital purposes, knives, forks, tablespoons, and teaspoons. Much of the tableware was silver plated and thereby involved four metals in the finished product. While difficulty was experienced in the earlier purchases by the manufacturers of sterilizer sets, in securing the shells for the dressing sterilizers and water sterilizers from the firms which drew them, no difficulty appears to have been experienced in securing a sufficient quantity of copper sheets for the instrument and utensil sterilizers. The difficulty was one of production of the semifinished product rather than of raw materials.

Manganese appeared only in the potassium permanganate of the supply table, of which, because of excessive cost, only 10,050 pounds were purchased.

Mercury finds a more extended use in medicine and hospital practice. It appears among the medicinal agents on the supply table in the forms of the corrosive chloride, calomel, yellow iodide, yellow oxide, and the salicylate. It appears as an article of dental use in the redistilled mercury, of which 11,100 pounds were purchased. It is required also in the manufacture of clinical thermometers, bath thermometers, and mirrors. While the prices for this substance were high, there was never any shortage, due to domestic production and imports.⁴¹

The chief use of nickel in medical and hospital practice is as a protective agent to prevent the rusting of instruments and as a plating for copper utensils. Its use in tableware has already been mentioned. Inasmuch as the bulk of nickel ore comes from Canada, the question was one of transportation rather than of production. No actual shortage was experienced.

Platinum finds its chief place in the medical science in the form of crucibles and wire for laboratory work, and wire for X-ray tubes.⁴² It also appeared in the breaker points of magnetos in the ambulances and motor cycles purchased. The quantity actually required was comparatively small. Small as it was, great conservation was necessary to provide the quantity needed. A substitute wire, called nichrome, was utilized in laboratory work to save platinum.

Tin was required by the Medical Department only as tin plate for containers for medicines and canned foodstuffs, and for certain kitchen utensils. While the supply was limited, due to insufficient water transportation to bring it from the Federated Malay States, no real shortage developed.

Zinc finds its use in medicine in the form of the sulphate and to a lesser extent in other medicinal compounds. It is used in the making of brass, and as a protective agent for metals, such as galvanized buckets, electro-galvanized bedsteads, etc. Domestic production was adequate to the needs, and no shortage arose therein.

While there was no acute shortage of these metals, except platinum, it was only by conservation that a shortage was avoided.

WOOL

The only articles on the standard medical supply table into which wool enters as a basic raw material are blankets and woolen bandages. During 1916 the specifications for these articles had required that they be all wool. Considerable difficulty had been experienced for a number of years in securing a flannel of sufficient quality to meet the specifications and as a result the prices had been steadily increased. By 1917 the prices of this grade of flannel had increased to such an extent that their purchase was discontinued throughout the war.

The United States produces usually about one-third of its wool requirements. For the remainder it must depend upon imports from Australia and South America.⁴³ Because of lack of ships during the latter part of 1916 and 1917 imports of wool fell off considerably and the market was unsettled. The requirements of the Government for clothing and blankets for the soldiers were enormous and the supply threatened to be inadequate and the prices high. Measures were taken very early to secure an adequate quantity of wool for the Army. Conservation of the supply became urgently necessary. Practically the entire stock in the country was secured by the Quartermaster's Department, the supply bureau charged with providing clothing for the soldiers.⁴³ The Medical Department accordingly revised its specifications for blankets and permitted the admixture of cotton with the wool. The blankets for field equipment were required to be more nearly all wool than those for ordinary hospital use. The majority of the blankets purchased for field use were all wool, but contained an increased amount of shoddy, approximately 35 per cent. The specifications adopted for the hospital blanket which, prior thereto had been white and all wool of not lower grade than quarter bred, were changed to the following:⁴⁴

SPECIFICATIONS—BLANKETS

MEDICAL DEPARTMENT, UNITED STATES ARMY

(1) *Composition*.—Warp to be white No. 6 cotton, 2,400 ends. Filling, not less than 20 per cent of new fleece wool, quarter blood or finer; 20 per cent wool noils, or reworked wool of good quality; 60 per cent cotton (China).

(2) *Color*.—A bright silver gray, as per sample of these specifications filed in the office of the New York medical depot, New York City. Mixture is composed of 7 per cent colored black wool, balance white stock.

(3) *Border*.—The finished blanket to have a border 3 inches wide, color medium Oxford gray, as per sample; woven across each end of the blanket 7 inches from the finished end.

(4) *Construction*.—The finished blanket shall have not less than 36–37 threads per inch in the warp, and the filling 54 to 56 picks per inch (double weave).

(5) *Weave*.—Blanket to be double weave.

(6) *Size and weight*.—The blanket shall be 66 by 84 inches, and shall weigh not less than 4 pounds.

(7) *Finish*.—Like sample.

To be a strong and serviceable blanket equal in every respect to the standard sample.

The ends shall be secured from raveling by a whipped overlock stitch, equal to the standard sample. (Use white thread.)

The prices paid for blankets for field use varied between \$4.25 and \$6.33. Of the 848,750 such blankets purchased during 1917, 100,000 were purchased at \$4.25 each; 10,000 at \$4.50; 266,100 at \$6.04; 253,500 at \$6.10; 2,650 at \$6.14; 26,000 at \$6.20; and 100,000 at \$6.32.⁴⁵ The prices paid for hospital blankets during the same period, of which the purchases amounted to 757,085, varied between \$4 each and \$5.975 each. The average price for the lot was \$5.25.⁴⁴ During 1918 the prices rose somewhat, due to the increasing military demands and shortage of wool.

COTTON AND LINTERS

Although the prices of cotton steadily advanced during the years 1917–18, there was never any shortage. The difficulties in securing the required amount of cotton fabrics was due to the magnitude of the demand for fabrics of special weave for which the machinery of the mills was not adapted. A readjustment of weaving processes was necessary. Mills that had been accustomed to weave one kind of cloth were converted to weave some other kind such as was required for Government use. The quantities of duck and canvas and of surgical gauze were enormous.

Besides surgical dressings in great quantities, the Medical Department required sheeting, towels, pajamas, bath robes, mattress covers, ticking for mattresses, muslin, tape, and canvas.

Prior to 1917 the standard mattress of the Medical Department was made of pure South American hair. This grade, which is the soft mane hair of the horse, makes a very soft and comfortable mattress especially suited to the sick. Because of the lack of ships, the quantity of hair available in 1917 was hopelessly inadequate and the prices asked for mattresses were very high. Consequently it became necessary to adopt some other substance for the purpose. Since cotton mattresses were in common use and promised to be materially less expensive than hair mattresses, it was decided to purchase them instead of the hair mattress. The early specifications for these mattresses called for a mixture of upland cotton and linters.⁴⁶

During the year 1917 no difficulty was experienced, so far as known, in securing linters in such quantities as was needed. But the Ordnance Department required linters for the manufacture of explosives and ammunition, consequently, as the production of explosives increased the supply of linters diminished. The grade of linters for explosives was, ordinarily, lower than that for

mattresses, but both were equally suitable. By the summer of 1918 the supply of linters had become so short that a linters pool was formed to take the entire output of linters.⁴⁷ In addition to this there was formed a mattress linter pool to handle the mattress grade of linters. The Du Pont American Industries (Inc.) was designated as the purchasing agent. This pool included the mattress linters cut prior to May, 1918. In all, 9,888 bales of linters appear to have been purchased for this pool.⁴⁷ The demand for mattresses became very heavy in the summer and fall of 1918 and the stock of linters was inadequate, so that a further variation in the specification became necessary. The Medical Department was in the market at the time for 250,000 mattresses for the standard hospital bed and for 400,000 mattress pads for a smaller sized cot used at evacuation and base hospitals for expansion purposes.⁴⁸ This cot was but 30 inches wide instead of 36 inches, the width of the standard hospital bed. Several modifications of the specifications were suggested by the bedding section of the War Industries Board as being equally efficient, less expensive, and using less "middling upland cotton," than required for other purposes. The three combinations most frequently recommended were, with estimated costs, as follows:⁴⁹

One-third No. 1 strips, white; one-third No. 1 peeler comber; one-third good cleaned cotton mill picker or fly; \$11.61.

One-third No. 1 peeler comber; one-third good clean cotton mill picker or fly; one-third grade A linters; \$10.66.

One-third No. 1 strips; one-third good cleaned picker or fly; one-third grade A linters; \$10.26.

Adequate stocks of all these mixtures were available and purchases were made accordingly.

REFERENCES

- (1) American Industry in the War. A Report of the War Industries Board. Government Printing Office, Washington, 1921, 82.
- (2) Letter from Reuben A. Bogley, superintendent, Tophams, Washington, D. C., to Col. C. R. Darnall, M. S. D., U. S. A., Washington, D. C., June 22, 1917. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-Misc.}}{B}$.
- (3) Letter from Col. H. C. Fisher, M.C., S. G. O., to J. E. Hall, American Sterilizer Co., Erie, Pa., June 2, 1917, relative to enlisting of personnel employed by that company. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-Misc.}}{A}$.
- (4) Telegram from the Surgeon General to Mr. Charles J. Pilling, Philadelphia, Pa., August 3, 1917, relative to exemptions. On file, Finance and Supply Division, S. G. O., 14636-91.
- (5) Letter from the Surgeon General to Mr. Charles J. Pilling, Philadelphia, Pa., August 6, 1917, relative to exemptions. On file, Finance and Supply Division, S. G. O., 14636-91.
- (6) First indorsement, Surgeon General's Office, to the officer in charge, Medical Supply Depot, New York, February 8, 1918, relative to exemption from the draft of surgical instrument makers. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-539.}}{405}$.
- (7) American Industry in the War, 83.

- (8) Letter, Medical Supply Officer, U. S. Army, New York, to the Surgeon General's Office (Attention Col. C. R. Darnall), May 24, 1918. Subject: Contracts No. 1534 and No. 2945, American Sterilizer Co., Erie, Pa. On file, Finance and Supply Division, S. G. O., 713-529 N. Y.
705
- (9) American Industry in the War, 85.
- (10) Letter from American Felt Co., Boston, Mass., to the Medical Supply Depot, New York, May 27, 1918, relative to delay in deliveries of blankets. On file, Finance and Supply Division, S. G. O., 713-539 N. Y. D.
743
- (11) Letter from the Surgeon General to U. S. Employment Service, Department of Labor, June 11, 1918, relative to supplying labor for American Felt Co. On file, Finance and Supply Division, S. G. O., 713-539 N. Y. D.
743
- (12) Letter from Acting Assistant Director General, U. S. Employment Service, Department of Labor, Washington, D. C., to Col. C. R. Darnall, M. C., S. G. O., June 21, 1918, relative to supplying labor. On file, Finance and Supply Division, S. G. O., 713-539 N. Y. D.
743
- (13) American Industry in the War, 89.
- (14) Memorandum from the Assistant Secretary of War to the Surgeon General, January 21, 1918, relative to closing of certain industrial plants. On file, Finance and Supply Division, S. G. O., 750-660 Sec. War.
16
- (15) G. O. No. 8, War Department, January 19, 1918.
- (16) Letter from the Medical Supply Depot, New York, to the Surgeon General, January 22, 1918. Subject: A request for information as to what classes of manufactures should be exempted from the Fuel Administrator's Monday closing order; and also requesting information as to how to obtain such exemptions. On file, Finance and Supply Division, S. G. O., 713-Misc.
14
- (17) Letter from the Acting Quartermaster General to the Surgeon General, January 19, 1918. Subject: Procurement of coal for contractors. On file, Finance and Supply Division, S. G. O., 750-594 Q. M. G.
82
- (18) Memorandum from the coordinating member of the Printers Committee, Council of National Defense, to the Surgeon General, January 15, 1918. Subject: List of urgent war products being manufactured in the State of New Jersey. On file, Finance and Supply Division, S. G. O., 533 N. D.
44
- (19) Letter from the Surgeon General to War Industries Board, Council of National Defense, January 16, 1918, submitting list of contractors in New Jersey supplying material to Medical Department that is urgently needed. On file, Finance and Supply Division, S. G. O., 533 N. D.
44
- (20) First indorsement, Surgeon General's Office, to the division surgeon, Camp Taylor, Ky., December 16, 1917, relative to supplies for eye department. On file, Finance and Supply Division, S. G. O. 531-139 Taylor.
57
- (21) Correspondence between the President of the American Drug Manufacturers' Association and the Surgeon General's Office, during November, 1917, relative to quinine. On file, Finance and Supply Division, S. G. O., 422 C. J. L.
1 Also: Correspondence between Powers-Wrightman-Rosengarten Co. and the Surgeon General's Office, November 24, 1917, to February 10, 1918, relative to supply of quinine. On file, Finance and Supply Division, S. G. O., 589 P. W. R. Co.
1-8

- (22) Letter from War Trades Board to the Surgeon General, April 27, 1918, relative to the export of cinchona bark from Dutch East Indies. On file, Finance and Supply Division, S. G. O., $\frac{759 \text{ W. T. B.}}{29}$.
- (23) Letter from Powers-Wrightman-Rosengarten Co. to the Surgeon General (Colonel Darnall), September 10, 1918, relative to quinine situation. On file, Finance and Supply Division, S. G. O., $\frac{589 \text{ P. W. R. Co.}}{14}$.
- (24) Letter from Frank G. Ryan, Council of National Defense, to Col. Carl R. Darnall, M. C., S. G. O., September 20, 1917, relative to purchase of pharmaceuticals. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N. D.}}{265}$.
- (25) Contracts of October 13, 1917, and November 4, 1918, between Lieut. Col. M. A. Reasoner, M. C., Field Medical Supply Depot, Washington, and Merck & Co., of New York, N. Y., for the extraction of morphine and codeine from crude opium. On file, Medical Section, New York General Intermediate Depot, Brooklyn, N. Y.
- (26) Cablegram from the Surgeon General's Office to chief surgeon, A. E. F., France, December 12, 1917, relative to purchase of morphine and codeine.
- (27) Letter from the medical supply officer, New York, N. Y., to the Surgeon General, July 22, 1918. Subject: Whiffen & Sons (Ltd.), morphine-codeine. On file, Finance and Supply Division, S. G. O., $\frac{250 \text{ France}}{147}$.
- (28) Letter from the chief surgeon, A. E. F., France, to the Surgeon General, April 2, 1918. Subject: Automatic supply. On file, Finance and Supply Division, S. G. O., $\frac{713-250}{15}$.
- (29) Memorandum for Director of Supplies and Purchases from the Surgeon General, May 27, 1918. Subject: Camphor. On file, Finance and Supply Division, S. G. O., $\frac{750-198 \text{ D. P.}}{45}$.
- (30) Memorandum from Capt. Frank L. McCartney, S. C., in charge General Purchasing Office, Medical Department, to Lieutenant Bradley, August 27, 1918. Subject: Camphor. On file, Finance and Supply Division, S. G. O., $\frac{268 \text{ G. P. O.}}{19}$.
- (31) Letter from the Surgeon General to Purchase and Supply Branch, Department of Purchase, Storage and Traffic, August 30, 1918. Subject: Imports from Japan.
- (32) American Industry in the War, 380.
- (33) War Industries Board, Priorities Division, Circular No. 5, July 22, 1918. Policies and Regulations Governing Distribution of Steel and Steel Products. Government Printing Office, Washington, 1918, 2-3.
- (34) Report of liaison officer, Medical Department, to the Surgeon General, October 29, 1918, on the status of interbureau procurement requisition M-36, of August 28, 1918, for 300,000 bedsteads. On file, Record Room, S. G. O.
- (35) First indorsement, Surgeon General's Office, to the War Industries Board, October 8, 1918, relative to finish of hospital beds. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N. D.}}{221}$.
- (36) Report of liaison officer, Medical department, to the Surgeon General, November 4, 1918, relative to status of interbureau procurement requisitions. On file, Record Room, S. G. O.
- (37) Letters from the Surgeon General's Office to the War Industries Board, Clearance Committee, August 31, 1918, and September 26, 1918. Subject: Clearance on contract for 3,000 hospital litter carriers. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N. D.}}{169}$.

- (38) Report of Lieut. Col. M. A. Reasoner, M. C., on the Field Medical Supply Depot, August 3, 1926. On file, Finance and Supply Division, S. G. O., 713-750 F. M. S. D.
x
- (39) Letters from the officer in charge, Medical Supply Depots, New York and Washington, to the Surgeon General, July 26, 1918. Subject: Aluminum required June 30, 1918, to June 30, 1919. On file, Finance and Supply Division, S. G. O., 713-750 Wash.
330
- (40) Memorandum, Purchase, Storage, and Traffic Division, Purchase and Supply Branch, from Surgeon General's Office, undated, 1918, relative to aluminum requirements. On file, Finance and Supply Division, S. G. O., 713-750 Wash.
330
- (41) American Industry in the War, 153.
- (42) Letter from Maj. George C. Johnston, M. R. C., to Maj. F. F. Simpson, Council of National Defense, March 19, 1918, relative to the quantity of platinum used in X-ray tubes. On file, Finance and Supply Division, S. G. O., 533 N. D.
68
- (43) American Industry in the War, 231-233.
- (44) Taken from contracts for blankets made in 1917. On file, Medical Section, New York General Intermediate Depot, Brooklyn, N. Y.
- (45) Prices and quantities obtained from Field Medical Supply contracts made during April-December, 1917. On file, Medical Section, New York General Intermediate Depot, Brooklyn, N. Y.
- (46) Letter from medical supply officer, New York, to the Surgeon General, May 23, 1917. Subject: Specifications for pillows and mattresses. On file, Finance and Supply Division, S. G. O., 14039-52-1.
- (47) American Industry in the War, 173-4.
- (48) Memorandum, Surgeon General's Office, to Director, Purchase, Storage, and Traffic Division, Purchase and Storage Branch, July 29, 1918. On file, Finance and Supply Division, S. G. O., 750-198 D. of P.
172
- (49) Minutes of meeting of the bedding section of the Textile Division, War Industries Board, held on Thursday, July 25, 1918, 8.30 p. m. On file, Finance and Supply Division, S. G. O., 750-198 D. P.
209

CHAPTER VIII

CLEARANCE AND PRIORITY OF MATERIALS TO BE MANUFACTURED

Under the advisory commission of the Council of National Defense there was formed, February 28, 1917, a munitions standards board, which merged a month later into the General Munitions Board,¹ charged with the duty of coordinating the buying of munitions by the War and Navy Departments and with assisting those departments in acquiring raw materials and manufacturing plants to meet their requirements. The General Munitions Board was composed of technically competent persons selected from civil life by the Advisory Commission of the Council of National Defense and representatives from the several supply bureaus of the War and Navy Departments. It was the function of this board to supervise the distribution of Government orders and to prevent competition among the several purchasing agencies of the two departments.¹

The Secretary of War in orders of April 12, 1917, directed:²

Where time will permit, information will be given to the Munitions Board constituted by the Council of National Defense, through the supply bureaus' representative, of orders to be made for supplies, with the view of assistance from the board in placing the orders and in order that the supplies of the War Department may be coordinated with those of the Navy and other executive departments and secured at prices not in excess of those paid by other departments.

The functions of the General Munitions Board were largely advisory. It received statements of immediate requirements only as they were brought to it and joined in the effort to supply them. It considered whether the proposed order involved a conflict with other necessary orders and whether emergency action were required to provide material or determine prices. It then attempted to discover the best available sources of supply.³ The earlier orders were placed with little or no reference to this board, except for certain articles on which a shortage was feared. For such articles, clearance was required. A list of articles was promulgated which required clearance, and Government agencies were requested to place no order for articles on that list without first having such orders cleared by the committee. This was to prevent orders from being placed in congested areas and where they were liable to interfere with other orders of equal or greater importance, to adjust the relative importance of deliveries, and to prevent abnormal rise in prices. The buying department read its proposed orders before the committee in full. If no objection were made by another department because of conflict with its program or by an agency of the board because of curtailment, or substitution, or because another plan of conservation was being hindered, clearance was delayed until the matter could be adjusted.⁴

Clearance showed very few results in the control of prices, and new agencies for that purpose were created in the priorities and price-fixing committees.⁴

The development of the priorities system of control had its beginning in the priority committee of the General Munitions Board created May 3, 1917, with the following provisions:⁵

Exercise full power in the determination of priority of delivery of materials and finished products whenever there is a conflict in delivery in accordance with the general policy of the Government. It is further understood that at present the priority committee of the General Munitions Board has no power in regard to the determination of priority in regard to civilian needs in which the Army and Navy requirements are not involved. It is further understood that as between the needs of our allies and our civilian population, the priority committee of the General Munitions Board for the present has no authority to act. In this connection, however, the priority committee should keep full information as to such cases or instances as come to its attention, in order that plans may further be developed for properly handling the matter.

The Munitions Standards Board and the General Munitions Board were officially disbanded July 28, 1917, and a new body, under the title of War Industries Board, created in their place.⁶ The functions of the War Industries Board as defined by the Council of National Defense in the order creating it were in general terms as follows:⁶

The board will act as a clearing house for the war industry needs of the Government, determine the most effective ways of meeting them and the best means and methods of increasing production, including the creation or extension of industries demanded by the emergency, the sequence and relative urgency of the needs of the different Government services, and consider price factors, and in the first instance the industrial and labor aspects of the problems involved and the general questions affecting the purchase of commodities.

With the establishment of the War Industries Board there was created the office of priorities commissioner.⁷ Under him was the priorities committee, transferred bodily from the old munitions board. This committee had a chairman and representatives from industry and the Army and Navy. It rapidly developed and became the priorities division of the War Industries Board. The functions of the priorities division were to formulate general plans for the coordination of the military program as presented by the military authorities and the industrial program in so far as such programs required priorities. It determined policies and designated agencies to carry them out. It defined the activities that were to be accorded preferential treatment because of their war or civilian importance and certified its classifications to the Fuel Administration, Railroad Administration, Employment Service, and industrial advisers of the district draft boards for their respective use in distributing fuel, furnishing transportation and labor, and in passing on cases of industrial and occupational deferment.⁸ The priorities division exercised its control through a system of priorities and of preferential treatment of essential industries. By means of this system it indicated the sequence in which materials should be manufactured and orders filled. This sequence was determined in accordance with its best judgment and conceptions of the importance of the various parts of the military program. The priorities division promulgated its rules and regulations through

a series of priority circulars, clearance lists, and preferential treatment lists, of which the circulars were the most important. There were 60 such circulars issued beginning with September 21, 1917, and ending December 20, 1918, with the rescission of all circulars.⁹ Circulars Nos. 1 and 2 were issued September 21, 1917. No. 1 prescribed the classes of priority, defined their order of precedence, specified the materials classified, classified existing and future orders, and fixed the form of priority certificate. This circular was modified and amplified by Circulars No. 3 of January 1, 1918, and No. 4 of July 1, 1918. Circular No. 1 applied particularly to iron and steel and their manufactured products. Circular No. 3 extended the application to chemicals, cotton duck, woolen cloth, and such raw materials and manufactured products as might be deemed necessary from time to time by the priorities committee. Circular No. 4 extended the application to all commodities except food, feeds, and fuels, and to all manufacturers except those concerned with these products. Circular No. 1 provided for three classes of priority, A, B, C. Circular No. 3 added a fourth, known as class AA. Circular No. 4 added a fifth, designated class D, and provided for automatic classifications. Prior to July, 1918, all priorities had been granted upon applications made to the priorities division. After that date applications were received for classifications higher than those included in the automatic ratings.

In its application of the provision of Circular No. 4 to industry the priorities division of the War Industries Board placed medicines, medical and surgical supplies in class C priority, and accorded to the manufacturers of those supplies preference in accordance with that priority.⁹ Instructions to those manufacturers on the subject were issued by the medical industry section of the War Industries Board on August 9, 1918, in the following letter from the chief of that section:

WAR INDUSTRIES BOARD,
Washington.

From: Lieut. Col. F. F. Simpson, M. C., N. A.

To: Manufacturers of drugs, medicines, and medical and surgical supplies.

Subject: Preferential rating.

1. You will find inclosed copy of a letter from Judge E. B. Parker, priorities commissioner, stating that drugs, medicines, and medical and surgical supplies have been certified by the priorities board as embraced within the schedule of purposes entitled to preferential treatment, and will, therefore, receive a class C priority classification, in accord with the bulletin of July 3.

2. The foregoing language is general, and includes such commodities for civil as well as military use. It also includes supplies for dental medicine and surgery.

3. In placing your orders for steel and other restricted commodities, file a copy of Judge Parker's letter with your order and also a copy of your preferential rating for coal and coke.

4. These communications will be prima facie evidence that the Government recognizes your plant as at present entitled to preferential treatment in the matter of materials, etc., for the making of medical and surgical supplies. The manufacturers will, in most instances, be able to honor your orders without the need for priority certificates.

5. In the event that a priority certificate is demanded by the manufacturer from whom you secure your machinery or raw materials, fill out a priorities blank and make application for a priority certificate for the specific order in the regular way.

6. If you desire, you may advise me that you have made such application, and I will assist the priorities division in obtaining such information as it may need for passing on the application.

7. It would be desirable for you to have on hand constantly a few blank priority application forms for emergency use.

_____,
Chief of Section of Medical Industry.

PREFERENTIAL TREATMENT

To simplify procedure and to provide a clearly defined basis for action, all industry was divided by the War Industries Board into two general groups. The one represented industries which were regarded as of prime importance in winning the war and classed as "essential industries." The other represented industries which, while useful in time of peace, contributed very little if at all to the success of the war, and were classed as "nonessential industries." The essential industries were of different degrees of importance. Since the more important, essential industries were entitled to and should receive preferential treatment in all matters relating to production, a general classification of the activities demanding preferential treatment was promulgated in March, 1918, by the War Industries Board. Seven well-defined classes were described in this classification. It was followed on April 6 by preference list No. 1, which increased the number of classes to 45. Preference list No. 2 was issued September 3, 1918, and still more widely extended the principle of preferential treatment to industry. The purpose of this list appeared to be to make the operation thereof as nearly automatic as possible. The object and method of operation of the preferment system was fully outlined in the foreword to this preference list.

In this classification plants engaged principally in the manufacture of medicines and medical and surgical supplies were placed in Class IV. Many of them, however, secured their materials and semifinished products from classes having higher ratings. The maintenance and operation of public buildings used as hospitals were placed in Class I.

Preference list No. 2 was soon followed by supplement No. 1 to preference list No. 2, in which were listed the names and addresses of the manufacturers to whom preference treatment had been accorded. Among those so listed were many makers of medical and surgical supplies.

HANDLING PRIORITIES

The Director of Purchase, Storage, and Traffic informed the Surgeon General on June 10, 1918, that the War Department was not securing the maximum benefit from the system of priorities of the War Industries Board because of lack of sufficient information on the subject and from lack of a proper organization within that department.¹⁰ Since the avowed purpose of the priority system was to assist contract deliveries to the purchasing bureaus by providing the contractors with raw materials, fuel, transportation, and power in time to insure such deliveries, new and higher priorities were obtainable whenever an urgent war necessity made such changes necessary. It was considered essential by the director of purchase, storage, and traffic that dates of deliveries be

analyzed and priority requests synchronized with the required dates of delivery. To accomplish this result and to assist in presenting the needs of the War Department to the War Industries Board with demonstrable proof on each request, the following directions were given by him:¹⁰

To the end that the War Department organization may be consistent within itself and with the organization of the War Industries Board and for the purpose of a more effectual control of War Department priorities, it is directed that each bureau of the War Department charged with the procurement of supplies shall organize a priority section within itself, which shall consist of an officer designated by the chief of bureau, who shall preside and who must be familiar with the production program and material needs of his bureau. In addition at least one purchasing and one production officer shall be members of the priority section of each bureau, with such additional officers and such clerical force as the chief of the supply bureau shall direct.

In compliance with the above-quoted instructions a priority section, consisting of three officers, was established in the Surgeon General's Office for the Medical Department.¹¹ The various depots were informed on June 21, 1918, of the appointment of this section and instructed to mail all requests for priority to the Surgeon General's Office.¹² They were directed to notify contractors to discontinue the practice of sending such applications direct to the War Industries Board.

The following rules governing the activities and procedures of priority sections of the supply bureaus were promulgated by the director of purchase, storage, and traffic July 17, 1918, and remained in force until the end of the war:¹³

* * * * * * *

6. The purchasing organization of each bureau shall inquire of prospective contractors—

(a) A definite date or dates of delivery.

(b) Adequacy of present plant facilities for the manufacture and delivery within the time stated.

(c) Whether he will require aid to secure new equipment.

(d) Whether a higher rating than A-5 is necessary.

(e) If answer to question (d) is "yes," what rating is necessary to satisfy delivery dates given in (a)?

(f) If answer to question (d) is "yes," if that is due to other priority certificates held by him.

(g) State numbers and rating of such priority certificates (set forth in (f)), with the name of the department or bureaus to which articles are to be delivered.

7. (a) All applications for priority on behalf of a bureau or of a contractor or subcontractor of such bureau shall first be considered by the bureau's priority committee, in accordance with the rules laid down by the priorities committee of the War Industries Board in Circular No. 4, and determine the classification and rating that should be requested. It shall then be forwarded with the committee's recommendation to the priority office of the purchase and supply branch, division of purchase, storage, and traffic, Council of National Defense Building, Eighteenth and D Streets.

(b) All priority applications on behalf of a bureau, contractor, or subcontractor of such bureau shall be made out in duplicate on the forms prescribed by the priorities committee of the War Industries Board (making sure that all questions asked therein are fully and clearly answered) and shall be submitted to the bureau's priorities committee.

(c) Where procurement has been consolidated, the procuring bureau will handle the application after ascertaining from the issuing bureau the desired date of delivery.

(d) The bureau's priority committee will retain the duplicate application.

8. (a) The priorities officer will ascertain whether the application interferes with the work of any other bureau, adjust the conflict, if any, and present the application to the priorities committee of the War Industries Board.

(b) The priorities committee of the War Industries Board will not issue a certificate covering an order placed in the restricted area unless the War Industries Board has granted permission for the placing of said orders in such restricted area.

9. (a) After final action by the priorities committee of the War Industries Board the original certificates issued by such committee will be forwarded by that committee direct to the applicant.

(b) A duplicate will be returned, through the office of the Director of Purchase and Supply, to the originating bureau for filing with the duplicate application, thus advising the bureau of the issuing of the original certificate.

10. (a) To change a priority rating, made necessary by changes in the military program or situation, the bureau priority committee should prepare and forward to the priority officer of the purchase and supply branch a supplemental emergency memorandum, setting forth the conditions and a recommendation for rerating.

(b) The application will then be handled by the priority officer of the purchase and supply branch in the same manner as an original application.

(c) Rerating should not be requested except in emergency cases.

* * * * *

CLEARANCES

The clearance activities of the munitions board were continued under the War Industries Board as an indispensable adjunct of its priority system. Clearance lists were published to the supply bureaus from time to time and extended as additional shortages threatened. The first list of articles on which clearance was required was issued under date of August 7, 1917, and included the following commodities: The metals group, iron, steel, and their products; lead and tin; textiles, chemicals; motor trucks; optical glass; rubber and rubber goods; lumber; explosives; and gasoline and motor oils. The board requested that these items be brought to its attention before orders for them were placed.¹⁴

On December 31, 1916, a revised and greatly amplified clearance list was published and the requirements relative to clearance were defined with greater precision. By that time the clearance committee of the War Industries Board was well organized and fully established. It was the channel of communication between the purchasing bureaus and the War Industries Board, and as such directed communications to their proper destination.¹⁵

The function of the clearance committee was to assist the War Industries Board, to consider the placing of orders or contracts by the various departments desiring to purchase material on the clearance list, to consider price and sources of supply, to adjust any obvious conflict with the supply of the same material for any other department, and to approve the placing of minor orders when satisfied of the propriety of the action desired. The clearance committee informed the interested division whenever shortage occurred or was imminent that action might be taken toward arranging for a satisfactory substitute.¹⁵

The following instructions appeared on the clearance list of December 31, 1917:¹⁶

There is presented herewith a list of items which should not be ordered without first consulting with the clearance committee of the War Industries Board and having clearance granted thereon (with a few exceptions).

Clearance is necessary either because of a shortage which exists or is probable on certain items, or because prices have been arranged on others, and the allocation of the various items is necessary through a central agency to obtain adequate production, or to receive the benefit of such prices as have been arranged or fixed.

In the letting of general contracts where subcontractors are required to furnish any of the items, the subcontractors' requirements should also be brought to the committee's attention by the department interested, in the same manner as the department's requirements.

The above action does not apply to contracts already awarded.

The above action relates only to orders in quantity, which point, when the question arises, should be determined by the department representative on the committee.

The list of items will be modified as occasion arises.

A new clearance list appeared on February 25, 1918. The clearance committee was reorganized following the reorganization of the War Industries Board in March, 1918. The organization and functions of that committee as projected in May, 1918, by the board were as follows:¹⁷

The clearance committee shall consist of a chairman and secretary, a representative from each of the supply departments of the Government, and representatives from the principal commodity sections of the War Industries Board. This clearance committee is to concern itself with schedules of prospective purchases and not with orders actually negotiated.

There will be published a clearance list of articles for which there is a shortage or for which the price is fixed, etc. This will not be a shortage list since certain articles will be on the clearance list, although there may be no shortage involved. An order will be issued to the effect that no orders shall be negotiated for articles on the clearance list before such schedule of prospective purchases have been cleared.

The schedules of prospective purchases will be presented and will be cleared forthwith by the committee wherever possible.

In other cases, the schedules will be referred to the commodity sections for consideration and results reported back to the secretary of the committee for transmission to the supply department.

With the promulgation of this definition of its function the clearance committee called for a statement from all the supply bureaus of the orders in immediate contemplation, showing: (1) Specifications of the article to be purchased, (2) quantity to be purchased, (3) delivery required.

The requirements of the clearance committee were transmitted to the various purchasing officers of the Medical Department under date of May 10, 1918, by the Surgeon General, and a strict observance of these requirements was enjoined.¹⁷ Prior to that date it had been the custom to request clearance at any time before the contract was actually signed or the purchase order issued. Beginning that date it was required that clearance be obtained before negotiations for the purchase of any article on the clearance list had begun. An officer in the Surgeon General's Office was designated to receive and transmit through the prescribed agency to the clearance committee all requests for clearance.

A new clearance list promulgated June 24, 1918, prescribed the following requirements for the purchase of supplies:¹⁸

Before negotiations are instituted clearance must be obtained on proposed purchases of articles or commodities in the four following general classifications:

1. All schedules of prospective purchases involving articles or commodities on the list given below, entitled "Clearance schedule."

2. All schedules of prospective purchases involving orders for any articles or commodities, to be placed in the congested district, which orders call for or involve the creation or use of additional fuel, power, or transportation facilities. The boundaries of the congested district will be defined from time to time by the Railroad Administration, Fuel Administration, and War Industries Board and will be published by the latter. This congested district now is included between the Atlantic Ocean and a line drawn through Chesapeake Bay to Baltimore, north to Harrisburg, west to Altoona, northeast through Williamsport, Binghamton, and Schenectady to the Hudson River, and thence north to the northeastern boundary of the State of New York. The districts served by the electrical power companies of Canton, Baltimore, Massillon, Alliance, Niagara Falls, Pittsburgh, Connellsville, Wheeling, Youngstown, and Akron are also prohibited centers due to lack of power.

3. All schedules of prospective purchases involving the creation of new or additional facilities wherever placed and however created; that is, either direct or indirect Government business.

4. The orders for production in Government plants do not require clearance so far as the actual order itself is concerned, though the materials required for filling the order will require clearance if on the clearance list. At the same time requirements are presented, statement must be made as to whether the Government department at interest is in position to handle all or any part of the order within its own plants.

The clearance schedule which accompanied these instructions included 44 groups of articles, materials, and commodities. Of these groups the Medical Department was interested more or less vitally in 27. The articles and commodities with which the Medical Department was concerned are quoted below:

Acids.	Iron and steel: Boiler tubes, boiler plates, steel rods (instrument steel), seamless tubing (sterilizers, etc.), sheets (enamel ware, etc.), tin plate (cans for ether and other medicines).
Ambulance bodies.	Leather and leather goods.
Ambulance chassis.	Linen and linen thread.
Boxes, containers, crates, etc.	Lumber (for crating, etc.).
Brass and copper rods, tubing and sheets.	Mica (for X-ray apparatus).
Cordage, hemp and fibers: Rope, coco mats, linoleum, oakum, burlap.	Needles.
Cork.	Nonferrous metals: Aluminum (cooking utensils), copper (shells for sterilizers), Mercury.
Cotton lintens (for mattresses).	Oils: Castor oil, linseed oil (green soap).
Cotton goods: Gauze, muslins, and bleached print goods, duck and webbing.	Optical glass and optical instruments.
Cylinders and container (pressure) for oxygen, nitrous oxide, and chlorine gas.	Paper, sulphate, Kraft (wrapping paper).
Electric equipment: Generators, transformers, motors, and electrical supplies.	Rubber goods.
Electric wire and cable for X-ray machines and other medical electric equipment.	Small tools.
Felts.	Tool chests.
Fire extinguishers, hand.	Woolen goods: Blankets, material for convalescent suits.
Hardware.	

While the reorganization of the War Industries Board and its various committees and the extension of their regulatory functions were in progress, a new regulatory body was developing in the War Department in the purchase and supply branch of the purchase, storage, and traffic division of the General Staff.¹⁹ This body required that all requests for clearance for articles on the clearance list which had not been consolidated with a single supply bureau for

purchase should be forwarded to it for consideration by the interested commodity section of the War Department to determine whether the purchase would conflict with the program of another supply bureau, before such clearances went to the War Industries Board for final action.²⁰ This routing became effective near the end of May, 1918. These instructions were amplified the middle of July,²¹ when clearance was required on (a) articles enumerated in the clearance list issued by the War Industries Board, (b) orders placed within the congested district, and (c) the creation of new facilities and the conversion of existing facilities wherever located. Clearance was to be handled by the War Industries Board in one of the six ways:

1. Clear forthwith without comment.
2. Clear, subject to restrictions as to congested area.
3. Clear, subject to restrictions as to placing orders in centers short of power.
4. Clear, subject to restrictions as to congested plants.
5. Clear, subject to restrictions as to new plant facilities, or with suggestions as to existing plant capacity available for that class of work.
6. Return the papers with clearance disapproved.

Clearance granted remained effective for 60 days after date of clearance. If not used within that time new clearance had to be requested. The officer requesting clearance was free to begin his negotiations for the article immediately after he received the clearance but not before. Requests for clearance received a preliminary consideration by the Army clearance committee, after which they went to the War Industries Board.²² The following routine method of handling clearances was prescribed July 17, 1918.²³

Schedules of immediate prospective purchases shall be submitted through the liaison officers to the purchase and supply branch for clearance, and in no case direct to the War Industries Board.

In cases where consolidations of procurement have been effected, the designated procuring bureau shall submit the requests for clearance, and not the issuing bureau.

Requests for clearance will be submitted on standard forms, the initial supply of which will be furnished by the War Industries Board; thereafter the purchase and Supply branch will furnish the forms. Five copies, the original and four carbons (in different colors) will be submitted to the purchase and supply branch.

Requests for clearance may be dispatched at any time throughout the day and up to 10 p. m. to the office of the purchase and supply branch by special messenger, through the liaison office. To be considered at the Army clearance committee meeting (described below) on any day it generally will be necessary that the papers be delivered at the office of the purchase and supply branch not later than 11 a. m. on that day.

Each day at noon, except Sundays, the accumulated requests for clearance will be presented by the clearance officer of the Purchase and Supply Branch to the Army clearance committee. If conflicts, not in the purview of the Army commodity committee or bureau priority committee, are brought out between any of the bureaus the items in question will be investigated by the clearance officer, who will refer the matter to the bureau from which it emanates for further consideration or will clear it. Where no such conflict develops the matter will be immediately cleared by the Army clearance committee.

The clearance officer of the purchase and supply branch will submit promptly to the clearance secretary of the War Industries Board all clearance papers which have been passed upon and cleared by the Army clearance committee. A record will be kept by the clearance secretary of the War Industries Board of the action taken in each case presented. This record will be returned to the Purchase and Supply Branch, and the interested bureau informed by telephone wherever possible. In addition to telephonic reports of clearance,

the paper indicating the action of recommendation of the War Industries Board will be submitted to the purchase and supply branch in duplicate. The original of this clearance will be forwarded immediately to the bureau of the War Department which requested the clearance.

If clearance by the War Industries Board is delayed beyond 48 hours after submission to the War Industries Board of the request for clearance, the purchase and supply branch will notify the bureau either to proceed on the assumption that the matter has been cleared, or that the matter has been held up and additional time granted to the War Industries Board. The 48-hour period shall be taken to include two full days following the day on which the request is submitted to the War Industries Board, and the report to the bureaus will be made on the morning of the third day following. For instance, a report will be made Thursday morning on all matters submitted to the War Industries Board on the preceding Monday. This rule will not cover the obtaining of allocations, since it is impossible, generally speaking, to accomplish allocations in so short a time. The bureaus shall not proceed at the end of the 48-hour period on the assumption that clearance on any request has been obtained unless specific authority to so proceed has been given by this office.

By the end of July the purchase and supply branch of the purchase and storage division of the General Staff had duplicated practically all the organizations and activities of the War Industries Board, as is evidenced by the following extract from Supply Bulletin No. 4, of that branch, dated July 23, 1918:

Matters to be taken up with the War Industries Board must in every case be referred up to the purchase and supply branch, and more specifically marked for the attention of the divisions, sections, and committees of that branch charged with specific duties and subjects, as follows:

- I. Matters of general policy to be taken up with the War Industries Board proper, to the director of purchases and supplies.
- II. Matters of priority to the chief of the Army priorities section.
- III. Matters of requirement to the chief of the Army requirements division.
- IV. Matters of clearance to the chief of the Army clearance section.
- V. Matters of price fixing to the chief of the Army price-fixing section.
- VI. Business with any commodity committee of the War Industries Board to the chief of the corresponding Army commodity committee.

The chiefs of the various divisions, sections, and committees specified above shall handle matters between the divisions, sections, and committees of the War Industries Board and the offices of the War Department from which the business arose, * * * keeping copies and files of all correspondence and referring to the director of purchases and supplies, for information or action, all matters of importance and well-established policy, and to other sections of the purchase and supply branch all matters arising in the course of business which affect such other sections.

REQUIREMENTS

The President, in his letter of March 4, 1918, to the chairman of the War Industries Board, increased the scope of the board.²⁴ Among other things the letter required of the chairman of the board that he "should be constantly and systematically informed of all contracts, purchases, and deliveries, in order that he might have always before him a schematized analysis of progress of business in the several supply divisions of the Government in all departments," and "anticipate the prospective needs of the several supply departments of the Government and their feasible adjustment to the industry of the country

as far in advance as possible in order that as definite an outlook and opportunity for planning as possible may be afforded the business men of the country."

To carry out the broader mission imposed upon it by this letter the War Industries Board was reorganized in the spring of 1918.²⁵ To enable it to "anticipate the prospective needs of the several supply departments of the Government and their feasible adjustment to the industries of the country," a requirements division was organized in June, 1918. This division consisted of a chairman, representatives of the Government purchasing agencies (Army and Navy), the priorities commissioner, the commissioner of finished products, chiefs of divisions, chiefs of sections, manager of the Allied Purchasing Commission, representatives of the Food, Fuel, and Railroad Administrations, the Capital Issues Committee, the Department of Commerce, the Red Cross, the Shipping Board, and other departments and bureaus.

For the use of this division the Secretary of War directed that each of the supply bureaus of the War Department take the necessary steps to accomplish the following:²⁶

The determining of all important requirements, projected into the future as far as practicable, these requirements to be accompanied by a translation of same into raw materials.

The establishment of a continuous system of reports of impending important contracts and purchases, which will give articles, quantities ordered, and dealers from whom ordered.

The director of purchases and supplies, purchase, storage, and traffic division of the General Staff, ordered, April 2, 1918, that he be furnished with those requirements and reports in triplicate at the earliest practicable date and that no purchases of articles or materials on the clearance list established by the War Industries Board be made until they had received the consideration and approval of that board.²⁶ The statements of requirements of the various supply bureaus after they had received general consideration by the requirements division went to the appropriate commodity sections of the War Industries Board where detailed studies were made and reports sent back to the sources from which the statements came concerning the possibility and means for meeting the requirements.²⁶

In compliance with the instruction of April 2, from the director of purchases and supplies, a condensed statement of the requirements of the Medical Department were submitted as soon as they could be compiled, but the exact date has not been ascertained. This statement covered both requirements and the raw materials required for the fabrication of the articles enumerated. It was prepared in the following form and covered 11 general headings—fabrics and textiles, surgical dressings, veterinary surgical dressings, automobile ambulances, instruments and appliances, and medicines. Under medicines were included ammonia products, mercurials, opium, morphine, cocaine, and castor oil. For brevity, only textiles and surgical dressings are given under requirements, but the entire list of raw materials is included under that head, except for the materials in the motor ambulances, for which no information was available at the time.²⁶

Important requirement of the Medical Department; estimated purchases to December 31, 1918

FABRICS AND TEXTILES		SURGICAL DRESSINGS—continued	
Aprons, cook.....each..	48,000	Cotton, absorbent, 1 pound in	
Bath robes.....do....	98,000	.....rolls..	500,000
Blankets.....do....	1,000,000	Cotton, absorbent, 1 ounce in	
Caps for cooks.....do....	48,000	.....packages..	13,000,000
Gowns, operating.....do....	36,000	Cotton bats.....pounds..	35,000
Muslin, unbleached.....yards..	7,360,000	Crinoline.....yards..	120,000
Pajamas.....suits..	600,000	First-aid packets.....each..	3,000,000
Pillow cases, cotton.....each..	750,000	First-aid packets, instruction	
Sheets, cotton.....do....	270,000	.....each..	200,000
Towels:		First-aid packets for shell	
Bath.....dozen..	30,000	wounds.....each..	1,000,000
Dish.....do....	48,000	Gauze, plain.....yards..	10,000,000
Hand.....do....	180,000	5-yard rolls.....rolls..	700,000
		1-yard to.....package..	1,200,000
		Gauze, sublimated, 1 yard to	
		.....package..	34,000,000
		Individual dressing packets	
		.....each..	5,000,000
SURGICAL DRESSINGS			
Bandages, gauze:			
Compressed, 1 gross in			
.....boxes..	300,000		
Roller, 72 in.....do....	150,000		

The following raw materials will be required to manufacture the several articles to be purchased during the calendar year of 1918, which is a part of this report:

Fabrics, textiles, surgical dressings:		Medicines—Continued	
Cotton.....pounds..	58,402,000	Metallic mercury.....pounds..	8,000
Wool.....do....	3,150,000	Anhydrous ammonia	
		.....pounds..	27,067
Instruments and appliances:		Gum opium.....do....	12,428
Brass.....pounds..	1,800	Cocainæ hydrochloridum ^a	
Steel.....do....	320,000	.....ounces..	3,065
Platinum.....ounces..	600	Castor Beans.....pounds..	757,896
Medicines:		Quininæ.....ounces..	417,483
Mercuric chloride.....pounds..	200,000	Alcohol.....gallons..	1,320,000
Mercurous chloride.....do....	16,000		
Red iodide of mercury			
.....pounds..	3,000		

Beginning with June 1, 1918, monthly reports were required as of the first of the month of requirements and supply, contract, schedules, and actual deliveries of all important articles.²⁷

REFERENCES

- (1) American Industry in the War. A Report of the War Industries Board. Government Printing Office, Washington, 1921, 21.
- (2) G. O. No. 49, War Department, April 24, 1917.
- (3) American Industry in the War, 32.
- (4) Ibid., 24.
- (5) Ibid., 48.
- (6) Ibid., 23.
- (7) Ibid., 22.

^aTo produce the above 3,065 ounces of cocainæ hydrochloridum, it will require 38,313 pounds *Erythroxylum coca* leaves. Cocainæ hydrochloridum is not, as a rule, made from the leaves in this country, but imported as crude alkaloid and refined here

- (8) Final Report of Priorities Division, War Industries Board. Manuscript copy, Office Assistant Secretary of War, Munitions Building, Par. 4.
- (9) Letter from the Priorities Commission to the chief of the section of Medical Industry, War Industries Board, Washington, July 17, 1918. Subject: Drugs, medicines, and medical and surgical supplies—preference list. Copy on file, Historical Division, S. G. O.
- (10) Letter from the Director of Purchase, Storage, and Traffic to Major General W. C. Gorgas, the Surgeon General of the Army, June 10, 1918. Subject: Handling of priorities. On file, Finance and Supply Division, S. G. O., $\frac{750-198 \text{ D of P.}}{64}$.
- (11) Memorandum from the Surgeon General to the Director of Purchase, Storage, and Traffic, June 13, 1918. Subject: Priority section. On file, Finance and Supply Division, S. G. O., $\frac{750-198 \text{ D of P.}}{64}$.
- (12) Letter from the Surgeon General to officer in charge, Medical Supply Depot, New York, N. Y., June 21, 1918. Subject: Priorities. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y. D.}}{775}$.
- (13) Supply Circular No. 50, Purchase and Storage Branch, Purchase, Storage, and Traffic Division, General Staff, War Department, July 17, 1918.
- (14) Memorandum from H. P. Bingham, Secretary, War Industries Board, August 7, 1917. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ Misc.}}{1}$.
- (15) War Industries Board, Clearance Committee, Clearance List, December 31, 1917. Washington, Government Printing Office, 1918, p. 4.
- (16) *Ibid.*, 1.
- (17) Letter from the Surgeon General to officer in charge, Medical Supply Depot, New York, May 10, 1918. Subject: Clearance. On file, Finance and Supply Division, S. G. O., $\frac{713 \text{ Misc.}}{43}$.
- (18) War Industries Board, Clearance Committee, Clearance List, June 24, 1918. Mimeo-graph Copy. On file, Finance and Supply Division, S. G. O., $\frac{713 \text{ Misc.}}{59-A}$.
- (19) General Orders, No. 14, W. D., February 9, 1918, and No. 36, April 16, 1918.
- (20) Supply Circular No. 15, Purchase and Supply Branch, Purchase, Storage, and Traffic Division, General Staff, War Department, May 25, 1918.
- (21) Supply Circular No. 48, Purchase and Supply Branch, Purchase, Storage, and Traffic Division, General Staff, War Department, July 17, 1918, par. 1-2.
- (22) *Ibid.*, par. 3.
- (23) *Ibid.*, par. 6 (a) to (g).
- (24) American Industry in the War, 25-26.
- (25) *Ibid.*, 35.
- (26) Memorandum from the Director, Purchases and Supplies, for the Surgeon General of the Army, April 2, 1918, relative to requirement. Also: Memorandum from the Surgeon General attached thereto. On file, Finance and Supply Division, S. G. O., $\frac{750-714 \text{ S. G. O.}}{818}$.
- (27) Memorandum from Automotive Products Section, War Industries Board, to the Surgeon General's Office, Supply Section (attention Maj. W. T. Fishleigh), May 23, 1918. On file, Finance and Supply Division, S. G. O., $\frac{713 \text{ Misc.}}{50-B}$.

CHAPTER IX
THE PURCHASE OF SUPPLIES
BY SUPPLY DEPOTS

The supplies purchased by the Medical Department had been divided for many years into two principal groups, hospital supplies, or post supplies as they were commonly called, and field supplies. As a result of the creation of the Veterinary Corps as a part of the Medical Department by the national defense act of 1916 a third group was added—veterinary supplies. Except for such nonstandard articles on special requisitions as were authorized to be purchased locally by other depots and emergency purchases wherever made, all purchases of medical and hospital supplies were made at three medical supply depots, New York City, N. Y.; St. Louis, Mo.; and Washington, D. C. The greater part of the post supplies were purchased at the New York depot. A few of these articles were purchased from time to time at the St. Louis depot whenever a better price could be obtained in the St. Louis market than in the New York market. In the last few years preceding 1916 the articles purchased at St. Louis had continued to become fewer from year to year until at the beginning of 1916 it might well have been ignored as a purchasing point for medical and hospital supplies. Some time prior to 1917 the St. Louis depot had been used as a purchasing and assembling point for veterinary supplies purchased by the Medical Department for the Quartermaster Corps under instructions from the War Department. As already noted, the depot in Washington, D. C., had been used exclusively for the purchase and assembling of field equipment and supplies for medical units and for the medical supplies issued to all military personnel.

The field of activities had narrowed, then, in the purchase of medical supplies, to these three places. The trend of thought relative to such supplies had come to associate the procurement of post or ordinary hospital supplies with the New York depot and field supplies with the Washington or field medical supply depot. It was inevitable, therefore, that these depots should have been chosen to purchase the same commodities for the greatly augmented military forces in 1917–18. The St. Louis medical supply depot not being involved in the procurement of either hospital or field supplies and having an organization experienced in the purchase of supplies was selected, very naturally, to handle the purchase of veterinary supplies, with which it was already familiar.¹

The purchase of medical and hospital supplies at these depots had reached considerable volume during the summer of 1916 as a result of the mobilization of the National Guard on the Mexican border and had given the personnel on duty therein an inkling of the amount of work and the difficulties likely to be encountered in providing such supplies for a large force. By the end of that

year the purchase of medical supplies had diminished to almost a peace-time volume, although articles for which contracts had been made continued to be received in considerable quantities. The early part of 1917 was devoted to routine purchases and to the consideration of the sources and the possibilities of an adequate supply in the event of the participation of the United States in the World War, which grew every day more unavoidable. Many difficulties and aggravating delays had been experienced in making the comparatively small purchases in 1916, and the outlook for the emergency, should war be declared, was far from bright. The situation as it presented itself at that time to those charged with providing medical supplies is fairly well portrayed in the following extract from a letter from the officer in charge of the New York medical supply depot in January, 1917, to the officer in charge of the supply division of the Surgeon General's Office:²

I have carefully read your memorandum for Colonel Arthur and the statements made therein are correct. I should say, however, that three months is entirely too short a time to get the articles of even ordinary commercial stock, when desired in such quantities as we have to obtain some of them for armies of the magnitude contemplated. I am inclosing herewith a memorandum made about January 10, for me, by the chief clerk, giving the status of many of the contracts now in force, and from it you can judge how difficult it is to get deliveries from even the largest and most reliable firms doing business in our country, when taxed beyond their ordinary capacities. I have used all sorts of argument and coercion, but without avail.

In one instance I even gave orders against the firm in open market, only to find out later that those to whom I gave the order were more unreliable than those who had the contract, with the result that I had to cancel the attempted open-market purchase against the firm.

The question of standards is one that is perpetually before us, and I have come to the conclusion that for the convenience of the business men from whom purchase is made we must have some sort of a guide so that when they come to look at the article we desire they may be able to form some opinion. In the case of medicines, the standard of U. S. P. is certainly necessary. * * * The variety of different textiles, etc., upon the market, is infinite. Take the common article of sheets, for instance. As you know from recent correspondence, the question of length alone may vary within considerable limits. Then add to this the question of quality, which is equally variable, and you can get some idea of how necessary it is to have some sort of a standard when you go to purchase this item.

I have come to the conclusion that delay in purchase is not so often due to standards as forms pursued in purchasing as required by the accounting officers. There is one way in which rapid work can be done; about as follows:

A requisition comes here with authority to purchase in emergency, thus eliminating the advertising in toto. The supply officer goes out on the open market, visits the large mercantile establishments, picks out articles from stock on hand, as many as possible, and as close as possible to the standard article he desires for immediate delivery. He then goes to another commercial house and does the same; so on, until the item is complete. This is the way a business firm, put up against the same proposition, would do, and which, unfortunately, we can only resort to in great emergency. The standard is still kept in view and purchases made as near to it as possible.

You would be astonished to know how comparatively few articles of a kind are kept on hand by any large commercial firm in this city. Space is too valuable to occupy for storage purposes. Everything is done by samples, and this is all right providing the matter of time enters into the transaction. I do not believe that I could buy 24 of our standard office desks in this whole city. To be sure, I could gather up 24 desks of different patterns in a very short time, but of the one variety, it is doubtful.

I am now speaking of the so-called items that can be purchased from commercial institutions in the open market. Coming down to items of field property, cases and containers, instruments and appliances, these are not in existence in sufficient quantities to count. They must all be made to order, and months must elapse. The items of rubber goods that are always supposed to be purchased as needed and no stock kept on hand belong to this category. Large quantities are not kept in storage by the firms, but are made to order, for reasons that you will readily apprehend.

The conclusion of the Dodge Commission is absolutely correct. Supplies of everything that could possibly be used and not deteriorate, in large amounts, should be kept on hand for immediate issue, while the machinery of purchase is being set in motion.

While the Medical Department has been able, during peace time, to obtain all the supplies it required, these supplies were obtained, as a rule, from jobbers or commission men. Very few manufacturers were willing to submit bids upon circulars of advertisement issued by the purchasing depots. In the few instances where bids were received from manufacturers of other than medical and hospital specialities the bids were usually higher than those from the jobber or commission man and the award usually went to the low bid. As a result the manufacturers declined to bid. Their failure to bid was frequently due to a misapprehension of the requirements, manner of purchase, and the time of making payments. The hostility of jobbers and professional Government contractors to such bids doubtless played an important part in keeping manufacturers from bidding direct. The quantities usually purchased by the Medical Department were small when compared with those handled by the jobbers and contractors and were accordingly of less interest to the manufacturer. To overcome this difficulty, interest the manufacturers in Medical Department supplies, and find new sources of supply the plan quoted below was suggested.³ Before this policy could be put into effect, however, we entered the war and other methods of obtaining supplies were adopted.

1. This office should be furnished, at the earliest practicable date, with a list of important medical supplies purchased at your depot which, in the opinion of the supply officer, it would be difficult to obtain in large quantities on reasonably short notice.

2. While the circular advertisements are sent out to a great many firms, it is believed that only a comparatively few firms have actually manufactured the items which we have difficulty in obtaining. When this list of difficult items is tabulated, it is believed that it would be expedient to furnish the specifications for these items to all of the reputable manufacturers and invite their attention to the desirability of becoming acquainted with our standards and placing their factories in a position to manufacture our supplies in large quantities on short notice.

3. This office should be furnished with a list of manufacturers who have furnished these difficult items to the Medical Department during the past three years, together with lists showing the firms that are not now manufacturing these products, but who, in the opinion of the supply officer, could furnish them on short notice in reasonably large quantities if they were fully informed as to our standards and given a preliminary trial order.

4. In this connection attention is invited to the recent difficulty in obtaining dental engines from the S. S. White Dental Manufacturing Co. It is understood from the statement made in your letter of September 27 that the extra parts manufactured by one dental firm will not fit the engines manufactured by any other firm. This being the case, it seems apparent that the purchase of dental supplies is practically confined to one firm. If the dental manufacturing companies are patriotic and desire to cooperate with the War Department, it is believed that they should be given an opportunity to so standardize their equipment as to make it interchangeable so that in event of war the Medical Department will be able to obtain equipment from a number of firms. If the dental manufacturing companies

have a particular reason for continuing the manufacture of special hand pieces and extra parts which will fit only their own engines, it is possible that they will be willing to make the above concession with the understanding that the interchangeable parts are to be manufactured only in time of war.

5. The remarks and recommendations of the supply officer are desired.

* * * * * * *

1. Replying to your letter of the 10th ultimo, 14039-W, the following is a list of the most important supplies which are only obtainable after considerable delay:

Chloroform and ether.	Mosquito bars.
Emetine hydrochloride tablets (hypodermic.)	Bedsteads.
Guaiacole carbonate.	Blankets, white.
Naphthalene.	Delft ware.
Potassium permanganate.	Razors.
Hydrargyri salieylas.	Glassware of all kinds.
Ipecac.	Hand grenades.
Salvarsan and neosalvarsan.	Litters.
Quinine sulphate.	Scales and weights.
Thymol.	Water coolers.
Thymol iodide.	Stains and other laboratory supplies.
Opium pulvis.	Mercurey, redistilled.
Tincture opium.	Trays, photographic.
Tincture opium camphorata.	Screen, intensifying.
Unguentum hydrargyri.	Novocain suprarenium tablets.
Veronal.	Dental chests.
Zinc oxide.	Crown removers, Dalton's.
Binders, loose leaf.	Dental engines.
Files, Shannon.	Instruments, instrument cases and surgical appliances.
Papers, all kinds	
Needles of all kinds.	

2. Difficulty in obtaining chloroform and ether promptly is due to the trouble experienced in meeting the specifications.

3. All mercurial salts and preparations are rather difficult to obtain. Same remarks apply to all the potash salts.

4. Considerable time is required to obtain all textiles, owing to the fact that the articles desired have to be made up.

5. In the summer months it is always difficult to obtain glassware in large quantities, owing to the fact that the factories close down.

6. Considerable time is required in obtaining dental engines and in fact all dental supplies in large quantities.

During the first three months of 1917 few purchases of any magnitude were considered. Authority had been granted the field medical supply depot, Washington, to purchase 50,000 shell-wound packets, 10,000 litters, 10,000 sets of contents for enlisted men's web belts, and a lot of miscellaneous articles.⁴ The officer in charge of the New York medical supply depot had been directed to purchase 200 emergency recruiting outfits, later increased to 500, and other miscellaneous articles.⁵ Except for routine purchases, the procurement of supplies was practically at a standstill.

It was foreseen early in the year that more definite standardization of sanitary supplies would be necessary, in the event of war, for the joint use of the Army, Navy, and Public Health Service. A joint board was designated for

this purpose which included representatives from those services, eminent surgeons, and representatives from the surgical instrument and surgical dressings manufacturers.⁶ The work laid out for this board was the selection of the most suitable articles required by modern practice for the care and treatment of the sick and wounded in the field and in hospital. Mass production in the quantities required could only be effected by keeping the number of types of instruments and apparatus at the minimum and by the selection of the simpler and more easily fabricated models. With the limited facilities available, the task at best was a gigantic one. The work of the board was completed in April, 1917, and its selections were published in pamphlet form by the medical section of the Council of National Defense in May of that year.⁷ The articles selected by this board became the standards for purchase and, for the most part, purchases during the war were limited to them. The list of laboratory apparatus prepared by the board was materially modified and augmented in February, 1918, by the laboratory division of the Surgeon General's Office.⁸

EARLY PLANS FOR PURCHASES

As soon as the President's message recommending the declaration of war against the Imperial German Government had been submitted to Congress, the Surgeon General began intensive consideration of the plans for the purchase of medical supplies. In these plans he had the help of the medical section, Council of National Defense, and of the munitions committee. The Surgeon General was represented on the latter committee by the officer who had charge of the supply division of his office.⁹ This officer participated in the formulation of general plans by that committee for the procurement of supplies. The officers in charge of the several purchasing depots were kept informed of these plans, in so far as they affected the Medical Department, and of the requirements, in order that there would be no avoidable delay in the delivery of the supplies. As soon as it became evident that Congress would vote to declare war, instructions were sent to the medical supply depots at New York City and Washington to initiate the purchase of the supplies allocated to them. The instructions to both depots were practically the same. Those to the New York depot are quoted below to show the general plan intended to be followed:¹⁰

1. You are authorized to issue 10-day circular advertisements covering all post supplies (except surgical instruments) needed for an Army of 500,000 men in addition to supplies already on hand, and including 500 portable dental outfits. X-ray supplies should be omitted. Provision should be made for 50 per cent increase. If standard articles are not obtainable, the nearest satisfactory substitute would be acceptable. A board is now revising the instrument cases and will submit its report in a few days, after which instructions will be given for the purchase of these items.

2. Bids should also be requested for 12 combination sterilizing sets arranged with satisfactory boiler for producing steam heat in the manner suggested by the American Co., which can give you details. Similar sterilizing outfits are now being made by them for the American Red Cross. Bids should be forwarded to this office for consideration.

3. The officer in charge of the field medical supply depot, Washington, D. C., has been instructed to send you a requisition covering all of the post medical supplies which will be needed at his depot.

4. The above mentioned circular advertisements should call for deliveries at either New York, St. Louis, Washington, or some other place within the territory east of the Mississippi River and north of the latitude of St. Louis. This will be necessary as it is probable that a number of subsidiary medical supply depots must necessarily be established in the territory indicated, the exact locations of which are indeterminate at this time. The attention of the bidders should be called, however, to the fact that all places to which deliveries are to be made by the contractors will be located on the main railroad lines, which will facilitate handling and reduce the cost of transportation to a minimum.

5. Attention is invited to the fact that the circular advertisement should call for delivery at Washington only of all items required by the field medical supply depot in the quantities indicated on requisition to be forwarded to New York as above indicated. Request for bids for sterilizing sets and portable dental outfits should call for delivery at New York only.

6. Instructions are given to issue these circular advertisements at the present time as it is the desire of this office to be in a position to promptly contract for these supplies as soon as money is available. By this method the manufacturers will be fully informed as to our immediate needs and it will be possible for the Medical Department to ascertain how long it will take to secure the supplies.

7. Twenty-five copies of each circular advertisement should be forwarded to this office as soon as it is printed. When the bids are opened they should be abstracted at the New York depot and the supply officer should recommend awards for each item by the usual red-ink check or otherwise, after which the abstract will be promptly forwarded to this office for consideration. One item may be recommended for award to several bidders in case the supply officer believes it would facilitate delivery to split the award in this manner.

The early relationship of the munitions committee of the Council of National Defense and the purchase of medical supplies for the Army is shown in the following extract of a letter from the representative of the Surgeon General on that committee to the officer in charge of the medical supply depot, New York, April 5, 1917:⁹

I am a member of the munitions committee of the National Defense Council. This committee is attempting to coordinate the needs of the various branches of the Government in order to regulate the distribution of the raw materials to manufacturers who are working upon supplies for the Government. It is believed that they will be able to secure the delivery of raw materials when necessary for the production of needed articles, so that this complaint need no longer be an acceptable excuse for failure to produce the goods. I believe I am in a position to say that Government assistance will be given if necessary in order to force the production of raw materials, but bidders should exhaust their own resources first and not depend upon Government aid. For this reason it is not desirable to inform them regarding this Government aid until it becomes necessary to do so.

An official communication is being forwarded to you to-day directing the issue of circular advertisements covering post medical supplies for 500,000 men. While the time of delivery quoted by the bidders will be a consideration in recommending the award, the Council of National Defense will take appropriate steps (as above indicated), so that raw materials may be available and the manufacturers will be able to furnish the articles most necessary for the Medical Department in the shortest possible time.

In case you come across a problem where bidders can not obtain necessary materials, if you will submit the proposition to me I will take it up with the munitions committee, who are convinced that they will be able to regulate this matter satisfactorily. The committee is working upon the principle of interfering as little as possible with the commercial interests, and thus far the patriotic offers of business firms seems to have been sufficient, with some little assistance, for the delivery of needed supplies. There is in back of it all, however, the authorization to take over plants and compel the furnishing of supplies for Government use, but this is not being put into prominence at this time. I feel very much encouraged to believe that we can get what we need promptly with the assistance of the committee as previously mentioned.

LACK OF FUNDS

In issuing the instructions referred to in the above-quoted letter, at this early date it was assumed that the declaration of war would be followed immediately by appropriations sufficient to provide all needed supplies and to make them available in adequate quantities by the time of actual call of the troops to the colors. The assumption was natural and was justified by past history. In 1898, before a state of war had been declared to exist between the United States and Spain, an appropriation of \$50,000,000 for the national defense had been placed at the disposal of the President to be expended at his discretion.¹¹ Of this sum the Medical Department received liberal grants as it made its wants known. It was expected that a similar procedure would obtain following the declaration of war with Germany. An appropriation for the national defense was made April 17, 1917, in the sum of \$100,000,000 and placed at the disposal of the President for disbursement at his discretion.¹² For some reason, best known to those in authority, it was decided not to include therein items that could be purchased from ordinary appropriations, and the Secretary of War decided not to ask the President for allotments of that fund except for extraordinary objects not embraced in estimates submitted to Congress.¹³

This left the Medical Department, as well as the other supply bureaus of the War Department, with only the available balances of existing appropriations for the initiation of its war-time purchases. Purchasing officers accordingly were informed on April 9 that the instructions of April 5, above quoted, were issued with a view of securing bids and making awards, and that purchases were not to be made until specifically authorized, as appropriations for the purchase had not become available.¹⁴ This shortage of funds, for a time, wholly inhibited purchases and procurement was at a standstill. Under existing law, except for a few purposes, purchases could not be made unless there was an appropriation adequate to their fulfillment. April passed without funds being made available. On May 1 authority was received from the Secretary of War to purchase in advance of appropriations medical supplies in the amount of \$3,421,500.¹⁵ The purchase of medical supplies is one of the few purchases which, under the statutes, can be made in the absence of appropriation when the exigency of the service demands it. The following articles were embraced in this authorization:

Mosquito bars, 100,000, at \$4.80.....	\$480, 000
Canvas cases for bedding:	
Large, 25,000, at \$6.....	150, 000
Small, 7,000, at \$4.....	28, 000
Blankets, field, gray, 250,000, at \$5.50.....	1, 375, 000
Litters with slings, 60,000, at \$6.....	360, 000
Pack saddles, 2,000, at \$63.....	126, 000
Cots, canvas, folding, 120,000, at \$4.....	480, 000
Chairs, folding, 34,000, at \$0.75.....	25, 500
Tables, bedside, folding, at \$0.90.....	27, 000
Vials, assorted.....	35, 000
Books for instruction.....	335, 000

Copies of this authority to incur a deficiency were furnished the purchasing officers at the New York and Washington depots, May 2, 1917, with instructions to proceed at once with the purchase of the supplies enumerated therein.¹⁶

EMERGENCY MEASURES USED TO OBTAIN SUPPLIES

On May 2 the Surgeon General obtained verbal permission from the Secretary of War to incur additional obligations amounting to \$5,000,000,¹⁷ in the absence of appropriations, but this and the sums mentioned above were all too small for the purpose. The embarrassment due to lack of appropriation was made known to the manufacturers, by whom the situation was understood. Many of them indicated a willingness to proceed with production in advance of a formal order provided they had reasonable assurance from the purchasing officers that a contract would be forthcoming as soon as the appropriation bill had passed. Some of the manufacturers had proceeded with commitments for materials without awaiting this assurance. In order that they might be protected and be definitely assured that contracts would be given them for the articles which they had undertaken to supply, letters were sent them in the following form:¹⁸

I have been informed by you of the progress made by the committee of manufacturers of surgical dressings in reference to the joint action in apportioning to the manufacturers the surgical dressings, etc., required by all departments of the Army. I also understand that these manufacturers, after the apportionment was made by your committee, proceeded at once with their purchases and manufacturing with the understanding that such apportionments would be confirmed with contracts now in preparation by the munitions board. This is to say, that the action taken by your committee and the manufacturers is entirely in accord with the request of the Secretary of War and myself, and the obligations the manufacturers have entered into for the Government become a moral obligation to the United States Government until such time as its acts are done under contract.

Please extend to each manufacturer and to the committee as a whole my appreciation of the promptness of action and the expression of my wish that work proceed with all possible dispatch.

In view of the attitude of many of the manufacturers to proceed at once with the work of production and in order to save as much time as possible, the following instructions were sent to the purchasing officers at the New York and Washington medical supply depots on May 15:¹⁹

1. You are directed to make plans for the purchase of supplies for an army of 1,000,000 men. You will not place the actual orders until the pending deficiency appropriation bill passes, but you should be prepared to go ahead promptly when this occurs.

2. Having determined upon the articles needed and from whom you will purchase them, you may notify such persons that you will give the orders when the money is available. It is believed most firms will proceed to manufacture the articles upon such notification. We shall urgently need their products and we must cooperate with the manufacturers to this extent, which will morally bind us to make the contracts later on.

3. Just how you will place the orders is left to your judgment, as the result of your knowledge of the business situation and of conversations with the various manufacturing committees which have been in cooperation with the Council of National Defense. It appears that some of these firms prefer that they should be informed at once regarding the complete needs for a year, while other committees working with the Government (as for instance the pharmaceutical committee) suggest that orders be placed in smaller amounts and repeated at intervals.

4. Our latest information indicates that 32 divisions will be formed and that these will assemble in divisional camps as far as practicable. It is contemplated that a thousand-bed hospital shall be provided at each such camp. It may be that some hospitals will be formed in connection with the hospitals at existing posts. On the other hand, it is probable that several separate brigade camps may be formed.

5. It is believed you can safely state that you will give an order for at least 25 combination sterilizing outfits. It is probable that more will be needed later.

6. The X-ray outfits will be managed from Washington by Captain Christie.

7. The Secretary of War has directed that no books or other material from which an Army officer will derive financial benefit shall be purchased during the war. This, of course, prevents the purchase for the present of such standard books as Mason's Handbook for the Sanitary Troops, LaGarde's Surgery, and Havard's Hygiene. Major Ashburn has given up his claim of royalty upon Ashburn's Hygiene, and it is expected that the other authors will do the same, in which case the publishers' prices to us should be correspondingly reduced.

8. This letter supersedes any previous directions that conflict with it.

Since a number of prospective contractors seemed unwilling to incur obligations for raw materials and semifinished parts without a formal order, and in view of the probable early passage of the pending appropriation bill, the following instructions were issued to the officers in charge of the purchasing depots at New York and Washington on May 25:²⁰

1. You are authorized to proceed with the purchase of supplies for an army of 1,000,000 men in addition to those now on hand, along the lines previously agreed upon in conferences with this office.

2. The contract for the surgical dressings is not yet prepared by the munitions board working with the manufacturers, and this purchase must be delayed till later authorized: also the order for the revised cases of surgical instruments, the catalogue for which will be furnished by the board in a few days. It is understood that the manufacturers have been informed of our needs and are preparing to make prompt deliveries.

3. Thirty combination sets of sterilizers for operating rooms should be obtained. It is probable that this number may be duplicated in the near future. Thirty X-rays outfits should be purchased with similar expectations of later increases. Major Christie will give expert advice regarding the X-ray apparatus.

4. Five hundred sets of portable dental apparatus should be purchased, and it is also probable that this order will be doubled later.

5. In the near future three or more distributing depots will be designated, and you will be furnished a list of supplies which you may ship for their stock. These retailing depots will carry post, field, and dental supplies.

6. It is to be understood that orders for a three months' supply of pharmaceuticals and chemicals will be submitted as recommended by the committee of manufacturers of these articles, working with the Council of National Defense. The subsequent orders will be given by you after the first lot is well under way, in accordance with the advice of the committee.

7. You have been furnished the requisitions of the St. Louis depot, which may be filled as they were modified, one-fourth of the pharmaceuticals and chemicals being furnished, and the remaining amounts as you can purchase them.

8. As previously informed, where standard articles are not obtainable, a satisfactory substitute may be accepted. As a guiding rule, all possible effort should be made to combine economy with efficiency. Ornamentation may be omitted and plainer furnishings substituted, provided they are good and serviceable.

9. A too strict insistence upon nonessential requirements of the specifications that were desirable during peace times can not be demanded in the present emergency. It is, however, expected that thoroughly practical articles may be obtained that will meet all reasonable requirements.

10. An estimate of the approximate cost of the above supplies should be furnished to this office as soon as practicable.

11. The original copy of each contract covering the above purchases should be stamped:

Deficiency (RS 3732),
Authority Secretary of War.
April 30, 1917.

12. The above should also be stamped in the upper left-hand corner of memorandum vouchers covering these purchases. The other copies of the contract and the original orders should not be stamped as indicated above.

The urgent deficiency appropriation bill became a law on June 15, 1917,²¹ and funds became available for the purchase of supplies and to enable the tentative agreements to be confirmed by contracts. By this time the machinery of procurement was well in motion. By means of the foregoing instructions, the purchase of supplies proceeded at a satisfactory rate, and the delay in the passage of that bill did not have as disastrous results as was anticipated. Production went on at top speed, deliveries of most articles were made promptly, and at sufficient quantity of supplies to permit the medical personnel to carry on and to prevent suffering was at the several camps as soon as the troops arrived.

EARLY PURCHASES IN 1917

The initial war purchases during 1917 were based on the requirements of 1,000,000 men for one year and followed the general plan outlined above. The additional needs of the Medical Department, as they arose during that year, were allotted among the members of the various commodity associations in much the same manner as the initial purchases. Congress, however, did not approve this plan and by legislation made it illegal for persons interested in the sale of supplies to the Government to act in any capacity as procuring agents.²² The various committees whose services had been of such help to the Medical Department were disbanded in the latter part of the year as agents or representatives of the Council of National Defense²³ and were reorganized as war service committees acting wholly as representatives of the manufacturers of commodity associations of which they were members.²⁴

It was decided by the Surgeon General in June, 1917, that hospital accommodations be provided for 25 per cent of the troops in France. It was understood by the officer in charge of the supply division of the Surgeon General's Office that the troop movements contemplated the early dispatch of all Regular Army and National Guard troops to France. On account of the time required to manufacture sufficient hospital beds for the American Expeditionary Forces, instructions were given the officer in charge of the New York medical supply depot, on August 12, 1917, to purchase 3,000 additional ward units (beds, bedding, and linen for 150,000).²⁵ Had troops been dispatched to France according to this understanding the ward units would have been required by the time they were ready for shipment. Conditions which arose within the United States as a result of the epidemics of the winter of 1917-18 required the distribution of many of these beds to the training camps. The warehouse space in the new depots was able to take care of the remainder and no slowing of production on account of lack of storage space became necessary.

The laboratory equipment listed in the standard supply table and included among the articles in the original instructions for the purchase of supplies for 1,000,000 men was very meager. Although the list had been revised by the committee on standardization, decision concerning the articles to be supplied to the base hospitals at the training camps was delayed. Instructions to purchase the laboratory equipment, except electrical apparatus, for the 32 training camps were issued June 30.²⁶ Purchase of the electrical apparatus was authorized July 17 and instructions for the purchase of a large lot of laboratory apparatus,²⁷ stains, and supplies, not included in former authorizations, were given July 20.²⁸

LATE PURCHASES IN 1917

Contracts for the major part of the articles required for the million men were placed during the months from May to August, 1917, inclusive. The August contracts were, for the most part, those for surgical dressings. The actual placing of these contracts had been delayed awaiting the perfection of the special form of contract which was being developed for that purpose by the munitions committee of the Council of National Defense collaborating with the Surgical Dressings Manufacturers' Association and the Surgeon General's Office.²⁹

The demand for field equipment and supplies was very great, and it was necessary to increase from time to time the quantities authorized to be purchased. On August 7, 1917, instructions for the purchase of the following articles were given the purchasing officer at the field medical supply depot; the estimates of cost were based on latest contracts for those articles:³⁰

Article	Quantity	Estimated cost	Article	Quantity	Estimated cost
Bed sacks	140,000	\$280,000	Tables:		
Brassards	150,000	16,000	Bedside, folding	30,000	\$30,000
Cases, bedding:			Mess	6,000	36,000
Large	25,000	145,000	Litters	60,000	360,000
Small	7,000	29,000	Canvas for litter	135,000	67,000
Pillow sacks	100,000	55,000	Tags, diagnosis, books of	250,000	50,000
Chairs:			Chests, tool, No. 2	300	13,000
Folding	34,000	20,000	Total		1,126,000
Medical and surgical	3,600	25,000			

These purchases were augmented on August 28 by instructions to purchase 350,000 blankets and 60,000 more litters.³¹ On September 6, the following instructions for the purchase of field supplies were issued to the office in charge of the field medical supply depot.³²

1. You are authorized and directed to make purchases of field supplies as follows:

Fabrics and textiles.—Duplicate orders placed as per Schedule 329, with the following exceptions:

Bed sacks.	Case, bedding, small.
Blankets.	Covers for cots.
Brassards.	Covers for litters.
Case, bedding, large.	Mosquito bars.

Of the excepted articles buy none at present.

Wooden articles.—Duplicate Schedule 330, with the following exceptions:

Boxes, standard packing.	Desk, field, No. 1.
Chairs, folding.	Mosquito bar frames.
Chest, medical and surgical.	Spreaders for mosquito bar frames.
Cots, folding.	Tables, bedside, folding.
Cots, and sticks for.	Tables, mess, folding.

Buy none of the excepted articles at the present time.

Miscellaneous supplies.—Duplicate Schedule 331, with the following exceptions: Bottles, flint, 8-ounce, wide mouth, ground-glass stoppers; litters; packsaddles and all packsaddle parts.

Buy none of the excepted articles. Buy bottles, flint, 8-ounce, wide mouth, and corks for same, in lieu of the ground-glass stoppered bottles. Buy 10,000 litter slings, as shown on schedule, with the new-style hardware.

Hardware and metal articles.—Duplicate Schedule 332, except as indicated below:

Cargo frames, none.	Scissors, bent trimmers, 7,000.
Chest, tool No. 2, none.	Spreaders for pack saddles, none.
Collars for flagstaff, 800 sets.	Stoves, alcohol, none.
Flagstaffs, 800 sets (1,600 poles).	Stoves, coal oil, blue frame, single burner, 4,000.
Packsaddle frames, none.	
Scissors, blunt point, steel, 125,000 (these should be bought through the surgical instruments committee).	

Table ware and cooking utensils.—Duplicate Schedule 333.

Instruments and appliances.—Duplicate Schedule 334, except as indicated below:

Cases, hemostatic forceps, none.	Forceps, artery, Tape's, none.
Cases for enlisted men's belts, none.	Needles, surgical, none.
Cases for officers' belts, none.	Specula, ear, none.
Cases, instrument, for emergency case, none.	Specula, rectal, none.
Cases, tooth extracting, none.	Tourniquets, field, web, 250,000

Rubber goods.—Duplicate Schedule 335, with the following exception: Bandages, rubber, Martin's, 15,000 instead of 5,000.

Stationery.—Duplicate Schedule 336, except as indicated below:

Books, blank:		Books, note, manifoldling fillers-----	250,000
Crown, cap, 250 pages-----	5,000	Erasers, steel-----	3,000
Svo, 150 pages-----	30,000		

Tin containers.—Duplicate Schedule 337, with the following [exception: Tins, square, round corner, $4\frac{1}{8}$ by $4\frac{1}{8}$ by $8\frac{1}{4}$ inches, body height, 150,000 (instead of 100,000).

Surgical dressings.—Duplicate Circular 338 in so far as it applies to ligatures and sutures, but buy no dressings at this time.

In addition to the above purchases you are directed to double your requisition on New York, dated April 7, 1917, except as indicated below:

Ether ----- tins..	200,000	Cases:	
Foot powder ----- do----	600,000	General operating -----	700
Quininae, hydrochlorosulphas, hypodermic tablets --- tubes--	60,000	Operating, small-----	3,000
Books, blank:		Post-mortem -----	150
Crown, cap 250 pages -----	None.	Crutches -----	2,000
Svo, 850 pages -----	None.	Rubber tips for crutches-----	4,000
Files, Shannon -----	None.	Chest, tool, No. 1 -----	150
Apparatus, restraint -----	200	Dishes, Petri -----	None.
Boxes, folding for tablets.gross--	200,000	Medicine droppers-----	200,000
		Pails, commode -----	1,500

Pajama coats	500, 000	Thermometers, clinical	100, 000
Pajama trousers	500, 000	Towels, dish	360, 000
Pins	150, 000	Tubing, drainage	200, 000
Pins, safety	1, 500, 000	Urinometers	400
Scales and weights	None.	Books, medical	120
Shears	None.		
Syringe, hypodermic, extra needles	200, 000		

The instructions covering the purchase of surgical instruments were elaborated in the following letter sent to the medical supply depot at New York and the field medical supply depot at Washington, the letters being identical:³³

1. You are authorized and directed to purchase surgical instruments as follows: Duplicate the present contracts, making them out exactly like those now in effect with the different firms, quantity to be the same. Send the contracts to the several firms with a letter requesting them to sign the same and return, if they are willing to undertake the work at the prices stated.

2. It is believed that the majority of the manufacturers will accept the terms and sign the contracts. Those who do not you will report to this office. This procedure is followed on the advice of the chairman of the committee on surgical instruments, Council of National Defense. However, you need not mention this in your letter to the manufacturers.

Authorization to the officer in charge, New York medical supply depot, for the purchase of Hodgen's splints in large quantities was granted October 24, 1917,³⁴ and, on November 7, 1917, for the purchase of stock of assorted instruments according to the list in the standard catalogue in such quantities as indicated on requisitions received.³⁵

PURCHASES DURING 1918

The purchase of laboratory supplies was transferred from the New York depot to the field medical supply depot in Washington at the end of 1917.³⁶ By this time, the standard supply table of laboratory supplies had been fully completed and the list was extensive. Also, the requirements in all classes of supplies had become better known, and a change in the mode of stating the requirements was made. This method is described in detail below under "Hospital supplies, Schedule 1." Because of the urgent need for laboratory supplies and the difficulties which had been experienced in securing them, these instructions directed that orders for them be placed without delay. The list included 130 articles.

With the rapid expansion of the Army, the changing environment, and the morbidity rate, it was continually necessary to add new articles of equipment to the armamentarium of the hospitals. Specialties sprang up overnight almost, and equipment had to be selected, standardized, and provided as the needs required. New types of morbidity were developing from changed conditions and weapons of combat. As each new condition arose, apparatus and supplies were developed and provided to cope with it. Advances in equipment were rapid. As these articles of new equipment were needed, instructions for their purchase were issued, while purchases of standard articles were made at fairly regular intervals.

The strength of the Army was constantly increasing, likewise the demand for medical supplies. By the end of 1917 the troops called to the colors had reached a million and a half, and further augmentation was being considered.³⁷ More supplies must be purchased. Plans for the early purchases in 1918 were perfected during the latter part of December, 1917. Instructions for the purchase of post supplies were sent to the officer in charge of the New York medical supply depot under date of January 10, 1918, as "Part I, hospital supplies, schedule of medical supplies required by the United States Army."³⁸ The letter of instructions directing these purchases is quoted here in full because, in several respects, it marks a departure from the method which previously had been followed in compliance with the instructions of the Secretary of War of April 13, 1917, already quoted. The letter is followed by sufficient extracts from Schedule 1 which accompanied it for a better understanding of the plan.

JANUARY 10, 1918.

From: The Surgeon General.

To: The officer in charge, medical supply depot, 628 Greenwich Street, New York.

Subject: Purchase of post supplies.

1. I send herewith Part I of schedule of medical supplies required by the Army. This list includes practically all items listed in the Manual for the Medical Department under the title "Post supplies." X-ray supplies are also listed, as are certain foods, beverages, and condiments pertaining to the field supply table. The latter are included for the reason that it will frequently be advisable for your depot to purchase these for shipment to France.

2. You are advised that the officer in charge, field medical supply depot, will be instructed to send no more requisitions to your depot for the purpose of replenishing his stock, but will, in future, purchase the articles heretofore drawn from your depot on requisition. These articles include alcohol, hypodermic tablets, cases of instruments, pajamas towels, etc. You will, however, fill all unfilled requisitions from that depot now on hand as soon as possible.

3. The following instructions will govern in making purchases under this schedule:

(a) Invite quotations on all items of a class at the same time, whenever possible, and for the full quantity to be purchased quarterly. If this is done the number of contracts to be made will be materially reduced.

(b) In all invitations for quotations the following statement should appear:

"Bidders may submit quotations for one or more of the items and for the whole or any portion of the total quantities called for of any item. Bidders must also state the rate of delivery and the total quantity they will deliver without fail within 90 days from date of award."

This requirement is very important, as it will enable the purchasing officer to so make the awards that in the majority of cases deliveries of the supply will be assured during the quarter covered by the purchase.

(c) As a rule, from 10 to 20 days should be given bidders in which to submit quotations. The date and hour of opening should be stated in the invitation.

(d) The invitations for quotations on the several classes of supplies should be sent out in such a way as to insure an even distribution of the clerical work involved in correspondence with bidders, drawing up contracts, etc. If this rule is followed, contracts can be executed promptly after awards are made.

(e) In future you will not purchase any articles pertaining solely to the field supply table unless directed to do so by this office. This applies to such articles as folding chairs, folding tables, etc. Should such items appear on requisitions referred to your depot for issue, you should advise this office at once.

(f) Until further notice from this office you are directed to proceed as follows:

CLASS I. MEDICINES, ANTISEPTICS, AND DISINFECTANTS

LISTS A AND B

1. Purchase enough of each item to bring the total quantity purchased since June 1, 1917, up to the figures given in first column (for 1,000,000 men one year) plus the quantity required to fill requisitions from the field medical supply depot since April 1, 1917. If there are indications that the quantity of any item given is not sufficient, it is directed that you advise this office without delay.

2. The regular quarterly purchases of both lists will be made by the general purchasing office, Medical Department, United States Army, now being organized. The first quarterly purchase will be made about March 1, 1918.

CLASS II. INSTRUMENTS AND APPLIANCES

LIST A

1. Purchase enough of each item to bring the total purchased since June 1, 1917, up to the figures given in the first column, plus the quantity required to fill requisitions from the field medical supply depot since April 1, 1917. If a probable shortage is indicated notify this office.

2. The regular quarterly purchase indicated should be made by you, including in the first quarter those purchases to be made under paragraph 1, list A.

LIST B

1. Submit a statement to this office showing total purchases of each item made since June 1, 1917.

2. In future purchases of items on this list will be made by the general purchasing office.

3. Submit a list of the "reserve" instruments you have purchased under authorization from this office dated November 7, 1917, with recommendations as to quantities that, in your opinion, should be purchased quarterly.

CLASS III. SURGICAL DRESSINGS

Submit a statement showing total quantity of each item purchased since May 1, 1917.

In future the items of this class will be purchased by the general purchasing office, Medical Department.

CLASS IV. SUTURES

Submit statement showing total purchases since June 1, 1917.

In future the items of this class will be purchased by the general purchasing office, Medical Department.

CLASS V. HOSPITAL EQUIPMENT AND FURNITURE

LIST A

1. Purchase enough of each item to bring the total quantity purchased since June 1, 1917, up to the figures given in first column plus the quantity required to fill requisitions from the field medical supply depot since April 1, 1917. If there are indications that the quantity of any item as given therein is not sufficient, advise this office without delay.

2. The regular quarterly purchases of the items of this list will be made by you. Include in the first quarter those purchases to be made under paragraph 1, list A.

LIST B

Submit statement to this office showing total purchases of each item made since May 1, 1917. Also submit recommendations as to purchases, bearing in mind those items marked *, against which the commander in chief, American Expeditionary Force, has sent stop orders.

CLASS VI. FABRICS AND TEXTILES

Submit statement to this office showing total purchases of each item since June 1, 1917, and the quantities requisitioned by the field medical supply depot since April 1, 1917.

Future purchases of items on this list will be made by the general purchasing office, Medical Department.

CLASS VII. RUBBER GOODS

1. Purchase enough of each item to bring the total quantity purchased since June 1, 1917, up to the figure given in first column, plus the quantity required to fill requisitions from the field medical supply depot since April 1, 1917. If there are indications that the quantity of any item as given therein is not sufficient, advise this office without delay.

2. The regular quarterly purchases of the items of this class will be made by you. Include in the first quarter those purchases to be made under paragraph 1.

CLASS VIII. KITCHEN UTENSILS AND TABLEWARE

1. Purchase enough of each item to bring the total quantity purchased since June 1, 1917, up to the figure given in first column. If, in your opinion, the quantity given of any item is too low, advise this office without delay.

2. The quarterly purchases will be made by you. Include in the first quarter those purchases to be made under paragraph 1.

CLASS IX. STATIONERY

LISTS A AND B

1. Purchase enough of each item to bring the total quantity purchased since June 1, 1917, up to the figure given in first column plus the quantity required to fill requisitions from the field medical supply depot since April 1, 1917. If, in your opinion, the quantity given, of any item, is too low advise this office without delay.

2. The quarterly purchases will be made by you. Include in the first quarter the purchases to be made under paragraph 1.

CLASS X. MISCELLANEOUS

1. Purchase enough of each item to bring the total quantity purchased since June 1, 1917, up to the figure given in first column plus the quantity required to fill requisitions from the field medical supply depot, since April 1, 1917. If, in your opinion, the quantity given of any item is too low, advise this office without delay.

2. The quarterly purchases will be made by you. Include in the first quarter the purchases to be made under paragraph 1.

CLASS XI. X-RAY SUPPLIES

LIST A

1. Purchase enough of each item to bring the total quantity purchased since June 1, 1917, up to the figure given in first column. If, in your opinion, the quantity given of any item is too low, advise this office without delay.

2. The quarterly purchases will be made by you. Include in the first quarter the purchases to be made under paragraph 1.

LIST B

Report to this office the total quantity of each item purchased since June 1, 1917, and whether, in your opinion, the quantity given of any item is too low.

CLASS XII. FOODS, BEVERAGES AND CONDIMENTS

To be purchased by you as required to fill requisitions and overseas orders.

(g) Special apparatus, instruments, etc., will be purchased by you on special authorization from this office as heretofore.

(h) Laboratory equipment and supplies will be issued from the field medical supply depot. Requisitions for these supplies will, however, be referred to you until the supply now on hand or under contract shall have been issued.

(i) A schedule of dental supplies is now being prepared and will be sent to you at an early date.

It is requested that you acknowledge receipt of these instructions.

SCHEDULE OF MEDICAL SUPPLIES REQUIRED BY THE UNITED STATES ARMY

PART I. HOSPITAL SUPPLIES

CONTENTS

- | | |
|---|---|
| Class 1. Medicines, antiseptics, and disinfectants. | Class 7. Rubber goods. |
| Class 2. Instruments and appliances. | Class 8. Kitchen utensils and tableware. |
| Class 3. Surgical dressings. | Class 9. Stationery. |
| Class 4. Sutures. | Class 10. Miscellaneous supplies. |
| Class 5. Hospital equipment and furniture. | Class 11. X-ray supplies. |
| Class 6. Fabrics and textiles. | Class 12. Foods, beverages, and condiments. |

NOTE.—The following are to be purchased only on special authorization of the Surgeon General.

- | | |
|------------------|-------------------|
| List B. Class 1. | List B. Class 5. |
| List B. Class 2. | List B. Class 6. |
| All of Class 3. | List B. Class 11. |

* * * * *

CLASS 1. MEDICINES, ANTISEPTICS, AND DISINFECTANTS

LIST A

To be purchased as indicated.

Items	Articles	Quantity required for 1,000,000 men for 1 year	Quantity to be purchased every 3 months
1	Acacia, powder, 1 pound, in bottle.....bottles..	12,000	5,000
4	Acidum aceticum, ½ pound, in bottle.....do.....	6,000	2,500
8	Acidum nitricum, ½ pound, in bottle.....do.....	12,000	5,000
17	Ether, ¼ pound, in tin.....tins.....	1,000,000	400,000

* * * * *

CLASS 2. INSTRUMENTS AND APPLIANCES

LIST A

To be purchased as indicated.

Items	Articles	Quantity required for 1,000,000 men for 1 year	Quantity to be purchased every 3 months
1	Applicators for throat, metal.....number..	4,000	500
8	Inflators, Politzer's.....do.....	2,000	500
12	Sphygmomanometers.....do.....	2,000	500
20	Syringes, Luer, 2 c. c.....do.....	4,000	1,000

LIST B

To be purchased as required by special authority of the Surgeon General.

Items	Articles	Quantity required for 1,000,000 men for 1 year	Quantity to be purchased every 3 months
36	Cases, ear, nose, and throat (par. 912)	number..	1,000
38	Cases, forceps, hemostatic (par. 915)	do.....	4,000
39	Cases, general operating (par. 916)	do.....	2,000
	* * * * *		*

CLASS 3. SURGICAL DRESSINGS

To be purchased only on special authorization of the Surgeon General.

Items	Articles	Quantity required for 1,000,000 men for 1 year	Quantity to be purchased every 3 months
1	Bandages, gauze, roller, assorted, 6 dozens in box	boxes..	600,000
3	Cotton bats	pounds..	400,000
5	Gauzes, absorbent, plain	yards..	50,000,000
	* * * * *		*

CLASS 4. SUTURES

To be purchased as indicated.

Items	Articles	Quantity required for 1,000,000 men for 1 year	Quantity to be purchased every 3 months
1	Sutures, catgut, plain, sterilized, 18 inches in tube, assorted sizes	tubes..	600,000
5	Sutures, silk, braided, sterilized, 18 inches each, 3 sizes in package	packages..	240,000
6	Sutures, silkworm gut, 100 in coil	coils..	30,000
	* * * * *		*

CLASS 5. HOSPITAL EQUIPMENT AND FURNITURE

LIST A

To be purchased as indicated.

Item	Articles	Quantity required for 1,000,000 men for 1 year	Quantity to be purchased every 3 months
2	Basins for sponges, white enamel	number..	20,000
8	Bottles, 4-quart, glass stopper, for antiseptic solutions	do.....	6,000
19	Funnels, glass, 250 c. c.	do.....	3,000
40	Medicine glasses	do.....	48,000
	* * * * *		*

CLASS 6. FABRICS AND TEXTILES

LIST A

To be purchased as indicated.

Items	Articles	Quantity required for 1,000,000 men for 1 year	Quantity to be purchased every 3 months
4	Gowns, operating.....number..	30,000	12,000
7	Pajamas, suits.....suits..	600,000	200,000
8	Pillow cases, cotton.....number..	600,000	250,000
9	Sheets, cotton.....do..	1,200,000	400,000

* * * * *

CLASS 7. RUBBER GOODS

To be purchased as indicated.

Items	Articles	Quantity required for 1,000,000 men for 1 year	Quantity to be purchased every 3 months
2	Bags, rubber, hot water.....number..	30,000	12,000
5	Catheters, flexible, assorted sizes.....do..	60,000	24,000
10	Gloves, rubber.....pairs..	200,000	80,000
16	Tubes, drainage, rubber, 3 sizes, one yard lengths, of each size.....yards..	100,000	40,000

* * * * *

CLASS 8. KITCHEN UTENSILS AND TABLEWARE

To be purchased as indicated.

Items	Articles	Quantity required for 1,000,000 men for 1 year	Quantity to be purchased every 3 months
1	Boilers, coffee, 11½-quart, enamel or tin.....number..	4,000	1,600
3	Boilers, double, for cooking, 11-quart.....do..	4,000	1,600
4	Boilers, double, for cooking, 4-quart.....do..	8,000	3,200
21	Forks, table, silver (or nickel) plated.....do..	200,000	72,000

* * * * *

CLASS 9. STATIONERY

LIST A

To be purchased as indicated.

Items	Articles	Quantity required for 1,000,000 men for 1 year	Quantity to be purchased every 3 months
11	Ink, black (powder or tablets), sufficient in box for 1 quart of fluid.....boxes..	4,000	1,000
13	Labels, for vials.....gross..	80,000	20,000
16	Pads, prescription.....dozen..	40,000	8,000
23	Paper, manifold, letter, 500 sheets in package.....packages..	13,000	4,000
25	Paper, typewriter, letter, 500 sheets in package.....do..	14,000	3,500

* * * * *

CLASS 10. MISCELLANEOUS SUPPLIES

To be purchased as indicated.

Items	Articles	Quantity required for 1,000,000 men for 1 year	Quantity to be purchased every 3 months
3	Boxes, folding, for tablets.....gross..	125,000	36,000
7	Brooms, corn.....number..	96,000	24,000
13	Brushes, scrubbing.....do..	48,000	12,000
24	Lye, concentrated, 1 pound in can.....cans..	36,000	12,000
35	Soap, Ivory, or equal.....cakes..	650,000	165,000

* * * * *

CLASS 11. X-RAY SUPPLIES

LIST A

To be purchased as indicated.

Items	Articles	Quantity required for 1,000,000 men for 1 year	Quantity to be purchased every 3 months
1	Films, dental, 1½ by 2½ inches.....dozen..	5,000	2,000
3	Preservers, negative, for 14 by 17 plates.....dozen..	20,000	8,000
7	Plates, X-ray, 14 by 17 inches.....dozen..	20,000	8,000
11	Screens, intensifying, detachable, 14 by 17 inches, without cassettes, furnished in cardboard folder.....dozen..	500	200
19	Hydroquinone.....pounds..	1,250	500

* * * * *

CLASS 12. FOODS, BEVERAGES, AND CONDIMENTS

To be purchased as required.

Items	Articles	Quantity required for 1,000,000 men for 1 year
2	Cocoa, in 8-ounce tins.....tins..	4,000,000
5	Milk, condensed, unsweetened, 1-pound tins, Borden's tall can, or equal.....do..	1,000,000
8	Soup, assorted, equal quantities of oxtail and mock turtle, Campbell's or equal; 10½ ounces net, in tins.....tins..	1,000,000
9	Sugar, granulated, in bulk.....pounds..	500,000

* * * * *

Schedule 2, field supplies, was transmitted to the field medical supply depot on February 7, 1918, and accompanied by instructions similar to those to the New York depot just quoted.³⁹ The general purchasing office, Medical Department, having been established in Washington, D. C., the purchase of medicines, antiseptics, disinfectants, certain surgical instruments, surgical dressings, fabrics, and textiles were reserved to that office for procurement. Schedule 2 was

prepared in the same manner and with appropriate classifications as Schedule 1. It will not be quoted.

The schedule for dental supplies⁴⁰ and the schedule for veterinary supplies⁴¹ were prepared during the latter part of January. They correspond in form with that of Schedule 1 above quoted. The schedule of dental supplies was transmitted, with appropriate instructions similar to those with Schedule 1, to the New York medical supply depot for procurement under date of February 11. The schedule for veterinary supplies conformed in general classification and arrangement to those already mentioned. Its basis of computation was, however, 250,000 animals. This schedule, with appropriate instructions, was sent to the medical supply depot at St. Louis, Mo., on February 12, 1918.

This method of stating requirements and issuing instructions to purchase continued in force until June, 1918, when it was modified to adapt it to the automatic supply schedule received from the chief surgeon, A. E. F., France, on May 10.⁴² This automatic supply schedule stated, for every article on the authorized supply list, the quantity required monthly for a mixed force of 25,000 men from front to rear, without regard to organization or whether in the combat zone or in the rest or training areas. Initial equipment for medical units was to accompany them or to arrive before them in accordance with the sailing schedule of such units.

In order to make procurements conform to the automatic supply schedule, mimeographed sheets were prepared showing the articles to be purchased by each of the three purchasing agencies of the Medical Department. On these sheets were listed the articles, the quantities required for one base or general hospital, and those on the automatic schedule for the particular articles. In issuing instructions to purchase or to procure articles it was necessary only to specify the number of times the quantities entered on these sheets was to be provided. As the strength of the Army was being augmented rapidly, this method proved a great convenience in meeting the changing conditions. The letter and a specimen sheet follow:⁴³

NOVEMBER 2, 1918.

From: The Surgeon General.

To: The officer in charge, general purchasing office, Medical Department.

Subject: Procurement schedule.

1. I send herewith procurement schedule of articles to be purchased by the general purchasing office. This list covers the estimated requirements from January 1 to June 30, 1919.

2. It is directed that you purchase one thousand one hundred and fifty times the quantity of each item listed in the last column, "Automatic supply for each 25,000 men," and seventy-five times the quantity listed in the column "Initial equipment for base hospitals," except for those items for which the figures are indicated in the left-hand margin of each page. In these cases you should buy the quantities stated.

3. Contracts should specify deliveries from December 1, 1918, to May, 1919, in approximately equal monthly installments.

By direction of the Surgeon General:

C. R. DARNALL,
Colonel, Medical Corps.

One inclosure.

Procurement schedule, Medical Department, United States Army

[To be purchased by general purchasing office]

		Initial equip- ment for base hospitals	Monthly auto- matic supply for each 25,000 men
MISCELLANEOUS SUPPLIES			
100,000	Atomizers, hand.....	number.....	864 50
70,000	Bags, rubber, hot water.....	do.....	864 100
30,000	Bags, rubber, ice, for head.....	do.....	300 20
None.	Bandages, gauze, compressed, 1 gross in box, 3 sizes.....	boxes.....	2,000
None.	Bandages, gauze roller, assorted, 6 dozen in box.....	do.....	720 600
None.	Bandages, plaster of Paris, 3-inch, in individual packets.....	dozen.....	216 500
25,000	Bandages, rubber, Martin.....	number.....	288 20
	Bandages, suspensory.....	dozen.....	96 30
7,000	Bandages, winders.....	number.....	18 5
50,000	Basins, for sponges, etc., white enamel.....	do.....	360 30
50,000	Basins, white enamel, for operating room.....	do.....	432 30
90,000	Bedpans, white enamel.....	do.....	840 60
16,000	Bells, call.....	do.....	216 10
10,000	Boilers, instrument.....	do.....	144 7
300	Books, medical library, base hospital, sets.....	do.....	6
	Bougies, flexible, Nos. 11, 13, 15, 17, 20, 22, French scale.....	do.....	288
	Capsules, gelatin, 100 in box:		
	Size 00.....	boxes.....	900 100
	Size 0.....	do.....	900 100
	Size 1.....	do.....	900 500
	Size 2.....	do.....	900 500
	Cases, aspirating (par. 910).....	number.....	12 2

This method of stating requirements was used also in giving instructions for the placing of interbureau requisitions after the consolidation of procurement had become fully effective in the summer of 1918. The same method continued in use until the Surgeon General was divested of the procurement activities of his office November 15, 1918, by the general consolidation of all procurement activities under the control of the director of purchase and storage, purchase, storage, and traffic division, General Staff.⁴⁴

While general procurement schedules and instructions for purchase were issued at fairly regular and stated intervals, issue of purchase instructions by the Surgeon General's Office was of practically daily occurrence. These instructions were issued by indorsements on requisitions authorizing the purchase of articles entered thereon which were not in stock or due on contract, by approvals of requests from the various medical supply officers to purchase supplies of which they were out of stock, and in letters directing the purchase of various articles in specified quantities.

BY THE MEDICAL DEPARTMENT GENERAL PURCHASING OFFICE

Very early in production, prospective shortages of various commodities appeared, and the War Industries Board began to exercise increasing control over raw materials through its system of priorities. This control was effected largely through conferences with representatives of the various industries and by securing their cooperation. These conferences were generally held in Washington in the offices of the War Industries Board. Washington came to be the common meeting place of representatives of industry and the point of contact between them and the Government supply bureaus.

As the year 1917 drew to a close, the tendency toward centralization of activities in Washington became manifest, and indicated the expediency of establishing a central agency in the Medical Department at Washington for the purchase of medical and hospital supplies. It seemed a logical step. Representatives of the various war service committees of manufacturers were more or less continuously in Washington; contact with them could be made quickly and business transacted with greater promptness.

A centralized purchasing department was organized early in January, 1918, under the title, "general purchasing office, Medical Department, United States Army."⁴⁵ Office space was given it at first in the Premier Apartment Building, 718 Eighteenth Street NW., Washington, D. C., and later in Unit F, Seventh and B Streets NW., Washington, D. C. Personnel was assigned to it and an intensive study was made of methods of purchase, production, and inspection in effect at the several supply depots.⁴⁶ At first but a few articles were consolidated for purchase by this organization.⁴⁵ By the middle of April, 175 contracts had been placed by it.⁴⁷ As its organization improved and the experience of its personnel increased other articles and commodities were consolidated for procurement by it. The assignment of articles to this office for purchase were, in order, medicines, surgical dressings, textiles, certain field items, surgical instruments,⁴⁷ until finally the greater part of all articles on the supply table, as well as special articles, were being procured. The organization developed slowly. Experts were called in to handle the various commodities assigned to it for procurement. The commissioned personnel, all officers of the Sanitary Corps, gradually increased, until at the time of signing the armistice they numbered 12. The office force, composed of limited-service men and civilian employees, had grown correspondingly. The personnel was grouped into sections in conformity with the various classes of duty to be performed, and into commodity sections for purchases. In this it followed commercial practice.

The general purchasing office maintained no depot for the storage and issue of the supplies it purchased. It had no property accountability or responsibility, other than for the office equipment in its office. It exercised a purely purchase function, negotiated purchases and placed contracts or purchase orders. It maintained records of purchases and production. It received its requirements from the Surgeon General's Office in the form of instructions to purchase. It was always in close liaison with that office with which its contact was direct and immediate. Conferences between the two offices were of almost daily occurrence.

In conformity with existing instructions, all purchases were made after advertising. Circulars of advertisement were issued; bids were opened, abstracted; awards were made; and contracts placed in routine manner in accordance with the regulations of the War Department. New sources of supply were investigated and new facilities sought. All payments for supplies purchased by the general purchasing office were made by the disbursing officer in the Surgeon General's Office. Consequently it was not the custodian of any public funds.

In its procurement the general purchasing office functioned in a manner similar to the purchasing division of the supply depots. Having no storage

and issue function, it was relieved of property accountability and rendered no return of property. This injected a new problem into the procurement of supplies. How to avoid this accountability and the rendering of the prescribed return was a difficult question for a time. It was finally solved by requiring the officer who received the supplies to take them up on his returns in much the same manner as was done by purchasing officers at the depots. The responsibility of the general purchasing office terminated with the placing of the articles purchased on board cars at the contractor's plant. All contracts called for delivery f. o. b. factory. The purchasing office followed production and arranged for the inspection of the supplies at the factory where they were made or at one of the chemical laboratories. From there on all details were handled by agencies within the finance and supply division of the Surgeon General's Office. Shipments were handled by the transportation section, vouchers and payments by the disbursing branch of the finance section, and property accountability by the property accounts section.

As noted elsewhere (p. 71), property received by purchase for many years had been taken up and reported to the Surgeon General through the use of a form known as Form 12. This form listed the articles and quantities received and bore the certificate of the purchasing officer that he had taken them up on his return of property. In solving the problem of purchases made by an agency which did not receive the property purchased or assume responsibility for it this form was not appropriate. A different procedure became necessary, for which new forms were devised. The revised purchase procedure contemplated that the supplies would be shipped from the contractor direct to a medical supply depot or other consignee and taken up by the latter. When the contractor had supplies ready for delivery, a formal order was sent him to make shipment; this order bore a serial number, the name of the contractor, the name and address of the consignee, and the articles and quantities to be shipped. The order was duly signed by an officer designated for that purpose. A printed form was used and the details filled in by typewriter. As it was typed, several copies of a similar form were prepared with it by the carbon process. The copies of this form were of different colors—pink, yellow, green, and white. The shipping order was blue. Each colored sheet had a different purpose, although all bore the same information. The purpose and distribution of these two forms are shown below:

APPLICATION OF SHIPPING ORDER AND INVOICE RECEIPT

BLUE SHEET¹

This is the original shipping order and goes to the shipper; it does not have the receipt portion at the bottom; it should specify definitely, commodity, unit, amount to be shipped, consignee, bill of lading numbers, etc.

PINK SHEET²

This copy is filed by the transportation branch, alphabetically, and attached to the contract papers.

¹ This does not show unit price.

² These all show unit price.

YELLOW SHEET²

This copy is forwarded by the transportation branch for the information of the tabulation, statistical, and finance sections.

THREE GREEN SHEETS²

These are mailed directly to the consignee by the transportation branch and in turn filled out by the consignee as to the receipt portion and disposed of as follows:

First green sheet is mailed by the consignee direct to the transportation branch, Medical Department, and is then passed on to the purchasing officer, who attaches the same to his contract papers to show final disposition.

Second green sheet is mailed to the disbursing officer, finance section, and is passed on from him to returns section to be taken up on the property return.

Third green sheet is filed by the consignee as his permanent record of the property, unit price of same, and to show the property taken up on his return.

WHITE SHEET²

This filed numerically by the transportation branch in order to quickly connect up information which may refer only to shipping order or bill of lading numbers.

NOTE.—When shipping orders are issued in blank to either of the field agents at Fall River, Mass., or Spartanburg, S. C., there will be furnished with each set the following:

Second white sheet to be filed by either of the above alphabetically with their papers.

Third white sheet to be filed by either of the above numerically.

The shipping order, when mailed to the contractor, was accompanied by a Government bill of lading filled out, except for the details which could not be entered until the shipment was made up, such as number of packages and weight. The spaces to be filled in by the shipper were appropriately indicated. The copies of the essential parts of the bill of lading, all containing the same entries, except as to signature, were required. These copies included the shipping order, the original bill of lading, and three memorandum bills of lading. The shipping order was a formal request to the transportation company to make the shipment and bore the signature of an officer of the Army duly authorized to sign it. The original and the three memorandum bills of lading were to be authenticated by the agent of the transportation company. Identical instructions and conditions were printed on the reverse side of the shipping order and the original bill of lading. They recited the agreement between the shipper and the transportation company and the conditions under which the shipment was made.

The yellow copy of the form of invoice-receipt was lodged finally in the finance section, finance and supply division, for the information and use of the disbursing officer. The No. 2 copy of the memorandum bill of lading, when received by the transportation branch, was routed to the disbursing officer, thus informing him of the technical delivery of the supplies ordered. Upon this evidence of delivery he was authorized to make payment. The second green copy of the shipping order-invoice-receipt form, duly signed by the consignee, upon its receipt in the finance and supply division, went first to the finance section to complete the chain of evidence of delivery and acceptance. From the finance section it went to the property accounts section, where it

² These all show unit price.

was filed and served to charge the consignee with accountability for the articles in the same manner as did the standard form of receipt. This completed the cycle. The property had been duly contracted for, delivered, paid for, and accountability for it established, without the purchasing officer having assumed accountability for it.

The records kept by the general purchasing office were a correspondence file, a contract file, a bid for proposal file, price records, production records, and inspection reports. These were all very similar to those maintained by the purchasing department described in the account of the New York medical supply depot. They need not be further considered here. The same general forms were used for circular advertisements and purchase orders. For contracts and abstracts of bids standard official forms were used.

To establish uniformity in practice and the required quality on delivery, instructions in the following form were sent to manufacturers of pharmaceuticals.

GENERAL PURCHASING OFFICE,
MEDICAL DEPARTMENT UNITED STATES ARMY,
Washington, D. C.

Sirs: Before making shipment on any article awarded you on circular, preliminary sample for examination must be submitted and approved by our chemist.

Whenever practicable submit an original container such as you propose to supply except in case of bulk, then a quantity sufficient to make at least three determinations should be submitted in a clean well-stoppered bottle. Sample must be plainly marked with your name as manufacturer or dealer and the name of the item and number as it appears in the circular. It must also contain your identifying or control number; every lot separately manufactured must bear such distinctive number for the purpose of identification, so that in the event of nonacceptability of any lot or delivery or partial delivery, it may be readily recognized without prejudice to other acceptable deliveries.

Samples of items whose number is preceded by the letter "P" are to be sent direct to:

Inspection Department,
Medical Supply Depot, United States Army,
Washington and Morton Streets,
New York, N. Y.

Samples of items whose number is preceded by letters "C" or "F" are to be sent direct to:

Chemist, Surgeon General's Office,
Army Medical Museum Building,
Seventh and B Streets SW., Washington, D. C.

These preliminary samples are requested with the view of preventing shipment and subsequent return of items, which through error, lack of understanding of requirements, or for other reasons, do not meet our standards. Later inspection as to packing, weight, measure, count, and standard of contents will be made upon receipt of shipments.

Prompt compliance with this request is essential.

By authority of the officer in charge.

In view of the large number of surgical and dental instruments required, the difficulty in securing a sufficient quantity of them, and the need for all information concerning facilities for their production, it was found convenient to maintain a file of manufacturers on data cards in the following form, which were ruled on the reverse side for additional data.

MANUFACTURERS DATA CARD

General Purchasing Office, Medical Department

Unit F, Wing 5, Seventh and B Streets

Washington, D. C.

191

Name -----
 Location -----
 Number of employees, mechanics, skilled -----
 Commercial rating (Bradstreet's) -----
 Manufacturers of -----
 Do drop forging -----
 Do nickle plating -----
 Kind of power used -----
 How is power generated -----
 Transportation, rail or water, and how near -----
 Could manufacture surgical and dental instruments and equipment -----

 Previous dealings with government -----
 List of machinery ----- Reported by -----

The general purchasing office continued to function as an agency of the Medical Department until November 15, 1918, when it was transferred to and became a part of the medical and hospital section of the office of the director of purchase and storage. There it served as the agency for the termination and adjustment of existing Medical Department contracts and the central advisory agency for the purchase of medical supplies. The temporary commissioned personnel were ultimately demobilized and the duties transferred to medical officers of the regular establishment assigned to that duty. This personnel handled matters relating to the disposal of surplus medical property.

REFERENCES

- (1) Letter from Lieut. Col. H. C. Fisher, M. C., S. G. O., to Lieut. Col. H. D. Snyder, M. C., Medical Supply Depot, New York, April 25, 1917, relative to the purchase of supplies. On file, Finance and Supply Division, S. G. O., 14039-20.9.
- (2) Letter from Lieut. Col. H. D. Snyder, M. C., Medical Supply Depot, New York, to Lieut. Col. H. C. Fisher, M. C., S. G. O., January 17, 1917, relative to difficulties in procurement. Also: Letter from the officer in charge, Medical Supply Depot, New York, to the Surgeon General, March 23, 1917. Subject: Medical Supplies obtained with difficulty. Finance and Supply Division, S. G. O., 14039-I.
- (3) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, February 10, 1917. Subject: List of important medical supplies. On file, Finance and Supply Division, S. G. O., 14039-V.
- (4) First indorsement, Surgeon General's Office, to the officer in charge, Field Medical Supply Depot, March 7, 1917, relative to purchase of supplies. Also: Letter from the Surgeon General to the officer in charge, Field Medical Supply Depot, March 16, 1917. Subject: Field Medical Supplies. Also: First indorsement, Surgeon General, to the officer in charge, Field Medical Supply Depot, January 19, 1917, relative to purchase of supplies. On file, Finance and Supply Division, S. G. O., 14101-3; 14101-11; and 14101-L.
- (5) Letter from the Surgeon General to the Officer in Charge, Medical Supply Depot, New York, March 22, 1917. Subject: Emergency recruiting outfits, and telegram from the Surgeon General to the officer in charge, Medical Supply Depot, New

- York, April 9, 1917, to assemble recruiting outfits. On file, Finance and Supply Division, S. G. O., 14101-7-3-8.
- (6) Letter from the Surgeon General to the Secretary of War, January 9, 1917, relative to standardization of supplies and ensuing correspondence. On file, Record Room, S. G. O., 164,108, A, B, et. seq. (Old Files).
 - (7) List of Staple Medical and Surgical Supplies selected to meet War Conditions by the Committee on Standardization appointed by the Council of National Defense. Washington, Government Printing Office, May, 1917.
 - (8) Laboratory apparatus and reagents: Proposed revision of par. S40, Manual for the Medical Department, 1916. Published in pamphlet form, February 15, 1918, Surgeon General's Office, War Department.
 - (9) Letter from Lieut. Col. H. C. Fisher, M. C., S. G. O. to Lieut. Col. H. D. Snyder, M. C. Medical Supply Depot, New York, April 5, 1917, relative to supplies. On file, Finance and Supply Division, S. G. O., 14039-18.
 - (10) Letter from the Surgeon General to the officer in charge, New York medical supply depot, April 5, 1917. Subject: Post medical supplies for 500,000 men. On file, Finance and Supply Division, S. G. O., 14039-20.
 - (11) Act of March 9, 1898 (30 Stats. 274)
 - (12) Act of April 17, 1917 (40 Stats. 28).
 - (13) First indorsement from the Adjutant General to the Surgeon General, May 10, 1917, relative to use of national defense fund. On file, Record Room, S. G. O., 169966.
 - (14) First indorsement from the Surgeon General's Office, to the officer in charge, Medical Supply Depot, New York, April 9, 1917, relative to the purchase of supplies. On file, Finance and Supply Division, S. G. O., 14101.-15.-1.
 - (15) Letter from the Surgeon General to the Secretary of War, April 25, 1917. Subject: Authority to incur a deficiency; and the approval of the Secretary indorsed thereon. Received back from The Adjutant General, May 1, 1917. On file, Record Room, S. G. O., 152,239.-6, (Old File).
 - (16) Indorsement, the Surgeon General to the officer in charge, Medical Supply Depot, New York, and Field Medical Supply Depot, May 2, 1917, to purchase supplies. On file, Record Room, S. G. O., 152,239.-6 (Old Files).
 - (17) Memorandum on Medical Department supplies prepared by Col. H. C. Fisher, M. C., December 24, 1917. On file, Record Room, S. G. O., 111.1 (f. y. 1918).
 - (18) Letter from the Surgeon General to Mr. Henry P. Kendall, secretary, Manufacturers of Surgical Dressings, 70 Fifth Avenue, New York, N. Y., May 17, 1917. On file, Finance and Supply Division, S. G. O., 14636.-22.
 - (19) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, May 15, 1917. Subject: Plans for the purchase of supplies for an army of a million men. On file, Finance and Supply Division, S. G. O., 14039-20.-12.
 - (20) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, May 25, 1917. Subject: Supplies for a million men. On file, Finance and Supply Division, S. G. O., 14039.-20.-14.
 - (21) Act of June 15, 1917 (40 Stats. 182).
 - (22) Act of Aug. 10, 1917 (40 Stats. 276).
 - (23) Letter from Dr. F. F. Simpson, Chief Medical Section, Council of National Defense, to Col. C. R. Darnall, Office of the Surgeon General, December 7, 1917. Subject: Dissolution of industrial committees of the Council of National Defense. On file, Finance and Supply Division, S. G. O., ^{533 N. D.}₃₂.
 - (24) Letter from Mr. Charles J. Lynn, manager, Eli Lilly & Co., Indianapolis, Ind., to Col. C. R. Darnall, War Department, Office of the Surgeon General, December 11, 1917, relative to pharmaceuticals. On file, Finance and Supply Division, S. G. O., 442 C. J. L.

- (25) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, September 8, 1917. Subject: Purchase of beds. On file, Finance and Supply Division, S. G. O., $\frac{250}{9}$.
- (26) Letter from the Surgeon General's Office, to the officer in charge, Medical Supply Depot, New York, June 30, 1917. Subject: Laboratory Supplies. On file, Finance and Supply Division, S. G. O., 14636.-53.-1.
- (27) Letter from the Surgeon General's Office to the officer in charge, Medical Supply Depot, New York, July 17, 1917. Subject: Laboratory supplies for cantonments. On file, Finance and Supply Division, S. G. O., 14636.-53.-1.
- (28) Letter from the Surgeon General's Office to the officer in charge, Medical Supply Depot, New York, July 20, 1917. Subject: Laboratory supplies. On file, Finance and Supply Division, S. G. O., 14636.-53.-3.
- (29) Letter from the Surgeon General's Office, to the officer in charge, Medical Supply Depot, New York, June 18, 1917. Subject: Printed copies of contracts for surgical dressings. On file, Finance and Supply Division, S. G. O., 14039.-99.
- (30) First indorsement, the Surgeon General's Office, August 7, 1917, on letter from officer in charge, Field Medical Supply Depot, Washington, to the Surgeon General, August 3, 1917. Subject: Authority to purchase. On file, Finance and Supply Division, S. G. O., $\frac{713-750}{1}$.
- (31) Letter from the Surgeon General's Office to the officer in charge, Field Medical Supply Depot, August 28, 1917. Subject: Authorization purchase of field supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-750}{30-A}$.
- (32) Letter from the Surgeon General to the officer in charge, Field Medical Supply Depot, Washington, September 6, 1917. Subject: Purchase of field supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-750}{45}$.
- (33) Letters from the Surgeon General to the officer in charge, Medical Supply Depot, New York, and Field Medical Supply Depot, Washington, September 18, 1917. Subject: Purchase of surgical instruments. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{126}$, $\frac{713-750}{57}$.
- (34) First indorsement, the Surgeon General's Office, October 24, 1917, on letter of October 19, 1917, from the officer in charge, Medical Supply Depot, New York. Subject: Splints. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{196, 248}$.
- (35) First indorsement, the Surgeon General's Office, November 7, 1917, on letter of November 5, 1917, from officer in charge, Medical Supply Depot, New York. Subject: Instruments as per stock catalogue. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{222}$.
- (36) Letter from the Surgeon General to the officer in charge, Field Medical Supply Depot, December 31, 1917. Subject: Class I laboratory supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-150}{152}$.
- (37) Tentative Strength Table, for requirements and supply estimates only, corrected to March 12, 1918. On file, Finance and Supply Division, S. G. O., $\frac{750-714 \text{ S. G.}}{S-10}$.
- (38) Letter from the Surgeon General's Office to the officer in charge, Medical Supply Depot, New York, January 10, 1918. Subject: Purchase of post supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{358}$.

- (39) Letter from the Surgeon General to the officer in charge, Field Medical Supply Depot, Washington, February 7, 1918. Subject: Part II, Schedule of Medical Supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-750}{182}$.
- (40) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, February 11, 1918. Subject: Schedule of Dental Supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y. D.}}{433}$.
- (41) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, Mo., February 2, 1918. Subject: Schedule of Veterinary Supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-750}{1821}$.
- (42) Letter from the Chief Surgeon A. E. F., to the Surgeon General, April 2, 1918. Subject: Automatic supply. On file, Finance and Supply Division, S. G. O., $\frac{713-250}{15}$.
- (43) Letter from the Surgeon General to the officer in charge, General Purchasing Office, Medical Department, November 2, 1918. Subject: Procurement Schedule. Copy on file, Finance and Supply Division, S. G. O.
- (44) Supply Circular No. 102, War Department, Purchase, Storage and Traffic Division, General Staff, October 24, 1918.
- (45) Office memorandum, Finance and Supply Division, January 9, 1918, relative to the General Purchasing Office, Medical Department, U. S. A. On file, Finance and Supply Division, S. G. O., $\frac{490 \text{ Misc.}}{177}$.
- (46) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, January 14, 1918. Subject: Investigation of methods of purchasing supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{374}$.
- (47) Memorandum for Colonel Wolfe from 1st Lieut. F. W. Lang, Sanitary Corps, N. A., April 18, 1918, relative to the work of the General Purchasing Office. On file, Finance and Supply Division, S. G. O., $\frac{490 \text{ Misc.}}{177}$.

CHAPTER X

INSPECTION OF SUPPLIES

Many elements enter into the inspection of supplies. Some of them can be gauged by the skill of the inspector through the senses of sight and touch. Color, texture, and finish can be so determined on the spot by the field inspector. The quality of many raw materials can be so judged, particularly those entering into textiles, brushes, brooms, and the like. For the more exact and scientific tests, a suitably equipped laboratory is required. Whenever the inspection to be made involves only the senses, a complete piece inspection is practicable. If need be, every individual article may be examined. When laboratory tests are required, inspection, as a rule, must be by sample. In many of the laboratory tests the sample tested loses any further usefulness.

An efficient and satisfactory inspection of supplies requires a field force for such inspections as can be made at the factory. This force will determine color, construction, and finish. For the technical tests samples of raw materials, semifinished products, and the finished article are sent to the laboratory. The findings of both inspections are then consolidated and placed before the purchasing officer.

Inspections of medical and hospital supplies involve a technical knowledge of a wide range of articles and many commodities. A chemical analysis is required for drugs and pharmaceuticals. Textiles, besides size, color, and finish, call for thread count, weight, and tensile strength. Surgical dressings require, in addition, a determination of the ash and extraneous materials, and the absorbency. Surgical instruments require a determination of the quality and carbon contents of the steel, the workmanship and finish. X-ray apparatus must be given a performance test. Every other commodity or class of articles included within the list of medical and hospital supplies has its own peculiar requirements in the matter of inspection. Not a few of the articles require for their complete inspection the knowledge and skill of the user as well as technical knowledge of manufacture and test.

For many years prior to the World War, the inspection of all articles purchased by the officers in charge of medical supply depots was made at the depots, except drugs, chemicals, and reagents. Whenever medicines and chemical agents were purchased in considerable quantities, samples were taken at random from the deliveries and forwarded to the Surgeon General's Office. There the labels were removed and a number attached to the container, after which the sample was referred to the chemical laboratory at the Army Medical School for analysis and an examination to determine whether it conformed to the specifications under which purchased.

As the years passed and the strength of the Army increased, the analytical work devolving upon the laboratory reached such volume that it could not

be handled with the existing facilities. The question arose whether to enlarge the laboratory or to establish another one. Because of the large purchases being made at the New York medical supply depot it was decided, in 1911, to establish a new laboratory there and to continue the one in Washington.¹ From that time on through the World War these two laboratories made examinations of supplies bought by the Medical Department.

Prior to 1908 specifications for medical supplies were few and the personnel making the inspections were not well trained for the work, except those in the chemical laboratory in Washington. Beginning in 1908 increasing interest was taken in supplies and attention given to the character and quality of articles purchased. Primitive specifications or descriptions of requirements for those articles were evolved as familiarity with them and knowledge of trade practices increased. Practically all articles except pharmaceuticals and chemical agents were purchased according to standard sample. This method had many advantages. Whenever an article of better quality was discovered, or one more suitable for the purpose, it was an easy matter to substitute it as standard sample. Subsequent purchases would conform to the new standard. Bidders were familiar with the quality of the standard sample, knew what to bid on, and where to secure the material. The quality required was evident from an inspection of the article. The use of specifications in the trade for commercial articles was then in its infancy.

The method of purchase by standard sample was satisfactory for all articles received at the purchasing depot. Deliveries could readily be compared with the standard sample or with the sample on which the purchase was based. The method had also its disadvantages. It required of the bidder that he see the standard sample upon which to bid. Information concerning the size, type, and quality could not readily be transmitted to an inspector at a distance from the depot. Even at the depot inconvenience would arise from lack of ready access to the sample. The purchase of the increased quantities of supplies required by the border mobilization of 1916 emphasized the disadvantages and led to increased effort in the preparation of specifications. During those purchases the urgency of the need on the border, the large bulk of the supplies, and the scanty storage space at the purchasing depots made necessary shipments direct from the factory to the distributing depots and hospitals in the southern department.

With the increasing interest in supplies following 1908, it was the plan of the Surgeon General to train medical officers of the Regular Army in the purchase and inspection of medical and hospital supplies. The number of officers in the whole Medical Department was so small and the demands for their services so diverse and widespread that very few could be spared for supply duty. One assistant each was assigned to the New York and St. Louis depots. The other medical supply depots had none. As a result comparatively few officers had been so trained prior to April, 1917. Even the few that had been trained were so urgently needed for administrative duties that they could not be spared for inspections during the World War and other assistance had to be found.

The lack of storage and the increased cost of handling bulky materials at the purchasing medical supply depots made it necessary that inspections be made elsewhere, preferably at the point of manufacture. As stated above, inspections at that point had many advantages; the raw materials and semi-finished products could be followed through to the finished article. The inspector would thereby be thoroughly familiar from all angles with the articles whose qualities and conformity to contract stipulations he must judge. Acceptances could be made on these inspections. Shipments could be made from the factories in full confidence that the articles being forwarded wholly met the requirements as to design, size, and quality. Only such quantities need be received at the purchasing depot as its immediate requirements demanded. The remainder would go direct from the factories to the camps, distributing depots, and ports of embarkation.

The chief requirement, then, for factory inspection was a sufficient force of technically trained inspectors. But the Medical Department did not have such a force. Where to secure trained personnel in whose judgment and integrity confidence could be placed was the question. Ample facilities could be provided without difficulty for the examination of pharmaceuticals and allied materials. It would only be necessary to expand the chemical laboratories of the Surgeon General's Office and the New York medical supply depot. Space was available at both places and trained personnel were not difficult to secure.

For supplies other than pharmaceuticals an entirely different situation presented itself. The Medical Department had no nucleus of personnel trained in the inspection of such supplies which it could expand to meet requirements. An entirely new inspection organization had to be built up and an efficient inspection system developed. To locate the necessary trained personnel was not an easy matter. It was at first thought that they could be secured from the various industries manufacturing the classes of supplies to be purchased.² Inspections could be made by the job on a per diem basis. These agents could act in the name of the supply officer, advising him whether the materials were acceptable, and certify to the purchasing officer the quantities which conformed to the specifications. The responsibility for the final acceptance of the material devolved, however, upon the purchasing officer. To secure the necessary personnel authority was granted by the Surgeon General to the three purchasing depots, early in May, 1917, for the employment of personnel on a job basis.

Meanwhile (April 11, 1917) the appraiser of the port of New York had suggested to the Secretary of the Treasury that the services of the expert merchandise examiners of his office might be utilized for the inspection of Army and Navy supplies to be purchased.³ The war in Europe had caused a marked falling off in imports and had greatly reduced the volume of work of these examiners. Men of all grades of the appraiser's force had volunteered for various war activities. The appraiser was enabled thereby to retain his force and utilize the services of his entire staff. These conditions prompted the suggestion of April 11 for the use of their services in inspecting Army and Navy supplies.⁴ The Secretary of the Treasury concurred in the suggestion and

forwarded it to the Secretary of War. It came shortly afterward to the Surgeon General, to whom the offer was most acceptable. The communication was referred to the medical supply officer at New York for consideration, the result of which is as follows:⁵

Now the question of inspectors as referred to by you in the official communication. I have made a provision which is absolutely fair and square, free from politics, and assuring us the very highest class of service by the most-trained experts in the United States. If you will recall, not very long ago, you sent me a communication addressed to your office by the Secretary of the Treasury placing the services of the customs appraisers throughout the United States at our disposal. This morning I interviewed the appraiser personally, and submitted to him the whole plan of factory inspection by civilians. He is favorably inclined, and his organization is not only in New York but from Los Angeles, Calif., to Portland, Me., and in all of the great cities. All that I will have to do is to notify him that a certain proposed shipment of goods is now at a certain factory and send him the specifications of these goods; he will then direct by telegraph the nearest expert in that particular line to proceed to the factory and make the inspection, reporting to him by telegraph, so that the action will be immediate. You can see for yourself what a mighty field this opens to us and will give us the impartial judgment of Federal employees trained to the service, we to pay the traveling expenses of these men, who are already under salary, at the rates allowed in accordance with Army Regulations.

The appraiser will write me a letter and take it up at the same time with the Secretary of the Treasury, and no doubt a most satisfactory arrangement can be made between the Secretary of the Treasury and the Secretary of War, which will protect the Government. I myself have observed in many dealings with these people that at the very mention of the appraiser's office a great respect is produced and a fluctuation downward in prices indicated.

As I stated before, these men are the most expert in the United States, trained to consider values and make adjustments and constantly called in legal matters when suits are instituted to give a fair valuation.

When the time comes for making a contract, I would suggest to the appraiser that he send me an expert in the line that I am dealing in, and I will take his advice in the matter of what should be a just price for a certain article which would be in consideration with what prices had already been previously paid and market conditions at the present time; and I would then be able to furnish all the data thus collected to Washington for final adjustment.

The chief of the comparative valuation report bureau in the appraiser's office learned of the plan to call department-store buyers and executives from civil life to serve as inspectors on Government contracts. He was convinced that such work could be done more effectively and at less expense by examiners from the offices of the various appraisers of merchandise. The comparative valuation reports bureau was to act as a central exchange and clearing house for all such activities.⁴ This led the appraiser on May 15, 1917,³ to renew his suggestion to the Secretary of the Treasury for the utilization of his force in the examination of Army supplies, applying the suggestion more particularly to the Medical Department. This offer was transmitted May 24, 1917, to the Secretary of War, approved by the Secretary of the Treasury,⁶ and was formally accepted by the Acting Secretary of War on June 9, 1917.⁷

The plan proposed by the appraiser at New York contemplated that his office would handle all matters relating to the inspection of Medical Department supplies in all parts of the United States. The letter of the Assistant Secretary of the Treasury to the appraiser approving the plan contained these instructions:⁸

You are requested to inform Colonel Snyder that if he will cause this department to be informed when he desires the assistance of appraising officers at other ports in passing upon purchases in their respective vicinities such officers will be directed, so far as practicable, to give such assistance, the expenses connected therewith to be borne by the Army.

After deliveries began to be made in considerable quantities it became difficult and inconvenient to obtain authority from the Secretary of the Treasury each time that an inspection was desired at a point outside the port of New York. To overcome this difficulty the Secretary of War, on June 15, 1917, made the following proposition:⁹

In view of the large quantities of medical supplies which are being purchased, it seems probable that the Medical Department of the Army will desire to frequently avail itself of the services of the appraisers, and information is desired as to whether it will be necessary to take the matter up formally each time, as has been done in this instance, or whether arrangements could be made whereby the medical officers of the Army could communicate direct from time to time, as needed.

The Secretary of the Treasury acceded to the suggestion of the Secretary of War and issued the following letter of instructions:¹⁰

In view of the technical equipment of the several appraisers' offices and the peculiar qualifications of the examiners for assisting the War and Navy Departments in passing upon supplies which they may have to purchase, appraising officers are requested to render such assistance to Army and Navy purchasing officers, upon their written request therefor, as the appraising officers may be able to furnish without detriment to the usual customs work of their respective offices.

The Secretary of War states that the extra expenses necessarily incurred in rendering such assistance to the War Department will be borne by the proper Army appropriations chargeable, through settlements by the respective auditors by transfers to adjust the appropriations involved. It is expected that a similar arrangement will be made by the Navy Department when availing itself of the assistance of appraising officers.

Appraising officers and employees in their offices performing services hereunder will be reimbursed for their actual and necessary expenses from the customs appropriations upon submission of proper vouchers to the collector of customs, the vouchers to have attached thereto the letters of the Army and Navy officers requesting the services.

Upon submission of vouchers claiming reimbursement, collectors will transmit the same to the department in the usual manner for approval. As soon as practicable after the 1st of the month, a statement of the vouchers paid for such services during the preceding month should be forwarded to the department, the statement to contain the voucher numbers, name of payees, and the amounts paid.

The examiners of merchandise in making inspections of supplies for the Medical Department incurred expenses for which they were entitled to reimbursement. Appropriations were available for the payment of these expenses. To secure reimbursement the examiners at first submitted appropriate vouchers therefor to the Surgeon General through the medical supply officer who had requested their services. Under existing regulations these vouchers were forwarded to the Treasury Department for payment direct to the examiner out of the appropriation, "Medical and Hospital Department." This procedure resulted in prolonged delay in the receipt by the examiner of reimbursement for the money paid out of his personal funds. It resulted in hardships and some discontent. The procedure was soon changed so that reimbursements were promptly made and all dissatisfaction removed.¹¹

On June 9, 1917, all purchasing medical supply depots were instructed to avail themselves of the services of the appraiser's personnel whenever supplies were to be accepted at point of manufacture.¹² It will be noted that the instructions of the Assistant Secretary of the Treasury of June 29, 1917, authorized any purchasing officer of the Army to apply directly to the nearest appraiser for assistance in making inspections. The Assistant Secretary suggested July 24, 1917, that inspections for medical supply depots be handled through the appraiser at New York.¹³ This procedure was observed thereafter until the need for inspections ceased after the armistice was signed.

The medical supply officer and the appraiser at New York were the points of contact and the channel of communication between the Medical Department of the Army and the customs service of the Treasury on all matters relating to cooperation between the two services in the inspection of supplies. An agreement was reached between these two officials in the latter part of July, 1917, for a deputy appraiser to take over the entire inspection service of the New York medical supply depot. Under this agreement the deputy appraiser was to establish an office in the supply depot, handle local and distant inspections, and utilize the appraiser's force according to his best judgement.¹⁴

As purchases of supplies and volume of deliveries increased, it became necessary for the New York depot to organize a department of its own to handle other matters relating to inspections. The deputy appraiser's office returned to the appraiser's building in New York just across the street from the medical supply depot. The officer in charge of the inspection department in the depot, thereafter, arranged with the appraiser's service for the inspections.

In this manner there was placed at the disposal of the Medical Department for the inspection of its supplies the services of a large body of highly trained technical personnel. The services of this force were entirely satisfactory throughout the period during which they were rendered and were of the highest value. This personnel had experts with special knowledge of the composition, values, and manufacturing processes of various commodities, an expert for every commodity. In addition the appraisers' stores were equipped with chemical laboratories, conditioning rooms, apparatus for determining the weights of yarn, counts of yarn, number of threads to the inch in fabrics, and facilities for making various examinations. There were also available analysts and technical experts of various other lines. On notice from the depots and the contractors, the chief appraiser at New York was able to send highly trained examiners from the office of the appraisers nearest to the place of manufacture to the factories. These men inspected the raw material, the process of manufacture under which the purchase was made, and the finished articles. As they made their inspection they certified with a stamp or label such articles and containers as conformed to the requirements of the contracts. They checked deliveries and made reports of acceptance or rejections to guide the purchasing officers in their final action.⁴

The volume of inspection at first required was comparatively small; but as deliveries began to increase in volume in the fall of 1917, the number of examinations to be made rapidly increased. This called for a corresponding increase in the number of appraisers assigned to duty as inspectors. The force

of inspectors greatly increased until at the time the armistice was signed it numbered about 150 men, of the appraisers' force, operating from nearly all the ports.⁴ Many of these men were on full duty on these inspections; others gave only part time. The custom of selecting inspectors, as far as practicable, from the port nearest the place of manufacture for the necessary examinations continued throughout the war. Inspections were made in nearly every State. They covered merchandise of a very wide range of articles. The inspections included surgical instruments, clinical thermometers, operating-room equipment, chemical glassware, artificial limbs, soaps, and foodstuffs. They also included mattresses, beds and bedding, operating gowns, sutures, surgical dressings, surgical and dental instruments, wooden and glass ware, paper, and a great variety of other articles.⁴

Such technical examinations as could not be made by the inspector in the field were made at the laboratory at the appraiser's warehouse in New York, where the chief chemist had charge of the work. There, specifications were developed and methods of examinations standardized. Manufacturing processes were studied and improvements suggested wherever practicable.⁴

The services of the customs inspectors were utilized to the fullest extent in all purchases made by the medical supply depot at New York, from the very beginning of the war. The purchasing officers at the other depots were authorized and instructed to avail themselves of the facilities of the Treasury Department in the making of inspections on the articles being purchased by them. For many months the other depots availed themselves to a very limited extent of these facilities except in the inspections of surgical gauze. As the number and extent of inspections required were swelled by the ever-rising volume of supplies being purchased, it was considered desirable to utilize the services of the appraisers for all purchases except pharmaceuticals. Accordingly instructions were issued to that effect August 17, 1918.¹⁵ The purchasing agencies of the Medical Department were instructed to forward to the Surgeon General's Office an additional copy of all contracts placed by them. These copies were then sent to the New York depot for use of the examiners of the appraisers' service.¹⁶ The inspection department of that depot, thereafter, had charge of inspection made for other depots as well as its own. In a number of contracts, purchase was made by sample, and inspections could not be made without the sample or adequate specifications. Samples were sent to the appraisers' laboratory, where specifications were prepared for them, upon which inspection could be made at the place of production. By the time the armistice was signed the appraisers' service had developed working specifications for a majority of the articles purchased by the Medical Department. These specifications, while many of them were not ideal, provided satisfactory materials for the period.

In the inspection of laboratory apparatus and instruments of precision a somewhat different procedure obtained. During 1918 these were purchased at the field medical supply depot, Washington. Because of the proximity of that depot to the United States Bureau of Standards, final determination of articles of these classes were made by the bureau.¹⁷ The facilities of the

bureau were available, and its examinations were accepted as final in all disputes. Its facilities were the most complete of any laboratory in the United States and the Medical Department had for many years availed itself of them. The officer in charge of the Washington depot also was thoroughly familiar with apparatus of those types of supplies.

For the inspection of motor ambulances units of highly trained personnel were developed and assigned to the establishments manufacturing the bodies and assembling the chassis. These units followed the production through all the manufacturing processes in the body factories and the assembling processes at the chassis factory. The personnel of these units were utilized in the inspection of litters and field litter carriers manufactured at the same plants or in their vicinity.

It has already been noted that the Medical Department at the beginning of 1917, had two chemical laboratories devoted to the examination of drugs, medicines, and antiseptics. The facilities of these laboratories, while limited, had been ample for all the examinations devolving upon them in time of peace. It was expected, in making plans early in 1917, to expand these facilities by the addition of such chemists, skilled in pharmaceutical analysis, as might be necessary. The laboratory space was limited in both of them. The expansion of personnel did not keep pace with the rising tide of supplies to be examined. The work began to lag. Examinations fell behind the receipt of supplies. Prolonged delays in the acceptance of supplies delivered were common because of failure to receive reports from the laboratories.

The volume of work kept on increasing, and it became evident in the spring of 1918 that measures must be taken to increase these facilities and to speed up the examinations. Accordingly instructions were sent to the New York depot in May to investigate the possibilities of having the examination of pharmaceutical products made at the point of manufacture and elsewhere by the United States appraisers.¹⁵ If such examinations could be made at places of manufacture some time might be saved in the acceptance of the supplies. While the appraisers' laboratory at New York was equipped for chemical analysis, the plan for inspections in the field was finally discarded in favor of expansion of existing facilities. It appeared logical to take advantage of the knowledge of the heads of the established Medical Department laboratories, and to increase the number of assistants in them. The knowledge of the men in charge of those laboratories was highly technical, had been gained by years of experience, and could not be duplicated in any other establishment.¹⁹

The average analytical chemist has little or no knowledge of pharmaceuticals, and as this country has never been an importer of pharmaceuticals, it is fair to assume that the United States appraisers' chemists have had little or no experience in handling pharmaceuticals. They could assay straight chemicals, of course, but when tablets, ointments, etc., were presented to them, they could not possibly make an intelligent decision unless the chemist handling such items had had special pharmaceutical training, either in the Government laboratories or in the laboratories of some large pharmaceutical manufacturer.¹⁹

Considerable difficulty was experienced in obtaining drugs, chemicals, and pharmaceuticals of a quality sufficient to pass the standard requirements.

Inexperienced new manufacturers, lured by the immense quantities required and the fancied profits in them, were undertaking to make various chemical and pharmaceutical compounds. Old established firms were making products with the processes with which they were unfamiliar. It was considered necessary to call for preliminary samples from the successful bidders before award was made in order to determine their abilities to produce articles of the required standard. These preliminary samples, if found satisfactory, were considered in comparison with samples taken from deliveries. These preliminary examinations added greatly to the amount of analytical work required at the laboratories.¹⁹

The testing of pharmaceuticals to be shipped direct to ports of embarkation introduced another difficult problem. Here the time element was short because of the urgency of the demand. The examination of preliminary samples reduced the likelihood of unsuitable materials being shipped but could not eliminate the need for other tests just before shipments were made. If unsatisfactory materials were delivered the mistake would be detected and the use of the medicine could be prevented by cable to the medical supply depot in France.¹⁹

It was decided, therefore, to expand the existing laboratories at Washington and New York and to employ additional chemists. Appropriate instructions were issued. The officer in charge of the New York depot reported that there would be no difficulty in enlarging the laboratory space and in providing clerical personnel.²⁰ Five enlisted men, classified as analytical or pharmaceutical chemists, were ordered to the laboratory at the New York depot and a corresponding number to the laboratory in Washington in June, 1918. While nothing was known of the technical abilities of these men, it was thought that from them a sufficient number could be selected to handle the work in a satisfactory manner.²¹

This expansion of existing laboratories gave relief and met the requirements for a limited time. But the flood of examinations required kept steadily rising, and the facilities failed to meet the demand with celerity. Delays in deliveries of medicines, because of the inadequacy of laboratory facilities, began to increase.²² In August relief from this situation became necessary. It was thought that colleges of pharmacy and other laboratories in various cities might be able and willing to do this work. Instructions were sent August 7, 1918, to the officers in charge of the medical supply depots at Atlanta, Chicago, Philadelphia, and St. Louis to communicate with reputable colleges of pharmacy located in those cities and to arrange with one or more of them to examine samples of pharmaceuticals. If satisfactory arrangements could be made with such colleges, samples of medicines delivered at these depots were to be sent to them. Reports of the examinations were to be sent directly to the depot submitting the sample.²³ At this time all medicines were purchased by the general purchasing office, Medical Department, in Washington, and all shipments were made to distributing depots direct from the manufacturer without examination. Examinations and acceptances were made after arrival of the shipment at destination. The receiving depot accepted the articles if the examinations warranted it, took up the property on the depot return, and forwarded a formal acknowledgment to the Surgeon General's Office, which served

as the basis for payment. Hence the need for the receiving depot to receive reports of examination as promptly as possible.

Favorable reports were received from Philadelphia,²⁴ Chicago,²⁵ and St. Louis.²⁶ The college of pharmacy in Atlanta was unable to undertake the work.²⁷ The Philadelphia College of Pharmacy, Philadelphia, Pa.; the University of Illinois School of Pharmacy, Chicago, Ill.; and the St. Louis College of Pharmacy, St. Louis, Mo., all readily agreed to undertake this work. The former two colleges preferred to do the work gratuitously, while the latter agreed to do it at a small flat rate. As none of the schools were in session until September, the plan was not put into effect until the first of that month.²⁸ In Chicago the local branch of the Bureau of Chemistry, Department of Agriculture, was willing and rather anxious to assist in this work.²⁵ Authority was given August 28, 1918, the medical supply depots at Chicago, Philadelphia, and St. Louis to have examinations of medicines received on direct shipments from the manufacturers made at the local institutions with which the arrangements had been made. They were instructed, however, to send a sample to the laboratory at New York or Washington for a confirmatory examination when the local report rejected the sample. The findings of those laboratories determined the final action in the premises.

In the matter of inspection of its supplies throughout the war the Medical Department was exceedingly fortunate in having an adequate force of highly efficient inspectors. While in many articles it was necessary to lower the peace-time standards or to change them entirely, the articles received conformed to the stipulations of the contracts under which they were purchased. The wording of these stipulations, too, was improved and made more clear and definite through the suggestion and cooperation of the inspectors. A high standard of production was continually maintained. Much of the credit of this is due to the system of inspection employed. The interests of the Government were well protected.

REFERENCES

- (1) Letter from Capt. D. W. Fetterolf, M. C., Army Medical School, Washington D. C., to Col. Edwin P. Wolfe, M. C., March 25, 1927. Subject: Establishment and operation of the medical laboratory at the New York Medical Supply Depot. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{1239}$.
- (2) Letters from the Surgeon General to the officers in charge, Medical Supply Depots, Washington, St. Louis, and San Francisco, May 9, 1917. Subject: Inspection of supplies. On file, Finance and Supply Division, S. G. O., 19374-38-A. B. C.
- (3) Letter from the Appraiser of Merchandise, port of New York, N. Y., to the Secretary of the Treasury, May 15, 1917, relative to cooperation between the merchandise examiners of his office and the Army and Navy, in inspection of supplies. On file, Finance and Supply Division, S. G. O., 181-500-a.
- (4) Report of the appraiser's activities, port of New York, during the war period, furnished the Secretary of the Treasury, April 1917, by Henry F. Bush, Inspector of Customs, New York, N. Y. On file, Finance and Supply Division, S. G. O., $\frac{753-539 \text{ N. Y.}}{1248}$.

- (5) Letter from Lieut. Col. H. D. Snyder, M. C., New York, N. Y., to Lieut. Col. H. C. Fisher, M. C., Surgeon General's Office, Washington, D. C., May 12, 1917, relative to inspectors for medical and hospital supplies. On file, Finance and Supply Division, S. G. O., 14374.
- (6) Letter from the Secretary of the Treasury to the Secretary of War, May 24, 1917, transmitting correspondence from the appraisers of merchandise, New York. On file, Record Room, S. G. O., 181000 (Old Files).
- (7) Letter from the Acting Secretary of War to the Secretary of the Treasury, June 9, 1917, formally accepting the offer of assistance by the inspectors of merchandise in the customs service. On file, Record Room, S. G. O., 181000-c (Old Files).
- (8) Letter from the Assistant Secretary of the Treasury to the appraisers of merchandise, New York, N. Y., May 24, 1917, relative to assistance to be rendered to the Medical Supply Depot, New York, by the merchandise examiners in the appraiser's office. On file, Record Room, S. G. O., 181000-b (Old Files).
- (9) Letter from the Secretary of War to the Secretary of the Treasury, June 15, 1917, relative to examination of medical and hospital supplies by examiners of the appraisers' service. On file, Record Room, S. G. O., 181000-h (Old Files).
- (10) Letter from the Secretary of the Treasury, June 29, 1917, to the collectors of customs and appraisers of merchandise, relative to the assistance of merchandise examiners of the appraisers' offices in inspecting supplies for the Medical Department. On file, Finance and Supply Division, S. G. O., 11640.
- (11) Correspondence between the officer in charge, Medical Supply Depot, New York, the Surgeon General of the Army, and the Auditor for the War Department, September 18, 1917, to October 29, 1917, inclusive. Subject: Accounts for traveling expenses of customs inspectors. On file, Record Room, S. G. O., 181000-M to V, incl., (Old Files).
- (12) Letters from the Surgeon General to the officers in charge, Medical Supply Depots, New York, Washington, St. Louis, and San Francisco, June 9, 1917. Subject: Inspection of supplies purchased. On file, Record Room, S. G. O., 18100-E, F, G, H (Old Files).
- (13) Letter from the Assistant Secretary of the Treasury to the Secretary of War, July 24, 1917, relative to inspection of medical and hospital supplies by examiners of the appraisers' service. On file, Record Room, S. G. O., 181000 J-1 (Old Files).
- (14) Letter from the medical supply officer, Medical Supply Depot, New York, to the Surgeon General, July 30, 1917. Subject: Inspectors for the medical supply depot. On file, Record Room, S. G. O., 181000-k (Old Files).
- (15) Letter from the Surgeon General to the officers in charge, Medical Supply Depots, St. Louis, Washington, August 15, 1918. Subject: Copies of contracts for inspection system. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{921}$.
- (16) Letter from the Surgeon General to the officer in charge, Field Medical Supply Depot, Washington, D. C., October 9, 1918. Subject: Specifications for mess and cooks' chests. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{1020}$.
- (17) Letter from the officer in charge, Field Medical Supply Depot, Washington, D. C., to the Surgeon General, October 31, 1918. Subject: Inspection of supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-750 \text{ Wash.}}{486}$.
- (18) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, May 11, 1918. Subject: Inspection of medical supplies by Treasury inspectors. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{656}$.

- (19) Memorandum for Colonel Darnall from Capt. Frank L. McCartney, S. C., General Purchasing Office, Medical Department, May 29, 1918. Subject: Inspection of drugs by the U. S. appraisers. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{656}$.
- (20) Letter from the officer in charge, Medical Supply Depot, New York, to the Surgeon General, June 7, 1918. Subject: Inspection of drugs. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{656}$.
- (21) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, June 13, 1918. Subject: Inspection of drugs. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{656}$.
- (22) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, August 7, 1918. Subject: Examination of medicines and antiseptics. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-Misc.}}{69}$.
- (23) Letters from the Surgeon General to the officers in charge, Medical Supply Depots, Atlanta, Ga., Chicago, Ill., Philadelphia, Pa., June 7, 1918. Subject: Examination of drugs. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-Misc.}}{69}$.
- (24) Letter from the medical supply officer, Philadelphia, Pa., to the Surgeon General, August 12, 1918. Subject: Examination of drugs. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-Misc.}}{69}$.
- (25) Letter from the officer in charge, Medical Supply Depot, Chicago, Ill., to the Surgeon General, August 24, 1918. Subject: Examination of drugs. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-Misc.}}{69}$.
- (26) Letter from the officer in charge, Medical Supply Depot, St. Louis, Mo., to the Surgeon General, September 4, 1918. Subject: Examination of medicines and antiseptics. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-Misc.}}{69}$.
- (27) Letter from the medical supply officer, Medical Supply Depot, Atlanta, Ga., to the Surgeon General, August 15, 1918. Subject: Examination of drugs. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-Misc.}}{69}$.
- (28) Letters from the Surgeon General to the officers in charge, Medical Supply Depots, Philadelphia, Pa., and Chicago, Ill., August 28, 1918. Subject: Examination of medicines. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-Misc.}}{69}$.

CHAPTER XI

CONSOLIDATION OF PROCUREMENT

At the declaration of war on April 6, 1917, there were five supply bureaus—Ordnance, Quartermaster, Medical, Engineer, and Signal Corps. The last bureau developed an aviation section which ultimately became independent and had its own supply functions.¹ The aviation section later became the Bureau of Military Aeronautics. As advances were made in the military and its various allied sciences, the articles on the list furnished by each supply bureau increased in number, variety, and complexity. Each supply bureau was deeply concerned for the successful accomplishment of its mission, believing that upon the success of all the supply bureaus taken together depended to no small extent the ultimate success of the military operations. Each supply bureau understood the responsibility placed upon it in the military program, appreciated the authority accorded it for the performance of its mission, and endeavored to administer its functions wisely and effectually. A century of development and of experience had amply demonstrated the efficiency of this principle and the wisdom of its application.

As the industry of the country developed, manufacture specialized more and more upon particular articles and groups of articles, which came in the course of events to be called commodities. These commodities were classified in various ways. Some were classified according to the raw materials from which the articles were made. Some derived their classification from the uses for which the articles were intended. The finished product might involve in the process of manufacture raw materials included in more than one classification. All of the supply departments required iron and steel products, textiles, wooden materials, and chemicals of some sort in varying quantities. Leather, rubber, and the nonferrous metals were required to a lesser extent but were, nevertheless, important commodities. Iron and steel and their products were required in enormous quantities, whether for cannon, arms, shells, machines, heating apparatus, plumbing supplies, cooking apparatus, hand tools, motor vehicles, hospital equipment, surgical instruments, or wire for field telegraph lines. Every phase of military activity demanded a share. Textiles were of only slightly less importance. The Ordnance Department required cotton fabrics, such as duck or canvas for the pack equipment of the soldier. The Quartermaster Department required them for tents, paulins, wagon covers, and other purposes, while the Medical Department required duck for litters, for cases for surgical instruments, and for cases for blankets and bedding. Sheets, pillow cases, and blankets were required by both the Medical and the Quartermaster Departments. Galvanized-iron buckets served such a variety of purposes that they were supplied, in some measure, by practically every supply department. Each such department had a particular use for this bucket and purchased according to its particular needs. A similar condition obtained along many

other lines. Each supply bureau purchased, for the most part, all the articles needed for the effectual performance of the function assigned to it by law and regulations. This method of purchase was said to be by "function." Appropriations were made by Congress for the specific purposes stated in the language of the grant. There were appropriations for the Quartermaster Department, the Signal Corps, the Medical Department, the Ordnance Department, and the Engineer Corps. Appropriations, therefore, were made according to function, apparently on the assumption that with responsibility should go authority and the means of accomplishment. Such an assumption seems logical and sound.

A rise in prices is inevitable under war conditions. Many factors influence the rise, such as shortages of raw materials and labor, transportation difficulties, financial conditions, the general uncertainty, the reorganization of industry.

As the year 1917 drew near to its close industry was everywhere hampered by delinquencies in rail transportation and by shortages of fuel. Raw materials were received at the factories with increasing difficulty. Delays were experienced in delivering the finished articles. Ships were not available to transport to France the great mass of supplies intended for overseas shipment. Storage space for those supplies was almost unobtainable. The congestion along the Atlantic seaboard increased to such an extent that it was difficult to get trains in and out of the ports. Conditions were rapidly reaching a climax. Instructions were received by the supply bureaus to curtail production. Early in January, 1918, the United States Railroad, Fuel, and Food Administrations came into active being and were followed shortly by the Labor Administration.² The War Industries Board was rapidly extending its control to all industry.³

The representatives of industry on the War Industries Board had been accustomed, in civil life, to thinking of industry in terms of commodities. In their control of industry they dealt with it on a commodity basis. They were closely associated with the purchasing service created in the War Department early in January, 1918, "to provide for the proper coordination of the procurement activities of the several supply branches of the Army."⁴ It was not long before the conception that procurement of supplies for the Army should be placed on a commodity basis gained general acceptance in that service. Under this conception all purchases of a commodity would be made by a single agency. If more than one supply bureau purchased the same or similar articles, the requirements of all bureaus for that article would be consolidated and the purchase of the total quantities made by one bureau. When the articles were ready for delivery they were to be distributed to the several bureaus needing them in accordance with their respective needs. The purchase by several supply bureaus of the same or similar articles was not regarded as economical or good business practice. Purchase "by function" came into disfavor.

On January 21, 1918, the director of purchases submitted to the several supply bureaus a partial list of articles purchased by more than one supply bureau of the War Department with the following statement:⁵

It seems very advisable to concentrate the buying as much as possible within departments in order to avoid competition in Government purchases and to secure the most efficient administration. This matter has been brought to the attention of the Secretary of War and he approves the policy of centralizing the purchase in so far as practicable.

Suggestions were requested concerning the articles which each supply bureau thought it should purchase and those which should be procured by other bureaus. To this request the Surgeon General replied, under date of January 23, as follows:⁵

1. It is believed that the principle of centralizing purchases of the general departments is sound and should be followed in all cases where its application does not interfere with the efficient administration of the departments concerned.

2. On the other hand, if the methods employed are so complicated or the organization so cumbersome as to cause delay in the procurement of supplies, centralization might paralyze the functions of the several departments and lead to disaster.

3. It is suggested that in these cases where one department undertakes to procure supplies for another department it confine itself to negotiating the purchase; that it make the preliminary arrangements, such as asking for quotations, recommending award, etc., but that the actual placing of the order, making the contract, and paying for the supplies be done by the department requesting the procurement.

For example: It having been agreed that all blankets for the use of the Army are to be procured by the Quartermaster's Department, suppose the Medical Department requires 100,000 hospital blankets. A request would be sent to the Quartermaster's Department to procure for the Medical Department 100,000 blankets of certain dimensions, weight, composition, color, etc. The place of delivery, rate of delivery, method of packing, etc., would also be stated in the request.

The Quartermaster's Department would invite quotations, analyze the proposals, and recommend to the Medical Department that the order for the blankets be placed with the Blank Woolen Mills at a certain price. The Medical Department would then make the contract with the Blank Woolen Mills for the blankets and the Quartermaster's Department would have nothing further to do with the transaction.

If the method suggested is adopted there need be no transfer of funds between departments, and the additional clerical work involved would be kept at a minimum.

4. As regards the list attached to this memorandum, it is presumed that it is given merely as an exhibit showing certain articles now being purchased by two or more departments and not a complete list of such articles.

5. It is to be understood that the Medical Department would be opposed to having any of its technical or professional equipment or supplies procured by or through any other department or agency whatsoever.

For instance, in this list appears the item "electrical material," but the Medical Department would not be willing to have its X-ray apparatus procured by the Signal Corps or the Chief of Engineers.

The Surgeon General accepted centralization of procurement as an expedient to meet a difficult situation. Already he had established a central purchasing office for the Medical Department designed to take over the purchase of all medical and hospital supplies as rapidly as the organization and operative machinery could be developed. It was intended that this central purchasing office take up, first, the purchase of drugs, medicines, and chemicals; second, surgical dressings; third, surgical instruments; and after that hospital supplies in an increasing number of articles.

The subject of consolidation of procurement was energetically pursued. Frequent conferences were held at which various steps in the procedure were discussed by representatives of the supply bureaus and others. Decision was reached in April, 1918, to make procurement by commodity and to consolidate the procurement of each commodity in some one of the supply bureaus. The general principles of this consolidation by that time were fairly complete;

only the details remained to be worked out. The general principles governing the consolidation of procurement and the rules of procedure were published to the Army in the following Supply Circular:

Supply Circular No. 2.

WAR DEPARTMENT,
PURCHASE, STORAGE AND TRAFFIC DIVISION, GENERAL STAFF,
PURCHASE AND SUPPLY BRANCH,
Washington, May 8, 1918.

Subject: Consolidation of procurement.

1. Whenever it shall be decided to consolidate under one bureau the procurement of any article or material now being procured by more than one supply bureau of the War Department, the following general instructions shall govern in such consolidation:

(a) Each supply bureau will continue to issue to the service the same articles as heretofore, these articles being delivered to it by the procuring bureau for such issue.

(b) Each issuing bureau will continue to be responsible for the determination of requirements for such articles.

(c) Each issuing bureau will continue to be responsible for the designs and specifications for such articles.

(d) Where the issuing is not the procuring bureau, the former shall make procurement requisition on the latter for its requirement, at the same time making transfer to the procuring bureau of the estimated amount of funds required for the purpose.

(e) In accordance with such procurement requisition, the procuring bureau will be solely responsible for making purchases, following production, conducting inspection, and making acceptance of and payment for the articles placed in its charge.

(f) While the issuing bureau will be responsible for designs and specifications, the procuring bureau will be charged with the duty of scrutinizing all such designs and specifications for the purpose of effecting to the maximum extent possible or desirable standardization of equipment, reductions in the number of types, adaptations of standard articles for special purposes, interchangeability of parts, etc. The procuring bureau will make recommendations to the issuing bureaus along these lines, or to the director of purchase, storage, and traffic for his action when desirable or necessary; but the procuring bureau shall not on its own initiative change plans or specifications or deviate therefrom without the consent of the issuing bureau or of superior authority.

(g) By arrangement with the procuring bureau the issuing bureau may make examination of articles under production to satisfy itself that designs and specifications are being satisfactorily complied with.

(h) The procuring bureau shall furnish estimates of cost upon request. It shall also make periodical reports of purchases made, production accomplished, and of estimated future production.

(i) Articles shall be delivered by the procuring bureau to the issuing bureau at the point of completion or at a designated delivery point. The procuring bureau will retain control of all shipments of components or materials until the completion of the article called for by the procurement requisition. Other arrangements as to delivery may be effected by special agreement between the procuring and the issuing bureaus.

(j) Procurement requisitions shall give the number or quantity desired, required rates and times of delivery, delivery point, amount of funds transferred, and appropriations involved. They shall be accompanied by drawings and specifications sufficiently detailed and complete to serve as a basis for the purchasing, production, and inspection work. The procurement requisitions shall also set forth, if the drawings and specifications are not in themselves sufficient, any pertinent and useful or necessary information, such as the service requirements to be met, to enable the procurement work to be properly and efficiently performed.

(k) Existing contracts shall not be affected by any consolidation of procurement, except in so far as can be worked out satisfactorily by mutual arrangement between the issuing and the procuring bureaus. An endeavor should be made in all cases to transfer to the designated procuring bureau as much of the production and inspection work on existing contracts as can be satisfactorily taken over to minimize as much as possible the duplications of such work up to the time that existing contracts run out.

2. The procuring bureau for each article or class of articles which it may be decided to consolidate under one bureau will be designated by the office of the director of purchase, storage, and traffic in separate enacting supply circulars to be issued hereafter. Such supply circulars will make reference to this supply circular, which prescribes the general principles and instructions to be followed in these consolidations.

3. In special cases exceptions to specific provisions of this supply circular may be made in enacting circulars in dealing with particular articles, and, in other special cases, the consolidation effected may be partial and not include every supply bureau. In all such cases the instructions of this circular shall govern all supply bureaus except where provisions of this circular or particular bureaus are specifically excepted.

4. Upon the issuance of circulars designating procuring bureaus for given articles each issuing bureau shall submit to the designated procuring bureau a list of personnel, if any, engaged in the purchase, production, and inspection of such articles in order that proper recommendations may be made by the procuring bureau for the necessary transfers of personnel to handle the consolidated work.

5. Nothing in this circular shall be construed to affect any orders or instructions issued by the commanding general A. E. F., but otherwise provisions of this circular are for the guidance of the supply bureaus of the War Department.

By authority of the Secretary of War:

GEO. W. GOETHALS,
*Major General, Assistant Chief of Staff,
Director of Purchase, Storage and Traffic.*

Following the publication of this circular the details of consolidation were discussed. Consideration was given to the articles to be consolidated and to the ways and means of effecting that consolidation. Conferences on the purchase of supplies became a matter of daily occurrence.⁶ Commodity after commodity was considered and the final decision published in supply circulars, of which 58 dealt with consolidation of procurement. Of these particular circulars, 12 were issued in May, 8 in June, 28 in July, 6 in August, and 4 in September, 1918.⁷ Circulars Nos. 3 and 44 are here quoted as examples. It will be noted in these circulars that certain exceptions were permitted under special conditions. The extent to which such "exceptions" could be used may be gathered from Supply Circular No. 74, also quoted below.

Supply Circular No. 3.

WAR DEPARTMENT,
PURCHASE, STORAGE, AND TRAFFIC DIVISION, GENERAL STAFF,
PURCHASE AND SUPPLY BRANCH,
Washington, May 11, 1918.

Subject: Consolidation of procurement—Enacting circular—Burlap and jute, cotton goods, woolen goods.

1. In accordance with the terms of Supply Circular No. 2, dated May 8, 1918, "Consolidation of procurement," except as modified herein, on and after June 10, 1918, the Quartermaster Corps shall have sole charge for the Army of making all purchases, following production, conducting inspection, and making acceptance of and payment for the following:

2. All cotton yarns, all cotton fabrics, all scoured and unscoured wool, wool yarns and woolen fabrics, all jute yarns and jute or burlap fabrics, all equipment fabricated from one or more of the above materials together with metal parts, cotton and linen thread that are used in connection with the manufacturer of the completed articles.

3. Exceptions to the above are:

(a) The Bureau of Aircraft Production shall continue, as heretofore, to have complete charge of the procurement of airplane and balloon cloths.

(b) The Bureau of Aircraft Production shall continue, as heretofore, to have complete charge of the procurement of aviators' clothing and component parts thereof until such time as the specifications for these articles become standardized. When this point of sufficient standardization shall have been reached, the procurement of these articles shall be transferred to the Quartermaster Corps.

(c) The Medical Department shall have complete control of the distribution and finishing of all gray goods which go into the manufacture of surgical dressings, the gray goods themselves to be procured by the Quartermaster Corps in accordance with Supply Circular No. 2.

(d) The Gas Defense Service of the Medical Department shall continue, as heretofore, to have complete charge of the procurement of the fine cotton fabric which is used in the manufacture of gas masks.

4. With the exceptions described in paragraph 3 above, the Quartermaster Corps will be charged with the responsibility of finishing, printing, bleaching, waterproofing, dyeing, or otherwise treating all fabrics mentioned above.

5. It is the intent of this order to cover the procurement of all articles made of cotton, wool, or jute, whether they are to be used as components or as articles of issue to the troops. It is therefore directed that all components such as wagon covers, gun covers, paulins, etc., be procured by the Quartermaster Corps, except as may be modified by mutual agreement between the issuing and procuring bureaus and approved by the director of purchase, storage, and traffic.

By authority of the Secretary of War:

GEO. W. GOETHALS,
*Major General, Assistant Chief of Staff,
Director of Purchase, Storage, and Traffic.*

Supply Circular No. 44.

WAR DEPARTMENT,
PURCHASE, STORAGE, AND TRAFFIC DIVISION, GENERAL STAFF,
PURCHASE AND SUPPLY BRANCH,
Washington, July 6, 1918.

Subject: Consolidation of procurement—Thermometers, clocks, watches, gauges, barometers, and compasses.

1. In accordance with the terms of Supply Circular No. 2, dated May 8, 1916, "Consolidation of procurement," except as herein modified, on and after August 1, 1918, the Bureau of Aircraft Production shall have sole charge for the Army of making all purchases, following production, conducting inspection, and making acceptance of and payment for all barometers, clocks, watches, gauges (oil, air, and gasoline), thermometers, and compasses, except as may be modified by mutual agreement between the issuing and the procuring bureaus and approved by the director of purchase, storage, and traffic.

2. The exceptions to the above are:

(a) The Medical Department shall continue, as heretofore, to have complete charge of the procurement of the special thermometers used by them.

(b) The Ordnance Department shall continue, as heretofore, to have complete charge of the procurement of time-interval recorders or stop watches.

By authority of the Secretary of War:

GEO. W. GOETHALS,
*Major General, Assistant Chief of Staff,
Director of Purchase, Storage and Traffic.*

Supply Circular No. 74.

WAR DEPARTMENT,
PURCHASE, STORAGE, AND TRAFFIC DIVISION, GENERAL STAFF,
PURCHASE AND SUPPLY BRANCH,
Washington, August 9, 1918.

Subject: Exceptions to consolidations of procurement—Consultation with designated procuring bureau in respect of proposed orders to manufacturers.

1. In working out the details of consolidation of procurement of articles and materials or classes of articles and materials, it has been found impracticable and inexpedient to effect immediately complete consolidations in certain cases, and therefore necessary to make in these cases either permanent or temporary exceptions in enacting circulars or similar exceptions by properly approved arrangements by mutual agreement of the supply bureaus concerned. However, the elimination of competition in the market between different War Department agencies and the coordination of all the War Department's procurement of any given class of articles or materials are so important that they must be secured also in those cases where complete consolidation has been impracticable or inexpedient at the present time.

2. It is therefore directed that in all cases of consolidation of procurement the supply bureau in whose favor an exception is made in an enacting circular or by approved mutual agreement shall take up with the designated procuring bureau by written communication or by telephone or personal conference confirmed by memorandum, before orders are placed, each proposed purchase or schedule of purchases exceeding ten thousand dollars (\$10,000) in money value, of articles or materials covered in general by the consolidation, in respect of the manufacturers with whom it is proposed to place such orders. If any disagreement arises as to the advisability of placing such orders with particular manufacturers, the two bureaus interested shall attempt to compose the disagreement and arrive at a mutually satisfactory arrangement; if such disagreement can not be mutually composed, it shall be promptly referred to the office of the director of purchase, storage, and traffic for decision.

3. The foregoing instructions supersede all previous instructions issued on this subject by any bureau of the War Department.

By authority of the Secretary of War:

GEO. W. GOETHALS,
*Major General, Assistant Chief of Staff,
Director of Purchase, Storage, and Traffic.*

In preparing the supply circulars covering consolidation of procurement it was customary for the representatives of the supply bureaus to meet in the office of the director of purchases and supplies for consideration of the particular commodity. At these conferences the commodities to be consolidated were presented and considered. After discussion, a draft of the proposed circular was submitted to the several supply bureaus for approval or comment. If any bureau did not approve the consolidation, the chief thereof presented his objections and the reasons for them in writing. After a consideration of reports from the chiefs of the several supply bureaus, decision was reached whether the consolidation would be effected. The objections by the chief of a supply bureau to a proposed consolidation were not always sustained; for example, the Medical Department strongly objected to the consolidation of microscopes for procurement by another supply bureau, but the objection was not sustained.⁸ A similar fate met the protest against the purchase by another bureau of oxygen and nitrous oxide for anesthesia and for the treatment of the sick.⁹ The gases required for such purposes must be exceptionally pure, whereas those for commercial purposes may admit of a considerable amount of impurities without interfering with the efficacy of the gas. The rules

promulgated for the guidance of these conferences on consolidation of procurement appear below. Previous instructions along similar lines promulgated May 10, 1918, did not provide for the submission of the proposed circulars to the chiefs of bureaus for consideration prior to their issue.

MEMORANDUM

JUNE 14, 1918

To: All liaison officers.

From: Maj. C. F. Cook.

Subject: Consolidation of procurement.

1. On account of slight misunderstandings which seem to occur over both the general and detail questions of consolidation of procurement of articles under the various "supply bureaus," the following brief outline of the procedure followed in determining consolidations is stated for the general information of the liaison officers, their assistants, and the representatives of the various bureaus attending the consolidation of procurement meetings.

a. The commodities to be considered are determined by the director of purchases and supplies.

b. Meetings are held in this office on the various commodities, or groups of commodities, at scheduled times, and each liaison officer is notified as far in advance as possible, of the dates of these meetings. Each bureau is expected to have present the proper representation along technical, commodity, and other lines, as well as some one, if possible, who can decide questions of policy and speak with authority. All of this may be combined in one representative or in several. From the evidence presented by these representatives decision is made at this meeting as to which bureau is best fitted through experience, quantity handled, personnel, etc., to have charge for the Army of the procurement of the article. The members present then draw up a tentative draft of a supply circular designating some one bureau as the procurement bureau for the Army.

c. Copies of this tentative draft of supply circulars are submitted through the liaison officers to the bureaus for discussion by the various sections interested. Written notification should then be sent to this office of the approval or definite objection of the bureaus to the draft in question.

d. These replies are tabulated in this office and when all are received the draft of the supply circular is again submitted through the liaison officers to the procurement chief of each bureau, together with a statement as to the approval or objection set forth by other bureaus, and the recommendations of this office in regard to the same.

e. A meeting of the procurement chiefs of the various bureaus is then called at this office where final decision of the drafted supply circular is reached, after which it is sent to the director of purchase, storage, and traffic for signature and promulgation.

The usual procedure followed by this office at present is to issue these circulars in groups of six or more at a time for approval or objection by the various bureaus.

HUGH S. JOHNSON,
Brigadier General, Director of Purchases and Supplies.
 By C. F. COOK,
Major, Ordnance, R. C.

The majority of the articles pertaining to the Medical Department which were consolidated with other bureaus for procurement are contained in the following list:

WAR DEPARTMENT,
 OFFICE OF THE SURGEON GENERAL,
Washington, D. C., August 23, 1918.

1. In accordance with the terms of Supply Circular No. 2, dated May 8, 1918, issued by the director of purchase, storage, and traffic, purchase and supply branch, the following items of Medical Corps property have been consolidated under the bureaus as set forth in

column 3. All interbureau procurement requisitions will be made by this office. Recommendations (based on your experience during the past year) as to quantities to be purchased covering those items heretofore procured at your depot will be submitted by you without delay. Specifications for all items purchased at your depot will be sent to this office at once.

2. In addition to the items mentioned, other articles purchased from time to time come under the provisions of consolidation circulars. Purchasing officers must familiarize themselves with all consolidation of procurement circulars and will be governed by them. When in doubt, this office should be consulted.

Item	Heretofore purchased by—	Procurement consolidated in—	By Supply Circular No.	Item	Heretofore purchased by—	Procurement consolidated in—	By Supply Circular No.
Aprons, cooks	G. P. O.	Quartermaster Corps.	3	Textiles for:			
Bars, mosquito	G. P. O.	do	3	Bags, laundry		do	3
Batteries, extra for electrical equipment.	W	Ordinance Corps.	28	Bandages—			
Bed sacks	G. P. O.	Quartermaster Corps.	3	Canton flannel (all)		do	3
Blankets	G. P. O.	do	3	gauze (all)		do	3
Caps, cooks	G. P. O.	do	3	Bath robes		do	3
Clocks	N. Y.	Bureau of Aircraft Production.	44	Coats made of canvas		do	3
		Quartermaster Corps.		Canvas for belts		do	3
Clothesline, manila	N. Y.	do	7	Canvas for litters		do	3
Cots, etc. (all cots and bedsteads and bunks).	G. P. O.	do	64	Cotton bats		do	3
Chest:				Gowus, operating		do	3
Tool, No. 1.	N. Y.	do	60	Packets:			
Tool, No. 2.	W	do	60	First-aid		do	3
Cots, folding, Gold Medal.	G. P. O.	do	3	Individual dressing.		do	3
Extra batteries for electrical apparatus.	N. Y.	Ordinance Corps.	28	Pajamas, suits		do	3
Flashlights, hand, electric.	W	do	28	Plaster, adhesive		do	3
Extra batteries for	W	do	28	Shirts, cotton		do	3
Gray gauze	G. P. O.	Quartermaster Corps.	3	Sponges, gauze		do	3
Lamps, wicks for	N. Y.	do	3	Razors, strops for	N. Y.	do	6
Lanterns:				Rope, cotton, 3/4-inch	G. P. O.	do	7
Wicks for	W	do	3	Refrigerators, large and small.	N. Y.	do	37
Complete	W	Ordinance Corps.	28	Saddles, pack	W	do	6
Folding	W	do	28	Saddlebags, "veterinary"		do	6
Without wick or globe.	W	do	28	Sheets, cotton	St. L.	do	3
Lamps:				Shirts, cotton	G. P. O.	do	3
Hand	N. Y.	do	28	Slings, suspending, "veterinary."	St. L.	do	3
Stand	N. Y.	do	28	Soap, washing, and bleaching powders.	N. Y.	do	68
Mattress covers	G. P. O.	Quartermaster Corps.	3	Soap:			
Mattress pads for cots	G. P. O.	do	3	Common	N. Y.	do	68
Mattresses	G. P. O.	do	3	Ivory	N. Y.	do	68
Mops, heads for	N. Y.	do	3	Scouring	N. Y.	do	68
Muslin, unbleached	G. P. O.	do	3	Washing powder	G. P. O.	do	68
Needles:				Tape, cotton	G. P. O.	do	3
Common, assorted	N. Y.	do	35	Thread:			
Sailmaker's	N. Y.	do	35	Cotton, assorted	G. P. O.	do	3
Upholsterer's	N. Y.	do	35	Linen, unbleached	G. P. O.	do	23
Packing material (all burlap and jute).	W	do	3	Tortiquets, cotton	W	do	3
Paint, white, 1 gallon, in tin.	N. Y.	Engineer Corps	30	Towels:			
Pillow cases	G. P. O.	Quartermaster Corps.	3	Cotton (all kinds)	G. P. O.	do	3
Pillow sacks	G. P. O.	do	3	Linen (all kinds)	G. P. O.	do	23
Pillows	G. P. O.	do	3	Twine:			
Paper:				Manila	W	do	3
Tarred, in 30-yard rolls.	G. P. O.	do	58	Jute	W	do	3
Toilet, in rolls of 2,000 sheets.	N. Y.	do	58	Wallets:			
Paper, wrapping:				Farrier's, empty	St. L.	do	6
White	N. Y.	do	58	Veterinary, officer's, empty.	St. L.	do	6
Blue	N. Y.	do	58	Kitchen utensils and tableware, hospital:			
Brown	N. Y.	do	58	Boilers—			
				Coffee—			
				1 1/2-quart, enamel or tin.	N. Y.	do	62
				6-quart enamel or tin.	N. Y.	do	62
				Double, for cooking—			
				11-quart.	N. Y.	do	62
				4-quart.	N. Y.	do	62

Item	Heretofore purchased by—	Procurement consolidated in—	By Supply Circular No.	Item	Heretofore purchased by—	Procurement consolidated in—	By Supply Circular No.
Kitchen utensils—Con.				Kitchen utensils—Con.			
Boilers—Con.				Rolling pins	N. Y.	do	62
Tin, copper bottom.	N. Y.	do	62	Sauces	N. Y.	do	62
Bowls—				Saws, butcher's	N. Y.	do	62
Chopping	N. Y.	do	62	Scales and weights, grocer's.	N. Y.	do	62
Soup, delft	N. Y.	do	62	Scoops	N. Y.	do	62
Sugar, with lid	N. Y.	do	62	Shakers—			
Can openers	N. Y.	do	62	Pepper, glass	N. Y.	do	62
Cleavers	N. Y.	do	62	Salt, glass	N. Y.	do	62
Collanders	N. Y.	do	62	Sieves, flour	N. Y.	do	62
Cornets, vinegar and oil.	N. Y.	do	62	Skimmers	N. Y.	do	62
Cups (coffee)	N. Y.	do	62	Spoons—			
Dippers	N. Y.	do	62	Basting, tinned iron.	N. Y.	do	62
Dishes—				Table, silver (or nickel plated).	N. Y.	do	62
Meat, assorted	N. Y.	do	62	Steels, butcher's	N. Y.	do	62
Pickle	N. Y.	do	62	Trays, butler's	N. Y.	do	62
Vegetable	N. Y.	do	62	Tumblers, glass	N. Y.	do	62
Egg beaters	N. Y.	do	62	Kitchen utensils and tableware, field:			
Forks—				Bowls, aluminum or enamel ware.	W	do	62
Carving	N. Y.	do	62	Cake cutters	W	do	62
Flesh	N. Y.	do	62	Cake turners	W	do	62
Table, silver (or nickel plated).	N. Y.	do	62	Can openers	W	do	62
Graters—				Cleavers, meat	W	do	62
Large	N. Y.	do	62	Dippers, white enamel.	W	do	62
Small	N. Y.	do	62	Dishes, vegetable	W	do	62
Gravy boats	N. Y.	do	62	Egg beaters	W	do	62
Gridirons	N. Y.	do	62	Food choppers	W	do	62
Grindstone, kitchen, complete, 10-inch.	N. Y.	do	62	Forks—			
Kettles, tea	N. Y.	do	62	Flesh	W	do	62
Knives—				Table, medium	W	do	62
Chopping	N. Y.	do	62	Sponge or egg beater.	W	do	62
Bread	N. Y.	do	62	Knife, butcher's	W	do	62
Butcher's	N. Y.	do	62	Knives—			
Carving	N. Y.	do	62	Fish	W	do	62
Table, silver (or nickel plated).	N. Y.	do	62	Table	W	do	62
Ladles	N. Y.	do	62	Ladles, soup	W	do	62
Measures, metal, 1-pint, 1 quart, 2-quart, and 4-quart.	N. Y.	do	62	Mashers, potato	W	do	62
Meat cutter	N. Y.	do	62	Nutmeg graters	W	do	62
Mills, coffee	N. Y.	do	62	Pitchers, enamel ware.	W	do	62
Pans—				Plates, aluminum	W	do	62
Dish—				Platters, meat	W	do	62
Deep, re-tinned, 2 1/4-quart.	N. Y.	do	62	Pot chains and scrapers.	W	do	62
Extra heavy, retinned or metal, 3 1/2-quart.	N. Y.	do	62	Sauces, aluminum or enamel ware.	W	do	62
Frying	N. Y.	do	62	Shakers—			
Milk	N. Y.	do	62	Pepper, glass	W	do	62
Muffin	N. Y.	do	62	Salt, glass	W	do	62
Sauce	N. Y.	do	62	Spice boxes	W	do	62
Pitchers—				Spoons—			
Delft—				Basting	W	do	62
1-pint	N. Y.	do	62	Dessert	W	do	62
4-quart	N. Y.	do	62	Tea (for medical chest)	W	do	62
Sirup, glass	N. Y.	do	62	Squeezers, lemon	W	do	62
Plates, dinner	N. Y.	do	62	Steels, butcher's	W	do	62
Potato mashers	N. Y.	do	62	Tea steepers	W	do	62
Pots—				Tea strainers	W	do	62
Mustard, with wooden spoons.	N. Y.	do	62	Trays, serving	W	do	62
Stock, 2 1/4-quart.	N. Y.	do	62	Sickle	W	do	62
Tea, enamel or tin.	N. Y.	do	62	Wire cutter and pliers.	W	do	62
				Wire, annealed	W	do	62

Colonel, Medical Corps, U. S. A.

INTERBUREAU REQUISITIONS

After a decision had been reached that supplies should be procured upon a commodity basis, it became necessary to develop a method to effect that end. Accordingly, conferences were held at which were present representatives of the supply bureaus and other interested persons, and ways and means were discussed. The principle laid down for these discussions was that the procurement of an article common to two or more supply bureaus should be assigned for purchase to the bureau that used the greatest quantity of it. Such bureau would receive from the other bureaus statements of the quantities required by them and, after consolidating those requirements with its own, would proceed with the negotiations and purchase of the whole amount. After delivery, distribution would be made to the other bureaus in accordance with their requests. These statements or requests came to be called interbureau procurement requisitions.¹⁰ The plan seemed quite simple. Under it the Medical Department, if it required sheets, made requisition on the Quartermaster Corps;¹¹ if lamps or microscopes, on the Ordnance Department;¹² if dry cells for flash lights, on the Signal Corps;¹³ if castor oil, on the Bureau of Aircraft Production. The funds for the payment of the supplies requisition were set up by the bureau which required the articles to the credit of the bureau which made the purchases.¹⁰

The bureau needing supplies furnished the procurement bureau with its requirement for any article the specifications for that article. Thereafter the requiring bureau had no further responsibility until deliveries were made by the procuring bureau of the quantities requested. Since all competition between governmental agencies was to be obviated, prices were expected to be less; furthermore, industry would deal with only one agency on matters relating to a particular commodity. The procuring bureau was to keep in touch with all manufacturers of the articles and commodities consolidated with it for procurement; also, it was to maintain an adequate force of expert purchasing agents and inspectors for these articles.

The Medical Department placed its first interbureau procurement requisition with the designated bureau on June 26, 1918. The second requisition followed on June 29. During July, 1918, 18 such requisitions were forwarded. Twenty-two requisitions were placed during August. By September 20 the number had risen to 65. Thereafter the number of such requisitions rose steadily until at the time the armistice was signed they approximated 200.

The projected strength of the Army was rising rapidly and the quantities of the articles entered on these requisitions were very large. A few requisitions for small quantities were placed, due to a misinterpretation of instructions.

That delays would occur and difficulties and complications arise in administering the new system were, perhaps, to be expected. Time was required for the development of an efficient and smoothly operating organization for the handling of the requisitions. Due allowances had to be made for the inexperience of the personnel assigned to this work and to their lack of familiarity with the principles and details of the prescribed method. It is doubtful that the

procuring bureaus visualized, as commodity after commodity was delegated to them for procurement, the great volume of work which would result from the consolidation. Whatever may have been the cause, long delays were experienced by the Medical Department in securing acknowledgments from the procuring bureaus of the requisitions which it forwarded. In a few instances the requisitions were handled promptly. In many other instances, however, especially during the first two months of operation of the system, delays of 10 to 30 days in acknowledging the receipt of the requisitions were not uncommon. Papers went astray or failed to reach the individual charged with the purchase of the article. The details of the system appear to have been interpreted differently in the various supply bureaus. The manner in which interbureau procurement requisitions were handled by the Medical Department is indicated in the following report of July 27, 1918:¹⁴

These are prepared by the procurement bureau officer, 12 to a set. The first two copies are signed by the bureau chief so that the approval of the Surgeon General and authorization are both accomplished. The entire set is then turned over to the contract and authorization section to be checked on specifications, for authorization of purchase, for price; and allotment number is secured from the finance section where reservation governing the amount involved is arranged for. Amendments and cancellations are handled in exactly the same manner.

The completed requisition is then returned to the procuring officer, who distributes by mail or by messenger to the various departments requiring copies, the first six, of course, going directly to the procuring bureau. The acknowledgment and all information in reference to production, place of contracts, price, terms, etc., are to come from the procuring bureau direct to the contract and authorization section. This is done so that the production department may follow up and charge the amount of allotment which may be arranged for promptly. The transfer of funds in the finance section is taken care of in accordance with instructions given in the supply circular.

Various expedients were utilized to overcome the many difficulties which persisted in spite of all efforts on the part of the supervising agency. A central organization was established to act as a clearing house for all matters pertaining to interbureau requisitions. This agency received all requisitions from the requiring bureaus, recorded them, and distributed them to the bureau designated to procure the commodity specified in each. It also received from the procuring bureau the acknowledgment of receipt of the requisitions and distributed these acknowledgments to the requiring bureaus. In general it was expected to maintain contact with both bureaus until contracts had actually been placed for the articles enumerated on the requisitions.

During the early weeks of operation of the system reports were required from time to time from all bureaus concerning the status of the requisitions.¹⁵ Later the procuring bureaus were instructed to submit reports semimonthly showing the status of all unfilled requisitions received by them up to the 5th and 20th of the month, respectively.¹⁶ As a further step toward the prompt and efficient handling of interbureau requisitions, the following instructions were issued August 6, 1918:¹⁷

In order that interbureau relations affecting procurements may function smoothly and expeditiously and that the proper coordination of the various divisions of each bureau may be assured, it is believed to be desirable that all papers and verbal information be routed through a central unit, section, or individual in each bureau and that the officer in charge of

this unit shall have at hand files which will permit an immediate reply to inquiries from another bureau relative to the status of its requisitions without waiting to have the matter reported upon through the usual internal routine of the bureau. This central unit or section should function as follows:

(a) *Incoming requisitions.*—To receive, record, distribute within the bureau, return receipts, issue reports of purchases and progress reports, and to answer quickly inquiries of other bureaus as to the status of requisitions

(b) *Outgoing requisitions.*—To record, issue, to ascertain receipt by procuring bureau, to follow up deliveries, and to place other bureaus in touch with the individuals who can give information in regard to specifications, shipping directions, and finances when same are not stated on the original requisition.

It is therefore requested that you advise this office of your views with regard to the above and, unless there is some serious objection, that a central unit or section for the entire bureau be organized as promptly as possible.

Since no commodity had been consolidated for procurement by the Medical Department, no need could be seen for the establishment therein of a separate organization to handle interbureau requisitions.¹⁸ A short time afterward, in response to a request from the director of purchases and supplies,¹⁹ an officer was designated by the Surgeon General to follow Medical Department requisitions of the procuring bureaus and keep completely posted at all times as to the progress of them.²⁰

A report on the status of the interbureau requisitions issued by the Medical Department was forwarded to the director of purchases and supplies, August 21, 1918,²¹ in compliance with his request of August 16, 1918. This number of requisitions contained in the report was 25. One of them had been canceled and three had been amended. The period covered by these requisitions was June 26 to August 7. Full shipping instructions had been issued for each request. An acknowledgment of receipt of the requisition by the procuring bureau had been received for 11 of the 25 requisitions. No report of purchase or other information concerning negotiations therefor had been received.

Judging from the reports received, the negotiations for purchase on many of the requisitions were late in starting and made slow progress. Deliveries likewise were slow and unsatisfactory. The causes for the delay were numerous; doubtless many of them were beyond the power of the procuring bureau to prevent. The difficulties encountered in obtaining from the procuring bureaus information concerning the progress made in procuring supplies on these requisitions were not abated when it came to adjusting them after the need for the supplies had passed. Since no action had been taken on the last hundred requisitions submitted, they were canceled immediately after the armistice was signed.

The difficulties already mentioned had to do, for the most part, with the transmission of requisitions from the using bureau to the procuring bureau and reports thereon, such as acknowledgment of receipt, purchase reports, procurement memoranda, production reports, etc. They but suggest some internal confusion and lack of organization within the procuring bureaus for the handling of requisitions received. After the requisitions were delivered to the procuring bureau, delay followed delay. Concrete information concerning the placement of orders and progress of production was very difficult to obtain. Deliveries were late in beginning and slow in progress. How much of this delay

was due primarily to defects in the procuring organization and how much depended upon the restrictions and regulations imposed by superior controlling bodies can not now be effectively determined.

The supply circulars referred to above plainly were intended to cover purchases in large quantities; they contained no provision or exception whereby local purchase could be made of a small quantity to fill a requisition. As a result a large number of interbureau requisitions were placed by the several supply bureaus with the designated procuring bureau for small quantities of articles, one or two or a half dozen of the article. These small requisitions added to the difficulties of the already overburdened procuring bureaus. To lessen this inconvenience the chief of the purchase branch directed, October 15, 1918, that all purchases having a money value of less than \$5,000 be made directly by the issuing bureaus instead of through the procuring bureau designated in the various supply circulars.²² These instructions were furnished the purchasing agencies of the Medical Department a few days later and materially assisted in securing supplies to fill requisitions for small quantities of articles not in stock.

REFERENCES

- (1) G. O. No. 51, War Department, May 24, 1918; G. O. No. 71, August 3, 1918.
- (2) American Industry in the War, A Report of the War Industries Board, by Bernard M. Baruch, Washington, Government Printing Office, 1921, 21, 85.
- (3) Priorities Circular No. 3, War Industries Board, January 1, 1918.
- (4) General Orders, No. 5, War Department, January 11, 1918.
- (5) Memorandum for the Surgeon General, from the Director of Purchases, January 21, 1918, relative to consolidation of purchases, and indorsment thereon. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N. D.}}{45}$.
- (6) Minutes of meetings of the various commodity sections of the War Industries Board and of the Purchase and Supply Branch, Purchase, Storage, and Traffic Division, General Staff, May to July, 1918. On file, Finance and Supply Division, S. G. O., $\frac{750-198 \text{ D. P.}}{166-223}$.
- (7) Supply circulars, Purchase, Storage, and Traffic Division, General Staff, War Department, April 24, 1918, to December 26, 1918, inclusive.
- (8) Letter from the Surgeon General to the Director, Purchase, Storage, and Traffic, May 24, 1918. Subject: Consolidation of optical glass and optical instruments. On file, Finance and Supply Division, S. G. O., $\frac{750-198 \text{ D. P.}}{15}$. Also: Letter from the Surgeon General to the Director of Purchases and Supplies, July 5, 1918. Subject: Consolidation of procurement. On file, Finance and Supply Division, S. G. O., $\frac{750-198 \text{ D. P.}}{84}$.
- (9) Letters from the Surgeon General to Purchase and Supply Branch, Purchase, Storage, and Traffic Division, General Staff, August 8, 1918, August 26, 1918. Subject: Consolidation of procurement. On file, Finance and Supply Division, S. G. O., $\frac{750-198 \text{ D. P.}}{213, 329}$.
- (10) Supply Circular No. 18, Purchase, Storage, and Traffic Division, General Staff, June 8, 1918.
- (11) Supply Circular No. 3, Purchase, Storage, and Traffic Division, General Staff, May 11, 1918.

- (12) Supply Circular No. 72, Purchase, Storage, and Traffic Division, General Staff, August 8, 1918.
- (13) Supply Circular No. 84, Purchase, Storage, and Traffic Division, General Staff, September 3, 1918.
- (14) Memorandum for Lieut. Col. Stockdale, Purchase, Storage, and Traffic Division, Washington, D. C., from the Surgeon General's Office, July 27, 1918. Subject: Method of handling interbureau procurement requisitions. On file, Finance and Supply Division, S. G. O., 750-198 D. P.
157
- (15) Letter from Purchase and Supply Branch, Purchase, Storage, and Traffic Division, General Staff, to the Medical Corps, Interbureau Unit, August 8, 1918. Subject: Interbureau procurement requisitions. On file, Finance and Supply Division, S. G. O., 750-198 D. P.
251
- (16) Letter from Purchase and Supply Branch, Purchase, Storage, and Traffic Division, General Staff, to the Surgeon General, August 24, 1918. Subject: Interbureau requisitions. On file, Finance and Supply Division, S. G. O., 750-198 D. P. A.
336
- (17) Letter from the Purchase and Supply Branch, Purchase, Storage, and Traffic Division, General Staff, to the Surgeon General, August 6, 1918. Subject: Central units to furnish information in status of interbureau requisitions. On file, Finance and Supply Division, S. G. O., 750-108 D. P.
235
- (18) Letter from the Surgeon General to Purchase, Storage, and Traffic Division, Attention Major Cook, August 10, 1918. Subject: Central units to furnish information in status of interbureau requisitions. On file, Finance and Supply Division, S. G. O., 750-198 D. P.
235
- (19) Memorandum for the Medical Department from the Director of Purchases and Supplies, August 13, 1918. Subject: Consolidation of procurement, appointment of an officer to follow interbureau procurement requisitions. On file, Finance and Supply Division, S. G. O., 750-198 D. P.
320
- (20) Memorandum from the Surgeon General to Purchase, Storage, and Traffic Division, on August 22, 1918, designating an officer to follow Medical Department requisitions on procuring bureaus. On file, Finance and Supply Division, S. G. O., 750-198 D. P.
320
- (21) Letter from the Surgeon General to Purchase, Storage, and Traffic Division, Purchase and Supply Branch, August 21, 1918. Subject: Report on interbureau requisitions. On file, Finance and Supply Division, S. G. O., 750-198 D. P.
304
- (22) Letter from Chief, Purchase Branch, Purchase, Storage, and Traffic Division, to the Surgeon General of the Army, October 15, 1918. Subject: Interbureau requisitions. On file, Finance and Supply Division, S. G. O., 750-198 D. P.
425

CHAPTER XII

CONSOLIDATION OF FINANCES

The principle of consolidation as interpreted by the Director of Purchase, Storage, and Traffic did not stop with procurement; its ramifications were many. There were many procedures involved other than centralizing in one supply bureau the purchase, for all supply bureaus, of a given article or group of articles. Modifications of existing methods followed one another in rapid succession throughout the whole fabric of the supply system. The changes in the procedures, in the judgment of the director, were the legitimate progeny of the principle of consolidation carried to its logical conclusion. One of these changes having to do with the financial side of consolidated procurement was unavoidable under any system set up. It is axiomatic that supplies purchased must be paid for within a reasonable time after they have been delivered or production will lag and soon cease. The consolidation of procurement as interpreted by the director devolved upon the procuring bureau the "sole charge of the Army of making all purchases, following production, conducting inspection, and making acceptance of and payment for the articles placed in its charge."¹ The appropriations made by Congress for the support of the Military Establishment stipulated the specific purposes for which they might be used.² The appropriations in such acts were grouped according to general purposes. Thus, there were appropriations for the Signal Corps, Quartermaster Corps, Medical Department, Engineer Department, and Ordnance Department.² Under the regulations and customs of the service for nearly a century the particular agency to disburse each such appropriation had become well defined. Officers of the Signal Corps disbursed appropriations for that corps;³ officers of the Quartermaster Corps disbursed Quartermaster appropriations;⁴ those of the Corps of Engineers disbursed Engineer appropriations;⁵ and officers of the Medical Department disbursed appropriations made under the title medical and hospital department.⁶ These agencies had long been recognized by Congress and the accounting officers of the Treasury Department as the proper agencies for the disbursement of the respective appropriations.⁷ When the consolidation of procurement was determined upon, a change in the system became necessary. The procuring bureau could not purchase out of the funds appropriated for it articles required for use or issue by another supply bureau, nor could it expend appropriations under the jurisdiction of the requiring bureau. Some provision, then, had to be made for extinguishing obligations incurred by the procuring bureau. There was already in common use a fiscal regulation under which appropriations made to one supply bureau could be transferred upon the books of the Treasury Department for disbursement by another bureau. Under this regulation the Secretary of War, at the

request of the chief of the supply bureau desiring to transfer the funds, made application to the Secretary of the Treasury for the transfer. In these transfers, however, the appropriation did not lose its identity and the funds so transferred could be applied only to the purposes for which they were appropriated. This regulation provided a way for extinguishing the obligations incurred by the procuring bureau on behalf of the bureau making the requisition. Accordingly, the general instructions covering the consolidation of procurement provided that, where the issuing was not the procuring bureau, the former should make procurement requisition on the latter for its requirement, at the same time making transfer to the procuring bureau of the estimated amount of funds required for the purpose.⁸

The detailed instructions covering interbureau procurement requisitions issued June 8, 1918, amplified these general instructions as follows:⁹

The certificate of credit in the lower right-hand corner of the interbureau procurement requisition notifies the procuring bureau that the issuing bureau has set aside, from the proper appropriation, the estimated amount of funds necessary to cover the cost of the material requisitioned, and that proper transfer of funds will follow in due course.

One copy of each interbureau requisition shall be supplied to the finance officer of the issuing bureau, where a record shall be made of the requisition, comprising its date, serial number, the article or material, estimated cost, appropriation, and allotment number chargeable. Immediately upon receipt of an interbureau procurement requisition in a procuring bureau a copy thereof shall be forwarded to the finance office of the procuring bureau, where a similar record shall be made. These entries will form a record of the reservation based upon the estimated cost. Actual transfer of funds will be based on the contract price, which will be obtained by each of the finance offices concerned from the "interbureau purchase report" (Form No. 4). A copy of the interbureau purchase report shall be supplied to the finance offices of the two bureaus as in the case of the interbureau procurement requisition for the purpose of obtaining a record of the actual amounts to be transferred. Transfer of funds covered by these requisitions shall be made periodically—that is, one transfer per bureau per period—provided, however, that in case an interbureau purchase report shows that the article or material called for will be delivered and must be paid for before the customary time for transferring funds to the procuring bureau a special transfer of funds may be made.

The details of the financial systems of the several supply bureaus were not identical, although all followed the same broad general principles. The system followed by each supply bureau was the evolution of years of experience. The variations which had developed in them were such as were most adaptable to the use of the particular supply bureau. These variations had been noted, understood, and found unobjectionable by the accounting officers of the Treasury Department. With the development of the principle of consolidation of procurement it appeared expedient to those in authority to unify these various systems of accounting and develop one applicable to all supply bureaus. To accomplish this end, it became necessary to establish a central financial organization to supervise, coordinate, and direct the financial agencies of the several supply bureaus.

In the process of evolution of consolidation there was created in the War Department January 11, 1918, an organization known as the purchasing service and authorized to exercise control over and enforce coordination within the

procurement activity of the several supply branches of the Army.¹⁰ While this service was concerned primarily with procurement, supervision of raw materials, and production, it also exercised, indirectly, control over finances to some extent. On February 9, 1918, the purchasing service became, with some additions, the purchase and supply division of the General Staff.¹¹ The duties prescribed for this division included, among other things, "the supervision and coordination of all appropriations, estimates, and requirements, and other financial matters relating to the purchase of munitions and all other supplies."¹¹ In the organization of this division a financial section was formed. On April 16, 1918, the purchase and supply division was merged with the storage and traffic division to form the purchase, storage, and traffic division,¹² of which the former became the purchase and supply branch. The finance section continued as a part of the purchase and supply branch of the new division. The duties of the finance section as defined by its chief were to standardize accounting and fiscal methods of the several supply bureaus so that the state of the finances of each bureau could be ascertained at any time, as well as that of the supply bureaus collectively.¹³

On June 10, 1918, the Medical Department, among other supply bureaus, was informed that this finance section was charged with the duties of standardizing and coordinating all fiscal accounting and methods in the several supply bureaus. No changes of or modifications in existing accounting methods were to be made until they had been approved by the finance section, and all bureau chiefs, chiefs of sections, and all other officers were directed to provide such assistance, information, and reports as might be required from time to time by the finance section in the discharge of its duties.¹⁴

At the end of August, 1918, the finance section became the accounts department, charged with responsibility for and authority over disbursements, fiscal accounting, preparation of estimates, and reports of accounts.¹⁵

On October 11, 1918, the accounts department became the finance department, with a director of finance in charge.¹⁶ On that date the following directions were promulgated:¹⁶

The director of finance shall have responsibility for and authority over the preparation of estimates, disbursements, money accounts, property accounts, finance reports, and pay and mileage of the Army.

The director of finance shall assume authority over and responsibility for the activities, personnel, and equipment of the several finance and accounts divisions, branches, and offices of the General Staff, and of the supply corps of the Army, and shall assume authority over and responsibility for the finances of the several corps, departments, and other separate activities of the Army, including the accounting for funds and property. The director of finance shall issue directions as to the order of such consolidation, together with such other instructions, regulations, and orders as shall be necessary to carry out the provisions of the circular.

In carrying out the duties assigned to him by these instructions the director of finance published the organization of his office on October 16, 1918.¹⁷ The organization was divided into nine divisions. In six of these divisions a

medical branch was established as follows: Estimates division, apportionments and requisitions division, credits division, money accounts division, property accounts division, and central disbursing division. The director of finance stated in the finance circular publishing the organization of his office that instructions would be issued concerning the order of consolidation of the existing finance and accounts division of the General Staff and the supply corps of the Army. The organization of his office was framed to provide for such consolidation, and to absorb the finance sections of the supply bureaus whenever directed by the director of finance.

On October 24, 1918, an order was issued directing the transfer of the supply activities of the Medical Department to the office of the director of purchase and storage and the financial and disbursing activities of the Surgeon General's Office to the director of finance.¹⁵ In carrying out the provisions of this order the director of finance issued instructions on November 13, 1918, for the distribution of the various financial activities of the office of the Surgeon General to sections in his office as indicated in the following circular:

NOVEMBER 13, 1918.

Finance Circular No. 14.

Subject: Transfer and assignment of certain branches of finance and supply divisions, Office of the Surgeon General.

1. In accordance with the terms of the Supply Circulars Nos. 98 and 102, transferring to the director of finance the personnel, equipment, and records pertaining to the finance and to the finance and accounting activities of the Office of the Surgeon General of the Army, the finance branch, property branch, and disbursing branch, and so much of the administration branch as relates to the finance and accounting, of the division of finance and supply of the Office of the Surgeon General, with records and equipment complete, will be reported by the senior officer on duty therewith to the director of finance for assignment as follows:

(a) The administrative section of the finance branch to the medical branch of the estimates division. Maj. Joseph C. Scheve, Sanitary Corps, is assigned to duty as acting chief of the medical estimates branch.

(b) The property branch to the Medical Corps property branch of the property accounts division. Mr. C. E. Stoddard is assigned to duty as acting chief of the Medical Corps property accounts branch.

(c) The disbursing branch and the accounts and approval section and record room section of the finance branch to the Medical Corps branch of the central disbursing division. Capt. J. G. Hurty, Sanitary Corps, is assigned to duty as acting chief of the Medical Corps disbursing branch.

(d) The bookkeeping section and authorization section of the finance branch to the medical branch of the apportionments and requisitions division. Second Lieut. E. B. Farrell, jr., Sanitary Corps, is assigned to duty as acting chief of the medical apportionments and requisitions branch.

(e) The contract section of the finance branch to the medical credits branch of the credits division.

(f) The recording and auditing section of the finance branch to the medical branch of the money accounts division.

2. Assignments of chiefs of the medical credits branch of the credits division and the medical branch of the money accounts division will be announced later.

3. The provisions of this order are to take effect November 15, 1918.

By authority of director of purchase, storage, and traffic.

Carrying the consolidation to its ultimate conclusion, the director of finance on December 2, 1918, gave instructions for the transfer of the disbursing office, at the New York medical supply depot, to the director of finance, and its consolidation with the disbursing offices of other supply branches in New York City and vicinity into a single office. A zone finance officer was appointed to assume responsibility for and authority over all financial activities in that area and the work pertaining thereto. He was instructed to effect a physical consolidation of them at the earliest practicable date.¹⁹ On December 11, 1918, similar instructions were given concerning the financial activities of the several supply branches in Philadelphia, the disbursing officer at the medical supply depot in that city being included in the consolidation.²⁰ Later the consolidation was extended to the depots at Atlanta, St. Louis, San Antonio, and San Francisco; the financial activities of all supply bureaus at those places being consolidated under one zone finance officer. As rapidly as the change could be made the consolidation was extended to include the Hawaiian Islands, the Philippine Islands, and the Canal Zone. By the end of 1918, the Surgeon General had been divested of all financial activities. All disbursements and accounting for funds appropriated for the Medical Department were made by or under the immediate direction of the director of finance.

REFERENCES

- (1) Par. 1 (e), Supply Circular No. 2, Purchase, Storage, and Traffic Division, General Staff, War Department, May 8, 1918.
- (2) Acts of May 12, 1917, July 9, 1918, etc.
- (3) G. O. No. 104, Headquarters of the Army, A. G. O., Washington, August 6, 1901.
- (4) Par. 990, General Regulations for the Army, 1825; par. 1027, Army Regulations, 1841, etc.
- (5) Par. 893, General Regulations for the Army, 1825, and succeeding edition Army Regulations.
- (6) Military Laws, Rules, and Regulations for the Army of the United States, 1820, p. 105; par. 1107, Army Regulations 1857; par. 1240, Army Regulations 1861; etc.
- (7) Report of Committee on Accounts and Expenditures of the War Department, House of Representatives, May 1, 1822, American State Papers, Class V, Military Affairs, Lowrie and Clarke, Washington, D. C., Gales & Seaton, 1832, Vol. II, 419.
- (8) Supply Circular No. 2, Purchase, Storage, and Traffic Division, General Staff, War Department, May 8, 1918.
- (9) Supply Circular No. 18, Purchase, Storage, and Traffic Division, General Staff, War Department, June 8, 1918.
- (10) G. O. No. 5, War Department, January 11, 1918.
- (11) G. O. No. 14, War Department, February 9, 1918.
- (12) G. O. No. 36, War Department, April 16, 1918.
- (13) Letter from chief of finance section, Office Director of Purchases and Supplies, to Col. H. M. Lord, Q. M. C., chairman of committee representing the finance sections of the supply bureaus, War Department, May 29, 1918. Subject: Report and recommendations dated May 27, 1918, of committee representing finance sections, supply bureaus, War Department. On file, Finance and Supply Division, S. G. O., 750-198 D. of P.

- (14) Supply Circular No. 19, Purchase, Storage, and Traffic Division, General Staff, War Department, June 10, 1918.
- (15) Supply Circular No. 80, Purchase, Storage, and Traffic Division, General Staff, War Department, August 27, 1918.
- (16) Pars. 1-2, Supply Circular No. 98, Purchase, Storage, and Traffic Division, General Staff, War Department, October 11, 1918.
- (17) Finance Circular No. 1, Office Director of Finance, Purchase, Storage, and Traffic Division, General Staff, War Department, October 16, 1917.
- (18) Par. 3, Supply Circular No. 102, Purchase, Storage, and Traffic Division, General Staff, War Department, October 24, 1918.
- (19) Finance Circular No. 36, Office Director of Finance, Purchase, Storage, and Traffic Division, General Staff, War Department, December 2, 1918.
- (20) Finance Circular No. 43, Office Director of Finance, Purchase, Storage, and Traffic Division, General Staff, War Department, December 11, 1918.

CHAPTER XIII

DISBURSEMENTS

In the purchase of supplies in time of peace it is customary to call for delivery at the depot making the purchase. This point of delivery is usually stated in the circular of advertisement. The prices paid for the articles include, therefore, transportation charges from the point of manufacture to the depot. They represent the cost of the article delivered into the warehouse of the purchasing depot. In routine purchases under those conditions it has been customary to wait until the supplies have been received before preparing vouchers for their payment. These vouchers contained a certificate signed by the purchasing officer that the supplies had been received. This certificate was the outgrowth of the act of January 31, 1823. Section I of this act provides that "payments on contracts shall not exceed the value of the services rendered or of articles delivered previous to such payments." For many years partial payments upon vouchers for medical supplies were not looked upon with much favor. The quantities purchased were generally small. The period covered by the expected delivery was generally short and the sums involved were not large. For such contracts payments were withheld until delivery had been made complete and the articles accepted, whereupon payment was made in full. In annual contracts, and those in which deliveries covered a long period, partial payments were made at stated intervals, in accordance with the quantities delivered.

For the greater part of the year 1917 these same procedures obtained. As the bulk of supplies increased, shipments direct from the factory to points other than the purchasing depot became more numerous; the assistance of the Government in securing transportation for the shippers increased, and other measures became necessary. Cars moving on Government bills of lading had preference on the railroads over those moving on commercial bills of lading and were generally more easily secured. If the contract called for delivery at the depot and direct shipments were made from the factory on Government bills of lading, it became necessary to make adjustments to cover the freight charges included in the prices paid for the articles. Consequently, the custom grew up of making purchases f. o. b. cars at the manufacturers' plants. Because of the magnitude of the contract, the length of time covered by the deliveries, and the value of the articles shipped, partial payments became the rule rather than the exception. But here again difficulty was experienced by the purchasing officer in making payments. Under the interpretation of the regulation then in force, the purchasing officers were of the opinion that payments could be made only after receipt of an acknowledgment from the receiving officer, or other satisfactory evidence of delivery at destination. Under this conception considerable periods, often weeks, elapsed between shipment and the formal acknowledgment of receipt at destination.¹ Payments were correspondingly delayed, often to the inconvenience of the manufacturer. In order to reduce

this inconvenience as much as possible, the following instructions were given by the Surgeon General, October 25, 1917, to all purchasing depots:²

Payment for supplies delivered under contract may be considerably expedited by furnishing the contractor with blank vouchers. When he sends his bill on he should enter in the gridiron on the vouchers the total amount of his bill, sign the vouchers, and return to the purchasing depot. When the goods have been received, payment can be made without waiting to send the vouchers in the usual manner. In this way several days can usually be saved, which will be a considerable help to contractors at this time.

In time of peace the expense involved in producing the quantities called for in Medical Department contracts was relatively small. Financial accommodations were secured easily by the manufacturers from the local banks with which they did business, and no material inconvenience resulted from the delay in making payments. With war expansion the situation changed. The production of the great quantity of supplies required called for the expenditures of large sums of money, both for raw materials and increased labor, as well as for expansion of manufacturing facilities and the financial risks increased. Accommodations at the banks became increasingly more difficult to obtain. The manufacturers had to depend more and more upon moneys received from the Government in payment for the supplies delivered. Delays between the shipment of supplies and receipt of payment became increasingly inconvenient. Some short cut became necessary. Furthermore, due to the transportation situation at the end of 1917, the majority of shipments of medical and hospital supplies were being made on Government bills of lading. The supplies were being inspected at the factories by representatives of the Government acting on behalf of the Medical Department. It was decided therefore to accept deliveries at the contractor's plant. Accordingly, the following instructions to officers in charge of the purchasing of medical supplies were issued by the Surgeon General, December 20, 1917. They remained in force throughout the remainder of the war.³

Many complaints are reaching this office from contractors in regard to the delay in remittances to them for goods delivered. The conditions will probably continue to get worse as banking conditions become less favorable.

I have discussed this matter with the legal advisors of this office, and it seems to be the consensus of opinion that contractors who have agreed to deliver goods f. o. b. the point of manufacture should not be compelled to wait for several weeks (in some cases) for their money.

It is directed that in future you proceed in the following manner, in so far as contracts calling for delivery f. o. b. point of manufacture are concerned.

A copy of the Government bill of lading signed by the agent of the railroad receiving the goods for shipment accompanying the bills will be sufficient evidence of delivery, and you are directed to pay such bills without waiting for notification of their arrival at destination, unless the destination is your depot. This should apply to reputable dealers only. Any discrepancies that may be discovered in the amount delivered or quality, etc., of goods may be adjusted at a later date.

Supplies to be delivered at your depot or at points designated in the contract other than the point of manufacture should not be paid for until actually delivered by the contractor.

It is further directed that you expedite payments as much as possible by promptly forwarding vouchers and checks.

Under this method of making payment it was possible for the contractor to receive payment for the articles shipped before they actually had reached their

destination. This method was applied of course only to those contracts which called for delivery f. o. b. cars at the manufacturer's plant. If a contract called for delivery at the depot the supplies were shipped on commercial bills of lading and delivery was not accepted until the articles had actually arrived at the depot. In case a shortage was found in shipments accepted at the manufacturer's plant when the car arrived at its destination, an investigation was at once started to determine whether the loss had occurred in transit, in which case the transportation company became responsible for the shortage. If the investigation developed the fact that the full quantities had not been loaded in the car at the factory, adjustments were made in subsequent payments. While this system was in operation very few adjustments were necessary.

It was the continued effort of the supply service of the Medical Department throughout the war to make payments to the contractors at the earliest possible date after the receipt and acceptance of articles shipped. In the earlier purchasing there was an insufficient number of trained personnel to handle the various procedures necessary to the preparation of the vouchers and some delay resulted. As the organization of the disbursing officers increased and became more efficient, the delays were reduced. The number of vouchers handled increased from month to month. During the summer and fall of 1918, the number of vouchers handled by the disbursing officer in the Surgeon General's Office exceeded 10,000 per month. The major part of the appropriations for the Medical Department was disbursed by the disbursing officers in the Surgeon General's Office and the disbursing officer at the Medical Supply Depot, New York. The disbursements made by the disbursing officer at the various depots of the Medical Department, both in the United States and with the American Expeditionary Forces are shown in the following tables:⁴

Disbursements of medical and hospital department funds by disbursing officers, Medical Department

	Surgeon General's Office	New York City	St. Louis, Mo.	Atlanta, Ga.	Philadelphia Pa.	San Antonio, Tex.
1917						
January	\$237,338.62	\$199,029.07	\$53,041.74			\$9,618.28
February	120,771.94	102,484.57	26,307.84			9,457.16
March	218,480.40	83,935.69	16,151.82			11,553.20
April	131,351.53	76,385.98	29,060.33			8,897.97
May	162,658.21	107,127.17	27,457.59			11,834.88
June	371,296.96	261,999.71	42,516.02			12,390.35
July	768,394.40	772,622.89	30,145.89	\$2,827.68		14,508.63
August	1,189,076.43	831,224.58	88,201.75	12,060.18	\$4,505.72	15,546.51
September	2,194,640.85	2,462,693.72	146,644.96	12,982.48	3,197.75	19,584.05
October	3,193,720.39	2,605,767.01	195,867.89	16,095.13	7,042.94	21,626.29
November	3,193,877.39	1,660,852.47	255,357.92	12,509.41	10,496.21	14,616.66
December	5,049,281.56	2,723,047.57	221,791.62	15,703.63	21,497.58	27,275.65
1918						
January	3,722,002.42	3,831,149.05	195,791.97	15,559.39	23,712.33	28,469.69
February	3,767,328.42	3,208,034.10	133,733.14	13,348.68	18,001.90	42,822.76
March	4,927,208.46	4,781,057.02	146,538.63	15,473.32	18,200.47	25,918.16
April	6,729,342.67	5,259,491.68	127,088.87	16,297.27	10,952.66	50,880.94
May	6,813,601.52	4,146,798.18	139,876.00	9,125.17	12,977.20	25,338.63
June	8,306,929.65	3,432,442.61	150,697.35	17,320.49	19,885.71	33,331.60
July	8,554,294.82	2,907,186.27	127,502.91	4,862.20	15,496.76	29,245.71
August	7,232,143.54	3,063,410.22	199,651.04	16,956.46	11,077.47	65,630.41
September	7,574,704.47	3,478,411.03	93,384.89	5,825.35	12,870.79	38,578.69
October	8,547,038.09	2,997,605.74	145,463.93	11,376.06	8,284.26	38,759.62
November	7,135,628.41	3,338,356.03	116,654.38	29,740.10	13,518.35	67,278.72
December	8,267,983.84	2,290,322.95	174,733.79	16,302.62	27,273.45	56,286.65
	98,348,994.99	54,621,595.31	2,883,662.87	244,365.62	238,991.55	679,250.01

Disbursements of medical and hospital department funds by disbursing officers, Medical Department—Continued

	San Francisco, Calif.	Louisville, Ky.	France	England	Other depots	Grand total
1917						
January	\$6,969.83				\$4,834.73	\$510,832.27
February	3,316.66				3,151.64	265,489.81
March	4,498.79				6,699.21	341,310.11
April	5,549.98				3,047.15	254,292.04
May	4,883.81				2,866.87	316,828.53
June	11,353.64				3,717.09	793,273.77
July	7,857.55				3,956.00	1,600,313.04
August	21,963.72				3,911.75	2,166,490.64
September	15,537.80	\$1,088.63			3,610.63	4,859,980.87
October	19,280.29	2,113.50	\$21,133.70		2,762.98	6,085,410.12
November	17,787.93	3,426.31	60,617.49		2,541.14	5,232,082.93
December	33,801.13	1,904.56	41,146.85		2,705.62	8,138,155.77
1918						
January	25,753.11	5,152.91	109,945.72		2,168.82	7,959,705.41
February	14,645.56	21,685.71	201,759.47		3,344.06	7,364,703.80
March	17,762.77	154,218.00	378,855.23		2,681.92	10,467,913.98
April	18,047.60	43,218.81	958,958.88		2,927.47	13,217,206.85
May	21,711.67	366,888.57	382,240.12	\$26,156.27	7,837.98	11,952,351.31
June	32,929.72	337,164.42	870,458.65	149,727.49	7,867.89	13,358,755.58
July	14,380.83	870,003.98	533,266.79	146,238.82	8,131.02	13,210,610.11
August	18,297.65	598,469.86	591,442.88	74,696.62	7,651.13	11,879,457.28
September	18,467.57	522,905.15	586,791.03	159,577.39	2,616.07	12,494,131.74
October	12,360.13	28,949.59	576,448.94	912,879.47	10,913.19	13,290,139.02
November	22,687.50		320,309.61	209,036.26	3,413.43	11,256,522.79
December	25,722.48		764,480.51	221,047.08	2,145.78	11,846,369.15
	395,566.82	2,957,190.00	6,397,855.87	1,899,359.31	105,494.57	168,772,326.92

Disbursements made by medical officers during the calendar years 1917 and 1918, by appropriations

	1916-17	1917	1917-18	1918	1919	Increased compensation	Total
1917							
January	\$163,075.57	\$347,756.70					\$510,832.27
February	63,451.00	202,038.81					265,489.81
March	171,055.96	170,254.15					341,310.11
April	90,640.92	163,651.12					254,292.04
May	67,844.89	248,983.64					316,828.53
June	111,603.48	286,733.26	\$304,937.63				793,273.77
July	170,890.09	310,298.03	1,108,285.97	\$10,838.95			1,600,313.04
August	49,414.71	186,167.27	1,902,663.86	28,244.80			2,166,490.64
September	194,529.11	126,207.56	4,504,391.61	34,853.19			4,859,980.87
October	8,768.88	136,882.91	5,899,683.71	40,074.62			6,085,410.12
November	1,914.05	9,049.48	4,318,904.69	902,215.31			5,232,082.93
December	5,146.38	4,829.33	3,899,491.39	4,228,688.67			8,138,155.77
1918							
January	2,251.78	4,747.17	2,914,197.44	5,038,116.09		\$392.93	7,959,705.41
February	548.43	1,579.53	901,111.31	6,450,355.78		2,108.75	7,364,703.80
March	5,237.52	6,962.40	732,536.96	9,721,372.80		1,804.20	10,467,913.98
April	421.23	2.18	692,318.08	12,522,128.70		2,356.66	13,217,206.85
May	150.37		544,064.81	11,406,327.31		1,808.82	11,952,351.31
June	929.76		397,346.62	12,958,881.71		1,597.49	13,358,755.58
July	21.60		121,209.86	12,895,336.36	\$193,572.20	470.09	13,210,610.11
August	900.89		31,088.16	10,103,102.01	1,743,949.72	416.50	11,879,457.28
September	15.29		80,634.03	7,638,699.88	4,761,835.90	13,546.64	12,494,131.74
October	299.96		7,683.52	5,056,639.21	8,217,972.51	8,143.82	13,290,139.02
November	311.04		197,158.35	903,913.73	10,147,574.11	7,565.56	11,256,522.79
December	754.09		233,025.22	1,444,820.79	10,161,042.73	6,729.32	11,846,369.15
	1,110,177.10	2,206,143.54	28,790,731.42	101,383,409.91	35,225,947.17	46,917.78	168,772,326.92

REFERENCES

- (1) Second indorsement, from the officer in charge, Medical Supply Depot, New York, to Supply Division, S. G. O., Washington, D. C., October 22, 1917, relative to payment for supplies. On file, Finance and Supply Division, S. G. O., $\frac{437}{2}$.
- (2) Third indorsement, War Department, S. G. O., to the officer in charge, Medical Supply Depot, St. Louis, Mo., October 25, 1917, relative to payment for supplies. On file, Finance and Supply Division, S. G. O., $\frac{437}{2}$.
- (3) Letter from the Surgeon General's Office, to the officer in charge, Field Medical Supply Depot, Washington, D. C., December 20, 1917. Subject: Payments to contractors. On file, Finance and Supply Division, S. G. O., $\frac{713-750 \text{ Wash. D.}}{146}$.
- (4) Compiled from accounts current of various disbursing officers, Medical Department, on file in the General Accounting Office.

SECTION III

FIELD EQUIPMENT

CHAPTER XIV

INDIVIDUAL EQUIPMENT

The paraphernalia or equipment required by the medical department of an army, to enable it to fulfill adequately its mission in the salvage of men, must be diversified. It must be especially selected to meet the conditions under which the services of that department are to be rendered and to the kind of treatment required. Those services extend from the battle line at the front to the fixed hospitals in the home territory or zone of the interior, and cover every phase of medical science. The equipment provided must meet these varied conditions all along the line where it is to be used. Far back in the home territory are the great general hospitals, fixed institutions where varied and extensive treatment can be given for as long periods of time as the needs of the individual patient may require. There the equipment is, as it should be, elaborate and in keeping with the character of the treatment to be given. It varies with the classes of disabilities to be treated. One hospital may be devoted entirely to a special class of cases, such as orthopedic, maxillofacial, neuropsychiatric, tuberculous, etc.; another may treat all classes of cases. The equipment in either event must be adapted to the kind of disabilities to be treated in the institution. The personnel, augmented from the surrounding civil community, must be as numerous and as skilled as required for the most effectual handling of the patients admitted. The equipment of general hospitals corresponds very closely to that of the best of the larger civil hospitals, and is fully equal to them.

As one goes toward the front, the type of hospitals and equipment changes. In the communications zone will be found the base hospitals. These are large institutions for the definitive treatment of acute conditions, both wounds and disease. The surgery here is less hurried than that at the front and is devoted to the operations of election. The less seriously wounded remain in these hospitals until their wounds are healed and they are fit to be sent to convalescent camps for further recuperation or to be returned to their commands for duty. The permanently disabled and those not likely to be fit for duty within three months, whether incapacitated by wounds or by disease, are evacuated to the general hospitals in the home territory as soon as their condition and the state of transport will permit. Consequently these base hospitals, while fixed, are much less permanently so than the general hospitals; their equipment, though adequate for the work required of them, is less complex, extensive, and elaborate than that of general hospitals. Already the question of transportation has

begun to play a part in the selection of articles of equipment. Uniformity of equipment has also become essential. These hospitals may be near the combat zone or hundreds of miles from the scene of action. They must have adequate rail transportation, sidings, and loading platforms.

As the combat zone is entered the type of equipment again changes. Here mobility of the unit and transportability of its equipment become imperative. In this zone the service becomes active and the treatment emergency in character. Several types of units of personnel and equipment are required from the evacuation hospitals, just out of range of the enemies' heavy artillery, to the regimental detachments on the battle field. The equipment of the evacuation hospital is limited and mobile but is sufficiently extensive for all emergency surgery and the primary treatment of the wounded. The patients remain in these hospitals only long enough to be fitted for the journey to the base hospitals in the communications zone.

In advance of the evacuation hospitals are the field hospitals, ambulance companies, and regimental units. The equipment provided each of these units is in conformity with its mission. Mobility is the dominant factor. To achieve this the articles of equipment of these units must be compact, strong, durable, and as light as possible consistent with their mission. They must be able to stand field transportation and rough usage incident to frequent changes of location made necessary by changing battle conditions. The complexity of the equipment must be reduced to the simplest essentials compatible with the efficient functioning of the particular unit.

The equipment provided for the several units of the Medical Department in the combat zone and on field duty generally for many years has been designated field equipment. The articles used by those units have long been known as field supplies. In the combat zone three types, units, or sets of equipment are provided, viz, that furnished regimental medical detachments for rendering first-aid treatment, including aid stations; that for sanitary trains, including ambulance companies and field hospitals; and that for evacuation hospitals. The mobility of the unit and its equipment increases from the rear to the front, reaching its maximum in the regimental detachments with the combat troops. The equipment of such detachments, because of the place in which it was intended to be used, came, in 1916, to be called combat equipment, and is so listed in the standard supply table. The combat equipment can be transported on a cart, on a pack mule, or, if the need arises, it can be carried on litters by members of the detachment.

The equipment to be provided for any Medical Department unit consists ordinarily of two parts, the individual equipment and the unit equipment. The former is provided for the immediate use of the individual member of the unit and is, for the most part, carried on his person. The latter is the equipment ordinarily required by the unit in the performance of its mission. Individual equipment may be divided again into two parts, personal and technical. The personal equipment is for the use of the individual in the care of himself. It consists of his clothing, mess equipment, and temporary or emergency shelter (shelter tent). The technical equipment includes articles designed for the care of others in the performance of the general mission of the individual as such.

and differentiated from the mission of the unit as a whole. The individual equipment accompanies the soldier on every change of station. It is issued to him and he is responsible for it. It goes with him when transferred from one organization to another. The unit equipment, on the other hand, moves with the unit to which issued.

The technical equipment provided for the individual use of Medical Department personnel naturally divides into two groups, that for the officer and that for the enlisted assistant. The two differ materially.

FOR MEDICAL OFFICERS

During the decade prior to the World War, the conception that the medical officer with combat troops would perform operations on the field of battle or at the dressing or aid stations was gradually abandoned. The conception that it was the duty of such officers under combat conditions simply to protect the wound by a suitable occlusive dressing, relieve pain and shock so far as practicable, and to supervise and expedite the removal of the wounded to the first hospital unit in the rear, gradually grew. Accordingly, when the equipment of the Hospital Corps was undergoing revision during 1913-1915, a corresponding unit of individual equipment was devised for the medical officer.¹ The contents of this equipment appear below.²

M. M. D. 864.

Individual equipment, medical officer

Article	A	B	C	Source
Belt, web, medical officer's.....number..	1	-----	1	M.
Case:				
Instrument (par. 919).....do.....	1	-----	1	M.
Medicine (par. 920).....do.....	1	-----	1	M.
Diagnosis tags.....do.....	1	-----	1	M.
Flask, empty, for morphine solution.....number..	1	-----	1	M.
Syringe, hypodermic (par. 936).....do.....	1	-----	1	M.
Extra needles for.....do.....	12	-----	12	M.
Thermometer, clinical.....do.....	1	-----	1	M.

NOTE.—The articles included in the above list constitute special equipment carried only by medical officers below the grade of lieutenant colonel. Field equipment pertaining to officers in general is given in Uniform Regulations.

M. M. D. 919.

Case, instrument, for medical officer's belt

(In khaki-colored canvas case)

Bistoury, straight.....number..	1	Scalpel.....do.....	1
Container, metal, for scalpel and bistoury.....number..	1	Scissors, straight.....do.....	1
Foreceps:		Sutures:	
Artery and needle, Abbey's.....do.....	1	Catgut, plain, sterilized, 18 inches each, 3 sizes in package.....package..	1
Hemostatic, Jones's.....do.....	1	Silk, braided, sterilized, 18 inches each, 3 sizes in package.....package..	1
Mouse-tooth, Liston's.....do.....	1		
Needle, aneurism and grooved director combined.....number..	1		
Needles, surgical, assorted.....number..	12		

M. M. D. 920.

Case, Medicine, for medical officer's belt

(A metal case, with clips for five h. r. bottles containing the following tablets)

Acetphenetidinum (phenacetin)	} 324	Pilulæ catharticæ compositæ.....	
----- mgm-----		Pulvis ipecacuanhæ et opii.....mgm	324
Mistura glycyrrhizæ composita (par. 902)-----		Quininae sulphas.....do	200

NOTE.—Any medical officer may make such substitutions in the contents of his own case as he may desire.

It was intended originally that the belt of this outfit should be woven in a manner similar to the standard cartridge belt furnished combat troops. The specifications of this belt as prepared by the board which developed it are as follows:

BELT FOR MEDICAL OFFICERS

(Revised model; February, 1916)

The revised model of the belt for medical officers shall consist of one pair of specially woven carriers and one $2\frac{1}{4}$ -inch back adjustment strap 26 inches long.

Adjustment strap.—The adjustment strap shall be made of $2\frac{1}{4}$ -inch ribbed web. Each end of the strap shall be fitted with a brass end piece having an end hook properly formed to engage the adjustment eyelets set in the rear wall of the carriers. Three eyelets and washers shall be inserted $\frac{5}{16}$ inch from the top selvage of the strap, one eyelet being set in the center of the strap and the other two, $1\frac{1}{2}$ inches center to center on each side of the center eyelet. In like manner eyelets and washers shall be set along the lower selvage of the strap, the first eyelet set in the center and eight eyelets set $1\frac{1}{4}$ inches center to center on each side of the center, making a total of 17 eyelets and washers in the lower selvage of the strap.

Carriers.—Each carrier shall be woven in one piece except for the covering flaps, and shall have two pockets, one large and one small, the large pocket being toward the front of the belt on both carriers. The back wall of each carrier shall be woven in two cloths for a depth of $\frac{5}{8}$ inch, thus forming a housing slit in which the covering flaps are stitched. The pocket shall be fitted with both front and side flaps to protect the contents from the weather. The flap on the large pockets shall have two caps bearing the eagle design, and two sockets to properly engage the studs set in the pocket, and the small pockets shall have one complete Mills fastener. In each of the small pockets shall be stitched to the rear wall of the carrier a $\frac{3}{4}$ -inch lifting strap fitted complete with a small fastener. In the small pocket of the left carrier shall be stitched a dividing partition. Round eyelets and washers shall be inserted in each carrier along both top and bottom selvages between the two pockets and just beyond the outer wall of each pocket. Five pairs of adjustment eyelets shall be set in the back wall of each carrier centered so as to permit the end hook on the adjustment strap to engage in these pairs of eyelets. One pair shall be set between the two pockets, three pairs shall be set $1\frac{7}{16}$ inches center to center in the back wall of the large pocket, and one pair shall be set in the selvage beyond the front wall of the large pocket and on a line connecting the eyelets in the upper and lower selvages, respectively. At the rear end of each carrier shall be inserted and stitched a $2\frac{1}{4}$ -inch chape having a double-bar gridiron or slide through which the back adjustment strap is inserted. On the front end of the right carrier shall be inserted and stitched a $2\frac{1}{4}$ -inch chape having the regulation $2\frac{3}{8}$ -inch Army male toggle fastener, and in the front end of the left carrier shall likewise be stitched a chape having the female part of the fastener.

General.—The adjustment strap, carriers, flaps, and chapes shall be woven of fast-color olive-drab yarn subject to the regulation Government tests and shall be free from imperfections of weave and finish. The stitching of the carriers shall be with 30/3 olive-drab linen thread, approximately 10 stitches per inch. All metal parts shall be of brass and the end pieces, eyelets, washers, toggle fasteners, and fastener caps shall be finished in dull bronze. The belt complete shall be made to conform to the standard approved sample.



FIG. 1.—Medical officer's belt. Instead of the flask for morphine solution, a package of Greeley units is shown

The requirements for woven belts for the combat branches of the Army proved to be so great that it became necessary to adopt a sewed or stiched belt as a substitute and to make certain changes in the processes of manufacture. The stiched belt conformed in design to the woven belt. The changes made in the woven belt were as follows:

CHANGES IN THE MEDICAL OFFICER'S BELT

1. *Pocket flaps.*—In order to increase the speed of manufacture and thereby promote more rapid delivery of these belts, a change in the pocket flap to be authorized so that this flap shall conform in design to a sample submitted June 13, 1917, to be approved; this change to apply to both flaps on each of the carriers of this belt.

2. *Retaining strap.*—Omit the retaining strap from the small pocket in each carrier of this belt.

The following table gives the number of these belts purchased during the years 1917–18.³

Web belts, medical officer's

Date	Contractor	Quantity ordered	Price	Quantity delivered	Gross cost
Mar. 13, 1917 ^a	Mills Woven Cartridge Belt Co.....	2,700	\$3.42	2,700	\$9,234.00
Oct. 23, 1917 ^b	.....do.....	5,000	3.42	5,000	17,100.00
Oct. 24, 1917 ^b	.....do.....	7,300	3.42	7,356	25,157.52
Jan. 9, 1918 ^b	.....do.....	10,000	3.42	10,000	34,200.00
Apr. 18, 1918 ^a	R. H. Long Co.....	11,000	2.55	11,000	28,050.00
	Total.....	36,000	c 3.154	36,056	113,711.52

^a Contracts placed by the Medical Department, stiched belt.

^b Contracts placed by the Ordnance Department.

^c Average.

FOR ENLISTED MEN, MEDICAL DEPARTMENT

Hospital Corps and orderly pouches were used with satisfaction through the Spanish-American War, the Philippine insurrection, the Boxer rebellion, and by the Army in the field for a number of years. The pouch possessed many advantages, but it also had a few rather serious disadvantages. Unless the web shoulder strap was passed under the belt the pouch would swing to the front and was in the bearer's way while ministering to the needs of a patient lying on the ground. Under those conditions it was to be removed and placed on the ground, where it was apt to become soiled or upset and its contents spilled. A few years prior to the World War, improved equipment was being adopted for both Infantry and Cavalry, and it appeared to the Surgeon General desirable that a study be made to determine whether the new equipment of those arms could be adapted to the needs of the Hospital Corps.⁴ Accordingly, a board of medical officers was appointed in December, 1913, at Texas City, Tex., for this purpose.⁵ Such models of suggested improvements in this equipment as were available were furnished the board. One of these was a Hospital Corps belt, with a small hand ax to replace the Hospital Corps knife.⁶

The board submitted sketches of belts for both medical officers and enlisted men in June, 1914. Sample belts were made in accordance with the sketches and sent to the board for trial.⁷ Before a definite conclusion had been reached by this board it ceased to function because its members had been ordered to stations elsewhere.⁸ Accordingly a new board was appointed in September, 1914, at Washington, D. C.⁹ For continuity of action this board

was composed of two of the members of the original board and one new member. Members of the board visited the manufacturers' plants and personally supervised the development of a belt designed to carry the first-aid equipment of the Hospital Corps soldier.¹⁰ A sample of the equipment as finally recommended met the approval of the Surgeon General.¹¹ This equipment consisted of a web belt with pockets for the first-aid material, with an adaptation of the Cavalry ration bags instead of a haversack in which to carry rations, and a blanket roll for the shelter tent half, blanket, and extra clothing for prolonged field service.¹² Five hundred of these belts were purchased through the Ordnance Department in April, 1915.¹³ They were delivered by the manufacturer to the field medical supply depot, Washington, D. C.¹⁴ There they were filled and distributed to the several ambulance companies and field hospital companies within the territorial limits of the United States.¹⁵ The reports from the commanding officers of these units on the new equipment were uniformly favorable.^a On January 10, 1916, the board submitted its report and recommendation in favor of the new equipment, which received the approval of the Secretary of War.¹⁶ The equipment recommended by the board was incorporated in the supply table of 1916, as prescribed by paragraph 865, Manual for the Medical Department, as follows:

M. M. D. 865.

Individual equipment, Hospital Corps

Article	A	B	C	Source	Remarks
(a)					
Belt, web, Hospital Corps.....number..	1		1	M	} Carried on belt when dismounted; in pommel pocket when mounted.
Contents of (par. 907).....do.....	1		1	M	
Can, condiment.....do.....	1		1	O	
Canteen.....do.....	1		1	O	
Canteen cover, dismounted.....do.....	1		1	O	
Fork.....do.....	1		1	O	
Hand ax, Infantry ¹.....do.....	1		1	O	
Hand-ax carrier.....do.....	1		1	O	
Hanger, canteen.....do.....	1		1	M	
Knife.....do.....	1		1	O	
Meat can.....do.....	1		1	O	
Pouch for diagnosis tags and instruments.....do.....	1		1	M	
Ration bags, Cavalry.....pairs.....	1		1	O	
Shelter tent half.....number.....	1		1	Q	
Shelter tent pole.....do.....	1		1	Q	
Shelter tent pins.....do.....	5		5	Q	
Spoon.....do.....	1		1	O	
(b)					
Bar, mosquito, single.....number.....	(*)	(*)	1	Q	* 1 for every 2 men.
Bed sack.....do.....		1	1	Q	
Cot.....do.....		1	1	Q	
Field kit, clothing component ².....do.....			1	Q	Carried on the person or saddle.
Overcoat.....do.....			1	Q	For winter use only.
Surplus kit ².....do.....		1	1	Q	Carried in surplus kit bag.
Sweater.....do.....			1	Q	When prescribed only.

¹ Detachment commanders are authorized to reduce, by 4 inches, the length of the handle of the hand ax issued to the Hospital Corps providing the change is made in a workmanlike manner. The shorter handle will be especially necessary for use by mounted men.

² The clothing component of the field kit includes the clothing actually worn by the soldier and that carried on the person or saddle. This is supplemented by the surplus kit, the two together constituting the clothing component of the service kit. The articles contained in each of these kits are given in general orders.

NOTE.—The method of packing the equipment for mounted and dismounted men is described in Drill Regulations and Service Manual for Sanitary Troops.

^a Though this equipment gave entire satisfaction in the preliminary trials, it did not withstand the test of actual war. The medical belt and the Medical Department pack for enlisted men proved a source of much dissatisfaction, both as to methods of packing and contents, thus leading the board of medical officers, appointed by the chief surgeon, A. E. F., to recommend the discontinuance of the belt principle. See last paragraph, p. 837, and footnote on p. 838, Vol. II.—Ed.

WEB BELTS

As has already been indicated, the individual equipment of the enlisted personnel, Medical Department, is divided into two quite definite and distinct parts. The one is required for his own comfort and well-being; the other provides him with the "tools of his trade." The former is contained in the pack; that is, ration bags and blanket roll. The latter consists of the web belt, model 1916, and contents. The contents of the belt were prescribed in paragraph 907, Manual for the Medical Department, 1916, given here in full.

M. M. D. 907.

Belt, web, Hospital Corps

(The belt itself, with pouch for instruments, is furnished by the Medical Department)

CONTENTS OF BELT

Article	Quantity	Place in belt. (Pockets are numbered from left front around belt to right front)
Bandages, gauze, compressed.....	number..... 6	Pocket No. 9.
Gauze, sublimated, two ½-yard pieces in package.....	packages..... 2	Pocket No. 3.
Individual dressing packets (par. 949).....	number..... 10	Pockets Nos. 4, 5, 6, 7, and 8.
Iodine swabs, 6 in box.....	boxes..... 2	Pocket No. 2.
Pins		
Common.....	papers..... ¼	Pocket No. 10, front compartment.
Safety.....	dozen..... 1	Pocket No. 1, front compartment.
Plaster, adhesive, zinc oxide, 5 yards by 1 inch.....	spools..... 1	Pocket No. 1.
Spiritus ammoniæ aromaticus, in flask with cup.....	flasks..... 1	Pocket No. 10.
Tourniquet, field.....	number..... 1	Pocket No. 1.

CONTENTS OF POUCH

Case, linen or canvas containing: Foreeps, dressing.....	number..... 1	Pencil, lead, with metal cap.....	number..... 1
Scissors, dressing.....	do..... 1	Tags, diagnosis.....	books..... 1

NOTE.—Medical officers are authorized to make such changes as they desire in the expendable contents of the belts worn by their orderlies. Under some circumstances it may also be desirable to make substitutions in the contents of belts worn by noncommissioned officers. In case of transfer of the belt to another medical officer the standard contents should be restored.

The specifications for the manufacture of the belt were as follows:

GENERAL DESCRIPTION OF BELT FOR HOSPITAL CORPS

Belt.—The belt shall be woven into one solid fabric, except for the flaps covering the pockets, approximately 4 inches wide, the pocket space being of sufficient length for 10 pockets, and the 4-inch plain web billet extending on each end beyond the pockets. Eighty-five per cent of the belts are to have 10½-inch billets; 10 per cent to have 12½-inch, and 5 per cent to have 14½-inch billets. Both billets shall be fitted with brass end pieces having end hooks to properly engage the adjustment eyelets. The back wall of the belt shall be woven in two cloths for a depth of three-fourths inch, thus forming a housing slit in which the covering flaps for the pockets are attached. The lower front selvage of the belts shall be so woven as to permit the insertion of eyelets and washers in the double back wall without interfering with the front or pocket fabric of the belt.

Pockets.—Eight pockets shall be of the proper size to carry two first-aid packets. The pocket at each end shall be made smaller and a partition stitched in same so that the rear section shall be of proper size to carry one first-aid packet and the front section to carry a package of pins or other articles. In each of the two end pockets shall be inserted and stitched to the back wall of the belt a ¾-inch lifting strap to properly retain the contents of the outside section and also to more easily withdraw the first-aid packet. This lifting strap shall be fitted with a small Mills fastener. All of the pockets shall be fitted with both front and side covering flaps to protect the contents from the weather. Each flap shall be fitted with socket and bronzed cap bearing the Army eagle design to properly engage the stud of the fastener set in the pockets.

Eyelets.—In each of the billets shall be inserted four pairs of adjustment eyelets, in which the hooks of the end piece are to engage. Similar adjustment eyelets shall also be set in the back of the belt between the first and second, second and third, and third and fourth pockets on each side, and also set centered in the back wall of each of the first three pockets on each side. On the belts having longer billets, additional pairs of adjustment eyelets shall be set. Between each two pockets and outside the last pocket on each side shall be set eyelets and washers along the top selvages, in which the hooks of the suspenders may be inserted. Oval eyelets and washers shall be inserted in the back wall of the belt along the lower selvaige between each two pockets. Round eyelets and washers shall be inserted in the lower selvaige on the inside and outside of the outer side wall of the last pocket at each end of the belt. These eyelets and washers in the lower selvaige shall be properly spaced so that the regulation hanger may be inserted therein.

Fasteners.—Each belt shall be equipped with 4-inch toggle fasteners of the same design as used on the regulation United States Army cartridge belt.

Pouch for diagnosis tags and instruments.—With each belt shall be furnished one specially woven pouch of the proper size to carry the diagnosis tags and instruments. This shall have a covering flap complete with two Mills fasteners and shall have attached to the back a hanger and wire double-end hook to be inserted in the eyelets along the lower selvaige of the belt.

Canteen hanger.—There shall also be furnished with each belt a hanger for carrying the canteen. This shall have the regulation double-end hanger wire for inserting in the eyelets of the lower selvaige of the belt and shall also have two eyelets properly spaced to engage the wire hanger on the canteen cover.

Ax carrier.—The ax carrier used with this belt shall be the regulation carrier, United States Army, model of 1910.

General.—All the fabric shall be woven of fast-color olive-drab yarn, subject to the regulation Government tests, and shall be free from imperfections of weave and finish. The stitching of the belts and other articles shall be with 30/3 olive-drab linen thread, approximately 10 stitches per inch. The toggle fasteners, fastener caps, hanger wires, end pieces, and eyelets shall be of brass finished in dull bronze. All articles are to conform to the standard approved sample.

Figure 2 shows the belt and contents. It will be noted that the belt described above was a woven belt which required special machinery and could be furnished only by one manufacturer. Additional machinery for weaving them was difficult to obtain. The demand for woven belts for combat troops was very great. It became imperative that modifications be made in the Hospital Corps belt to permit of a wider distribution for manufacture. A substitute belt, sewed or stitched, was authorized in June, 1917, and the manufacturer was permitted to supply both types.¹⁷ The following changes proposed by the manufacturer were agreed upon and deliveries accepted accordingly:

CHANGES IN HOSPITAL CORPS BELT

Because of the existing emergency which must continue for some months, and the urgent demand for the earliest possible production of a large quantity of these belts, the following changes are suggested, with the view to simplify manufacture and therefore increase the average daily product per operative.

CHANGES IN THE REGULATION BELT

1. *Eyelets.*—Omit six pairs of adjustment eyelets, three pairs at either end of the belt, each of these pairs being set in the middle of the back of the first, second, and third pockets from each end; the adjustment eyelets between the pockets to remain as now.

2. *Pocket flap.*—For the pointed boxed pocket flap, as shown in the drawings, substitute a new model of flap as illustrated in a sample submitted June 13, 1917, to be approved.

3. *Retaining strap.*—The retaining straps in the two end pockets of the belt to be hereafter omitted.

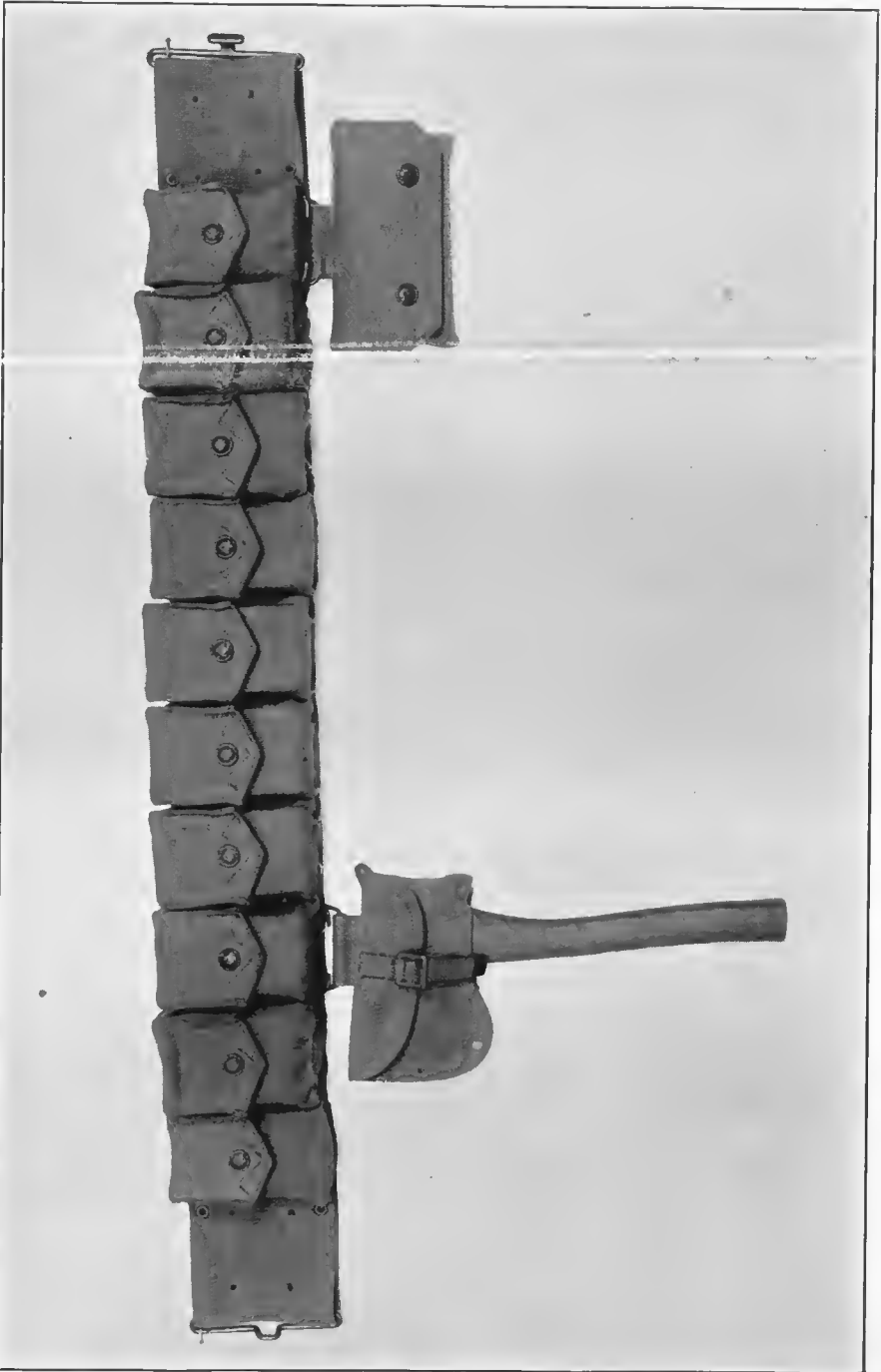


FIG. 2.—Medical Department enlisted man's web belt

PROPOSED SUBSTITUTE BELT

In lieu of the woven regulation belt, delivery to be authorized of a substitute belt to be manufactured of olive-drab duck of as good quality as to cloth and color as the haversack and pack carrier forming part of the Infantry equipment; in design this belt to be as nearly as practicable a duplicate of the regulation woven belt, but of such form that it may be produced on sewing machines; the belt in length, width, size of pockets, position and number of eyelets, method of adjustment, and all other essential details to be as nearly like the regulation woven belt as possible, and to be interchangeable with it as to application thereto of other articles of equipment or of the standard contents.

Substitute diagnosis tag pouch.—In order to apply all weaving machinery possible to the production of belts readily producible only by such machinery, the diagnosis tag pouch may be manufactured of duck of the same quality as to cloth and color as the substitute Hospital Corps belt; a sample of this substitute diagnosis tag pouch to be approved as a pattern.

NOTE.—The belt for enlisted men must have the hanger for canteen.

At the time of the declaration of war, April 6, 1917, the Ordnance Department was charged with the supply of certain individual equipment to the combat troops. Because of the similarity of the web belt adopted for the Hospital Corps to that of the cartridge belt for combat troops, the procurement of web belts for the commissioned and enlisted personnel of the Medical Department had devolved upon the Ordnance Department. The estimated requirements for medical officers' and Hospital Corps belts were transmitted to the Ordnance Department officially in June, 1917.¹⁵ The details had previously been discussed by representatives of both departments. These estimates called for a total of 15,000 officers' belts and 150,000 Hospital Corps belts. Orders for 10,000 Hospital Corps belts had been placed by the Ordnance Department in December, 1916,¹⁹ and for 2,700 officers' belts and 6,600 Hospital Corps belts in March, 1917.²⁰ These orders were included in the totals above stated. The manufacturer of these belts in a personal interview with a representative of the Surgeon General's Office, June 15, 1917, promised delivery of 15,000 medical officers' belts in three months, 37,000 Hospital Corps belts by September 1, 75,000 by November 1, and to complete the delivery of the entire 150,000 by February 1, 1918.²¹

It was early foreseen that the issue of the web belt by the Ordnance Department and its contents by the Medical Department would be most unsatisfactory. Neither belt nor its contents could be used without the other. The Surgeon General accordingly proposed, June 15, 1917, that proper orders be issued directing the Medical Department to supply the belts as well as their contents.¹⁸ The Ordnance Department was requested to purchase the belts and deliver them to the Medical Department at the field medical supply depot, Washington, D. C. Reimbursement of the Ordnance Department was to be effected by a Treasury transfer of funds in the customary manner.¹⁸ The belts were to be filled with the prescribed contents at the field medical supply depot and issued complete as a unit. This would insure uniformity of contents and a greater certainty of supply. The proposed plan was approved by the Ordnance Department June 27, 1917,²² and by the War Department July 3, 1917.²³ The Chief of Ordnance advised on June 27 that steps were being taken to procure, with the least practicable delay, the number of belts requested.²² The Chief of Ordnance advised of the adoption of a substitute stitched belt and

stated that it was expected that 10,000 medical officers' belts and 40,000 Hospital Corps belts would be ready for delivery by the first part of September.²² The belts to be procured included a pouch for diagnosis tags and a canteen hanger.¹⁸ Arrangements were perfected shortly thereafter whereby any belts in the possession of medical detachments would be transferred to the Medical Department, accounted for on the property returns of that department,²⁴ issued to the authorized personnel as personal equipment. This information was furnished all Medical Department personnel in August by a supply letter from the Surgeon General's Office, and was republished in December, 1917, in *Compilation of Supply Letters*, Nos. 1 to 23, inclusive. (See appendix, p. 864.)

The deliveries of belts did not materialize as promised, for officers or enlisted men. The Regular Army was expanded in June and July to full war strength. New Medical Department units were organized, but there were not belts enough to equip them. Although the Chief of Ordnance reported in June that there were 3,000 woven Hospital Corps belts on hand and 20,000 due by September 1,²⁵ the manufacturer wired August 10 that 2,600 medical officers' belts and 8,820 enlisted men's belts had been shipped since June 22, and that not so many of them were being made as had been hoped owing to the urgent requirements of other kinds of belts.²⁶ On August 15 the officer in charge of field medical supply depot, Washington, reported that the total receipts to that date were medical officers' belts 1,840, and enlisted men's belts 6,600.²⁷ By October 30, 1917, deliveries of medical officers' belts at that depot were approximately 6,540 and enlisted men's belts 26,299.²⁸ Troops had assembled in all the training camps, but the insistent demand for belts was not satisfied until the following April or May. Belts in sufficient number to equip the Medical Department personnel already overseas were sent to France from the early deliveries. Belts were sent to the medical superintendent, Army transport service, New York City, in August, 1917, to equip the personnel of Medical Department organizations passing through that port.²⁹ The first effort was to equip the organizations of the Regular Army, since it was expected that they would be the first to go overseas. The remaining organizations were placed on a priority list in accordance with the order in which they were scheduled to sail, and issues made as rapidly as the belts became available. The two primary ports of embarkation, Hoboken, N. J., and Newport News, Va., were kept stocked with belts in quantities sufficient to meet the needs of the smaller units passing through and which could not well be reached from the field medical supply depot. These units were dispatched at frequent intervals, and information of their prospective departure did not often reach the depot in time to permit shipment to their respective stations before the units left for the port of embarkation. A stock of belts was kept at the ports of embarkation and at the camps later assigned to receive troops for embarkation until the need for them was terminated by reason of the armistice.

The supply of belts for both officers and enlisted men of the Medical Department under the contracts placed by the Ordnance Department was never sufficient to meet the needs for them. Other sources of supply were sought by the officer in charge of the field medical supply depot. A satisfactory stitched belt of the same design as the woven belt but made of canvas was developed

and contracts for 100,000 enlisted men's belts were let in April, 1918.³⁰ A contract for an additional 50,000 enlisted men's belts was let in July, 1918.³¹ By the end of June, 1918, the saturation point in the demand for belts had



FIG. 3.—A pile of filled enlisted men's belts, representing a day's work, awaiting boxing for shipment at the field medical supply depot at Washington



FIG. 4.—Showing manner of filling belts

been reached and thereafter no difficulty was experienced in meeting all requirements.

The filling of these belts was carried on at the field medical supply depot, Washington. Civilian employees were selected and trained to the work. A

section of the depot was set apart for their use. Each employee filled a definite pocket in the belt. Others filled the pouch for instruments and diagnosis tags, and still others attached these pouches and the canteen hangers to the belts. Figure 3 shows a pile of filled belts, approximately a day's work, waiting to be boxed for shipment; figure 4 the manner of filling them. The number of belts purchased is given in the following table:

Contracts for, deliveries, and cost of web belts, enlisted men, Medical Department

Date	Contractor	Contract price	Contract quantity	Delivery price	Quantity delivered	Gross
CONTRACTS PLACED BY THE ORDNANCE DEPARTMENT						
Dec. 8, 1916	Mills Woven Cartridge Belt Co.....	\$5.48	10,000	\$5.48	10,000	\$54,800.00
Mar. 22, 1917 ^a	do.....	5.48	6,000	5.48	1,099	6,022.52
Aug. 28, 1917	do.....	{ 4.96 b 4.75	{ 20,000	{ 4.96 b 4.75	{ 16,080 3,920	{ 79,756.80 18,620.80
Sept. 14, 1917	do.....	{ 4.96 b 4.75	{ 113,400	{ 4.96 b 4.75	{ 840 360	{ 4,166.40 1,710.00
Mar. 2, 1918	do.....	4.70	100,000	{ c 4.945 d 4.70	{ 80,560 100,000	{ 381,451.60 470,000.00
Total ordered by the Ordnance Department.....			250,000		244,499	1,172,987.12
CONTRACTS PLACED BY THE MEDICAL DEPARTMENT						
Apr. 18, 1918	Hewes & Potter.....	b 1.03	50,000	b * 2.69	50,000	134,500.00
Do.....	R. H. Long Co.....	b 3.95	50,000	b 3.95	50,000	197,500.00
July 1, 1918	do.....	b 3.70	50,000	b 3.70	50,000	185,000.00
Total ordered by Medical Department.....			150,000		150,000	517,000.00
Aggregate, web belts, enlisted men, Medical Department.....			400,000		394,499	1,689,987.12
Average cost per belt.....				4.284		

^a Order placed at the request of the Militia Bureau to equip the National Guard but paid for by the Medical Department.

^b Stitched or sewed belts.

^c Supplemental contract prior to completion of original contract.

^d No record of the proportion of stitched and woven belts obtainable.

* Includes cost of supplies furnished by the Medical Department, viz, duck, binding, webbing, washers, eyelets, end fasteners, belt fasteners, and Carr (lift-the-dot) fasteners.

REFERENCES

- (1) Supplementary report of board of medical officers to the Surgeon General on individual equipment. On file, Record Room, S. G. O. (Old Files).
- (2) Manual for the Medical Department, U. S. Army, 1916, pars. 864, 919, and 920.
- (3) Compiled from records on file in the Finance Department, Miscellaneous Section—contracts placed by the Ordnance Department, and Lieut. Col. M. A. Reasoner, M. C., Field Medical Supply Depot, Washington, D. C.
- (4) Letter from the Surgeon General to The Adjutant General, December 9, 1913. Subject: Experimental tests of adaptability of new Infantry and Cavalry equipment for the Hospital Corps. On file, Record Room, S. G. O., 147549 (Old Files).
- (5) Special Orders, No. 228, Headquarters Second Division, Texas City, Tex., December 19, 1913. Extract on file, Record Room, S. G. O., 147549-B (Old Files).
- (6) Second indorsement, from Field Medical Supply Depot, Washington, to the Surgeon General, February 11, 1914. Subject: Designs for service belt or roll for packing contents, Hospital Corps pouch. On file, Record Room, S. G. O., 147549-C (Old Files).
- (7) Correspondence between Capt. Percy L. Jones, M. C., recorder of the board, the Surgeon General, and the Mills Woven Cartridge Belt Co., June 29, 1914, to August 25, 1914, relative to belts for Hospital Corps and medical officers. On file, Record Room, S. G. O., 147549-E-E3 (Old Files).

- (8) Letter from the division surgeon, Second Division, Texas City, Tex., August 20, 1914. Subject: Board of medical officers for unit equipment, Hospital Corps. On file, Record Room, S. G. O., 147549-G (Old Files).
- (9) Letter from the Surgeon General to The Adjutant General, September 4, 1914. Subject: Board of medical officers on personal equipment for Hospital Corps, and First indorsement thereon from The Adjutant General to commanding general, 2d Division, Texas City, Tex. On file, Record Room, S. G. O., 147549-H-B1 (Old Files).
- (10) First indorsement, Surgeon General to The Adjutant General, November 7, 1914, approving request of the board for one of its members to visit the Mills Woven Cartridge Belt Co. Also: Letter from the Surgeon General to The Adjutant General, February 26, 1916. Subject: Special duty, medical officers. On file, Record Room, S. G. O., 147549-K and 147549-3 (Old Files).
- (11) Letter from the Surgeon General to The Adjutant General, March 22, 1915. Subject: Individual equipment of the Hospital Corps. On file, Record Room, S. G. O., 147549-P (Old Files).
- (12) Manual for the Medical Department, U. S. Army, 1916, par. 865.
- (13) Indorsement from Chief of Ordnance to the Surgeon General, April 13, 1915, relative to contracts for medical officers' and Hospital Corps belts. On file, Record Room, S. G. O., 147549-P (Old Files).
- (14) Ninth indorsement, Surgeon General to Chief of Ordnance, April 27, 1915, requesting delivery of belts to Field Medical Supply Depot for distribution. On file, Record Room, S. G. O., 147549-P (Old Files).
- (15) Letter from the Surgeon General to the field medical supply officer, Washington, D. C., May 12, 1915. Subject: Issues of Hospital Corps belts and officers' belts. On file, Record Room, S. G. O., 147549-Q (Old Files).
- (16) Third indorsement from the Surgeon General to the Chief of Ordnance, April 29, 1917, relative to issue of pistol belts to detachment, Medical Department, Fort Myer, Va. On file, Record Room, S. G. O., 127608-P (Old Files).
- (17) Schedules of deliveries and prices on contracts made by the Ordnance Department with the Mills Woven Cartridge Belt Co., in 1917, copies furnished the Surgeon General, October 23, 1917. On file, Finance and Supply Division, S. G. O., 750-550 Ord.
9
- (18) Letter from the Surgeon General to The Adjutant General, June 15, 1917. Subject: Belts for medical officers and enlisted men, Medical Department. On file, Finance and Supply Division, S. G. O., 13849-C.
- (19) Contract No. 13794, December 8, 1916. On file, Office of Chief of Ordnance, administrative division, contract section, 38310/364.
- (20) Contracts Nos. 13735, March 13, 1917, and 13840, March 22, 1917. On file, Office of Chief of Ordnance, administrative division, contract section, 38310/364.
- (21) Letter from the Surgeon General to the Chief of Ordnance, June 15, 1917. Subject: Belts for officers and enlisted men, Medical Department. On file, Finance and Supply Division, S. G. O., 13849-C.
- (22) Second indorsement from Chief of Ordnance to The Adjutant General, June 27, 1917, relative to belts for officers and enlisted men, Medical Department. On file, Finance and Supply Division, S. G. O., 13849-C.
- (23) Third indorsement from The Adjutant General to the Surgeon General, July 3, 1917, relative to transfer of belts to Medical Department. On file, Finance and Supply Division, S. G. O., 13849-C.
- (24) Correspondence between the Surgeon General, the Chief of Ordnance, and the field medical supply officer, July 31-August 15, 1917, relative to transfer of accountability for belts to Medical Department. On file, Finance and Supply Division, S. G. O., 13849-E.

- (25) Indorsement from Chief of Ordnance on Surgeon General's letter of June 15, 1917, to Chief of Ordnance, relative to belts for officers and enlisted men. On file, Finance and Supply Division, S. G. O., 13849-C.
- (26) Telegram from Mills Woven Cartridge Belt Co., Worcester, Mass., to the Surgeon General, August 10, 1917, relative to deliveries of web belts. On file, Finance and Supply Division, S. G. O., $\frac{509}{2}$.
- (27) Second indorsement from field medical supply officer, Washington, D. C., to the Surgeon General, August 15, 1917. On file, Finance and Supply Division, S. G. O., 509.
2
- (28) Memorandum from the field medical supply officer, Washington, D. C., to the Surgeon General, October 31, 1917, relative to deliveries of web belts. On file, Finance and Supply Division, S. G. O., $\frac{750-550}{9}$ Ord.
- (29) Letter from the Surgeon General to the Medical Superintendent, Army Transport Service, New York, N. Y., August 1, 1917. Subject: Belts, web. On file, Finance and Supply Division, S. G. O.
- (30) Contracts dated April 18, 1918, between Lieut. Col. M. A. Reasoner, M. C., Washington, D. C., and R. H. Long Co., and Hewes & Potter, for 50,000 belts each. On file, Office of Chief of Finance, Miscellaneous Section.
- (31) Contract between Lieut. Col. M. A. Reasoner, M. C., and R. H. Long Co., July 1, 1918, for 50,000 enlisted men's belts. On file, Office of Chief of Finance, Miscellaneous Section.

CHAPTER XV

COMBAT EQUIPMENT

The term combat unit, as used herein, covers all the equipment, by whatever name it may have been known, issued to the unit of medical personnel, on duty with or definitely attached to a regiment or smaller unit of combatant troops in the field or in combat, to be used in the performance of its mission. It does not cover articles issued to the various personnel of the medical establishment for their individual use and designated individual equipment. The former is the equipment of the unit, the latter, of the individual, as described in the preceding chapter.

The first essential of medical combat equipment is that it shall contain ample quantities of surgical appliances and dressings for the effective administration of the primary treatment of the wounded with the minimum of delay and preparation. They must be ready for immediate use. To apply them must require the minimum of time, preparation, and manipulation. The second requirement is that the equipment shall be sufficiently light and compact to be suitable for the limited available transportation. This requires a very careful selection. The third requirement is that the equipment shall be made of the most durable materials consistent with its function in order that it may withstand the rough usage to which, from the nature of its service, it must be called upon to meet in the field. To meet these requirements great care must be taken in design and manufacture of the equipment. A sufficient quantity of dressings must be provided to meet the emergency until replenishments can be received from the supply train. These dressings must be sterile and ready for application even by the untrained. They must also be as small in bulk as is compatible with their purpose.

For several years after the Spanish-American War, the regimental hospital equipment was issued to all large posts, particularly those having the headquarters of the regiment. These hospitals by frequent inspection were kept in instant readiness for field service. After 1911 they were reduced to regimental infirmary equipments which provided dispensary service only. All patients requiring hospitalization were sent to the camp or field hospital. Greater prominence was given the first-aid station equipment. As the functions and limitations of the regimental medical detachment in the field and in combat came to be better understood and the difficulties of field transportation were more fully comprehended, it became desirable further to modify the regimental equipment. The mission of the regimental detachment is twofold: The administering of first aid to the wounded on the battle field and the collecting of such wounded into groups in the protected places preparatory to their evacuation to the hospitals in the rear; the furnishing, in camp and on the march, of dispensary service to the members of the regiment to which it is attached. The equipment of the regimental infirmary was adapted to these two missions and could fairly well be separated into two groups corresponding to these missions.

Accordingly, it was decided to form two unit equipments instead of one, augmenting each unit as was necessary to adapt it the more adequately to its particular mission. The unit intended for use on the battle field was called a combat equipment. The amount of equipment varied with the different arms of the service, although the component elements were the same in all.¹ One such combat equipment, the contents of which are shown in the following paragraphs of the Manual for the Medical Department, was authorized for and issued to every regiment.

M. M. D. 866.

Regimental combat equipment

Articles	A	B	C	Source	Remarks
Ax, short handle.....number	1		1	M	
Bag, nose.....do	1		1	Q	
Bag, water, sterilizing.....do	1		1	Q	
Box, pack mule, empty, No. 1 (par. 909).....do	1		1	M	
Brush, horse.....do	1		1	Q	
Bucket, galvanized iron.....do	1		1	M	
Candles, lantern.....do	8		8	M	
Chest, medical and surgical (par. 932).....do	1		1	M	
Comb, curry.....do	1		1	Q	
Desk, field, No. 2 (par. 941).....do	1		1	M	Carried on regimental field train. (See appendix: Equipment.)
Guidons, ambulance, without staff.....do	2		2	Q	
Lanterns, folding.....do	2		2	M	
Litters, with slings:					
Battalion of Engineers.....do	2		2		} There is an additional litter in possession of each company, troop, and battery. When on the march not in the immediate presence of the enemy all the litters are carried on the ammunition wagons. (See Tables of Organization.)
Battalion of Signal Corps.....do	1		1		
Regiment of Artillery.....do	7		7	M	
Regiment of Cavalry.....do	6		6		
Regiment of Infantry.....do	9		9		
Manuals, Army Regulations, etc.....do	(*)	(*)	(*)		*In field desk No. 2.
Saddle, pack (par. 953).....do	1		1	M	
Surgical dressings (par. 955).....boxes	1		1	M	Contents only.
Surgical dressings, ambulance (par. 954):					
Regiment of Artillery.....do	2		2		} Carried on ammunition wagons. (See Tables of Organization.)
Regiment of Cavalry.....do	3		3	M	
Regiment of Infantry.....do	9		9		
Tentage, heavy:					
Fly, wall tent, small, with ropes.....number	1		1	Q	
Tent pins, small.....do	6		6		
Wire cutters.....do	1		1	M	
Total weight, about.....pounds	884		884		} For Infantry. Figures for other arms are somewhat less.
Cubic space, about.....feet	55		55		

M. M. D. 867. The following articles are not kept in the depots as a part of the regimental combat equipment, but must be obtained by the regimental surgeon from the proper supply department as indicated for each item under "Source":

Articles	A	B	C	Source	Remarks
Cover, mule, blanket lined.....number	1		1	Q	For winter use only.
Equipments, horse (par. 943).....do	(*)		(*)	Q	* Based on Tables of Organization.
Equipments, individual (par. 865).....do	(*)	(*)		(**)	* 1 for each man of Hospital Corps. ** M. D., Q. M. C., and O. D.
Halter and strap.....do	1		1	Q	For pack mule.
Horses, riding:					
For enlisted men.....do	(*)		(*)	Q	* Based on Tables of Organization.
For officers.....do	(*)		(*)	Q	* 1 for each captain or lieutenant not privately mounted.
Lime, hypochlorite.....tubes	10	(*)	(*)	Q	
Mule, pack.....number	1		1	Q	* Replenished by Q. M.
Shoes:					
Horse, fitted.....do	(*)		(*)	Q	* 1 fore and 1 hind on each mount.
Mule, fitted.....do	2		2	Q	1 fore and 1 hind in pack.

That part of the equipment or unit intended to furnish supplies for dispensary service was denominated a camp infirmary.² It was intended primarily for

service in camp, hence its name. It consisted essentially of medicines, surgical dressings, and materials for holding sick call. One of these camp infirmaries was issued to each regiment in time of peace, and a wagon from the divisional sanitary train was assigned to transport it.³ This equipment was required at all times to be kept in instant readiness for field service. In addition to the camp infirmary equipment and supplemental to it there was provided a unit equipment composed largely of ward and mess equipment which, when added to the infirmary, constituted a regimental hospital.⁴ This supplementary unit was issued only when the regiment was on duty apart from other regiments. The complete equipment, then, gave the regiment full paraphernalia for the care of the sick and wounded pending their evacuation to more permanent hospitals.

It was thought, also, that conditions frequently would arise when the quantities of medicines and surgical dressings in the camp infirmary would prove inadequate. To meet these conditions another unit, called the camp infirmary reserve, was provided.⁵

When regiments were assembled in divisions it was contemplated that an infirmary service would be established on the basis of one infirmary to each brigade. The director of ambulance companies was to be charged with the establishment and maintenance of the infirmaries for the replenishment of the supplies and for the enlisted personnel permanently assigned to them.⁶ The number of camp infirmary equipments required for the infirmary service of the division were to be transferred, under instructions from the division surgeon, to the director of ambulance companies. The remaining camp infirmary equipments were to be transferred to the medical supply officer of the camp to be held in reserve.⁶ The infirmary service proper was to be under the immediate charge of the senior medical officer of the organizations served by the individual infirmary. Each organization was to be responsible for its own infirmary service and definite hours in the day were to be set aside for sick call for the various units.⁷

Surgical dressings and similar articles expended from the combat equipment during combat were to be replenished from the reserve supplies of the nearest ambulance company or camp infirmary. For these replenishments formal requisitions, invoices, and receipts were not required. Provision was made for the transfer of supplies to the regiment from other Medical Department units. Invoices and receipts were required in the transfer of nonexpendable articles.⁸

When the strength of the companies of Infantry was increased to 250 men in the fall of 1917, making the strength of the battalion equal to that of the pre-war regiment, it became necessary to provide additional medical combat equipment. This was effected by providing each battalion with a regimental medical combat equipment and increasing the allowance of litters.⁹ The number of combat equipments required for a division at war strength was 30.¹⁰ The size of the medical detachment assigned to the regiment was increased in conformity with the increase in the strength of the regiment. Litters were issued on the basis of 2 per cent of the strength of the command, and carried for the most part on the combat wagons and trucks. The ambulance boxes

of surgical dressings also were issued in accordance with the strength of the command and their prospective casualties. The equipment as issued in 1918, and its distribution in the regiment is given in the following War Department table of equipment, May 14, 1918. The contents of the various boxes, cases, chests, etc., specified in the table of equipment, and as listed in the Manual for the Medical Department, 1916, are given immediately after it.

TABLE 40.—*Medical Department, attached to Infantry division organizations*

[Series A. May 14, 1918]

MEDICAL EQUIPMENT

Article, equipment A and C	Infantry			Field Artillery				Engi- neers	Sig- nal Corps	Train headquarters and military police, Infantry division (Table 21)	Ammunition train, Infantry division (Table 25)	Supply train, Infantry division (Table 26)
	Regiment (Table 4)	Machine-gun battalion, 2 com- panies (Table 9)	Machine-gun battalion, 4 com- panies (Table 10)	Regiment, 2 battalions, carried on motor trucks (Table 36)	Regiment, 2 battalions, horse- drawn (Table 13)	Regiment, 3 battalions (Tables 17 and 38)	Trench-mortar battery (Table 21)	Regiment (Table 29)	Field battalion (Table 23)			
Boxes, pack mule, empty, No. 1 (par. 909, M. M. D.) ^a										2		
Brassards	b 5	7	15	b 23	b 27	b 38	4	b 31	15	3	32	11
Wallets, farrier (par. 970, M. M. D.) ^{ac}					4					6		
Wallets, pocket, veterinary (par. 974, M. M. D.) ^{ac}					2					3		
Chests, field, veterinary officers (par. 987) ^{ac}					2					3		
Chests, veterinary field unit (par. 966, M. M. D.) ^{ac}					2					3		
Combat equipment ^d	e 3	f 1	e 1	f 2	e 2	f 3		e 2	f 1	e 1	e 2	e 1
First-aid packets ^e	7	1	1	3	11	4		3	1	35	3	1
Individual equipment, officers (par. 864, M. M. D.)	7	1	1	3	3	4		3	1	1	3	1
Individual equipment, enlisted men ^h	48	6	14	19	23	33	4	27	14	6	29	10
Litters with slings ⁱ	j 76	k 8	k 16	m 30	n 30	3	3	o 34	k 10	k 7	k 26	k 9
Motor ambulances				2		3					1	1
Motor cycles with side cars		2		3		4			2		5	2
Saddles, pack (par. 933, M. M. D.) ^h										1		
Surgical dressings, ambulance, boxes of (par. 954, M. M. D.)	p 30	k 3	k 6	q 8	r 11	s 12		t 13	k 4	k 3	k 10	k 4

^a Veterinary supplies.^b Extra one for chaplain.^c 1 each for each infantry brigade.^d Each combat equipment consists of following:1 ax, short handled (carried on outside, pack-mule
box No. 1).1 box, pack mule, empty, No. 1 (par. 909, M. M. D.).
(For packing medical supplies.)

1 bucket, G. I.

8 candles, lantern. (Packed in pack-mule box No. 1.)

1 case, emergency (par. 913, M. M. D.).

1 chest, medical and surgical (par. 932, M. M. D.).

1 field desk, No. 2 (par. 941, M. M. D.).

2 lanterns, folding. (Packed in pack-mule box
No. 1.)1 box surgical dressings, contents only (par. 955,
M. M. D.). (Packed in pack-mule box No. 1.)75 feet rope, 3/8-inch. (Packed in pack-mule box
No. 1.)

1 venereal prophylactic unit (par. 958, M. M. D.).

1 wire cutter. (Packed in pack-mule box No. 1.)

^e Carried on medical cart.^f Carried on quartermaster transportation assigned to
organization.^g 1 for each medical officer, veterinary officer, and en-
listed man of Veterinary Corps.^h No Engineer or Signal equipment.^h Medical Department equipment only, as shown in
par. 865, M. M. D., as modified by C. M. M. D. No. 3,
1917, and No. 7, 1918.ⁱ Carried on combat wagons and trucks.^j 21 for each combat equipment, 6 for headquarters com-
pany, 3 for supply company, 4 for machine-gun company.^k All for combat equipment.^l 8 for each combat equipment, 1 for supply com-
pany, 4 for headquarters company.^m 12 for each combat equipment, 4 for headquarters com-
pany, 2 for supply company.ⁿ 8 for each combat equipment, 4 for headquarters com-
pany, 2 for supply company.^o 16 for each combat equipment, 2 for headquarters
company.^p 8 for each combat equipment, 3 for headquarters
company, 2 for machine-gun company, 1 for supply
company.^q 3 for each combat equipment, 2 for headquarters
company.^r 4 for each combat equipment, 2 for headquarters com-
pany, 1 for supply company.^s 3 for each combat equipment, 2 for headquarters com-
pany, 1 for supply company.^t 6 for each combat equipment, 1 for headquarters
company.

No Engineer or Signal equipment.

M. M. D. 932.

Chest, medical and surgical.

(Weight, 100 pounds)

MEDICINES AND ANTISEPTICS

Adrenalin chlorid, 1-mgm. tablets, 20 in tube	tubes	5
Alcohol, 12 ounces in bottle	bottles	1
Apomorphinæ hydrochloridum, 6-mgm. hypodermic tablets, 20 in tube	tubes	3
Atropinæ sulphas, 0.65-mgm. hypodermic tablets, 20 in tube	tubes	7
Bismuthi subnitras, 324-mgm. tablets, 700 in 12-ounce tin	tins	2
Chloroformum, 1/4 pound in tin	do.	3
Cocainæ hydrochloridum, 10-mgm. hypodermic tablets, 20 in tube	tubes	7
Digitalinum, 1-mgm. hypodermic tablets, 20 in tube	tubes	5
Emetinæ hydrochloridum, 22-mgm. hypodermic tablets, 20 in tube	tubes	5
Foot powder (par. 902)	tins	1
Hydrargyri chloridum corrosivum, tablets (antiseptic) (par. 902), 350 in 12-ounce tin	tins	1
Hydrargyri chloridum mite, 32-mgm. tablets, 1,000 in bottle	bottles	1
Hyoscine hydrobromidum, 0.65-mgm. hypodermic tablets, 20 in tube	tubes	3
Iodum-potassii iodidum	do.	20
Linimentum rubefaciens, tablets (par. 902), 200 in 12-ounce tin	tins	1
Magnesii sulphas, 3 pounds in tin	do.	1

Mistura glycyrrhizæ composita, 3,600 in 12-ounce tins	tins	1
Morphinæ sulphas, 8-mgm. hypodermic tablets, 20 in tube	tubes	45
Nitroglycerin, 0.65 mgm. hypodermic tablets, 20 in tube	tubes	8
Petrolatum, in 12-ounce tin	tins	2
Phenol, crystals, 1/2 pound in bottle	bottles	1
Pilulæ camphoræ et opii (par. 902), 875 in 12-ounce tin	tins	1
Pilulæ cathartica compositæ, 1,200 in 12-ounce tin	tins	2
Potassii bromidum, 324-mgm. tablets, 500 in bottle	bottles	1
Protargol (or equivalent), 1 ounce in bottle	bottles	1
Quininæ hydrochlorosulphas, 32-mgm. hypodermic tablets, 20 in tube	tubes	10
Quininæ sulphas, 200-mgm. tablets, 1,000 in 12-ounce tin	tins	3
Sodii salicylas, 324-mgm. tablets, 600 in 12-ounce tin	tins	1
Strychninæ sulphas, 1-mgm. hypodermic tablets, 20 in tube	tubes	20
Thymolis iodidum (Aristol), in sprinkler	do.	1
Unguentum hydrargyri chloridi mitis, 30 per cent, 1/2 pound in wide-mouth bottle	bottles	1

The tubes of hypodermic tablets are all in one 12-ounce tin.

MISCELLANEOUS

Aprons, rubber	number	2
Bag, rubber, hot-water, and syringe	do.	1
Bandages:		
Gauze, compressed, 3 sizes	do.	80
Plaster of Paris, in individual packets	number	6
Bandage, rubber, Martin	do.	1
Bands, elastic, in pouch	do.	16
Basins, hand, rubber	do.	2
Book, blank, svo.	do.	1
Book, note, manifold:		
4 by 6 inches, binder	number	1
4 by 6 inches, filler	number	1
Boxes:		
Folding, for tablets	gross	1
Ointment, 3 in nest	nests	8
Box, soap, metal	number	1
Brushes, hand, fiber	do.	6
Case:		
Forceps, hemostatic (par. 915)	do.	1
Operating, small (par. 922)	do.	1
Tooth-extracting, 3 forceps in canvas roll	number	1
Catheters, flexible, 17, 20, 24, French scale, in tin	number	3
Corks, for 1-ounce vials, 50 in bag	bags	1
Corkscrew	number	1
Cotton, absorbent, sterilized, 1-ounce package	packages	26
Cup, enamel ware	number	1
Gauze, sublimated, 2 half-yard lengths in package	packages	46
Gloves, rubber, in pouch, sizes 8 and 9	pairs	2
Inhaler, chloroform, Esmarch, with drop bottle	number	1
Labels:		
For vials	dozen	6
Poison	do.	3

Matches, safety	boxes	6
Medicine glass, in wooden case	number	1
Mortar and pestle, porcelain, 7 cm.	do.	1
Penicils, hair, 1 dozen in vial	vials	1
Pencils, indelible	number	2
Pins:		
Common	papers	1
Safety	dozen	2
Plaster, adhesive, zinc oxide, 5 yards by 1 inch	spools	3
Pouch, for gloves	number	1
Razor	do.	1
Razor, strop for	do.	1
Seissors	do.	1
Soap, hand	cakes	2
Spatula, 3-inch	number	1
Spoon, tea	do.	1
Sutures:		
Catgut—		
Chronicized, sterilized, 18 inches each, 3 sizes in package	packages	10
Plain, sterilized, 18 inches each, 3 sizes in package	packages	20
Silk, braided, sterilized, 18 inches each, 3 sizes in package	packages	10
Silkworm gut, 100 in coil	coils	1
Syringe, hypodermic (par. 956)	number	1
Extra needles for	number	12
Tags, diagnosis	books	2
Thermometers, clinical	number	6
Tins, enameled, as containers	do.	17
Tongue depressor	do.	1
Tourniquet and bandage, rubber	do.	1
Towels, hand	do.	6
Tubes, drainage, 2 sizes, in tin with catheters	pieces	2
Vials, 1-ounce	number	6

M. M. D. 941.

Desk, field, No. 2

(Weight 35 pounds)

(a) STATIONERY

Bands, elastic, assorted sizes.....gross..	1	Paper—Continued	
Book, correspondence (issued by A. G. Dept.)		Carbon, letter, 100 sheets in a box.....boxes..	1
.....number.....	1	Writing—	
Books, note, manifolding, 4 by 6 inches, binders		Letter, 100 sheets in pad.....pads..	2
.....number.....	4	Note, 100 sheets in pad.....pads..	6
Books, note, manifolding, 4 by 6 inches, fillers		Paste, photo.....tubes..	1
.....number.....	8	Pencils:	
Envelopes, official, letter.....do.....	50	Indelible.....number.....	2
Eraser, rubber.....do.....	1	Lead.....do.....	12
Ink, black, powder or tablets.....boxes..	1	Penholders.....do.....	4
Ink well.....number.....	1	Pens, steel.....do.....	24
Pads, prescription.....do.....	4	Ruler.....do.....	1
Paper:			
Blotting.....pieces.....	4		

(b) MANUALS, ARMY REGULATIONS, ETC.

Army Regulations.....number.....	1	Field Service Regulations.....number..	1
Drill Regulations and Service Manual for Sanitary Troops.....number.....	1	Manual Medical Department.....do.....	1
Equipment Tables, Q. M. Supplies.....do.....	1	Rules of Land Warfare.....do.....	1

All published changes in the above-named publications should be placed in the desk at the time of issue from the depot.

(c) BLANK FORMS, MEDICAL DEPARTMENT (par. 961)

Nos. 17, 17c, 24, 37, 47a, 49, and 50, of each.....number..	4	Nos. 28 and 53, of each.....number..	24
Nos. 51 and 51a, of each.....do.....	6	Nos. 17a, 17b, 77, 82, and 83, of each.....do.....	48
Nos. 35, 51b, 56, and 78, of each.....do.....	12	No. 52.....do.....	100

M. M. D. 954.

Surgical dressings, ambulance box of

(Wooden chest. Weight 28 pounds)

Bandages, gauze, compressed, 3 sizes.....number..	24	Iodine swabs, 6 in box.....boxes..	4
Chloroformum, ¼-pound tins.....number..	1	Pins, safety.....dozen..	4
Cotton, absorbent, sterilized, in 1-ounce package		Plaster, adhesive, zinc oxide, 5 yards by 1 inch	
.....packages.....	8	.....spools.....	6
Individual dressing packets (par. 949).....number..	24	Spiritus ammoniæ aromaticus, ½ pound in glass-	
Gauze, sublimated, 2 half-yard lengths in package		stoppered bottle.....bottles..	1
.....packages.....	36	Vials, 4-ounce, with rubber stoppers, number.....	2
Hydrargyri chloridum corrosivum, tablets			
(antiseptic) (par. 902), 350 in 12-ounce tin.....tins..	1		

M. M. D. 955.

Surgical dressings, box of

(Weight 93 pounds)

Bandages, gauze, compressed, 3 sizes.....number..	144	Plaster, adhesive, zinc oxide, 5 yards by 1 inch	
Cotton, absorbent, sterilized, in 1-ounce package		.....spools.....	12
.....packages.....	44	Sapo mollis (green soap), ½-pound jar in case.....jars..	1
Individual dressing packets (par. 949).....number..	48	Splints, wire gauze for, 1 yard in roll.....rolls..	6
Gauze, sublimated, 2 half-yard lengths in package		Splints, wood veneer.....number.....	12
.....packages.....	140	Tags, diagnosis.....books..	10
Iodum-potassii iodidum.....tubes..	60	Vials, 4-ounce, with rubber stoppers.....number..	4
Pins, safety, 3 sizes.....dozen..	6		

The major part of the combat equipment was intended to provide the needed facilities for the first-aid dressing station. The articles required for this station were designated aid-station equipment. For a number of years pack animals had been regarded as the most suitable means of transportation for the aid-station equipment. Pack transportation had many advantages in the field, especially in mountainous and rough country. The mule is sure-footed and can negotiate ravines and trails inaccessible to any form of wheeled

transport. Since the Army was engaged for many years in controlling the hostile Indians on the western frontier, where dependence had to be placed much of the time on pack transportation, the adoption of pack-animal transport for the aid-station equipment was but natural.

Carrying the aid-station equipment on a pack mule still left a part of the combat equipment to be transported in some other manner. Since an animal can always pull on a wheeled vehicle much more than it can carry and since the territory in which the Army was expected to operate in Europe was well provided with good roads, it was decided to substitute a cart for the packsaddle in which to transport the combat equipment. It was at first contemplated that the packsaddle would be carried in the cart with the rest of the equipment. The cart was to be hauled to some point near the lines. There the mule was to be unhitched from the cart, saddled,

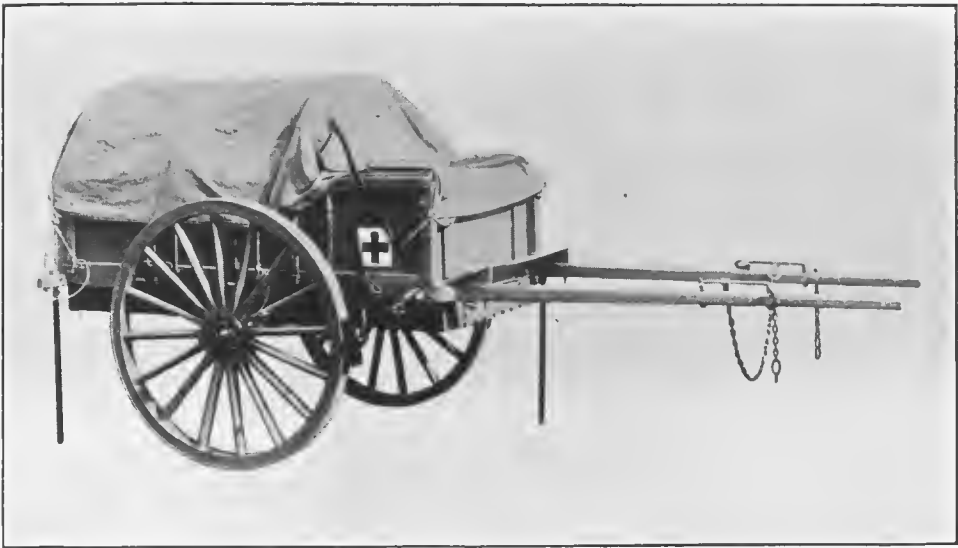


FIG. 5.—Medical cart

and used as a pack animal to carry the aid-station equipment to the point where the station was to be established. This increased the size and weight of the cart. Ultimately the packsaddle was omitted entirely from the combat equipment of Infantry regiments but retained for the transport of veterinary supplies for the train headquarters and military police. (See table of equipment quoted above.) The general appearance of the medical cart and the method of packing its contents are shown in Figures 5 and 6. This cart was built of standard wagon parts for facility in assembling and for replacement of spare parts. It was found to be very substantial and entirely capable of carrying its prospective load, but too heavy, when loaded, to be drawn by a single mule. A device was placed on the right side of the frame to which another animal could be hitched to help pull the load. The cart was remodeled in 1918. Its weight was reduced,

and the body was shortened. These carts, with their harness and animals were supplied by the Quartermaster Corps.

CAMP INFIRMARY EQUIPMENT

When the troops were sent to the concentration camps in the fall of 1917 they were furnished an outfit for dispensary or infirmary service as noted in the chapter on camp medical supply depots. This was done in order that the combat equipment might be maintained intact. It was intended that the combat equipment be entirely separate and apart from the infirmary. So long as

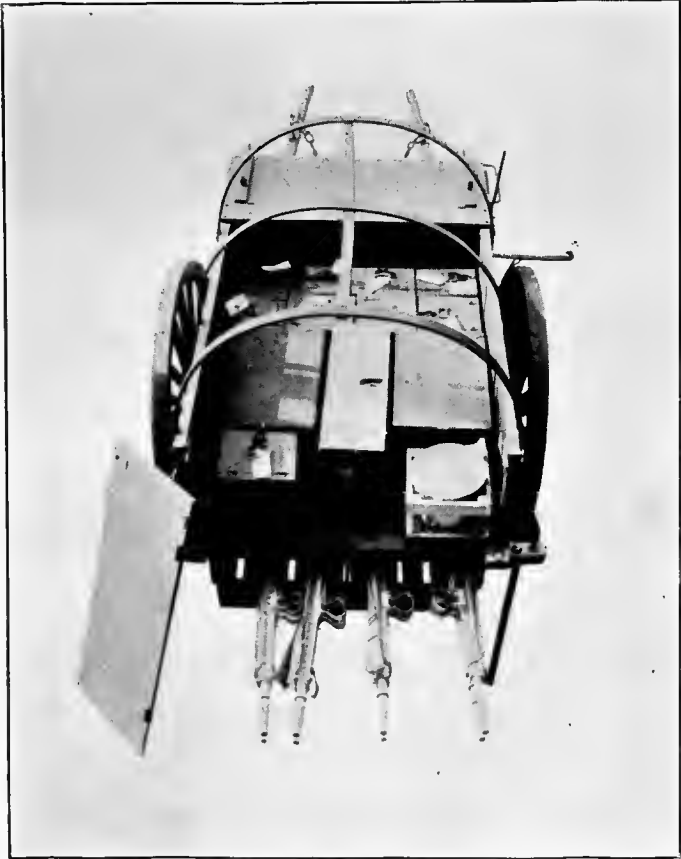


FIG. 6.—Method of packing contents of medical cart

the troops remained in the concentration or training camps these infirmaries furnished the necessary supplies for regimental use. These infirmary equipments were left behind when the divisions embarked for overseas service. When the troops began to arrive in France and to be billeted in towns and villages, the need for even more extensive infirmary service immediately arose. Often only a single battalion could be billeted in a town, and the contents of the combat equipment soon became exhausted. To provide supplies for this extended infirmary service, eight camp infirmary equipments were issued to

each division.⁹ The commander in chief, A. E. F., requested that each battalion be provided with a regimental hospital equipment, but accepted camp infirmary and camp infirmary reserve as a substitute for the hospital.¹¹ The regiments, thereafter, were issued 1 combat equipment, 1 camp infirmary, 1 camp infirmary reserve, and a medical cart for each battalion, with litters and surgical dressings in accordance with the strength of the command. The contents of the camp infirmary followed by those of the camp infirmary reserve appear below.

M. M. D. 869.

Camp Infirmary

Articles	A	B	C	Source	Remarks	
MEDICINES AND ANTISEPTICS						
Foot powder (par. 902).....tins	100		100	M	Other medicines and antiseptics are contained in the chest, medical and surgical; in the case, emergency; and in the venereal prophylaxis unit. See below under Miscellaneous.	
Iodine swabs, 6 in a box.....boxes	100		100	M		
Spiritus ammoniæ aromaticus, ½ pound in glass-stopper bottle.....bottles	6		6	M		
MISCELLANEOUS						
Alcohol, denatured, 2 quarts, in tin.....tins	2		2	M	1 quartermaster bucket on wagon.	
Bag, water, sterilizing.....number	1		1	Q		
Basins, hand.....do	3		3	M		
Buckets, galvanized iron.....do	4		4	M		
Candles.....pounds	2		2	M		
Case, emergency (par. 913).....number	1		1	M		
Chest, medical and surgical (par. 932).....do	1		1	M		
Supplementary (par. 933).....do	1		1	M		
Corks, No. 2, 150 in a bag.....bags	1		1	M		
Desk, field, No. 2 (par. 941).....number	1		1	M		
Flag:						
Distinguishing, Red Cross.....do	1		1	Q	* For emergency use only.	
Halyards for, 50 feet.....do	2		2	Q		
National, storm.....do	1		1	Q		
Staff for, complete.....do	1		1	M		
Food, box of (par. 948)*.....do	1		1	M		
Guidon, ambulance, with staff.....do	1		1	Q		
Lanterns:						
Without globes or wicks.....do	2		2	M		
Wicks for.....dozen	1		1	M		
Globes for—						
Green.....number	2		2	M		
White.....do	4		4	M		
Litters, with slings.....do	2		2	M		
Rope, ¾-inch.....feet	100		100	M		
Soap, Ivory.....cakes	10		10	M		
Spade.....number	1		1	Q		
Stove, alcohol.....do	1		1	M		
Surgical dressings (par. 955).....boxes	2		2	M		
Tent, wall, complete.....number	1		1	Q		
Towels, hand.....dozen	2		2	M		
Twine, coarse.....pounds	1		1	M		
Venereal prophylaxis unit (par. 958).....number	1		1	M		
Vials, 1-ounce.....dozen	6		6	M		
Total weight.....pounds	840		840			
Cubic space.....feet	41		41			

M. M. D. 870. The following articles are not kept in the depots as a part of the camp infirmary equipment, but must be obtained from the proper supply department as indicated for each item under "Source."

Articles	A	B	C	Source	Remarks
Covers, mule, blanket-lined.....number	4		4	Q	For winter use only.
Equipments, individual, Hospital Corps (par. 865), number	1		1	(*)	Based on Tables of Organization. *M. D., Q. M. C., and O. D.
Equipments, individual, Quartermaster Corps, number	1		1	(*)	Do.
Lime, hypochlorite.....tubes	20	(*)	(*)	Q	*Replenished by camp quartermaster.
Mules, draft.....number	4		4	Q	Do.
Oil, mineral.....quarts	5	(*)	(*)	Q	
Shoes, mule, fitted.....number	16		16	Q	For list, see Equipment Tables, Q. M. Supplies.
Wagon, escort, and harness, complete.....do	1		1	Q	

M. M. D. 873.

Weight carried by camp infirmary wagon

(Exclusive of driver and his individual equipment)

(a) CAMP INFIRMARY PROPER	Pounds	(b) WITH RESERVE SUPPLIES	Pounds
Supplies as listed in pars. 869 and 870.....	850	Camp infirmary proper.....	1,138
Sergeant in charge, and his individual equip- ment.....	180	Reserve supplies (par. 871).....	1,050
Grain, 4 mules, 3 days.....	108	Total weight.....	2,188
Rations (see par. 660).....	-----		
Total weight.....	1,138	(c) WITH ADDITIONAL SUPPLIES FOR REGIMENTAL HOSPITAL	
	-----	Camp infirmary proper.....	1,138
	-----	Equipment "A" (par. 872).....	880
	-----	Total weight.....	2,018

CAMP INFIRMARY RESERVE

M. M. D. 871. The articles listed below do not form a part of the regular equipment of the camp infirmary, but when a camp infirmary is serving with divisional troops under conditions which, in the opinion of the division surgeon, make it necessary or desirable to have within the division an additional supply of medicines and dressings for the sanitary troops on duty with line organizations or for the infirmaries themselves, the following articles will be procured on requisition and carried on each camp infirmary wagon. (See par. 633 b.)

These supplies belong in equipment "A."

Medicines and antiseptics

Acetphenetidinum (phenacetin), 324-mgm. tablets, 500 in 12-ounce tin.....	2	Ichthyolum, 3 ounces in wide-mouth bottle bottles..	2
Acidum boricum, 324-mgm. tablets, 700 in 12-ounce tin.....	2	Iodine swabs, 6 in box.....	20
Acidum salicylicum, 324-mgm. tablets, 400 in 12- ounce tin.....	1	Iodum-potassii iodidum, in tubes.....	200
Alcohol, 3 pints in tin.....	18	Linimentum rubefaciens, tablets (par. 902) 200 in 12-ounce tin.....	2
Amylis nitrus, 5-drop spirits, 12 in box.....	2	Magnesii sulphas, 3 pounds in tin.....	5
Apomorphinae hydrochloridum, 6-mgm. hypodermic tablets, 20 in tube.....	6	Mistura glycyrrhizae composita, tablets (par. 902), 3,600 in 12-ounce tin.....	1
Argenti nitras, crystals, 1 ounce in bottle.....	1	Morphinae sulphas, 8-mgm. hypodermic tablets, 20 in tube.....	48
Argenti nitras fusus, 1 ounce in bottle.....	1	Morphinae sulphas, 8-mgm. tablets, 600 in 3-ounce tin.....	1
Aspirin, 324-mgm. tablets, 500 in bottle.....	4	Normal saline solution tablets (par. 902), 150 in 12- ounce tin.....	1
Capsicum, 32-mgm. tablets, 600 in 3-ounce tin.....	1	Oleum ricini, 3 pints in tin.....	4
Chloralum hydratum, 324-mgm. tablets, 400 in bottle.....	2	Oleum terebinthinae rectificatum, 3 pints in tin	2
Cocaina hydrochloridum, 10-mgm. hypodermic tablets, 20 in tube.....	20	Petrolatum, in 12-ounce tin.....	8
Codcina, 32-mgm. tablets, 600 in 3-ounce tin.....	1	Phenol, ½ pound in bottle.....	8
Collodium, 1 ounce in bottle.....	6	Phenylis salicylas (salol), 324-mgm. tablets, 500 in bottle.....	1
Emplastrum belladonnae, 2 yards by 6 inches, in tin.....	1	Pilulae aloini compositae for tablets (par. 902), 750 in 3-ounce tin.....	1
Foot powder (par. 902), ¼ pound in tin with perfor- ated cover.....	10	Pilulae camphorae et opii (or tablets) (par. 902), 875 in 12-ounce tin.....	2
Glycerinum, 3 pints in tin.....	1	Pilulae catharticae compositae (or tablets) 1,200 in 12- ounce tin.....	4
Heroini hydrochloridum, 5.5-mgm. tablets, 500 in 3-ounce tin.....	1	Pilulae ferri compositae (or tablets) (par. 902), 1,200 in 12-ounce tin.....	1
Hexamethylenamina (urotropin), 324-mgm. tablets, 600 in 12-ounce tin.....	1	Plumbi acetas, 130-mgm. tablets, 600 in 3-ounce tin	1
Hydrargyri chloridum corrosivum, tablets (anti- septic) (par. 902), 250 in bottle.....	10	Potassii bromidum, 324-mgm. tablets, 500 in bottle	2
Hydrargyri chloridum mite, 32-mgm. tablets, 1,000 in bottle.....	2	Potassii chloras, 324-mgm. tablets, 1,200 in 12-ounce tin.....	1
Hydrargyri iodidum flavum, 10-mgm. tablets, 750 in 3-ounce tin.....	2		

¹If transportation for medical officers' baggage, tentage, forage, etc., is provided by the regimental field train, as required by Field Service Regulations, equipment "B" (par. 872) may also be carried without exceeding the maximum load for one wagon.

Potassii iodidum, 324-mgm. tablets, 500 in bottle.....bottles..	2	Spiritus ammoniæ aromaticus, ½ pound in glass stopper bottle.....bottles..	8
Potassii permanganas, 324-mgm. tablets, 1,200 in 12- ounce tin.....tins..	1	Strychninæ sulphas, 1-mgm. hypodermic tablets, 20 in tube.....tubes..	36
Protargol (or equivalent), 1 ounce in bottle.....bottles..	8	Sulphur lotum, ½ pound in 12-ounce tin.....tins..	1
Pulvis ipecacuanhæ et opii, 324-mgm. tablets, 700 in 12-ounce tin.....tins..	2	Thymolis iodidum (Aristol), 1 ounce in bottle.....bottles..	2
Quininæ hydrochlorosulphas, 32-mgm. hypodermic tablets, 20 in tube.....tubes..	20	Tinctura digitalis, 0.3 c. e. tablets, 800 in 3-ounce tin.....tins..	1
Quininæ sulphas, 200-mgm. tablets, 1,000 in 12-ounce tin.....tins..	5	Tinctura opii, ½ pound in bottle.....bottles..	4
Sapo mollis (green soap), ½-pound jar in case.....jars..	6	Trochisci ammonii chloridi, 350 in 12-ounce tin.....tins..	4
Sodii bicarbonas, 324-mgm. tablets, 1,000 in 12-ounce tin.....tins..	1	Unguentum hydrargyri ½ pound in wide-mouth bottle.....bottles..	1
Sodii bicarbonas et mentha piperita, tablets (par 902), 1,000 in 12-ounce tin.....tins..	1	Unguentum hydrargyri chloridi mitis, 30 per cent, ½ pound in wide-mouth bottle.....bottles..	2
Sodii carbonas monohydratus, for surgical use, ½ pound in 12-ounce tin.....tins..	2	Veronal, 324-mgm. tablets, 100 in 3-ounce tin.....tins..	2
Sodii salicylas, 324-mgm. tablets, 600 in 12-ounce tin.....tins..	2	Zinci oxidum, powder, ½ pound in 12-ounce tin.....tins..	1
		Zinci sulphas, 324-mgm. tablets, 250 in 3-ounce tin.....tins..	1

Miscellaneous

Alcohol, denatured, 2 quarts in tin.....tins..	10	Individual dressing packets (par. 949).....number..	1,000
First-aid packets (par. 944).....number..	500	<i>Surgical dressing</i> (par. 955).....boxes..	4

Weight, 1,050 pounds. Cubic space, 42 feet.

NOTE.—The medicines and antiseptics listed above are identical with those contained in boxes 1, 2, 3, and 4, of the field hospital (par. 879).

REPLENISHMENTS

The quantities of the component articles of the combat equipment, camp infirmary, and camp infirmary reserve prescribed in the tables above quoted were intended to meet service requirements and to keep the wheeled transport at the minimum consistent with efficiency.¹² The supplies allowed in these units were calculated on the basis of replenishment at 10-day intervals from the line of communications.¹³ Formal requisitions, invoices, and receipts were not required in the combat zone. No accountability was required of regimental medical units. The divisional medical supply officer was accountable for the nonexpendable articles and dropped from his return the expendable articles as issued. A memorandum receipt was given for nonexpendable supplies and an informal receipt for expendable supplies. These receipts were kept by the divisional medical supply officer to show the disposition of the supplies for which he was accountable.

QUARTERMASTER AND ORDNANCE SUPPLIES

It will be noted in the list of contents of the combat equipment and camp infirmary quoted above that numerous articles were issued by the Quartermaster Corps and several by the Ordnance Department.¹⁴ In assembling unit equipment at the medical supply depots for a number of years prior to 1917 the required articles furnished by those departments were incorporated into the unit so that it could be issued complete. This was made possible by the cooperation of those departments. Having the complete unit assembled at one place facilitated its distribution. The demands for supplies of all kinds were so insistent, the quantities required were so large, and the available supply so limited during 1917 that this method could not be carried out. The

War Department charged each supply branch with the duty of providing its own equipment for all units at the camps and other points of ultimate issue.¹⁵ This made it necessary for the medical units of the division to requisition directly upon the Quartermaster Corps and the Ordnance Department for the articles furnished by them, respectively. The same rule covered unit equipment shipped to France for replacement and reserve. After the authorization of divisional medical supply officers the inconveniences of this triple source of supply were somewhat reduced, since the units of the sanitary train looked to that officer to secure for them the needed equipment and supplies. The regimental medical units looked to the regimental unit supply officers for their quartermaster and ordnance equipment.¹⁶

REFERENCES

- (1) Manual for the Medical Department, U. S. Army, 1916, pars. 866-867.
- (2) *Ibid.*, pars. 869-870.
- (3) *Ibid.*, par. 657.
- (4) *Ibid.*, par. 872.
- (5) *Ibid.*, par. 871.
- (6) *Ibid.*, pars. 658-659.
- (7) *Ibid.*, par. 663.
- (8) *Ibid.*, par. 551.
- (9) Letter from the Surgeon General to the division surgeons of all National Army camps, December 23, 1917. On file, Finance and Supply Division, S. G. O., $\frac{551 \text{ N. A.}}{76}$.
- (10) Letter from the Surgeon General to the division surgeon, Camp Sherman, Chillicothe, Ohio, March 2, 1918. On file, Finance and Supply Division, S. G. O., $\frac{531-128}{5}$.
- (11) Cable No. 211, Headquarters, A. E. F., October 10, 1917, par. 4; *Ibid.*, No. 279, November 12, 1917, par. 5.
- (12) Manual for the Medical Department, U. S. Army, 1916, par. 857.
- (13) *Ibid.*, par. 858.
- (14) Correspondence between the officer in charge, Medical Supply Depot, St. Louis, Mo., the Surgeon General, the Quartermaster General, and the Chief of Ordnance, in March and April, 1917, relative to quartermaster and ordnance supplies for field units. On file, Finance and Supply Division, S. G. O., 14066-S-T.
- (15) General Orders, No. 96, War Department, July 23, 1917, and No. 137, October 30, 1917.
- (16) Army Regulations 681-I (C. A. R. No. 56, May 10, 1917).

CHAPTER XVI

FIELD HOSPITAL, AMBULANCE COMPANY, AND OTHER DIVISIONAL UNIT EQUIPMENT

FIELD HOSPITAL

The experiences of the Medical Department during the Spanish-American War and the events which immediately followed it were such as to stimulate studies on the organization and equipment of the sanitary service in war. The need for a reserve equipment in time of peace to enable it to function effectively at the declaration of war had been very strongly impressed upon all medical officers who had participated in that war. The studies of this period in medical equipment were devoted largely to the requirements of the larger units. The earliest of these units to be considered and developed was the divisional unit, consisting of a hospital section called the field hospital and an ambulance section called the ambulance company.¹

In the standard supply table of 1902 the authorized capacity of the field hospital was 108 beds. It was fully equipped for its own purposes and included in its hospital supplies a reserve for issue to regiments. It was intended for assignment with troops in the field wherever its services might be needed. Its capacity was considered sufficient for ordinary requirements of 5,000 effectives.² The ambulance company was at first administered as a part or section of the field hospital,³ but later became independent.⁴ To meet the requirements of large bodies of troops in more or less permanent camps a camp hospital equipment of 324 beds was provided in order that the field hospitals might remain mobile and ready to march on short notice.⁵ The field hospital equipment served as a nucleus for that of the camp hospital.⁶

The equipment of field hospitals was designed to provide the maximum of treatment with the minimum of equipment. Compactness, durability, and transportability were essential factors in its design. The field hospital was intended primarily for service during active operations and only occasionally as a fixed hospital for short periods. Its equipment was designed accordingly,⁷ and modified from time to time as its purpose and limitations became better understood. In the earlier stages of its development emphasis was placed upon operative procedures and temporary hospitalization. In later tables of equipment the conception of the purpose of this hospital changed. Operations of election gave place to those purely emergency in character. Emphasis was placed upon the emergency, or first-aid, treatment and the preparation of the patient for evacuation to the rear. Ward equipment was minimized, and the surgical equipment greatly reduced. In 1916 the capacity of the field hospital was increased to 216 patients,⁸ but its equipment was so modified and

curtailed as to weigh, without transportation, complete and packed for shipment, but 18,200 pounds, and it occupied approximately 850 cubic feet.⁹ The railway requirements for the field hospital of 1916, including personnel, equipment, and animal transportation, were a train composed of 2 tourist sleepers, 1 kitchen car, 1 baggage (box) car, 3 standard stock cars for the animals, and 3 flat cars for the vehicles.¹⁰

During the last decade of the nineteenth century the conception of the hospital service for troops in the field contemplated a single field hospital for the division, with a section for each brigade,¹⁰ as in the Civil War. Brigade sections could be detached for service with their respective brigades when the latter were separated from the division. In later years each brigade section was made coequal with the original division field hospital, and four field hospitals were allowed each division. For purposes of control these four hospitals were grouped into a battalion under an officer designated director of field hospitals.¹¹ This officer was immediately under the division surgeon and was the latter's executive in respect to the field hospitals.¹² He was expected to maintain contact with the director of ambulance companies, with the transport columns and the nearest hospital on the line of communications.¹³ Usually but one field hospital was in service. The remainder were held in reserve and were advanced into action as the battle developed and the casualties required.¹⁴ The field hospitals, when opened on the field, were to be organized into a number of departments: Dispensary, kitchen, receiving and forwarding, slightly wounded, seriously wounded, and mortuary.¹⁵ Its equipment was arranged accordingly. After combat these hospitals cleared as rapidly as possible and followed the division.¹⁶ If the sick and wounded could not be evacuated before the division moved, they were to be concentrated in one or two field hospitals so as to free the others for the advance. If any field hospital were immobilized when the troops moved, another was to be required to accompany them.¹⁷

Prior to the World War, sufficient field hospital equipments were assembled complete, except perishable articles, to equip all existing field hospital companies of the Regular Army, and as many of those of the National Guard as had been accorded Federal recognition. In addition there were 44 such equipments in reserve stored at the various medical supply depots within the United States.¹⁸

Following the declaration of war, April, 1917, the assembling of these units was resumed, with the exception of quartermaster and ordnance supplies. Quartermaster and Ordnance Department supplies required to complete the equipment were obtained by the commanding officer of the hospital company or by the camp or division medical supply officer by requisition upon the local representatives of those departments. After July 1, 1917, the greater part of the field hospital equipments issued were assembled at the field medical supply depot, Washington, D. C. The numbers issued from that depot by periods were April 1 to June 30, 1917, 27; July 1 to December 31, 1917, 38; January 1 to July 30, 1918, 58; July 1 to December 31, 1918, 118; total 241. Of this total, 118 were issued in the United States and 123 shipped to France.¹⁹ Five additional field hospital equipments each were assembled at the St. Louis and San Francisco depots.²⁰

A survey of the medical equipment of the National Guard made in May, 1917, by the representative of the Medical Department on duty in the Militia

Bureau, showed that 25 field hospital organizations were without equipment.²¹ These organizations, the 64 organizations in the National Army training camps, the new field hospital organizations of the Regular Army, and the additional divisions formed absorbed the number of equipments noted above as having been issued in the United States. The cost of the components of the field hospital equipment furnished by the Medical Department was approximately \$4,454.34,²² making a gross cost of \$1,073,495.94 for those issued from the field medical supply depot above noted.

A list of equipment of the field hospital of 1916, inclusive of all articles furnished the company by the Quartermaster Corps and the Ordnance Department, is shown on pages 275-283.

AMBULANCE COMPANY

The equipment of the ambulance company was designed on the basis of the mission assigned to it. This mission, as prescribed in the Manual for the Medical Department, 1916, had two primary objects: The collection and first-aid treatment of the wounded; the evacuation of the wounded from regimental aid stations and ambulance dressing stations to the field hospitals. For its transportation function it was provided with 12 ambulances and 3 escort or Army wagons. For collecting the wounded from the battle field it had a litter-bearer section equipped with litters, first-aid dressings, stimulants, and anodynes. The ambulance companies established dressing stations in protected places as near the battle field as practicable. It was intended that the work of these dressing stations, when operating, should have a dispensary, a kitchen, a receiving and forwarding department, a slightly wounded department, and a seriously wounded department. Dressings were to be applied as the condition of the wounded indicated, diagnosis tags applied, and records kept as required, the wounded sorted and distributed in accordance with their condition and the character of their wounds.²³ To meet the most exacting conditions of field service it is necessary that the dressing station equipment be simple, compact, and easily transportable. That of 1916 was designed to be carried on four pack mules. Its contents and the manner of packing for carriage by pack mules is shown in the following table, Manual for the Medical Department:²⁴

M. M. D. 878.

Method of packing the dressing station equipment

	Quantity	Pounds		Quantity	Pounds
MULE NO. 1			MULE No. 1—Continued		
Right side:			Left side—Continued.		
Medical and surgical chest			Box, pack mule, No. 2—Contd.		
..... number.....	1	100	Paper, toilet..... packages..	5	4
Left side:			Rope, 3/4-inch..... feet.....	50	5
Ax..... do.....	1	5	Soap, Ivory..... cakes.....	6	2
Box, pack mule, No. 2..... do.....	1	31	Tent pins, short..... number..	12	6
Alcohol, denatured..... tins.....	2	8	Twine, coarse..... balls.....	1	1
Basins, hand..... number.....	6	5	Wire cutters..... number.....	1	1
Calcium carbide..... tins.....	4	9	Top:		100
Candles..... pounds.....	2	2	Buckets, galvanized-iron..... do.....	6	26
Corks, extra, for alcohol tins			Bags, water, pack mule..... pairs..	1	14
..... number.....	6				40
Guidons, without staff..... do.....	6				
Lamps, acetylene..... do.....	6	13			
Lanterns, folding..... do.....	8	9			
Lime, hypochloride..... tubes..	5				
			Total weight.....		240

Method of packing the dressing station equipment—Continued

	Quantity	Pounds		Quantity	Pounds
MULE NO. 2			MULE NO. 3—Continued		
Right side:			Top:		
Box, pack mule, No. 3..number..	1	30	Blankets—		
Surgical dressings, box of (contents only)..number..	1	60	Gray.....number..	6	32
Towels, hand.....do.....	6	2	Rubber.....do.....	3	18
		92			70
Left side:			Total weight.....		234
Box, pack mule, No. 4.....do.....	1	30	MULE NO. 4		
Surgical dressings, box of (contents only)..number..	1	60	Right side:		
Towels, hand.....do.....	6	2	Box, pack mule, No. 7..number..	1	30
		92	Bucket, galvanized-iron.....number..	1	4
Top:			Food, box of (contents only) .....number..	1	68
Blankets—			Spoon, serving.....do.....	1	1
Gray.....do.....	6	32	Stove, alcohol.....do.....	1	4
Rubber.....do.....	3	18			106
		50	Left side:		
Total weight.....		234	Box, pack mule, No. 8.....do.....	1	30
MULE NO. 3			Bucket, galvanized-iron.....number..	1	4
Right side:			Food, box of (contents only) .....number..	1	68
Box, pack mule, No. 5..number..	1	30	Spoon, serving.....do.....	1	1
Surgical dressings, box of (contents only)..number..	1	60	Stove, alcohol.....do.....	1	4
Towels, hand.....do.....	6	2			106
		92	Top:		
Left side:			Tent flies, wall, small.....do.....	2	34
Box, pack mule, No. 6.....do.....	1	30	Total weight.....		246
Surgical dressings, box of (contents only)..number..	1	60			
Towels, hand.....do.....	6	2			
		9			

NOTE 1.—On the march, not in the presence of the enemy, blankets, both woolen and rubber, are habitually carried on the ambulance company combat wagon. On long marches, under similar conditions, the other top loads may also be carried in an accessible place on the combat wagon. When the dressing station party is about to separate from the wheeled transportation the top loads of mules Nos. 1 and 4, and if necessary those of mules Nos. 2 and 3, may be quickly put in place on the mules.

NOTE 2.—As the weights of the boxes are changed by expenditure of their contents, readjustment must be made in order to maintain the right and left loads of each mule at approximately the same weight. Sore backs will certainly be produced if this precaution is neglected.

The table of equipment of an ambulance company, as published in the supply table of 1916, was designed for animal-drawn transportation. Motor ambulances, while under consideration, had not been definitely adopted and were not available for issue. It remained for the mobilization on the Mexican border in the summer of 1916 to crystallize the sentiment in favor of the motor ambulance and to establish it on a firm basis as a unit of transportation for the Medical Department. Thereafter both types of ambulances were used. The account of the ambulance is given in the chapter devoted to that subject. With the advent of the motor ambulance the requirements of ambulance company equipment changed somewhat, a part of the supplies being basic and another part relating necessarily to the type of transportation furnished. The components of the animal-drawn and motor-drawn equipments, respectively, are given in the table of equipment for the sanitary train of the division found at the end of this section.

For the rail transportation of the personnel and equipment of an animal-drawn ambulance company at war strength and with full equipment required 3 tourist or standard sleeping cars for the personnel, 1 kitchen car, 1 baggage or box car, 5 standard stock cars for the animals, and 5 flat cars for the vehicles.²⁵ For the motorized company 6 flat cars were required for the ambulances and 1

box car for the company baggage, the spare parts car or trailer, and the accessories and detachable parts of the several ambulances were substituted for those required for the animal-drawn transportation.

Prior to 1916 in assembling ambulance company equipment at the medical supply depots, quartermaster and ordnance supplies, less transportation, were obtained from the respective departments and incorporated in the unit as it was assembled. In equipping the Medical Department units in 1917-18 only medical supplies and equipment were issued from medical supply depots. The articles normally furnished by other supply departments were obtained from the local representatives of those departments at the concentration or training camps.²⁶ Replenishments in the field were obtained from divisional supply officers of the respective departments—Medical, Quartermaster, Ordnance.

The cost of ambulance company equipment varied, from time to time, according to the cost of the component articles. The part of this equipment issued by the Medical Department, less transportation, during 1917-18 was approximately \$1,914.78. This gives a total for initial equipment issued during that period of \$756,338.10, including equipment in storage, at the declaration of war and that assembled thereafter.²⁷

The complete equipment of a sanitary train is as follows:

TABLE 28.—Sanitary train—Infantry division, maximum strength

[Series A. June 28, 1918]
MEDICAL EQUIPMENT

Article	Equipment A and C							Eight camp infirmaries	Divi-sional medical supply unit
	Ambulance section		Field hospital section			3 com-panies, motor			
	Train head-quarters	1 am-bu-lance com-pany, animal-drawn	Head-quarters	Head-quarters	1 field hospital com-pany, animal-drawn				
MEDICINES AND ANTISEPTICS (Pars. 874 and 879 M. M. D.)									
Acidum foricum, 324-mgm. tablets, 700 in 12-ounce tin.....							a2	a16	
Acidum salicylicum, 32-mgm. tablets, 400 in 12-ounce tin.....							a1	a8	
Adrenalin chlorid, 1-mgm. tablets, 20 in tube.....							(b)	(b)	
Alcohol, 3 pints in tin.....							24	72	
Arnylis nigris, 5-drop spirits, 12 in box.....							b18	b54	
Apomorphine hydrochloridum, 6-mgm. hypodermic tablets, 20 in tube.....							a2	a6	
Aqueous nitras crystals, 1 ounce in bottle.....							a1	a3	
Aqueous nitras fusus, 1 ounce in bottle.....							a1	a3	
Asgerol, 1 ounce in bottle.....							(a)	(a)	
Aspirin, 10-mgm. tablets, 500 in 3-ounce tin.....							(a)	(a)	
Aspirin, 324-mgm. tablets, 500 in bottle.....							a4	a12	
Aspirin, sublimis, 0.65-mgm. hypodermic tablets, 20 in tube.....							(b)	(b)	
Bismuth subnitras, 324-mgm. tablets, 700 in 12-ounce tin.....							(b)	(b)	
Bismuth subnitras, 324-mgm. tablets, 250 in bottle.....							(c)	(c)	
Caffeina citrea, 65-mgm. tablets, 250 in 3-ounce tin.....							(c)	(c)	
Caffeina citrea, 65-mgm. tablets, 600 in 3-ounce tin.....							a1	a3	
Chloroform bydro, 1/2 pint, 324-mgm. tablets, 400 in bottle.....							a2	a6	
Chloroform bydro, 1/2 pint, 324-mgm. tablets, 400 in bottle.....							ab114	ab132	
Cocaine hydrochloridum, 10-mgm. hypodermic tablets, 20 in tube.....							b20	b60	
Cocaine hydrochloridum, 10-mgm. hypodermic tablets, 20 in tube.....							a1	a3	
Codeina, 32-mgm. tablets, 600 in 3-ounce tin.....							a6	a18	
Coffolum, 1 ounce in bottle.....							(b)	(b)	
Digitalinum, 1-mgm. hypodermic tablets, 20 in tube.....							(b)	(b)	
Eucodine hydrochloridum, 22-mgm. hypodermic tablets, 20 in tube.....							a1	a3	
Empilustrum belladonnae, 2 yards by 6 inches, in tin.....							(a)	(a)	
Empilustrum, carthagensis, 1 yard by 6 inches, in tin.....							b10	b30	
Foot powder (par. 902), 1/4 pound in tin with perforated cover.....							b150	b450	
Glycerinum, 3 pints in tin.....							b10	b30	
Hexamethylenamina (Crotolopin), 324-mgm. tablet, 600 in 12-ounce tin.....							a1	a3	
Hydrargyri chloridum corrosivum, tablets (antiseptic) (par. 902), 250 in bottle.....							a1	a3	
Hydrargyri chloridum mite, 32-mgm. tablets, 1,000 in bottle.....							a1	a3	
Hydrargyri iodidum flavum, 10-mgm. tablets, 750 in 3-ounce tin.....							b10	b30	
Hyescinae hydrobromidum, 0.65-mgm. hypodermic tablets, 20 in tube.....							b2	b6	
Icthyolum, (or equivalent), 3 ounces in wide-mouth bottle.....							(b)	(b)	
Icthyolum, (or equivalent), 3 ounces in wide-mouth bottle.....							a2	a6	

	boxes	100	300	200	60	160
Iodine swabs, 6 in. box	(b)	(b)	6	6	6
Iodium-potassii iodolum, in tubes	(b)	(b)	6	6	6
Linumatum rubefactum, tablets (par. 902), 200 in 12-ounce tin	(b)	(b)	6	6	6
Linumatum rubefactum, 3 pounds in tin	(b)	(b)	6	6	6
Magnesia sulphas, 8-mgm. hypodermic tablets, 20 in tube	(b)	(b)	6	6	6
Magnesia sulphas, 8-mgm. hypodermic tablets, 20 in tube	(b)	(b)	6	6	6
Morphina sulphas, 8-mgm. hypodermic tablets, 20 in tube	(b)	(b)	6	6	6
Morphina sulphas, 8-mgm. hypodermic tablets, 20 in tube	(b)	(b)	6	6	6
Normal saline solution tablets (par. 902), 150 in 12-ounce tin	(b)	(b)	6	6	6
Oleum ricini, 3 pints in tin	(b)	(b)	6	6	6
Oleum terribintibae rectificatum, 3 pints in tin	(b)	(b)	6	6	6
Oleum theobromatis, 1/2 pound in 12-ounce tin	(b)	(b)	6	6	6
Petrolatum, in 12-ounce tin	(b)	(b)	6	6	6
Phenol, 1/2 pound in bottle	(b)	(b)	6	6	6
Phenylis salicylas (salol), 324-mgm. tablets, 500 in bottle	(b)	(b)	6	6	6
Phosphate aluminii compositae (or tablets), (par. 902), 750 in 3-ounce tin	(b)	(b)	6	6	6
Phosphate camphorae et opii (or tablets), (par. 902), 875 in 12-ounce tin	(b)	(b)	6	6	6
Phosphate caltharicae compositae (or tablets), 1,200 in 12-ounce tin	(b)	(b)	6	6	6
Phosphate ferri compositae (or tablets), (par. 902), 1,200 in 12-ounce tin	(b)	(b)	6	6	6
Plumbi acetatis, 130-mgm. tablets, 600 in 3-ounce tin	(b)	(b)	6	6	6
Potassii bromidum, 324-mgm. tablets, 500 in bottle	(b)	(b)	6	6	6
Potassii chloras, 324-mgm. tablets, 1,200 in 12-ounce tin	(b)	(b)	6	6	6
Potassii iodidum, 324-mgm. tablets, 500 in bottle	(b)	(b)	6	6	6
Protargol (or equipment), 1 ounce in bottle	(b)	(b)	6	6	6
Pulvis ipecacuanhae et opii, 324-mgm. tablets, 707 in 12-ounce tin	(b)	(b)	6	6	6
Quinine hydrochlorosulphas, 32-mgm. hypodermic tablets, 20 in tube	(b)	(b)	6	6	6
Quinine sulphas, 200-mgm. tablets, 1,000 in 12-ounce tin	(b)	(b)	6	6	6
Sapo mollis (green soap), 1/2-pound jar in case	(b)	(b)	6	6	6
Sodii bicarbonas, 324-mgm. tablets, 1,000 in 12-ounce tin	(b)	(b)	6	6	6
Sodii bicarbonas et mentha piperita, tablets (par. 902), 1,000 in 12-ounce tin	(b)	(b)	6	6	6
Sodii carbonas monohydratus, for surgical use, 1/2 pound in 12-ounce tin	(b)	(b)	6	6	6
Sodii salicylas, 324-mgm. tablets, 600 in 12-ounce tin	(b)	(b)	6	6	6
Spiritus ammoniac, aromaticus, 1 pound in glass-stopper bottle	(b)	(b)	6	6	6
Spiritus frumenti, 1 quart in bottle	(b)	(b)	6	6	6
Styehinae sulphas, 1-mgm. hypodermic tablets, 20 in tube	(b)	(b)	6	6	6
Sulphur lotum, 1/2 pound in 12-ounce tin	(b)	(b)	6	6	6
Thymolis iodidum (or equivalent) (Aristol), 1 ounce in bottle	(b)	(b)	6	6	6
Tinctura digitalis, 0.3 c. tablets, 800 in 3-ounce tin	(b)	(b)	6	6	6
Tinctura opii, 1/2 pound in bottle	(b)	(b)	6	6	6
Trochiscus ammonii chloridi, 350 in 12-ounce tin	(b)	(b)	6	6	6
Unguentum ammonii chloridi, 1/2 pound in wide-mouth bottle	(b)	(b)	6	6	6
Unguentum hydragryi, 1/2 pound in wide-mouth bottle	(b)	(b)	6	6	6
Unguentum hydragryi chloridi initis, 30 per cent, 1/2 pound in wide-mouth bottle, bottles	(b)	(b)	6	6	6
Veronal (or equivalent), 324-mgm. tablets, 100 in 3-ounce tin	(b)	(b)	6	6	6
Zincum oxidum, powder, 1/2 pound in 12-ounce tin	(b)	(b)	6	6	6
Zinci sulphas, 24-mgm. tablets, 250 in 3-ounce tin	(b)	(b)	6	6	6

STATIONERY

(For additional stationery and blank forms, see field desk No. 1 and No. 2)

Books—						
Blank—						
Crown cap, 250 pages	.....	(b)	(b)	(b)	(b)	(b)
Note, manifold—						
4 by 6 inch binders	.....	(b)	(b)	(b)	(b)	(b)
4 by 6 inch folders	.....	(b)	(b)	(b)	(b)	(b)

^a Additional in medical and surgical chest, supplementary.
^b Additional in medical and surgical chest.
^c Additional in box, surgical dressings of.
^d Additional in sterilizer chest.
^e Additional in venereal prophylactic unit.

TABLE 28.—Sanitary train—Infantry division, maximum strength—Continued

[Series A. June 28, 1918]

MEDICAL EQUIPMENT—Continued

Article	Equipment A and C							
	Ambulance section		Field hospital section			Eight camp infirmaries	Divisional medical supply unit	
	Train headquarters	Headquarters	1 ambulance company, animal-drawn	3 companies, motor	Headquarters	1 field hospital company, animal-drawn	3 companies, motor	
STATIONERY—continued								
Envelopes, official, letter.....	1	200	(c)	(c)	(c)	(c)	(c)	100
Labels, for vials.....				(b)	(b)	(b)	(b)	
Poison.....			(c)	(c)	(c)	(c)	(c)	
Paper:				(c)	(c)	(c)	(c)	
Blotting.....		1	(c)	(c)	(c)	(c)	(c)	1
Carbon, letter, 100 sheets in box.....		2	(c)	(c)	(c)	(c)	(c)	1
Cap, 250 sheets in a package.....		3		1	1	1	1	1
Manifolding.....								
Letter, 500 sheets in a package.....		2		1	1	1	1	1
Cap, 250 sheets in a package.....		2		1	1	1	1	1
Letter, 500 sheets in a package.....		1		1	1	1	1	1
Stamp, wax, rubber with pad.....		1		1	1	1	1	1
Stamp, penally, rubber, extra pads for.....								2
MISCELLANEOUS								
Alcohol, denatured, 2 quarts in tin.....				10	30	10	30	16
Aprons, rubber.....				(b)	(b)	(b)	(b)	(b)
Atomizers, hand.....						(a)	(a)	(a)
Axes, short-handle.....								
Bags, rubber, hot water and syringe.....				(b)	(b)			(c)
Bandages:								
Gauze compressed, 1 gross in box.....				(b)	(b)			(b)
Plaster Paris, 3-inch.....				(b)	(b)			(b)
Rubber, Martini.....				(b)	(b)			(b)
Suspensory.....								(b)
Basins, hand.....				16	18	1	3	b24
Bed pans, boxes of (par. 906 M. M. D.).....								
Bed sacks.....								
Blankets, gray.....				18	54	220	660	840
Blankets, rubber.....				12	36	280	840	840
Bougies, flexible, Nos 11, 13, 15, 20, 22, French scale.....						144	432	(a)

TABLE 28.—Sanitary train—Infantry division, maximum strength—Continued

[Series A. June 23, 1915]

MEDICAL EQUIPMENT—Continued

Article	Equipment A and C									
	Ambulance section			Field hospital section			Eight camp infirmaries	Divisional medical supply unit		
	Train head-quarters	1 ambulance company, animal drawn	3 companies, motor	Head-quarters	1 field hospital company, animal drawn	3 companies, motor				
MISCELLANEOUS—continued										
Food:										
Ambulance, boxes of (par. 947 M. M. D.)		12	36							
Boxes of (par. 948 M. M. D.)		3	9						8	
Funnel, agate ware										
Gauze, sublimated, 2 half-yard lengths, in package		(b)	(b)						(b)	
Gloves, rubber, sizes 8 and 9										
Graduate, glass:										
100 c. c.										
250 c. c.										
Head mirror in case										
Individual dressing packets (par. 949 M. M. D.)										
Individual equipment, officers (par. 864 M. M. D., as modified by C. M. M. D. No. 3, Sept. 29, 1917)	1	5	15	1	6	18				1
Individual equipment, enlisted men (Medical Department equipment only, as shown in par. 865 M. M. D., as modified by C. M. M. D. No. 3, Sept. 29, 1917)	14	153	368	6	82	249			16	8
Inhalers, chloroform, Esmarch, with drop bottle		(b)	(b)						(b)	
Lanterns:										
Without globes or wicks	2	5	15	1	20	60			16	4
Folding		8	24							
Globes for—										
White	2	10	33	1	26	78			32	8
Green		3	9		3	9			16	
Wicks for	16	1	3	1	2	6			8	1
Liters:										
Canvas for—										
Tacks for, 75 lb package		6	18		6	18				
Extra studs for		12	36		12	36				
With slings	4	4	12		4	12				
Matches, safety, boxes of		50	150		50	150			16	
Medicine droppers		(b)	(b)						(b)	
Medicine glasses		(b)	(b)						(b)	
Mortars and pestles, porcelain, 7 cm		(b)	(b)						(b)	
Motor cycles with side cars	1	9	27	1	9	27			6	2
Motor cycles spare parts A	1	9	27	1	9	27			6	2
Motor cycle spare parts B		4	12		4	12			6	2

Motor ambulance	number	35			
Motor ambulance spare parts A	sets	35			
Motor ambulance spare parts B	do	3			
Motor ambulance, repair car for	number	3			
Muslin, unbleached	yards	15		45	(4)
Needles, common, assorted	papers				
Pajama coats	number	36		108	
Pajama trousers	do	36		108	
Paper					
Latmus, blue and red, 100 strips in vial	vials				
Toilet	packages	10		30	
Pill tile, hard rubber	number				
Pins:					
Common	papers	(b)			(4)
Safety, 3 sizes	dozen	(ac)			
Plaster, adhesive, zinc oxide:					
5 yards by 1 inch	spools	(ac)			
5 yards by 2½ inches	do				
Punch, hotchkiss	number	1		3	
Brads for	boxes	2		18	
Razors, strops for	do	(b)			(b)
Rope, 3/8-inch	number	(b)			(b)
Saddles, pack (par. 053 M. M. D.)	feet	150		450	
Scissors	number	4			
Sheeting, rubber	do	(b)			(b)
Sickle	yards				
Soap:	number				
Hand	do	(b)		20	(b)
Ivory	do	(*)			(*)
Spatulas, 3-inch	do	(ad)		48	(b)
Specula, ear, set of 3	do	(b)			(b)
Speculum, rectal	do	(*)			(*)
Splints:					
Coaptation, 5 in set	sets				
Wire gauze for, 1 yard in roll	rolls				
Wood veneer	number	(c)		12	(ac)
Sponges, gauze, dozen in box	boxes	(c)		30	(c)
Spoons, serving	number	(c)		50	(c)
Sprinklers, powder, hard rubber	do	(ac)			(ac)
Sterilizers for dressings	do				
Stethoscope, double	do	(b)			(b)
Stove, alcohol	do	(d)			(d)
Sutures:					
Catgut—					
Chromicized, sterilized, 18 inches each, 3 sizes in package	packages	2		6	α 2
Plain, sterilized, 18 inches each, 3 sizes in package	do	(b)			(b)
Silk, braided, sterilized, 18 inches each, 3 sizes in package	do	(b)			(b)
Silk worm gut, 100 in coil	do	(b)			(b)
Silver wire, yard lengths	coils	(b)			(b)
	yards				

(c) Carried on repair car with each ambulance company. See Information and Instructions for Motor Ambulances and Motor Cycles, Surgeon General's Office.
 (d) Carried on each motor ambulance. See Information and Instructions for Motor Ambulances and Motor Cycles, Surgeon General's Office.
 (e) Carried on spare parts car. See Information and Instructions for Motor Ambulances and Motor Cycles, Surgeon General's Office.
 (*) 1 additional in chest, cooking utensils.

TABLE 28.—Sanitary train—Infantry division, maximum strength—Continued

[Series A. June 28, 1918]

MEDICAL EQUIPMENT—Continued

Article	Equipment A and O							Divi- sional medical supply unit
	Ambulance section		Field hospital section			Eight camp infirm- aries		
	Train head- quarters	1 ambu- lance con- pany, animal- drawn	3 com- panies, motor	Head- quarters	1 field hospital con- pany, animal- drawn		3 com- panies, motor	
MISCELLANEOUS—(continued)								
Syringes:								
Hypodermic (par. 956 M. M. D.)	number							
Extra needles for	do	(b)	(b)		b 4	b 12	(b)	
Pens, glass, in case	do	(c)	(c)		b 24	b 72	(b)	
Rectal, h. r., 6-ounce	do	(b)	(c)		a e 24	a e 72	(a e)	
Surgical dressings:								
Boxes of (par. 955 M. M. D.)	do		36					
Ambulance, boxes of (par. 954 M. M. D.)	do	12	36				16	
Tables, bedside, folding	do	12	36					
Tags, diagnosis books	do	(b e)	(b e)		b e 50	b e 150	(a b c)	1
Tape measure, 66½-inch	do				(c)	(c)		
Tape, office, red	do	2	6		(c)	(c)		
Test tubes, 3 in nest	do				(b)	(b)		
Thermometers, clinical	number	(b)	(b)		b 30	b 90	(a)	
Thread, cotton, assorted	do	(b)	(b)		a 6	a 18	(a)	
Tongue depressors, metal	do	(b)	(b)		(d)	(d)		
Tool, universal	do	(b)	(b)		(d)	(d)		
Tourniquets and bandages, rubber	do				b 6	b 18	(b)	
Towels:								
Dish	dozen	12	25					
Hand	do	b 2	b 6		(u)	(u)		
Trays, instrument, enamel ware	number				b 48	b 144	b 2	
Trusses for supporting liters	do				(d)	(d)		
Tubing, drainage, unperforated, Nos. 1, 2, and 3	yards				3	9		
Twine, coarse	pounds	(b)	(b)		a b 9	a b 27	(a b)	
Typewriters	number	1	3		2	6	8	
Type-writer, record ribbons for	do	1	3		1	3		
Vials, 1-ounce	dozen	2	6		2	6		
Venereal prophylactic units (par. 958 M. M. D.)	number	(b)	(b)		a b 12	a b 36	a b 48	2
Wire cutters	do	1	3		1	3	8	

^a Additional in medical and surgical chest, supplementary.

^b Additional in medical and surgical chest

^c Additional in box, surgical dressings of

^d Additional in sterilizer chest

^e Additional in venereal prophylactic unit.

^u 1 additional in chest, cooking utensils.

No engineer or signal equipment supplies to this organization

FIELD EQUIPMENT

	14	14	122	122	6	6	1	153	153	4	83	83	6	6	82	82	2	2	8	8
Comb, curry																				
Cot																				
Covers, mule, blanket-lined																				
Filing equipment																				
Flag, distinguishing, red			1	1							1	1			1	1	1	1		
Cross																				
Dublin, 4 ounce box	14	14	122	122	6	6	153	153			83	83	6	6	82	82	2	2	8	8
Flag, national, storm			1	1							1	1			1	1	1	1		
Flag, halcyon			2	2							2	2			2	2	2	2		
Forge, portable																				
Forge, stable																				
Globe lantern	3	2	5	6	1	2	3	6	6	6	6	6	1	2	3	6	6	6		
Guidons, ambulance, with staff											12	12			12	12	1	1		
Guidons, ambulance, company, burning, with staff			1	1																
Guidons, field hospital, burning, with staff											1	1			1	1				
Guidons, ambulance, without staff			12	12			12	12												
Halter and strap																				
Handkerchiefs, pair	1	1			1	1														
Harness																				
Head net, mosquito	1		12	12			15	15			8	8			8	8			1	1
Horse, riding																				
For use of enlisted men	9	9			1	1	19	19					1	1	16	16				
For use of officers	3	3					5	5							5	5				
For use of field and general officers	1	1					1	1							1	1				
Irons, assorted sizes, pounds			30	30			30	42	72	16	16	16			16	20	36			
Branding "U. S."																				
Jack, wagon	1	1					1	1							1	1				
Lampblack, pounds	1	1					1	1							1	1				
Lantern, frame, combination	3	2	5	6	1	2	3	6	6	6	6	6	1	2	3	6	6			
Leather, harness, black, pounds	70	36	106																	
Mender, harness																				
Mules:																				
Draft																				
Lead							35	35							17	17	2	2		
Wheel							36	36							18	18	2	2		
Pack							4	4												
Nails:																				
6d, pounds	20	20					10	10			10	10	10	10	10	10				
8d, pounds	20	20					40	40			40	40	40	40	40	40				
10d, pounds	80	80					40	40			40	40	40	40	40	40				
20d, pounds	50	50					25	25			25	25	25	25	25	25				
Horseshoe, pounds	5	5			1	1	13	29	42				1	1	8	16	24	3	3	

Issued as part of "complete vehicle." See note 26.
Not taken to Europe.
See note 3.

Tables of Organization,

Tables of Organization,

1 pound of nails for every 15 pounds of fitted and extra shoes.

TABLE 28.—Sanitary train—Infantry division, maximum strength—Continued

[Series A. October 2, 1918]

QUARTERMASTER EQUIPMENT—Continued

Article	Train head-quarters			Ambulance section						Field hospital section						Divi-sional medical supply unit	Remarks	
	Ambulance company, motor		Head-quarters	Ambulance company, animal drawn		Field hospital company, motor		Head-quarters	Field hospital company, animal drawn		Camp infirmary		A	B	C			
	A	B		C	A	B	C		A	B	C	A						B	C
Needles, harness:																		
Glover, paper																		(1 paper of glove, and two papers of Nos 2, 3, and 4 needles for every 40 draft mules equipped with quartermaster harness.
No. 2, paper					2													
No. 3, paper					4													
No. 4, paper					4													
Oil, sperm, pint																		For contents, see note 14. For contents, see note 15. (¹ / ₂ pound in A and B, and ¹ / ₁₆ pound in C for every 4 draft mules equipped with quartermaster harness.
Paulin, large					1													
Pickax and helve					1													
Pot, marking					2	4	1	1	1	1								
Rake, steel					1	1	1											
Ridge, field:					2	2	1	1	2	1	3							
No. 1, complete					1													
No. 2, complete					1													
Rivets and hurs, copper:																		
No. 8, 1½-inch, pounds																		
No. 9, 1½-inch, pounds																		
No. 9, 1-inch, pounds																		
No. 12, ½-inch, pounds																		
Rope, picket line, ¾-inch, feet					180													
Saw, field																		
Saw, crosscut, with handles																		
Shoe-repairing outfit, complete																		
Shoes, horse and mule:																		
(1) Fitted—																		
For riding horses, number	26			4														
For pack mules, number																		

Not taken to Europe.

1 fore and 1 hind shoe per animal; carried on mount.
1 fore and 1 hind shoe per animal; carried in pack.

	284	284	284	140	140	16	16	16	16
For draft mules, number.									
(2) Extra—									
For horses, pounds.	13	26	39						
For mules, pounds.	2	4	6	22	44	66	88	110	132
Saddle.	2	4	6	35	70	105	140	175	210
Shield, tent, galvanized iron.	5	5	5	2	2	2	2	2	2
Stove, tent.	9	9	9	2	2	2	2	2	2
Stovepipe.	9	9	9	3	3	3	3	3	3
Elbow.	10	10	10	4	4	4	4	4	4
Joint.	52	52	52	18	18	18	18	18	18
Shank arrester.	9	9	9	282	282	282	282	282	282
Stretching shoe.	9	9	9	3	3	3	3	3	3
Tentage, heavy (if other shelter is not provided).	2	2	2	2	2	2	2	2	2
Tent—									
Hospital, complete.	4	4	4	4	4	4	4	4	4
Pyramidal, complete.	4	4	4	13	13	13	13	13	13
Wall—									
Large, complete.	2	2	2	1	1	1	1	1	1
Small, complete.	3	3	3	1	1	1	1	1	1
Ward, complete.	3	3	3	5	5	5	5	5	5
Canvas cover for folded ward tent.	1	1	1	6	6	6	6	6	6
Canvas latrine screen.	1	1	1	6	6	6	6	6	6
Thread, saddler's.									
No. 3, pounds.				2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4
No. 10, pounds.				4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2
Toilet articles:									
Brush—									
Clothes.	2	16	1	1	1	1	1	1	1
Hair.	14	122	6	11	11	11	11	11	11
Shoe.	2	16	1	82	82	82	82	82	82
Comb.	14	122	6	11	11	11	11	11	11
Company barber kit (purchased from company fund).									
Housewife.	2	16	1	11	11	11	11	11	11
Mirror, steel.	14	122	6	82	82	82	82	82	82
Brush, shaving.	14	122	6	82	82	82	82	82	82
Razor.	14	122	6	82	82	82	82	82	82
Soap, shaving, cake.	14	122	6	82	82	82	82	82	82
Toothbrush.	14	122	6	82	82	82	82	82	82
Towel, face.	28	244	12	164	164	164	164	164	164
Tools:									
Butcher's kit.				1	1	1	1	1	1
Wheelwright's and carpenter's.				1	1	1	1	1	1

4 shoes per mule; carried in wagons.

For winter use, not issued except when specially prescribed. See note 13.

2 at train headquarters for use of guard.

Not taken overseas, except by ambulance companies and field hospital companies.

For repair of quarters master harness.

1 per squad. A. R. 1217.

1 per squad. A. R. 1217.

See note 2.

1 per squad. Issued gratuitously when ordered overseas.

Part of commissary chest, see notes 4 and 19.

See notes 21 and 25. (The kit is equipment A, set B; kit equipment B; kit complete set equipment C. Complete set taken to Europe.)

TABLE 28.—Sanitary train—Infantry division, maximum strength—Continued

[Series A. July 11, 1918.]

ORDNANCE EQUIPMENT

Article	Equipment A and C								Remarks		
	Train headquarters	Ambulance section			Field hospital section					Divisional medical supply unit	
		Headquarters	1 ambulance company, motor	Ambulance company, animal drawn	Headquarters	1 field hospital company, motor		Field hospital company, animal drawn			8 camp infirmaries
						Headquarters	1 field hospital company, motor				
VII-2. PISTOLS											
Magazines, for automatic pistol, caliber .45, M. 1911. ^a -----	4	48	48	4	48	48			4 extra magazines for each pistol.		
Pistols, automatic, caliber .45, M. 1911. ^a -----	1	12	12	1	12	12					
VIII-2. PISTOL AMMUNITION											
Cartridges, ball, pistol, caliber .45, M. 1911. ^a -----	35	420	420	35	420	420			35 for each pistol.		
IX-1. INFANTRY EQUIPMENT											
Cans:											
Condiment, M. 1910. ^a -----	18	7	127	158	7	89	88	16	9		
Meat, M. 1910. ^a -----	18	7	127	158	7	88	88	16	9		
Canteens, M. 1910. ^a -----	18	7	127	158	7	89	88	16	9		
Covers, canteen:											
M. 1910, dismounted. ^a -----	5	5	127	134	5	89	66	16	9		
M. 1917, mounted. ^a -----	13	2		24	2		22				
Cups, M. 1910. ^a -----	18	7	127	158	7	89	88	16	9		
Forks, M. 1910. ^a -----	18	7	127	158	7	89	89	16	9		
Helmets, steel, M. 1917. ^a -----	18	7	127	158	7	89	88	16	9		
Knives, M. 1910. ^a -----	18	7	127	158	7	89	88	16	9		
Pouches, for first-aid packet, M. 1910. ^a -----	4	1	5	5	1	6	6		1		
Spoons, M. 1910. ^a -----	18	7	127	158	7	89	88	16	9		
IX-2. CAVALRY EQUIPMENT											
Bags, ration, M. 1912. ^a -----	14	6	127	153	6	89	82	16	9		
Holsters, pistol, M. 1916. ^a -----		1	12	12	1	12	12				
Spurs, pairs. ^a -----	13	2		24	2		22				
Straps, spur:											
Lower, M. 1911. ^a -----	26	4		48	4		44				
Upper, M. 1911. ^a -----	26	4		48	4		44				
IX-3. ARTILLERY EQUIPMENT											
Belts, M. 1912, without saber ring, for pistol or revolver. ^a -----	1	1	12	12	1	12	12				
Pockets, magazine, web. ^a -----		2	24	24	2	24	24				
IX-5. HORSE EQUIPMENT											
Bags:											
Feed, M. 1912. ^a -----	13	2		24	2		22				
Grain, M. 1912. ^a -----	13	2		24	2		22				
Blankets, saddle. ^a -----	13	2		24	2		22				
Bridles, cavalry, M. 1909. ^a -----	13	2		24	2		22				
Brushes, horse, M. 1912. ^a -----	13	2		24	2		22				
Carriers, guidon and standard, M. 1912-----				1			1				
Cases, picket pin, M. 1917. ^{a b} -----	13	2		24	2		22				
Covers, horse. ^a -----	13	2		24	2		22				
Currycombs, M. 1913. ^a -----	13	2		24	2		22				
Headstalls, halter, M. 1904. ^a -----	13	2		24	2		22				
Lariats, M. 1915. ^{a b} -----	13	2		24	2		22				
Links. ^a -----	13	2		24	2		22				
Nets, hay. ^a -----	13	2		24	2		22				
Pins, picket, M. 1912. ^{a b} -----	13	2		99	2		57	32			
Ropes, halter tie, M. 1912. ^a -----	13	2		24	2		22				
Saddlebags, pairs. ^a -----	13	2		24	2		22				
Saddles, McClellan, cavalry, M. 1904. ^a -----	13	2		24	2		22				
Straps, lariat. ^{a b} -----	13	2		24	2		22				
Stirrings, M. 1912. ^a -----	13	2		24	2		22				

^a May be issued to officers on memorandum receipt; quantity shown includes allowance for officers.

TABLE 28.—Sanitary train—Infantry division, maximum strength—Continued

Article	Equipment A and C								Remarks	
	Train headquarters	Ambulance section			Field hospital section			Divisional medical supply unit		
		Headquarters	1 ambulance company, motor	Ambulance company, animal drawn	Headquarters	1 field hospital company, motor	Field hospital company, animal drawn			8 camp infirmaries
IX-6 OFFICER'S EQUIPMENT										
Insignia, officer's saddlecloths, ^a	8	2		10	2		12			2 to a set.
Saddlecloths, officer's, without insignia, ^a	4	1		5	1		6			
X-3 INTRENCHING TOOLS										
Axes, intrenching, hand, M. 1910.	14	6	122	153	6	83	82	16	8	
Carriers, intrenching hand ax, M. 1910.	14	6	122	153	6	83	82	16	8	
X-5. MARKING AND STENCIL OUTFITS										
Outfits, marking, M. 1910, for stamping leather, ^b				1			1			
Outfits, marking, M. 1917, for stamping metal.			1	1		1	1	1		
Outfits, stencil ^b			1	1		1	1			
Stencils, personnel equipment, ^b		1	1	1	1	1	1			
X-9. REPAIR TOOLS										
Kits, cleaning, pistol, M. 1912.		1			1					
Tools:										
Blacksmiths', sets	1									See note 1.
Saddlers', sets	1									See note 3.
X-10. CLEANING AND PRESERVING MATERIALS										
INITIAL ALLOWANCE										
Dressing, russet leather, boxes			2			2				Allowance for 6 months shown. Only 3 months' allowance is to be taken overseas.
Naphthaline flake, pounds			6			6				
Oil, neat's-foot, 1-gallon and 2-gallon cans			2			2				
Oil, sperm, pints			2			2				
Soap:										
Castile, pounds			10			8				Or "Paco" soap.
H. & H., cakes			8			6				
Saddle, 1-pound tins			6			4				
Sponges, 5-inch			30			20				

^a May be issued to officers on memorandum receipt; quantity shown includes allowance for officers.

^b Not to be taken overseas.

OTHER DIVISIONAL UNITS

Beside the regimental medical detachments, field hospitals, and ambulance companies, there were other agencies of the Medical Department for which special unit equipment was considered necessary. They were the division surgeon, the division veterinarian, and the division mobile veterinary section.

DIVISION SURGEON

The duties of the division surgeon were quite extensive. They were both advisory on all matters pertaining to the sanitary welfare of the command and administrative on those pertaining to the personnel and equipment of the sanitary service under organization commanders.²⁸ He was required to take action on all official papers passing through his office, and for this purpose he

maintained an office of record. He rendered daily consolidated reports of sanitary personnel, transportation, and patients. For this purpose a large supply of appropriate blank forms was kept on hand. In addition to these duties, the division surgeon supervised and directed inspection of the sanitary conditions in the division and of the medical units thereof. He arranged for the care and disposal of the sick and wounded of the division, and performed numerous other duties in connection with the medical service of the division.²⁹

For the use of his office the following equipment was provided:³⁰

M. M. D. 884

Division surgeon's office

Articles	A	B	C	Source	Remarks
(a) STATIONERY					
Envelopes, official, letter.....number	200		200	M	150 additional in field desk No. 1.
Paper:					
Blotting.....quires	1		1	M	
Carbon, letter, 100 sheets in a box.....boxes	1		1	M	1 box additional in field desk No. 1.
Manifolding—					
Cap, 250 sheets in a package.....packages	1		1	M	
Letter—					
500 sheets in package.....do	2		2	M	
Perforated, 500 sheets in package.....do	1		1	M	
Typewriter—					
Cap, 250 sheets in package.....do	1		1	M	
Letter, 500 sheets in package.....do	1		1	M	
(b) BLANK FORMS, M. D. (par. 961)					
No. 61.....books	1		1	M	Issued only in time of war. (See par. 544.)
Nos. 12 M. D. and 334 W. D., of each.....number	6		6	M	
Nos. 46 M. D., 506 M. D., 330 W. D., 330a W. D., and 335 W. D., of each, number.....	12		12	M	
Nos. 59, 84, and 85, of each.....number	24		24	M	
No. 70.....do	1,000		1,000	M	
(c) MISCELLANEOUS					
Broom, corn.....number	1		1	M	
Calcium carbide, 2 pounds in tin.....tins	4		4	M	
Case, emergency (par. 913).....number	1		1	M	
Chairs, folding.....do	3		3	M	
Containers, for certificates of identity.....do	100		100	Q	Issued only in time of war.
Desk, field, No. 1 (par. 940).....do	1		1	M	
Lamps, acetylene.....do	2		2	M	
Table, mess, folding.....do	1		1	M	
Typewriter.....do	1		1	M	
Typewriters, record ribbons for.....do	2		2	M	
Total weight, packed.....pounds	314		314		
Cubic space, packed.....feet	22		22		

NOTE.—Tentage and other quartermaster supplies for the division surgeon's office are included in the allowances of division headquarters as published in Equipment Tables, Quartermaster Supplies.

M. M. D. 885.

BLANK FORMS, DIVISION SURGEON'S EMERGENCY SUPPLY

Each division staff officer is required by Army Regulations to keep on hand an emergency supply of blank forms pertaining to his department, preferably carried in the supply train. Such emergency supply for the division surgeon will consist of the following:

Nos. 12, 17, and 17c, of each.....number	6	No. 28.....number	50
Nos. 19, 24, 32, 50b, 59, and 74, of each.....number	12	Nos. 35, 53, 82, and 83, of each.....do	100
Nos. 37, 47a, 48, 49, 50, 56, 78, 84, and 85, of each.....number	24	Nos. 17a, 17b, and 77, of each.....do	500
		Weight, packed.....pounds	12

NOTE.—For key to form numbers see par. 961.

DIVISION VETERINARIAN

The division veterinarian was one of the technical assistants of the division surgeon. His duties related to the care of the animals of the division and to the professional supervision of the veterinary personnel attached to the division. His duties were closely related to those of the division surgeon, but because of the special character of the work done the division veterinarian was provided with the following office equipment: ^{31 a}

Brooms, corn-----number--	1	Lantern, candle, folding-----number--	2
Candles-----do-----	24	Typewriter-----do-----	1
Chair, folding-----do-----	3	Typewriter ribbon-----do-----	2
Desk, field, No. 1, veterinary-----do-----	1		

MOBILE VETERINARY SECTION

In the development of units of organization of the Veterinary Corps in 1917-18 to adapt it to field service and combat conditions a divisional unit was provided under the title "Mobile veterinary section." One such section was allowed each division. The duties of this organization with reference to disabled animals were similar to those of a field hospital in the care of the disabled personnel of the division. A unit equipment was designed and provided for this organization. Inclusive of the individual equipment of commissioned and enlisted personnel of the organization this unit equipment contained the following: ³²

Boxes, pack mule (for miscellaneous articles)-----number--	2	Saddle, pack-----number--	1
Chest:		Wallet:	
Veterinary field unit-----do-----	4	Farrier's-----do-----	2
Veterinary officer's-----do-----	1	Veterinary officer's-----do-----	1

REFERENCES

- (1) Manual for Medical Department, 1902, pp. 152, 171.
- (2) *Ibid.*, 1902, par. 288.
- (3) *Ibid.*, 1906, pars. 544-553.
- (4) *Ibid.*, 1911, pars. 560, 622, 628.
- (5) *Ibid.*, 1906, par. 559.
- (6) *Ibid.*, 1916, par. 886.
- (7) *Ibid.*, 1906, par. 553.
- (8) *Ibid.*, 1916, page 211.
- (9) *Ibid.*, 1916, par. 879, p. 286, Equipment C.
- (10) *Ibid.*, 1916, par. 881.
- (11) *Ibid.*, 1916, par. 691.
- (12) *Ibid.*, 1916, pars. 692-693.
- (13) *Ibid.*, 1911, pars. 648-650; Manual for the Medical Department, 1916, par. 694.
- (14) *Ibid.*, 1916, par. 702 (a).
- (15) *Ibid.*, 1916, par. 703.
- (16) *Ibid.*, 1916, par. 707.
- (17) *Ibid.*, 1916, par. 707 (a).
- (18) First Indorsement Surgeon General to the Chief of Staff, December 9, 1915, relative to medical supply depots and reserve supplies. On file, Record Room, S. G. O., 152911 (Old Files).

^a A more complete description of this equipment will be found under veterinary equipment.

- (19) Data compiled in 1927 from the property returns of the Field Medical Supply Depot. On file in the Office of the Chief of Finance under the supervision of C. E. Stoddard, Principal Clerk, Finance and Supply Division, S. G. O.
- (20) Letters, Surgeon General, to the medical supply officers at St. Louis, Mo., March 3, 1917, and San Francisco, Calif., May 23, 1917, relative to assembling medical unit equipment. On file, Finance and Supply Division, S. G. O., 12892-x-1 (Old Files).
- (21) Memorandum from the Militia Bureau to the Surgeon General, May 23, 1917, relative to National Guard medical units, which required equipment. On file, Finance and Supply Division, S. G. O., 12892-X-1 (Old Files).
- (22) Equipment "C" supplies, Field Hospital, Par. 879, Medical Supplies Only, Field Medical Supply Depot, 1918. On file, Medical Section, New York General Intermediate Depot, Army Supply Base, Brooklyn, N. Y.
- (23) Manual for the Medical Department, 1916, pars. 668-690.
- (24) *Ibid.*, 1916, par. 878.
- (25) *Ibid.*, 1916, par. 876.
- (26) General Orders, Nos. 63 and 137, War Department, July 23 and October 30, 1917.
- (27) Data compiled in Surgeon General's Office during the war period, in possession of the author.
- (28) Manual for the Medical Department, 1916, par. 743.
- (29) *Ibid.*, 1916, par. 744.
- (30) *Ibid.*, 1916, par. 884-885.
- (31) Par. 992. Additional paragraph to Manual for the Medical Department, 1916, proposed by the Surgeon General, February 19, 1918, and used thereafter. On file, Finance and Supply Division, S. G. O., $\frac{750-714 \text{ S. G.}}{732}$.
- (32) First indorsement, Surgeon General, to division veterinarian, 88th Division, Camp Dodge, Iowa, July 23, 1918, relative to overseas equipment. On file, Finance and Supply Division, S. G. O., $\frac{531-123 \text{ Dodge}}{204}$.

CHAPTER XVII

EVACUATION HOSPITAL

The Medical Department units necessary to an army in the field are those with the combat troops, and those primarily of the line of communications or communications zone. To the units with combat troops belong the medical units of the division already considered. They are integral parts of the division and are required wherever the division may be, in camp or in combat, whether operating alone or combined with other divisions into corps and armies. When combined into corps and armies other medical units of like organization are attached to the corps or army for service with corps or army troops not parts of divisions. They also constitute a reserve which may be used by the chief surgeon of the corps or army whenever it is necessary to augment the units of the division. To the units of the line of communications, or communications zone, belong evacuation hospitals and base, camp, and convalescent hospitals.

The evacuation hospital is essentially mobile and it follows closely in the rear of the divisional units.¹ Its primary function is to relieve the field hospitals after combat either by taking over the patients and equipment in situ, with an exchange of equipment, or by transfer of the patients alone.² The evacuation hospital may be established during the battle in sufficiently close proximity to the battle field to receive patients directly from the ambulance, dressing, or collecting stations. In which event it serves as an adjunct to the divisional field hospital and takes its place. In either event its presence permits the division field hospitals to clear promptly and proceed with the division of which they are a part.²

The equipment of an evacuation hospital is much more extensive and complete than that of the field hospital. It moves only when its presence is required by reason of a battle. It may be transported by animal-drawn transportation, by motor truck, or by rail. It is usually established near a rail head³ and is more apt to move by rail than by other means of transportation. Its equipment, while not nearly so comprehensive as that of the base hospital, is sufficiently complete to provide effectual treatment for the sick and wounded with a reasonable degree of comfort.⁴

The treatment administered at evacuation hospitals is ordinarily as complete as the existing condition will admit. If the wounded are coming in rapidly and in large numbers, the surgical treatment must be limited to emergency operations, the treatment of shock, and the better preparation of the wounded for transport. If the wounded arrive slowly, in small numbers, and an early move of the hospital be not in prospect, complete operative treatment may be given even during the battle.⁵

The equipment provided is of the field type, essentially the same as that of the field hospital. It is more comprehensive than the latter and more extensive since it is intended to care for a greater number of patients. As originally planned, the equipment provided for 324 patients and was considered commensurate with its mission.⁶ This equipment was first introduced into the supply table of the Medical Department in 1911.⁷

During the years 1912-1916 such changes were made in the equipment of the evacuation hospital as changes in standard field equipment and a more adequate conception of its mission indicated. These changes were generally along the lines of simplicity, durability, efficiency and portability of equipment. Better designs were effected. Improved articles were substituted. New articles were added to provide better treatment. Unnecessary articles were eliminated. The normal bed capacity of the evacuation hospital was expanded from 324 in 1911 to 450 in 1916.⁴ The weight of the equipment of 1911 was, medical, 40,166 pounds; quartermaster, including tentage and camp equipment but exclusive of transportation, 24,654 pounds;⁸ aggregate, 64,820 pounds. This equipment required for its transportation 17 standard trucks or two standard freight cars, which were not completely filled.⁹ The weight of the 1916 equipment under the same conditions, although providing for 450 patients instead of 324, was, medical, 34,663 pounds; quartermaster, 19,275 pounds; total, 53,938 pounds.¹⁰

Observations in the theater of operations in 1917 convinced the chief surgeon, A. E. F., that the standard equipment of the evacuation hospital would be inadequate to the conditions of warfare then existing.¹¹ The battle lines were more or less fixed by reason of the trench warfare which then obtained. Moves of the evacuation hospital were of comparatively infrequent occurrence. Evacuation hospitals took on more and more the functions of base hospitals; they became the hospitals of the sector where a great deal of major surgery was done. Because of a steady flow of casualties in comparatively large numbers, it became necessary to expand these hospitals and to augment their equipment as to both quantity and variety.¹² The capacity of the evacuation hospital was increased to 1,000 patients, with an emergency expansion to 2,000.¹³ The following list shows the initial equipment of a 1,000-bed evacuation hospital:

List of medical supplies for the initial equipment of 1,000-bed evacuation hospital (overseas)

(Revised, S. G. O., June 29, 1918)

MEDICINES, ETC.

	Quantity		Quantity
Acidum boricum, pulvis	pounds.. 50	Chloroformum, ¼-pound tin	tins.. 500
Acidum salicylicum, 324-mgm., 400 tablets	tins.. 6	Cocainæ hydrochloridum, 10-mgm. hypolemic tablets, 20 in tube	tubes.. 40
Ether, ¼ pound in tin	do... 1,000	Codeina, 32-mgm., 600 tablets in tin	tins.. 6
Alcohol, 3 pints in tin	do... 400	Colloidum, 1-ounce bottle	bottles.. 50
Amylis nitris, 5-drop, 12 in box	boxes.. 50	Foot powder (par. 902), ¼-pound tin	tins.. 300
Apomorphinæ hydrochloridum, 6-mgm. hypodermic tablets, 20 in tube	tubes.. 24	Glycerinum, 3 pints in tin	do... 20
Argenti nitras crystals, 1 ounce in bottle	bottles.. 6	Hexamethylenamina (urotropin), 324-mgm. tablets, 600 in tin	tins.. 10
Argenti nitras fusus, 1 ounce in bottle	do... 6	Ilydrargyri chloridum corrosivum, tablets (antiseptic), 250 in bottle	bottles.. 40
Acidum acetylsalicylicum, 324-mgm. tablets, 500 in bottle	bottles.. 30	Ilydrargyri chloridum mite, 32-mgm. tablets, 1,000 in bottle	bottles.. 12
Barbital, 324-mgm. tablets, 100 in bottle	do... 24	Ichthyolum, 3 ounces in bottle	do... 12
Chloralum hydratum, 324-mgm., 400 tablets in tin	tins.. 6		

	Quantity		Quantity		
Iodine swabs, 6 in box	boxes	200	Potassii iodidum, 324-mgm., 500 tablets in bottle	bottles	12
Iodum-potassii iodidum	tubes	700	Protargol (or equivalent), 1 ounce in bottle	do	100
Linimentum rubefaciens, 200 tablets in tin (par. 902)	tins	20	Pulvis ipecacuanhæ et opii, 324-mgm. tablets, 700 in tin	tins	12
Magnesiæ sulphas, 3 pounds in tin	do	100	Quininae hydrochlorosulphas, 32-mgm. hypodermic tablets, 20 in tube	tubes	40
Mistura glycyrrhizæ composita, tablets (par. 902), 3,600 in tin	tins	10	Quininae sulphas, 200-mgm., 1,000 tablets in tin	tins	20
Morphinae, sulphas:			Sapo mollis (green soap), 1 pound in jar	jars	200
8-mgm. hypodermic tablets, 20 in tube	tubes	500	Sodii bicarbonas, pulvis	pounds	100
8-mgm., 600 tablets in tin	tins	6	Sodii bicarbonas et mentha piperita tablets (par. 902), 100 in tin	tins	12
Normal saline solution, 150 tablets in tin (par. 902)	tins	3	Sodii carbonas monohydratus, for surgical use, ½ pound in tin	tins	80
Oleum ricini, 3 pints in tin	do	30	Sodii salicylas, 324-mgm., 600 tablets in tin	do	12
Oleum terebinthinae rectificatum, 3 pints in tin	tins	40	Spiritus ammonia aromatiens, ½ pound in bottle	bottles	33
Petrolatum, 12 ounces in tin	do	100	Spiritus frumenti, 1 quart in bottle	do	123
Phenol, ½ pound in bottle	bottles	32	Strychnina sulphas, 1-mgm. hypodermic tablets, 20 in tube	tubes	200
Phenylis salicylas (Salol), 324-mgm. tablets, 500 in bottle	bottles	12	Sulphur lotum, ½ pound in tin	tins	48
Pilula aloini compositæ (or tablets) (par. 902), 750 in tin	tins	12	Tinctura digitalis, 0.3 c. c., 800 tablets in tin	do	12
Pilula camphoræ et opii (or tablets) (par. 902) 875 in tin	tins	10	Tinctura opii, ½ pound in bottle	bottles	18
Pilula eartharticae compositæ (or tablets), 1,200 in tin	tins	20	Trochisci ammonii chloridi, 350 in tin	tins	24
Pilula ferri compositæ (or tablets) (par. 902), 1,200 in tin	tins	12	Unguentum hydrargyri, ½ pound in bottle	bottles	10
Plumbi acetas, 137-mgm., 600 tablets in tin	do	12	Unguentum hydrargyri chloridi mitis, 30 per cent, ½ pound in bottle	bottles	18
Postassii bromidum, 324-mgm., 500 tablets in bottle	bottles	12	Zinci oxidum, powder, ½ pound in tin	tins	12
Potassii chloras, 324-mgm., 1,200 tablets in tin	tins	12	Zinci sulphas, 324-mgm. tablets, 250 in tin	do	12

NOTE.—If containers as given above are not available, equivalent quantities in other containers will be furnished.

STATIONERY

Bands, elastic	dozen	100	Paper:		
Books, blank:			Blotting	quires	12
Crown (cap), 250 pages	number	24	Carbon—		
8vo, 150 pages	do	24	Cap, 100 sheets in box	boxes	4
Books, note, manifolding, 4 by 6 inches:			Letter, 100 sheets in box	do	8
Binders	do	24	Fasteners	do	12
Fillers	do	48	Manifolding—		
Envelopes, official:			Cap, 250 sheets in package	packages	8
Large	do	300	Letter, 500 sheets in package	do	12
Letter	do	1,500	Typewriter—		
Erasers, rubber:			Cap, 250 sheets in package	do	6
Pencil	do	12	Letter, 500 sheets in package	do	12
Typewriter	do	12	Writing—		
Ink:			Letter, 100 sheets in pad	pads	36
Black, powder (or tablets)	boxes	6	Note, 100 sheets in pad	do	150
Red, powder (or tablets)	do	6	Paste, photo, in tube, with brush	tubes	12
Labels:			Pencils:		
For vials	gross	24	Indelible	dozen	12
Poison	dozen	48	Lead	number	144
Pads, prescription	do	24	Penholders	do	36
			Pens, steel	gross	3

MISCELLANEOUS

Acetylene lighting and heating unit (par. 927½)	number	2	Bandages—Continued.		
Alcohol, denatured, 2 quarts in tin	tins	200	Rubber, Martin	number	24
Apparatus, restraint (par. 904)	number	2	Suspensory	dozen	16
Aprons, rubber	do	100	Basins, hand, enamel ware	number	120
Atomizers, hand	do	72	Bedpans, enamel ware or aluminum ware	do	50
Bags, rubber, hot-water and syringe	do	100	Bed sacks	do	500
Bandages:			Blankets:		
Gauze, compressed, 3 inch, 1 gross in box	boxes	200	Gray	do	4,000
Plaster of Paris, 3-inch, in individual packets	dozen	18	Rubber	do	140
			Books, medical, box of (par. 908)	do	1
			Bougies, flexible, Nos. 11, 13, 15, 17, 20, 22. French scale	number	24

Boxes:	Quantity	Litters:	Quantity
Folding for tablets.....dozen	360	With slings.....number	200
Fracture, folding.....number	3	Extra canvas for.....pieces	150
Ointment, 3 in nest.....aests.	720	Extra tacks for, 75 in package.....packages	150
Brooms, corn.....number	72	Matches, safety boxes.....dozen	72
Brushes:		Medicine droppers.....number	144
Haud, fiber.....do	200	Medicine glasses.....do	144
Scrubbing.....do	200	Mortars and pestles, porcelain, 7-cm.....do	4
Buckets:		Muslin, unbleached.....yards	300
Enamel ware, 3 in nest.....nests	20	Needles, common.....papers	144
Galvanized iron.....number	100	Needles, surgical, assorted.....dozen	72
Cases:		Pajama suits.....number	3,000
Bedding—		Paper:	
Large, empty.....do	240	Litmus, 100 strips, in vial; blue, 6; red, 6, vials.....	12
Small, empty.....do	50	Toilet.....packages	500
Emergency (par. 913).....do	5	Wrapping, brown.....quires	24
Catheters, flexible.....do	100	Pill tiles, hard rubber.....number	2
Chairs, folding.....do	100	Pillowcases, cotton.....do	2,000
Chests:		Pillow sacks.....do	500
Commode (par. 928).....do	21	Pins:	
Cooking utensils (par. 929).....do	6	Common.....papers	144
Medical and surgical (par. 932).....do	5	Safety, 3 sizes.....dozen	240
Supplementary (par. 933).....do	2	Pitchers, 3-liter enamel ware.....number	36
Tableware (par. 936).....do	18	Plaster:	
Corks, assorted, 300 in bag.....bags	3	Adhesive—	
Corkscrews.....number	6	Zinc oxide, 5 yards by 1 inch.....spools	400
Cots.....do	500	Zinc oxide, 5 yards by 2½ inches.....do	144
Cotton, absorbent:		Isinglass, 1 yard, in roll.....rolls	50
In roll.....pounds	200	Moleskin.....yards	20
Sterilized, 1 ounce., in package.....packages	2,000	Plaster of Paris, 4 pounds in tin.....tins	30
Crutches:		Pus basins.....number	72
Assorted lengths.....pairs	100	Razors (par. 932).....do	24
Rubber tips for, assorted sizes.....number	600	Razor strops for (par. 932).....do	6
Cups, enamel ware.....do	1,500	Rope, ¾-inch.....feet	600
Cushions:		Shears.....number	6
Rubber—		Sheets, cotton.....do	2,000
Open center.....do	75	Silk, oiled (or equivalent), 5 yards in roll.....rolls	10
Small.....do	25	Spatulas 3-inch (par. 932).....number	6
Surgical, Kelly's.....do	12	Splints:	
Desks, field No. 1 (par. 940).....do	2	Coaptation, 5, in set.....sets	48
Dippers.....do	24	Hodgen's.....number	12
Eye shades:		Wire gauze for, 1 yard, in roll.....rolls	72
Double.....do	200	Wood, veneer.....number	300
Single.....do	100	Stethoscopes, double (par. 933).....do	6
First-aid packets (par. 941).....do	500	Stoves, blue flame:	
Flags, staffs for.....do	1	One burner.....do	36
Flasks, Erlenmeyer, 2-liter.....do	50	Extra wicks for.....do	72
Funnels, aluminum ware.....do	24	Sutures:	
Gauze:		Catgut, chromicized, 3 sizes in package.....packages	1,000
Plain—		Horsehair, 100 in coil.....coils	24
25 yards in roll.....yards	2,000	Catgut, plain, 3 sizes in package.....packages	2,000
Sterilized 2 half-yard lengths, in packages.....packages	1,000	Silk, 3 sizes in package.....do	600
Sublimated, half-yard lengths, in package.....packages	3,000	Silkworm gut, 100 in coil.....coils	100
Gloves, rubber, 6½, 7, 7½, 8, 8½; 80 of each.....pairs	400	Silver wire, in yard lengths.....yards	24
Gowns, operating.....number	300	Syringes, hypodermic (par. 956).....number	60
Graduates, glass.....do	24	Syringes:	
100 c. c.....do	24	Hypodermic—	
250 c. c.....do	12	Extra needles for.....do	360
600 c. c.....do	12	Extra wires for.....bundles	60
Individual dressing packets (par. 949).....do	500	Penis, glass, in case.....number	144
Inhalers, chloroform, Esmarch, with drop bottles.....number	6	Tables:	
Lanterns:		Bedside, folding.....do	100
Globes for—		Mess, folding.....do	48
Green.....do	24	Operating, field, folding.....do	12
White.....do	144	Typewriter, folding.....do	12
Wicks for.....do	360	Tape measure, 60-inch.....do	12
Without globes or wicks.....do	72	Test tubes, 3 in nest.....nests	60
		Thermometers, clinical.....number	400
		Thread, cotton, assorted.....spools	72

	Quantity		Quantity		
Tonniquets and bandages, rubber.....	number..	48	Typewriters, record ribbons for.....	number ..	36
Towels:			Urinals, enamel ware or aluminum ware.....	do.....	50
Bath.....	dozen	170	Urinometers.....	do.....	6
Dish.....	do.....	24	Veneral prophylaxis units (par. 95S).....	do.....	1
Hand.....	do.....	1,000	Vials:		
Trays, instrument, enamel ware.....	number..	24	1-ounce.....	dozen ..	48
Tubes, stomach.....	do.....	18	2-ounce.....	do.....	96
Tubing, drainage, unperforated.....	yards ..	360	4-ounce.....	do.....	48
Twine, fine, 5 pounds, and coarse, 20 pounds			Wire cutters.....	number ..	4
.....	pounds..	25	Chests, field laboratory, Nos. 1, 2, 3, 4, 5, and 6 (as		
Typewriters.....	number..	12	per attached list of contents).....	number..	1

CONTENTS OF FIELD LABORATORY CHEST No. 1

Blood lancet.....	number..	1	Wire—Continued.		
Bottles, narrow-mouth, 50 c. c., cap.....	do.....	7	Nichrome, 20-gauge.....	centimeters..	60
Pipettes, Barnes, for above bottles.....	do.....	7	Baskets, wire, for culture tubes.....	number..	9
Burners, alcohol, 4-ounce.....	do.....	1	Burners, Tirrill.....	do.....	2
Cover glasses No. 1, 22 mm. square.....	do.....	1	Tripod for above.....	do.....	1
File, triangular, 4-inch.....	do.....	1	Paper, filtering, for blotting slides, 480 by 480		
Forceps, medium fine, 115-mm.....	do.....	2	mm.....	sheets ..	20
Funnels, glass, with 60° angle ground rims, 75 mm.			Pipettes:		
diameter.....	number..	2	1 c. c. in one one-hundredths.....	number..	24
Glass tubing, soft for bending, each piece 30 cm.			10 c. c. in one-tenths.....	do.....	6
long, 8 mm. diameter.....	pieces ..	10	Pipette box.....	do.....	1
Graduates, glass, 30 c. c.....	number..	1	Rods, stirring:		
Hæmocytometer, complete in leather case, double			20 cm. long by 4.8 mm. diameter.....	do.....	1
Nebauer ruling.....	number..	2	25 cm. long by 8 mm. diameter.....	do.....	1
Hæmoglobinometer.....	do.....	1	Rubber tubing, cloth wrapped, 6-mm. bore.....	coil..	1
Jars, Coplin, staining.....	do.....	4	Support with iron base, 10 cm. by 15 cm., rod 45		
Labels:			cm. by 8 mm.....	number..	1
Microscopic.....	books..	1	Rings for above 68 mm.....	do.....	1
Dennison, No. 231.....	do.....	2	Rings for above 93 mm.....	do.....	1
Microscope.....	number..	1	Test tubes:		
Mechanical stage.....	do.....	1	Heavy wall, without lip, 150 by 16.....	do.....	225
Needles, inoculating.....	do.....	6	Medium wall, without lip, 75 by 10.....	do.....	225
Paper, filtering:			Thermometers:		
For blotting slides 2 by 2.....	sheets..	24	100° C.....	do.....	2
150 mm.....	packages..	1	200° C.....	do.....	2
Pencils:			Towels, hand, standard.....	do.....	12
Lead.....	number..	2	Balance prescription.....	do.....	1
Wax—			Weights for above.....	do.....	1
Blue.....	do.....	1	Blank book, 150 pages.....	do.....	1
Red.....	do.....	1	Standard Methods of Water Analysis.....	copy..	1
Pipettes:			Box for matches.....	number..	1
Dropping, 10 cm.....	do.....	4	Box for soap.....	do.....	1
1 c. c. graduated in one one-thousandths			Brushes, test tube.....	do.....	2
number.....	do.....	6	Burners, Khotal.....	do.....	2
10 c. c. graduated in one-tenths.....	do.....	2	Cards, record.....	do.....	200
Rubber tubing, 3-mm. bore by 1-mm. wall for			Clamps, Mohr's, pinchcocks:		
hæmacytometers.....	centimeters..	60	5 cm.....	do.....	1
Slides:			6.25 cm.....	do.....	1
75 by 25 mm.....	cartons ..	4	Color comparison tubes.....	do.....	6
Concave center.....	numbers..	24	Counting plate, Jeffers.....	do.....	1
Syringes:			Funnel, enamel:		
Luer, 10 c. c. with 2 needles.....	do.....	2	8.5 cm.....	do.....	1
Needles, 37 mm. by 20 gauge.....	do.....	4	11 cm.....	do.....	1
Test tubes:			Funnels, glass:		
Thin wall with lip 150 by 18 mm.....	do.....	12	Ground rims, 65 mm.....	do.....	1
Thin wall with lip 120 by 16 mm.....	do.....	12	Ribbed.....	do.....	1
Thin wall with lip 100 by 12 mm.....	do.....	12	Gasometer scale.....	do.....	1
Urinometer, Squibbs.....	do.....	1	Graduate, 250 c. c.....	do.....	1
Wire:			Matches, safety.....	boxes..	24
Copper, 16-gauge.....	spools..	1	Paper filter, 100 mm. diameter.....	packages..	3

CONTENTS OF FIELD LABORATORY CHEST No. 2

Acid:			Copper sulphate, in 1-ounce bottle.....	bottles..	1
Acetic, 99 per cent, in 1-pound bottle.....	bottles..	1	Eesin, in 10-gram bottle.....	do.....	1
Sulphuric, in ¼-pound bottle.....	do.....	1	Fuchsin, in 10-gram bottle.....	do.....	1
Bismarek brown, in 10-gram bottle.....	do.....	1	Gentian violet in 10-gram bottle.....	do.....	1

	Quantity		Quantity
Iodine, in 1-ounce bottle.....	bottles.. 1	Dextrose, in 1-pound bottles.....	bottles.. 1
Mercuric chloride, in 1.4-pound bottle.....	do... 1	Fuchsin acid, in 10-gram bottle.....	do... 1
Methylene blue:		Laetose, in 1-pound bottle.....	do... 1
Loeffer's, in 50-c. c. bottle.....	do... 1	Litmus powder, in ¼-pound bottles.....	do... 4
In 10-gram bottle.....	do... 1	Normal saline solution, tablets in 1-pound bottle.....	bottles.. 1
Aniline oil, in 50-c. c. bottle.....	do... 1	.....	bottles.. 1
Paraffin, 52, in 1-ounce tin.....	tins.. 1	Peptone, in 1-pound bottle.....	do... 1
Petrolatum, in 1-ounce bottle.....	bottles.. 1	Silver nitrate, saturated solution.....	do... 1
Phenol, in 1-ounce bottle.....	do... 1	Sodium carbonate, in 1-pound bottle.....	do... 1
Potassium iodide, in 1-ounce bottle.....	do... 1	Sodium hydroxide, in ½-pound bottle.....	do... 1
Sodium chloride, in 1.4-pound bottle.....	do... 1	Sodium sulphite, in ¼-pound bottle.....	do... 1
Sodium sulphate, in 1.4-pound bottle.....	do... 1	Saccharose, in 1-pound bottle.....	do... 1
Wright's stain, in 0.02-gram ampoules.....	ampoules.. 15	Sodium chloride, in 1-pound bottle, U. S. P.....	do... 1
Bottles (citrate of magnesia).....	bottles.. 8	Litmus paper, in vials:	
Bottles, 4-ounce glass stoppered, narrow mouth, filled with the following reagents:		Blue.....	vials.. 2
Acid—		Red.....	do... 2
Nitric, 10 per cent solution.....	bottles.. 1	Alcohol:	
Sulphanilic, 1 per cent.....	do... 1	Ethyl, in 1-pound bottle.....	bottles.. 1
Sulphuric, concentrated.....	do... 1	Methyl, in 1-pound bottle.....	do... 1
Diphenylamine, 0.02 per cent solution.....	do... 1	Petri dishes.....	number.. 24
Naphthalamine, 1 per cent solution.....	do... 1	Holders.....	do... 2
Sodium chloride solution.....	do... 2	Sternberg field outfit.....	do... 1
Agar agar, in 1-pound packages.....	packages.. 1	Tanks, tin, 7¾ by 5 inches, to hold alcohol and mineral oil.....	number.. 2
Bacto bile, in 1-pound bottle.....	bottles.. 1	Formaldehyde, 40 per cent.....	do... 1
Beef extract, in ¼-pound jars.....	jars... 1	Chloroform, 8-ounce bottle.....	do... 1

CONTENTS OF FIELD LABORATORY CHEST No. 3

Sterilizer, hot air, Lautenschlager form, 12 by 18 by 9 inches, for kerosene heating, with 2 Khotal burners.....	number.. 1
--	------------

CONTENTS OF FIELD LABORATORY CHEST No. 4

Autoclave, copper, with hinged lid on sheet-iron base. Inside dimensions, 11 inches diameter by 24 inches deep, with 2 baskets, to be heated with Khotal burner.....	number.. 1
--	------------

CONTENTS OF FIELD LABORATORY CHEST No. 5

Acetylene lighting and heating unit (par. 927½ M. M. D.).....	number.. 1
---	------------

CONTENTS OF FIELD LABORATORY CHEST No. 6

Microscope.....	number.. 1	Funnel stop.....	number.. 1
Mechanical stage.....	do... 1	Micro lamp complete.....	do... 1
Dark ground illuminator.....	do... 1	Xylol.....	pounds.. 1

ADDITIONAL ARTICLES

MEDICINES			
Hydrargyri salicylas, 1 ounce in bottles.....	bottles.. 10	Mattresses, for standard white enamel bedsteads.....	number.. 500
Iodine crystals, 1 ounce in bottles.....	do... 50	Mattress pads for metal folding cots.....	do... 500
Procaïne, 1 ounce in bottles.....	do... 6	Mortars and pestles, wedgewood, 29-cm.....	do... 4
MISCELLANEOUS		Pails, commode (close stools).....	do... 36
Apparatus, X-ray, standard set.....	number.. 1	Patching outfits for rubber gloves, etc.....	do... 6
Applicators for throat, wood, boxes.....	gross.. 10	Pillow cases, cotton.....	do... 4,000
Basins for sponges, etc., enamel ware.....	number.. 60	Pillows:	
Bedsteads, white enamel, standard.....	do... 500	Feather.....	do... 1,100
Boilers, instrument, portable, small.....	do... 24	Hair.....	do... 1,000
Bottles, 4-liter, for antiseptic solutions.....	do... 20	Scales and weights:	
Cabinets for dressings and instruments.....	do... 1	Apothecaries, metric system (par. 845).....	do... 1
Cases:		Balance in glass case.....	do... 1
Aspirating (par. 910).....	do... 2	Sheeting, rubber.....	yards.. 200
Ear, nose, and throat (par. 912).....	do... 2	Sheets, cotton.....	number.. 4,000
Eye (par. 914).....	do... 1	Shirts, night.....	do... 4,000
Foreeps, hemostatic (par. 915).....	do... 8	Soap:	
General operating (par. 916).....	do... 6	Common.....	pounds.. 400
Genitourinary (par. 917).....	do... 2	Ivory.....	do... 200
Post-mortem (par. 924).....	do... 1	Scouring.....	do... 100
Chests, tool, No. 1 (par. 937).....	do... 1	Stools, revolving, white enamel.....	number.. 12
Cots, metal, folding.....	do... 500	Suits, convalescent, heavy.....	do... 2,000
Irrigators, graduated 2-liters.....	do... 35	Tables, dressing, ward, rolling, enamel or galvanized iron.....	number.. 12

* For the present these items will be obtained by requisition upon arrival at station overseas.

	Quantity	Catalogue	Quantity
Tongue depressors, wood	gross..	No.	
Tubing, drainage, red rubber:		Scissors—Continued.	
$\frac{3}{8}$ -inch	yards..	Straight—Continued.	
$\frac{1}{2}$ -inch	do....	Double blunt—	
$\frac{5}{8}$ -inch	do....	5 $\frac{1}{2}$ -inch	number.. 12
$\frac{3}{4}$ -inch	do....	110-1. 6 $\frac{1}{2}$ -inch	do.... 12
		111. 1-point, sharp 5-1 $\frac{1}{2}$ -inch	do.... 36
		112. Double point, sharp 5 $\frac{1}{2}$ -inch	do.... 24
		115. Bandage	do.... 40
		Forceps:	
		120. Hemostatic (Kocher)	do.... 100
		Intestinal (Doyen)—	
		Straight, 9-inch	do.... 6
		Curved, 9-inch	do.... 6
		126. Sponge holders, long	do.... 100
		127. Tissue, Allis, 6-inch	do.... 24
		128. Dressing, 10-inch	do.... 60
		130. Thumb, plain, 5 $\frac{1}{2}$ -inch	do.... 72
		131. Tissue, mouse-toothed, 5 $\frac{1}{2}$ -inch	do.... 36
		Needle holder:	
		132. Richeer, 7-inch	do.... 8
		133. Hegar, 7 $\frac{1}{2}$ -inch	do.... 8
		Forceps:	
		134. Towel (Baekhaus) 6-inch	do.... 60
		135. Bullet 8-inch (Senn)	do.... 6
		140.1. Tourniquet, Esmarch's, with chain	do.... 24
		151. Retractor, Sharp, 4-tooth, 8 $\frac{1}{2}$ -inch	do.... 36
		156. Probes, 8-inch	do.... 24
		158. Directors, grooved	do.... 24
		Forceps:	
		173. Bone-cutting (Liston)	do.... 12
		175. Rongeur, curved (Horsley) 8 $\frac{1}{2}$ -inch	do.... 6
		177. Sequestrum, screw lock	do.... 6
		188. Currettes, bone, sizes, 2, 4, 6	sets.. 4
		313. Tongue depressors (Farlow)	number.. 12
		430. Sphygmomanometer	do.... 2
		455. Mask, metal, Yankauer	do.... 12
		630. Politzer bags	do.... 6
Apparatus, Carrel-Dakin (revised), with extra articles and chemicals	number..		
Drums, nickel, sterilizing dressings:			
10-inch diameter	do....		
9-inch diameter	do....		
Forceps, dressing, 6-inch, medium	do....		
Needles, Reverdin	do....		
Ophthalmoscopes	do....		
Retractors, deep, 7 $\frac{1}{2}$ -inch, with 2-inch hook	pairs..		
Speculum, rectal (Sims), bivalve, wrought metal	number..		
Sterilizers, standard outfit, including autoclaves	number..		
Syringes, glass, Luer:			
2 c. e.	do....		
10 c. e.	do....		
30 c. e.	do....		
Extra needles for 2 c. e., 10 c. e., 30 c. e., of each	dozen..		
Tips, intravenous, infusion metal	do....		
Catalogue			
No.			
Scalpels:			
102. 5 $\frac{1}{4}$ -inch	number..		
103. 6 $\frac{1}{4}$ -inch	do....		
Scissors:			
108. Dissecting, Mayo, curved 5 $\frac{1}{2}$ -inch	do....		
Straight—			
109. Mayo	do....		

M. M. D. 913.

Case, emergency

(In aluminum, brass, or leather case, with detachable sling)

Tablets, in $\frac{1}{2}$ -ounce h. r. bottles:		Tablets, hypodermic, extra (1 tube of each):	
Acetphenetidinum (phenacetin)	mgm.. 324	Digitalinum	mgm.. 1
Aspirin	do.... 324	Quininae hydrochlorosulphas	do.... 32
Bismuthi subnitras	do.... 324	Instruments, etc.:	
Caffeina citrata	do.... 65	Bistouries, curved and straight, of each	number.. 1
Heroini hydrochloridum	do.... 5.5	Case, linen, for instruments	do.... 1
Hydrargyri chlor. corros. (par. 902)	do.... 32	Forceps—	
Hydrargyri chlor. mite	mgm.. 32	Dissecting	do.... 1
Mistura glycyrrh. comp. (par. 902)	do.... 8	Hemostatic	do.... 1
Morphinae sulphas	mgm.. 8	Needles, surgical, assorted	do.... 12
Pilula aloini comp. (par. 902)	do....	Plaster, isinglass, 5 by 18 inches	rolls.. 1
Pilula camphora et opii (par. 902)	do....	Scalpel	number.. 1
Pilula catbart. comp.	do....	Scissors, straight	do.... 1
Potassii bromidum	mgm.. 324	Sutures—	
Pulvis ipeac. et opii	do.... 324	Silk, sterilized, 3 sizes in package	packages.. 2
Pulvis ipeac. et opii	do.... 324	Silver wire, sterilized, 1 yard	do.... 1
Quininae sulphas	do.... 200	Syringe, hypodermic (par. 956)	number.. 1
Sodii bicarbonas	do.... 324	Thermometer, clinical	do.... 1
Sodii bicarb. et menth. pip. (par. 902)	do....		
Sodii salicylas	mgm.. 324		
Tinctura digitalis	c. e.. 0.3		
Veronal	mgm.. 324		

NOTE.—For tropical use the contents of the emergency case, as listed above, are packed in a canvas roll, each roll containing, in addition, a brass box for sutures and hypodermic tubes.

M. M. D. 927½

Acetylene lighting and heating unit

(In wooden box with hinged lid. Prest-O-Lite cylinder in separate box or crate)

Lighting unit:		Lighting unit—Continued.	
Burner tips, extra.....	number .. 4	Valve, pressure-reducing ..	number .. 1
Cylinders, Prest-O-Lite, 70 cubic feet... do ..	2	Valve key.....	do .. 1
Case, fiber, for fixtures and tools.....	do .. 1	White lead, in compressible tube.....	tube .. 1
Fixture with one ½-foot burner.....	do .. 1	Wrench, open end, and valve.....	number .. 1
Fixture with four ½-foot burners, with reflector and chain.....	do .. 1	Heating attachment:	
Gaskets, lead.....	do .. 10	Connection, 2-way (packed with lighting unit)	number .. 1
Pliers.....	do .. 1	Hot plate (4-unit).....	do .. 1
Straps, webbing, for attachment of tubing to tent poles.....	do .. 6	Tubing, noncollapsible, 8-foot piece, with connections.....	pieces .. 1
Tubing, noncollapsible, two 25-foot lengths, with connections.....	feet .. 50		

NOTE 1.—The light and heat unit is simple in construction, and instructions for operating are furnished with each outfit.

NOTE 2.—When a Presto-O-Lite cylinder is exhausted it should be sent immediately to the proper depot or supply station for exchange.

NOTE 3.—Care should be taken in packing the fixtures to insure against damage in transportation.

NOTE 4.—When a full flow of gas is not required for heating or lighting, the valves should be closed enough to provide only the minimum quantity needed.

M. M. D. 928

Chest, commode

(Iron-bound wooden chest, with hinged top, removable bottom, and hasp and button, weight 62 pounds)

Bedpan, white enamel.....	number .. 1	Spit cup, white enamel.....	number .. 1
Chamber pot, white enamel.....	do .. 1	Urinal, white enamel.....	do .. 1
Paper, toilet.....	packages .. 6		

M. M. D. 929.

Chest, cooking utensils

(Iron bound chest, weight 134 pounds)

Batter whip and mixer.....	number .. 1	Masher, potato.....	number .. 1
Biscuit cutter, rotary.....	do .. 1	Match box.....	do .. 1
Bread board.....	do .. 1	Nail box, filled.....	do .. 1
Cake turner.....	do .. 1	Nutmeg grater.....	do .. 1
Can openers.....	do .. 2	Platters, meat.....	do .. 6
Cleaver, butcher's.....	do .. 1	Pot chain and scraper.....	do .. 1
Clothesline.....	feet .. 50	Sickle.....	do .. 1
Cookbook, Army.....	number .. 1	Soap box.....	do .. 1
Corkscrew and opener.....	do .. 1	Spice box, with 6 cans.....	do .. 1
Dipper.....	do .. 1	Spoons, serving.....	do .. 4
Dishes, vegetable and pudding.....	do .. 6	Squeezer, lemon.....	do .. 1
Egg whisk.....	do .. 1	Steel, butcher's.....	do .. 1
Emergency Diet for the Sick, Munson.....	do .. 1	Tea steeper.....	do .. 1
Forks, flesh.....	do .. 4	Tea strainer.....	do .. 1
Knife and saw, combination.....	do .. 1	Towels, dish.....	do .. 24
Knife, butcher's.....	do .. 1	Trays, serving.....	do .. 6
Ladle, soup.....	do .. 1	Wire, annealed.....	coils .. 1
Lantern.....	do .. 1	Wire cutter and pliers.....	number .. 1

M. M. D. 932.

Chest, medical and surgical

(Weight, 100 pounds)

MEDICINES AND ANTISEPTICS

Adrenalin chlorid, 1-mgm. tablets 20 in tube.....	tubes .. 5	Bismuthi subnitras, 324-mgm. tablets, 700 in 12-ounce tin.....	tins .. 2
Alcohol, 12 ounces in bottle.....	bottles .. 1	Chloroformum, ¼ pound in tin.....	do .. 3
Apomorphinae hydrochloridum, 6-mgm. hypodermic tablets, 20 in tube.....	tubes .. 3	Cocaina hydrochloridum, 10-mgm. hypodermic tablets, 20 in tube.....	tubes .. 7
Atropinae sulphas, 0.65-mgm. hypodermic tablets 20 in tube.....	tubes .. 7	Digitalinum, 1-mgm. hypodermic tablets, 20 in tube.....	tubes .. 5

Emetinæ hydrochloridum, 22-mgm. hypodermic tablets, 20 in tube.....tubes..	5	Phenol, crystals, ½ pound in bottle.....bottles..	1
Foot powder (par. 902).....tins..	1	Pilulæ camphoræ et opii (par. 902). 8/5 in 12-ounce tin.....tins..	1
Hydrargyri chloridum corrosivum, tablets (antiseptic) (par. 902), 350 in 12-ounce tin.....tins..	1	Pilulæ catharticæ compositæ, 1,200 in 12-ounce tin,.....tins..	2
Hydrargyri chloridum mite, 32-mgm. tablets, 1,000 in bottle.....bottles..	1	Potassi bromidum, 324-mgm. tablets, 500 in bottle.....bottles..	1
Hyoscine hydrobromidum, 0.65-mgm. hypodermic tablets, 20 in tube.....tubes..	3	Protargol (or equivalent), 1 ounce in bottle.....bottles..	1
Iodum-potassii iodidum.....do.....	20	Quininæ hydrochlorosulphas, 32-mgm. hypodermic tablets, 20 in tube.....tubes..	10
Linimentum rubefaciens, tablets (par. 902), 200 in 12-ounce tin.....tins..	1	Quininæ sulphas, 200-mgm. tablets, 1,000 in 12-ounce tin.....tins..	3
Magnesi sulphas, 3 pounds in tin.....do.....	1	Sodii salicylas, 324-mgm. tablets, 600 in 12-ounce tin.....tins..	1
Mistura glycyrrhizæ composita, 3,600 in 12-ounce tin.....tins..	1	Strychnine sulphas, 1-mgm. hypodermic tablets, 20 in tube.....tubes..	20
Morphinæ sulphas, 8-mgm hypodermic tablets, 20 in tube.....tubes..	45	Thymolis iodidum (Aristol), sprinkler.....number..	1
Nitroglycerin, 0.65-mgm. hypodermic tablets, 20 in tube.....tubes..	8	Unguentum hydrargyri chloridi mitis, 30 per cent, ½ pound in wide-mouth bottle.....bottles..	1
Petrolatum, in 12-ounce tin.....tins..	2		

The tubes of hypodermic tablets are all in one 12-ounce tin.

MISCELLANEOUS

Aprons, rubber.....number..	2	Matches, safety.....boxes..	6
Bag, rubber, hot-water, and syringe.....do.....	1	Medicine glass, in wooden case.....number..	1
Bandages:		Mortar and pestle, porcelain, 7 em.....do.....	1
Gauze, compressed, 3 sizes.....do.....	83	Pencils:	
Plaster of Paris, in individual packets.....do.....	6	Hair, 1 dozen in vial.....vials..	1
Rubber, Martin.....do.....	1	Indelible.....number..	2
Bands, elastic, in pouch.....do.....	16	Pins:	
Basins, hand, rubber.....do.....	2	Common.....papers..	1
Book:		Safety.....dozen..	2
Blank, 8vo.....do.....	1	Plaster, adhesive, z. o., 5 yards by 1 inch.....spools..	3
Note, manifolding, 4 by 6 inches—		Pouch, for gloves.....number..	1
Binder.....do.....	1	Razor.....do.....	1
Filler.....do.....	1	Razor, strop for.....do.....	1
Boxes:		Scissors.....do.....	1
Folding, for tablets.....gros..	1	Soap, hand.....cakes..	2
Ointment, 3 in nest.....nests..	8	Spatula, 3-inch.....number..	1
Box, soap, metal.....number..	1	Spoon, tea.....do.....	1
Brushes, hand, fiber.....do.....	6	Sutures	
Cases:		Catgut—	
Forceps, hemostatic (par. 915).....do.....	1	Chromicized, sterilized, 18 inches each, 3 sizes in package.....packages..	10
Operating, small (par. 922).....do.....	1	Plain, sterilized, 18 inches each, 3 sizes in package.....packages..	20
Tooth-extracting, 3 forceps in canvas roll.....do.....	1	Silk, braided, sterilized, 18 inches each, 3 sizes in package.....packages..	10
Catheters, flexible, 17, 20, 24, French scale, in tin.....number..	2	Silkworm gut, 100 in coil.....coils..	1
Corks, for 1-ounce vials, 50 in bag.....bags..	1	Syringe, hypodermic (par. 956).....number..	1
Corkscrew.....number..	1	Extra needles for.....do.....	12
Cotton, absorbent, sterilized 1-ounce package.....packages..	26	Tags, diagnosis.....books..	2
Cup, enamel ware.....number..	1	Thermometers, clinical.....number..	6
Gauze, sublimated, 2 half-yard lengths in package.....packages..	40	Tins, enameled, as containers.....do.....	17
Gloves, rubber, in pouch, sizes 8 and 9.....pairs..	2	Tongue depressor.....do.....	1
Inhaler, chloroform, Esmarch, with drop bottle.....number..	1	Tourniquet and bandage, rubber.....do.....	1
Labels:		Towels, hand.....do.....	6
For vials.....dozen..	6	Tubes, drainage, 2 sizes, in tin with catheters.....pieces..	2
Poison.....do.....	3	Vials, 1-ounce.....number..	9

M. M. D. 933.

Chest, Medical and Surgical, Supplementary

(Weight, 95 pounds)

MEDICINES AND ANTISEPTICS

Acidum boricum, 321-mgm. tablets, 700 in 12-ounce tin.....tins..	1	Amylis nitris, 5-drop spires, 12 in box.....boxes..	1
Acidum salicylicum, 324-mgm. tablets, 400 in 12-ounce tin.....tins..	1	Argenti nitras, crystals, 1 ounce in bottle.....bottles..	1
		Argenti nitras fnsas, 1 ounce in bottle.....bottles..	1
		Argyrol, 1 ounce.....bottles..	1

Arsenii trioxidum, 1-mgm. tablets, 500 in 3-ounce tin.....tins..	1	Plumbi acetas, 137-mgm. tablets, 600 in 3-ounce tin.....tins..	1
Aspirin, 324-mgm. tablets, 500 in bottle.....bottles..	1	Potassii chloras; 324-mgm. tablets, 1,200 in 12-ounce tin.....tins..	1
Caffeina citrata, 65-mgm. tablets, 250 in bottle.....bottles..	1	Potassii iodidum, 324-mgm. tablets, 500 in bottle.....bottles..	1
Capsicum, 32-mgm. tablets, 600 in 3-ounce tin.....tins..	1	Potassii permanganas, 324-mgm. tablets, 1,200 in 12-ounce tin.....tins..	1
Chloralum hydratum, 324-mgm. tablets, 400 in bottle.....bottles..	12	Pulvis ipecacuanhæ et opii, 324-mgm. tablets, 700 in 12-ounce tin.....tins..	1
Chloroformum, ¼ pound in tin.....tins..	1	Sodii bicarbonas, 324-mgm. tablets, 1,000 in 12-ounce tin.....tins..	1
Codeina, 32-mgm. tablets, 600 in 3-ounce tin.....tins..	1	Sodii bicarbonas et mentha piperita, tablets (par. 902), 1,000 in 12-ounce tin.....tins..	1
Collodium, 1 ounce.....bottles..	2	Sodii carbonas monohydratus, for surgical use, ½ pound in 12-ounce tin.....tins..	1
Emplastrum belladonnæ, 2 yards by 6 inches, in tin.....tins..	1	Spiritus ammoniæ aromaticus, ½ pound in glass-stopper bottle.....bottles..	2
Emplastrum cantharidis, 1 yard by 6 inches, in tin.....tins..	1	Spiritus frumenti, ½ pint in bottle.....do.....	1
Glycerinum, ½ pint in bottle.....bottles..	1	Sulphur lotum, ½ pound in 12-ounce tin.....tins..	1
Hexamethylenamina (Urotropin), 324-mgm. tablets, 600 in 12-ounce tin.....tins..	1	Tinctura digitalis, 0.3 c. c. tablets, 800 in 3-ounce tin.....tins..	1
Hydrargyri iodidum flavum, 10-mgm. tablets, 750 in 3-ounce tin.....tins..	1	Tinctura opii, ½ pound in bottle.....bottles..	1
Icthyolum, 3 ounces.....bottles..	1	Trochisci ammonii chloridi, 350 in 12-ounce tin.....tins..	1
Morphinæ sulphas, 8-mgm. tablets, 600 in 3-ounce tin.....tins..	1	Unguentum hydrargyri, ½ pound in wide-mouth bottle.....bottles..	1
Normal saline solution tablets (par. 932), 150 in 12-ounce tin.....tins..	1	Veronal, 324-mgm. tablets, 100 in 3-ounce tin, or equivalent.....tins..	1
Oleum ricini, 3 pints in tin.....do.....	1	Zinci oxidum, powder, ½ pound in 12-ounce tin.....tins..	1
Oleum terebinthinæ rectificatum, 3 pints in tin.....tins..	1	Zinci sulphas, 324-mgm. tablets, 250 in 3-ounce tin.....tins..	1
Oleum theobromatis, ½ pound in 12-ounce tin.....tins..	1		
Plenylis salicylas (Salol), 324-mgm. tablets, 500 in bottle.....bottles..	1		
Pilule aloini compositæ (par. 902), 750 in 3-ounce tin.....tins..	1		
Pilule ferri compositæ (par. 902), 1,200 in 12-ounce tin.....tins..	1		

MISCELLANEOUS

Atomizer, hand.....number..	1	Pill tile, hard rubber.....number..	1
Bags, rubber, hot-water, and syringe.....do.....	2	Specula, ear, set of 3.....sets..	1
Bandages, suspensory.....dozen.....	1	Spectrum, rectal.....number..	1
Bougies, flexible, Nos. 11, 13, 15, 17, 20, 22, French scale, in tin with catheters.....number..	6	Splints, wire gauge for, 1 yard in roll.....rolls..	12
Catheters, flexible, Nos. 15, 17, 18, 20, 22, 24, French scale, in tin with bougies.....number..	6	Stethoscope, double.....number..	1
Corks, for vials, 50 in bag.....bags..	1	Syringes, penis, glass.....do.....	12
Corkscrew.....number..	1	Syringe, rectal, hard rubber, 6-ounce.....do.....	1
Cups, enamel ware.....do.....	2	Tags, diagnosis.....books..	12
Eye shades, single.....do.....	6	Tape measure, 60-inch.....number..	1
Graduate glass, 100 c. c. in case.....do.....	1	Test tubes, 3 in nest.....nests..	2
Hand mirror in case.....do.....	1	Thread, cotton.....spools..	1
Medicine droppers.....do.....	6	Tins, enameled, as containers.....number..	26
Needles, common, assorted.....papers..	2	Tubes, drainage, unperforated, in tin with catheters.....pieces..	6
Paper, litmus, blue and red, 100 strips in vial, of each.....vials..	1	Tube, stomach.....number..	1
		Vials, 1-ounce.....dozen..	2

M. M. D. 936.

Chest, tableware

(Iron-bound chest; weight, 175 pounds)

Bowls, enamel ware or aluminum.....number..	106	Plates, enamel ware or aluminum.....number..	106
Forks, steel, triple-plated.....do.....	100	Sauces, enamel ware or aluminum.....do.....	106
Knives, steel, triple-plated.....do.....	100	Shakers, glass, salt and pepper, of each.....do.....	6
Pitcher:		Spoons, steel, triple-plated.....do.....	100
Large, enamel ware.....do.....	1		
Small, enamel ware.....do.....	1		

M. M. D. 958

Veneral Prophylaxis unit

(In pine box with hinged lid; weight 45 pounds)

Basins, e. w	number..	3	Soap, Ivory.....	cakes..	2
Form 77, M. D.....	do.....	200	Sponges, gauze, 1 dozen in box.....	boxes..	4
Graduate, glass, 120 c. c., in case.....	do.....	1	Syringes, penis, h. r.....	number..	4
Hydrargyri chloridum corrosivum, tablets (anti-septic) (par. 902), 350 in 12-ounce tin.....	tins..	1	Towels, hand.....	do.....	12
Protargol, 2 gms. in ampul.....	ampuls..	200	Unguentum hydrargyri chloridi mitis, 30 per cent, ½ pound in wide-mouth bottle.....	bottles..	4

NOTE.—List of contents and directions for administering the prophylactic are pasted on inside of cover.

WAR DEPARTMENT,
 ADJUTANT GENERAL'S OFFICE,
 Washington, June 3, 1918.

From: The Adjutant General of the Army.

To: Commanding generals of all National Army, National Guard, and Regular Army divisions, all department commanders, and chiefs supply bureaus.

Subject: Allowance of quartermaster supplies for base and evacuation hospitals for overseas duty.

The authorized equipment for base and evacuation hospitals for overseas duty is as follows:

Axes, with helvcs.....	10	Pickaxes, with helvcs.....	3
Bags, water sterilizing.....	8	Pot, marking.....	1
Brush, marking.....	1	Rakes, steel.....	8
Bugles, with slings.....	2	Ranges, No 5.....	5
Flag:		Shovels, short handle.....	3
Distinguishing, Red Cross.....	1	Spades.....	6
Halyards for.....	2	Stick, size, show.....	1
National storm.....	1	Stretcher, shoe.....	1
Lampblack.....	2		

By order of the Secretary of War:

F. W. SENN, *Adjutant General.*

WAR DEPARTMENT,
 THE ADJUTANT GENERAL'S OFFICE,
 Washington, June 3, 1918.

From: The Adjutant General of the Army.

To: Commanding generals of all National Army, National Guard, and Regular Army Divisions, all department commanders, and chiefs of all supply bureaus.

Subject: Authorization of cooking utensils, etc., for issue with No. 5 Army range for base and evacuation hospitals for overseas duty.

The following articles are authorized for issue with No. 5 Army range:

Boilers:		Grinder, meat.....	1
Round; one 6-gallon and one 8-gallon.....	2	Knives, butcher, 10-inch.....	2
Square; one 10-gallon, one 15-gallon, and one 20-gallon.....	3	Pans, bake, one Army range No. 5, large, and one No. 578 large.....	2
Buckets, galvanized iron, 12-quart.....	2	Pans, frying, one 12-inch and one 18-inch.....	2
Cake turners.....	2	Pan, dish, 21-quart.....	1
Cans, garbage.....	2	Saw, meat, 22-inch blade.....	1
Can openers.....	2	Sieve, flour.....	1
Cleaver, 8-inch.....	1	Skimmers, large.....	2
Dippers, 2-quart.....	3	Spoons, large.....	3
Forks, meat, large.....	3	Steel, butcher, 12-inch.....	1

The bake pans listed above are in addition to the two bake pans which are issued with and form part of the No. 5 Army ranges.

By order of the Secretary of War:

F. W. SENN, *Adjutant General.*

As elsewhere described (p. 251) the Medical Department's system of supplying troops in the field contemplated a unit of equipment commensurate with the function of the unit of medical personnel for which it was provided. The introduction of the evacuation hospital having been determined in 1911, measures were instituted for the development and assembly of the prescribed equipments. These equipments were assembled complete through the cooperation of the Quartermaster and Ordnance Departments and were placed in storage.¹⁴ Only articles which deteriorated readily were omitted from the assembled equipments. It was intended to supply these articles from fresh stock when the unit was placed in service. To each unit, as it was assembled, was assigned a number from 1 upward.¹⁵ Every package of equipment or supplies pertaining to this unit bore the unit number in addition to the other necessary markings. When the assembly was completed, the unit was taken up and carried on the property returns as one evacuation hospital. All papers required for the shipment and transfer of the property, medical, quartermaster, and Ordnance, were prepared at the same time and kept ready for use against the issue of the particular unit equipment. By the end of June, 1916, 20 evacuation hospitals had been assembled and stored at medical supply depots within the United States.¹⁶ In addition two equipments each had been furnished the Philippine Department and the Hawaiian Department.¹⁶

At the end of March, 1917, there were in storage at El Paso, Tex., 9 evacuation hospital equipments, with 10 more at San Antonio, Tex.¹⁷ When it became necessary to provide medical equipment for the troops in the first convoy of American Expeditionary Forces scheduled to sail June 1, 1917, a base hospital equipment complete, with iron bedsteads and hair mattresses, and four evacuation hospitals were shipped from El Paso to Hoboken, N. J.¹⁸ Information of the contemplated movement and of the date of departure was received in the Surgeon General's Office during the forenoon of May 19. A telegram was dispatched to the medical supply officer at El Paso the same date to make the shipment.¹⁸ These supplies, loaded in 17 cars, left El Paso, Tex., at 8:45 p. m., May 23. Twelve cars arrived at Hoboken at 8:45 p. m., May 28, two cars arrived at 11 a. m., May 29, and three cars at 6 p. m., May 29.¹⁹

The evacuation hospital equipments in storage at El Paso and San Antonio were all of the 1911 model. After the dispatch of these to Hoboken on May 23, the equipments remaining at those depots were remodeled to conform to the 1916 supply table and shipped to Hoboken between July 1 and December 31, 1917, en route to France. Additional equipments were shipped to France from time to time as required. They were assembled as to medical equipment at the field medical supply depot in Washington. In accordance with the plan of supply adopted by the War Department, articles supplied by other departments were shipped by those departments to their respective depots in France, from which they were to be obtained on requisition as required. In August, 1918, there were 28 assembled evacuation hospital equipments on hand at the field medical supply depot, Washington.²⁰ During August, September, and October, 1918, 54 such equipments were shipped to France and 1 to Siberia.²¹ The

shipment to France of tentage with these equipments was discontinued early in March, 1918, pursuant to cabled request from the commander in chief.²²

The cost of one evacuation hospital, augmented as requested by the chief surgeon, A. E. F., in 1917, and as further expanded upon cabled request of the commander in chief, was approximately \$98,751.69.²³ The cost of the equipment as listed in the supply table of 1916 was much less. The cost of the units assembled in 1917-18, practically all of which were shipped to France, was, therefore, approximately \$8,690,148.72.

The number of evacuation hospitals assembled and issued during 1917-18 was 89, 86 of which were shipped to the American Expeditionary Forces.

REFERENCES

- (1) Manual for the Medical Department, 1911, par. 704, and 1916, par. 793.
- (2) *Ibid.*, 1911, par. 695, and 1916, par. 795.
- (3) *Ibid.*, 1911, par. 700, and 1916, par. 796.
- (4) *Ibid.*, 1911, pars. 847-856, and 1916, pars. 891-892.
- (5) *Ibid.*, 1911, par. 706 (a), and 1916, par. 800.
- (6) *Ibid.*, 1911, par. 851.
- (7) *Ibid.*, 1911, par. 560.
- (8) *Ibid.*, 1911, pars. 847-856 (last line of each paragraph).
- (9) Data compiled at El Paso, Tex., 1916, for the author, in his personal possession.
- (10) Manual for the Medical Department, 1916, pars. 891-892 (last line of each paragraph).
- (11) Par. 3, cable No. 322, H. A. E. F. in France, November 27, 1917.
- (12) Letter from the chief surgeon, A. E. F., in France, to the Surgeon General, November 23, 1917. Subject: Evacuation Hospital Equipment. On file, Finance and Supply division, S. G. O., 250-F.
- (13) Par. 5-A, cable No. 949, H. A. E. F. in France, London, April 19, 1918.
- (14) General War Plans of the Medical Department, March 9, 1914. On file, Record Room S. G. O., 93360-I.
- (15) Manual for the Medical Department, U. S. Army, 1916 par. 793.
- (16) Preparedness for the Medical Department for War, an address delivered November 16, 1916, at the Army War College by Lieut. Col. Henry C. Fisher, M. D. Copy on file, Finance and Supply division, S. G. O., 12709-G.
- (17) Letter from the department surgeon, Southern Department, to the Surgeon General, July 14, 1916, relative to evacuation hospitals, and action taken thereon. On file, Finance and Supply Division, S. G. O., 13256-211.
- (18) Telegram from the Surgeon General to the Medical Supply Officer, El Paso, Tex., May 19, 1917, to ship supplies to France. On file, Finance and Supply Division, S. G. O., 14778-C.
- (19) Letter from the Quartermaster General to the Surgeon General, May 29, 1917. Subject: Arrival of medical supplies. On file, Finance and Supply Division, S. G. O., 14778-C (QM 523.12-T).
- (20) Memorandum for Colonel Wolfe from the officer in charge, Field Medical Supply Depot, Washington, D. C., August 20, 1918, relative to supplies on hand. On file, Finance and Supply Division, S. G. O., 713-750 Wash. D.
360
- (21) Data furnished the Surgeon General's Office, August 26, 1919, by A. S. Lucas, Field Medical Supply Depot, Washington, D. C., relative to shipments of assembled units to France in 1918. On file, Finance and Supply Division, S. G. O., 713-750 Wash. D.
360
- (22) Cablegram No. 733, H. A. E. F. to The Adjutant General, Washington, March 16, 1918, par. 3.
- (23) Data compiled in the Surgeon General's Office, during 1918, and in possession of the author.

CHAPTER XVIII

LITTERS AND LITTER CARRIERS

LITTERS WITH SLINGS

The specifications for litters with slings purchased during 1917-18 are given below. The appearance of the litter is shown in Figure 7. The number of litters purchased during the same period is given in the table following the specifications.¹ The prices in that table do not in all cases represent the total cost of the finished litter. Some of the materials were furnished by the Medical Department, and the cost of such materials is not reflected in the prices given.

All litters purchased during the years 1917-18 for the United States Army were purchased by the Medical Department through the field medical supply depot, at Washington, D. C.

SPECIFICATIONS FOR LITTERS WITH SLINGS

Parts—Each litter to be composed of the following parts:

- 2 side poles.
- 1 canvas cover.
- 2 sets of stretchers or braces complete, with pole pieces, etc.
- 2 litter straps with screws, washers, and studs.
- 2 litter slings, complete with rings.

Side poles.—Two in number, to be made of best quality, well-seasoned, straight-grained ash, 7 feet 6 inches long, 2 inches thick, $1\frac{1}{2}$ inches wide, with all angles slightly rounded off, hand smoothed, sandpapered, and nicely worked. The upper part of the outer surface of each pole, at the attachment of the canvas, to be shaved away not more than $\frac{1}{8}$ inch deep and 1 inch wide so that the surface of the applied canvas and the heads of the tacks attaching it shall be flush with the lower unshaved part of the said surface. Commencing 9 inches from each end, the poles will be rounded into handles; diameter of handles at the base, $1\frac{1}{2}$ inches, sloping to 1 inch in diameter at the ends. The poles to be filled with one coat of liquid filler, rubbed in, and then receive two coats of hard oil finish. Each pole to be free from defects of any kind that will impair its strength.

Canvas cover.—To be made of United States Army standard, waterproofed, khaki-colored canvas, $28\frac{1}{2}$ inches wide, weighing not less than 12 ounces to the linear yard; canvas to contain not less than 56 three-ply threads in the warp and not less than 34 two-ply threads in the filling per inch of width, and capable of sustaining a strain of at least 150 pounds in the warp and 100 pounds in the filling to the $\frac{1}{2}$ inch of width, same tested in the piece. Litter covers to be 6 feet 2 inches long by 2 feet $4\frac{1}{2}$ inches wide; at each end 1 inch to be turned under and at each side $2\frac{1}{8}$ inches to be turned under, all turned under parts to be neatly sewed with best quality, heavy, khaki-colored linen thread, 7 stitches to the inch. The canvas, thus formed, to be evenly tacked to the shaven surfaces of the litter poles so that when the litter is opened the canvas will be thoroughly stretched and measure on its upper surface 6 feet by 22 inches in the clear. Tacks used to be 10-ounce, round head, japanned, same spaced 1 inch apart.

Stretchers or braces.—Each litter to be provided with two complete stretchers or braces; stretchers to be secured to the litter poles 21 inches from their ends, four 1-inch No. 14 flathead bright iron screws being used in each pole plate; screws to be driven with a screw driver and not hammered. Stretchers to be so placed that when the litter is closed the

braces of the stretchers project lengthwise toward the center of the litter immediately between the approximated poles. Each brace to consist of two pole plates with a stirrup or footpiece, same joined by two movable spreaders. The legs or feet to be stirrup shaped, extending 4 inches below the supporting surface of the pole plate to which they are attached. Each pole plate is 5 inches long, and has, on the outer part of the end toward which the braces fold, a $\frac{1}{4}$ -inch projecting lug to keep the spreader pieces in position when the braces are closed. The pole plate is turned up at right angles on each side $\frac{3}{8}$ inch. The pole plate has five apertures, as follows: One, $\frac{3}{8}$ inch in diameter for the bolt on which the movable spreader arms play, same countersunk on the upper surface to make the largest diameter of the opening $\frac{5}{8}$ inch; sides of the countersunk area sloping at an angle of 45° ;

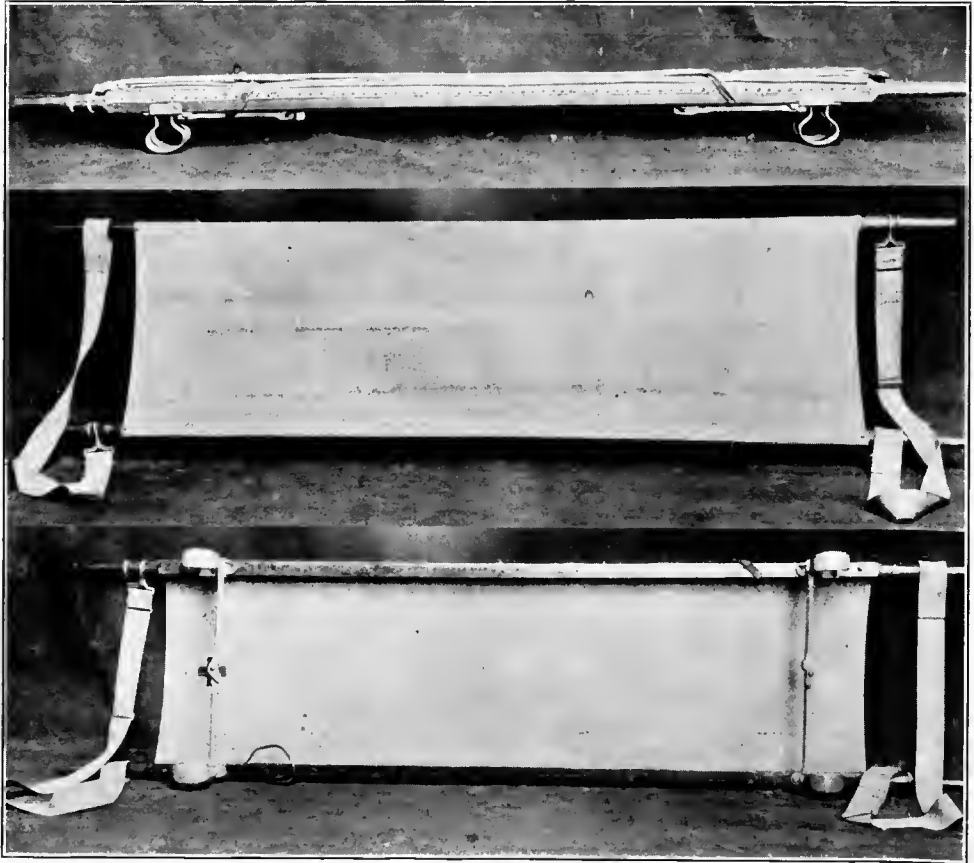


FIG. 7.—Litter with slings

four holes, countersunk on the outer surface of the pole plate, of suitable size for a No. 14 flathead wood screw, two holes to be on the bottom plate and one on each side plate as in standard. The loop of the stirrup, $1\frac{3}{4}$ inches wide near the pole plate, widening out to $3\frac{3}{8}$ inches at its widest part, about $\frac{3}{4}$ inch from the footplate. The blades forming the loops are each $\frac{7}{8}$ inch broad at the neck, expanding to $1\frac{7}{8}$ inches where they conjoin to form the footplate, which is somewhat convex in every way to give a broad support. Spreader to be of steel forging, each consisting of two pieces, playing at their outer ends on the bolt in their respective pole plates, and hinged by a $\frac{1}{4}$ -inch steel bolt at the junction of their inner ends. Each piece is formed from a bar of steel forging $\frac{1}{2}$ inch wide by $\frac{5}{8}$ inch deep. The outer end of each to be flattened, as in standard, to facilitate movement

on the pole plate. The inner end of one projects about 2 inches beyond that of the other, which it embraces, to strengthen the joint when the braces are opened, both pieces being bored to receive a $\frac{1}{4}$ -inch bolt. The hole in the embracing piece to be countersunk on its upper side. This joint to be fenestrated, as in standard, to prevent choking by mud and dirt. The bolt or pivot by which the spreaders are attached to the pole plates is $\frac{3}{8}$ inch in diameter, and has a head 1 inch in diameter by $\frac{1}{8}$ inch thick. It should be of sufficient length to pass through the spreader and pole plate and allow of riveting down flush to fill the countersunk area on the pole plate. The bolt joining the inner ends of the spreaders is of steel, $\frac{1}{4}$ inch in diameter, having an oval head $\frac{1}{2}$ inch in diameter on one end. It should be of sufficient length to pass through the interlocking spreader arms and allow of riveting down flush to fill the countersunk area on the outer spreader. From the center of the pole plate to the center of the rivet which hinges the spreader arms each measures $10\frac{1}{4}$ inches. The whole brace, when stretched, should measure 22 inches between the outer faces of the litter pole rests in the pole plates. All metal work in the stretchers or braces to be thoroughly tinned.

Litter straps.—A fastening for the closed litter to be provided by means of two straps made of best quality, oak-tanned, russet leather, 12 inches long by $\frac{3}{4}$ inch wide. One strap to be attached by one end to the under surface of one pole $1\frac{1}{2}$ inches from the shoulder of the handle, the other strap to the corresponding part of the other pole at the opposite end; the attachment to be made by a $\frac{3}{4}$ -inch, No. 7, round-head, blued-iron screw passing through a copper washer $\frac{1}{2}$ inch in diameter, the hole in the leather to be no larger than the neck of the screw and to be located $\frac{1}{2}$ inch from the end of the strap. The reef end of the strap to be punched with a stud hole, same located 1 inch from the strap end and to measure $\frac{3}{8}$ inch by $\frac{5}{8}$ inch. When the litter is opened the strap is intended to be under the pole and fastened to a standard-size stud placed at such a distance from the screw as required by the length of the strap. When the litter is closed, the straps are intended to be passed around the two poles from their point of attachment on the one to a stud which will be placed at a corresponding point on the other pole.

Slings.—Each litter should be furnished with two carrying slings; sling made of best grade United States Army standard khaki-colored cotton webbing, $2\frac{1}{2}$ inches wide; sling proper to be 6 feet long in its greatest length, and made adjustable by means of a blued sliding buckle of drop-forged steel with a blued steel loop near one end, and provided at each end with a loop lined with good quality strap leather, loop to be 6 inches long. All straight stitching on slings to be machine work, 6 stitches to the inch, all free ends of stitching properly secured to prevent raveling. Yellow three-cord saddler's thread (Barbour's standard best Irish flax) or equal, to be used in all sewing, same waxed when used. To the buckle end of the sling will be attached a blued malleable-iron pear-shaped loop 3 inches long by $2\frac{1}{2}$ inches wide in greatest width, pendant from the loop attached to the swivel. One pear-shaped iron loop, with sling attached, to be passed over the left front and one over the right rear handle of the litter. These loops are kept in place by rings fastened $4\frac{1}{2}$ inches from the end of the handles by two cast-steel brads, No. 17, $\frac{3}{4}$ inch long. These rings to be of malleable iron, turned on the inner surface, and having two holes at opposite sides for the admission of a No. 17 brad; outside diameter, $1\frac{3}{4}$ inches; inside diameter, $1\frac{1}{4}$ inches; thickness at turned surface, $\frac{3}{8}$ inch.

Marking.—Litter will be marked as follows: On outer surface of canvas cover, 4 inches from one end in the median line, a standard size red cross will be stenciled. Just below this the letters "MED. DEPT., U. S. A." in black 1-inch letters. Each litter will bear a name plate of brass which shows in raised letters the name of the contractor and the date of the contract, plate to be securely tacked to one litter pole on its inner surface, about 2 inches from shoulder of handle.

Testing.—All litters when received at this depot will be subjected to a standard test as follows: The open litter will be supported at each end and a "live" weight of 200 pounds will be applied at the midpoint of each pole. Poles must show a normal resiliency. Poles breaking under this test will be rejected.

Finish and workmanship.—Materials, workmanship, and finish of completed litter to be first class in every respect; finished litter to be equal to and like standard sample on display at this depot.

Delivery.—Litters to be delivered to this depot neatly folded in the regulation manner, securely tied in bundles of four litters. Each bundle protected by burlap or other satisfactory wrapping.

MODIFICATIONS AUTHORIZED IN CONTRACTS OF 1918

Slings to be made with a loop of double webbing instead of leather lined.

Contractor's name and date of contract stenciled on litter poles instead of brass plate being attached.

Burlap wrapping not necessary.

Laminated or Lindermined side poles, of equal strength and resiliency, may be substituted.

Cotton thread equal in strength to the linen thread may be used.

Tacks for fastening canvas to litters may be galvanized instead of japanned.

Stretchers must be secured to litter poles 14 inches from their ends instead of 24 inches as specified herein.

Spreaders to be made of malleable iron instead of steel forging.

All metal work in the stretchers or braces to be tinned or electro galvanized.

All hardware specified "blued steel" may be electro galvanized.

Duck and webbing (for slings) to be furnished by the Medical Department, United States Army, delivered to contractor's works.

Litters

Date	Contractor	Quantity ordered	Price	Quantity canceled	Accepted	Cost
May 15, 1917	H. H. Babcock Co.-----	30,000	^a \$5.90	None.	30,000	\$177,000.00
Aug. 27, 1917	do-----	60,000	^a 5.99	None.	60,000	359,400.00
Apr. 17, 1918	do-----	20,000	^a 5.99	None.	20,000	119,800.00
Oct. 16, 1918	do-----	50,000	^a 4.83	25,000	25,000	120,750.00
	Total-----	160,000		25,000	135,000	776,950.00
Aug. 27, 1917	Gold Medal Camp Furniture Co.	30,000	^a 6.00	None.	30,000	180,000.00
Apr. 16, 1918	do-----	10,000	^b 5.35	None.	10,000	53,500.00
Oct. 16, 1918	do-----	45,000	^b 4.16	22,500	22,500	93,600.00
	Total-----	85,000		22,500	62,500	327,100.00
Apr. 16, 1917	Hard Manufacturing Co.-----	20,000	^b 3.99	None.	20,000	79,800.00
Oct. 16, 1918	do-----	35,000	^b 4.19	17,500	17,500	73,325.00
	Total-----	55,000		17,500	37,500	153,125.00
May 15, 1917	Heywood Bros. & Wakefield Co.	30,000	^a 5.64	None.	30,000	169,200.00
Aug. 29, 1917	do-----	30,000	^a 6.03	None.	30,000	180,900.00
Apr. 16, 1918	do-----	20,000	^b 4.65	None.	20,000	93,000.00
	Total-----	80,000		None.	80,000	443,100.00
Apr. 16, 1918	Rex Manufacturing Co.-----	15,000	^b 4.96	None.	15,000	74,400.00
Oct. 16, 1918	do-----	25,000	^b 4.65	17,500	7,500	33,875.00
	Total-----	40,000		17,500	22,500	108,275.00
Apr. 13, 1917	Tophams-----	10,000	6.10	None.	10,000	61,000.00
Apr. 16, 1918	do-----	5,000	^b 5.16	None.	5,000	25,800.00
	Total-----	15,000		None.	15,000	86,800.00
Apr. 16, 1918	M.S. Wright Manufacturing Co.-----	10,000	^b 4.18	None.	10,000	41,800.00
Oct. 16, 1918	do-----	25,000	^b 4.50	12,500	12,500	56,250.00
	Total-----	35,000		12,500	22,500	98,050.00
	Aggregate-----	470,000		95,000	375,000	1,976,650.00
	Add for materials furnished by the Government-----					536,000.00
	Gross cost-----					2,512,650.00
	Average cost per litter-----		6.70			

^a Duck furnished by the Government.

^b Duck and webbing (for slings) furnished by the Government.

In loading patients upon ships for water transport and in unloading them at ports of debarkation, it becomes necessary to take the patients up and down steep stairways, through narrow passages, and around sharp turns.

Often the ship's hoisting machinery can conveniently be utilized in loading and unloading patients as well as supplies. These conditions demand a litter of different shape, structure, and design, to which the patient can be secured and in which he can be adequately protected while being so handled. Litters for this purpose and of a suitable type are required on all troop ships as well as on hospital ships. After the service at the two primary ports of embarkation had become well established it was considered advisable to provide all troop ships with suitable litters. The transports directly under the charge of the Navy were supplied with equipment by the Navy. The chartered transports were equipped by the Army. The type of litter developed and in general use in the United States Navy was selected for use on the transports and the requisite number was purchased and issued. This type of litter was commonly known as the Stokes litter (splint stretcher).

It is a galvanized-iron stretcher basket which has certain fixation apparatus attached to it.² These consist of straps which pass over the patient's chest, hips, and legs as he lies in the wire basket. A movable foot rest is provided on each side of the septum which divides the lower end of the basket into two big furrows for the legs of the patient. There are handgrips around the strong galvanized-iron frame which forms the upper margin of the basket. These may be used either for carrying the stretcher by hand or for attaching it by means of a bridle to a hoisting apparatus for lowering to or hoisting from a small boat.

THE SNOWSHOE TRENCH LITTER

In warfare of position where the forces engaged are protected by trenches with narrow passage and many abrupt turns at acute angles, the standard type of litter becomes inadaptable and a special type again becomes necessary. Each of the allied armies had developed its own type of litter to overcome the difficulties incident to this kind of warfare. A type of trench litter known as the snowshoe litter was devised by one of the medical officers with the American Expeditionary Forces and is considered to have sufficient merit to justify its description. It was accepted as the standard trench litter for the United States Army. Detailed specifications were prepared for it and plans made for the purchase of an adequate number of these litters in the autumn of 1918, but the warfare of position had given place to a warfare of movement before the plans for procurement had been fully completed. No purchase of considerable numbers was made.

LITTER CARRIERS

The fatigue experienced by litter bearers in removing the wounded from the battle field to the first-aid, ambulance, or collecting stations is great, and requires numbers of bearers out of proportion to the number of wounded. To overcome this condition, attention has been given from time to time during the past decades to the development of a wheeled device upon which the wounded could be placed and which could be pulled or pushed by the litter bearers from the places where the wounded men lay to a point where they could be placed in ambulances. The device must be light, durable, and easily transported. It must be so designed that the wounded may be placed upon it and taken off

without violence to the patient. It is desirable that it be constructed of materials which make repairs and replacements simple and easy.

At the time of declaration of war in 1917 no type of a wheeled litter or litter carrier had been adopted as standard equipment, nor had any such been

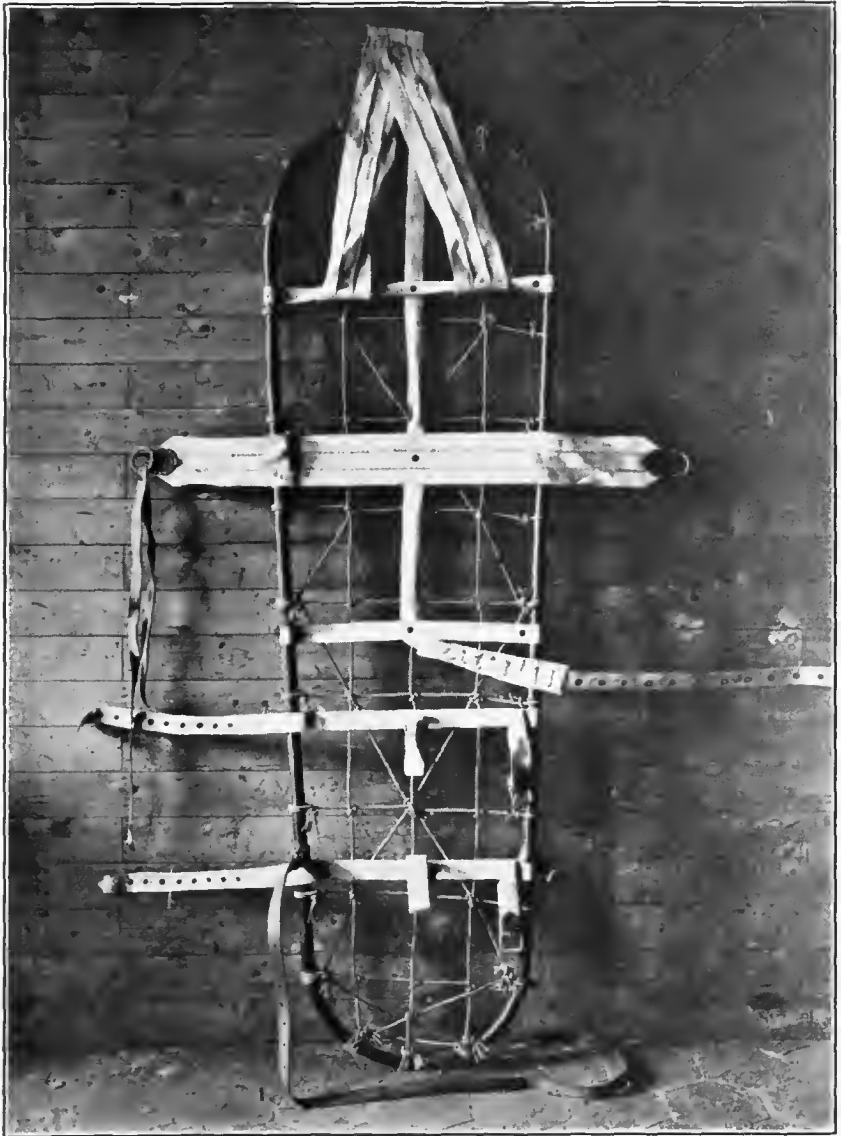


FIG. 8.—Snowshoe litter

purchased. The need for a wheeled litter carrier was early appreciated, and work was begun by the ambulance board to develop a suitable design; however, other duties incident to the procurement of supplies, and particularly ambulances, delayed the work for several months.

After a suitable organization for the inspection of ambulances had been developed and the changes in ambulance design perfected, the development of the litter carrier was again taken up and carried to completion. It was found impracticable, in the developmental work on this subject, to combine in a single carrier all the essentials necessary to make it serviceable both in the field and in hospitals.³ Therefore, two different types were devised, the one for use in the field and the other for use in hospitals. The former was called the field litter carrier and the latter wheeled litter carrier.

FIELD LITTER CARRIER

Certain definite principles were observed in the development of this carrier. It must be durable, easily loaded, drawn by the minimum of effort, comfortable for the patient, and its essential parts must be interchangeable with other standard equipment. The desirable parts of wheeled litter carrying devices then in use

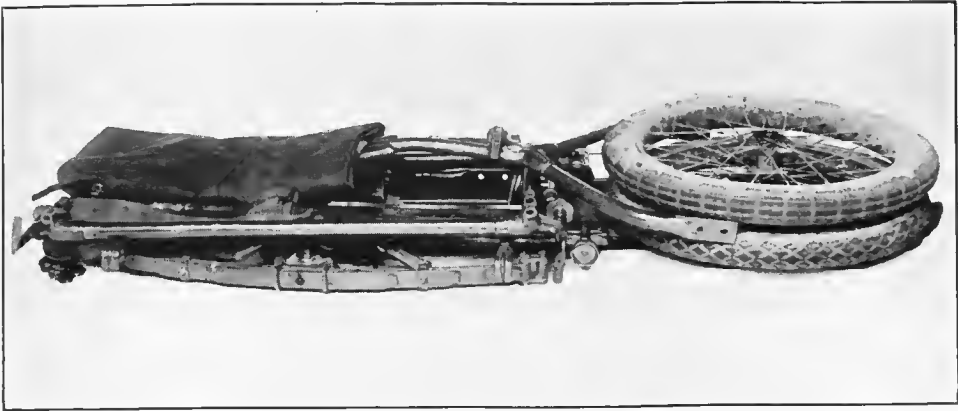


FIG. 9.—Field litter carrier in collapsed form

were considered. Wherever the principle involved was applicable and advantageous it was incorporated in the devices which finally were developed. The earlier conceptions of a litter carrier contemplated a collapsible type; a type with a frame so designed and hinged as to permit the sides to come together in much the same manner as the members of a parallel ruler. When open the hinged parts were to lock securely and so prevent accidental collapse of the carrier. Photographs were submitted to manufacturers for suggestions as to stability and manufacturing difficulties.⁴ The principle was found to be impracticable and was abandoned in favor of the knockdown type. Collapsibility is essential only as a transportation requirement to point of use. It was concluded that in the field sufficient transportability would be had if the device could be successfully trailed behind an ambulance or other vehicle.

The types of litter carriers originally suggested contemplated a device upon which the litter could be placed and to which it could be clamped, the handles of the litter being used in propelling the carrier. After much consideration and many experiments, it was concluded that the same load could be pulled more easily than it could be pushed. The type developed

under this idea contemplated a carrier with a bar so attached to the axle as to serve the same purpose as the tongue of a wagon; that is, a place to apply the tractive force and also to steer the vehicle. It was further decided that the carrier could be made to trail behind an ambulance by providing the end of the bar with a suitable eye to go over the pintle hook of the ambulance. The device was finally completed by the development of a suitable breast harness to be worn by the litter bearers and which would attach to the frame of the carrier. This harness, when in use, allowed the two bearers to walk beside the tongue of the carrier. For their further convenience in pulling the carrier, a projection or handle was attached at right angles to the front end of the



FIG. 10.—Field litter carrier in use

tongue, in such manner that each bearer could grasp his end of it with both hands, enabling him to push as well as to pull if the need arose. In order to bring this handle bar to a height convenient for the bearers, the tongue of the carrier was approximately curved. The handle bars were hinged to permit them to be folded backward parallel with tongue when the carrier was knocked down and crated for shipment or when used as a trailer. A very ingenious device held them firmly in place when extended for use of the bearers.

It was found, after the plan of using the harness had been adopted, that two patients could be transported by two bearers without material effort and the design, as finally adopted, provided carrying places for two litters instead of one. To protect the wounded from the sun and rain and to some extent from gases, canvas curtains and cover were provided. These curtains and

cover were removable and could be detached whenever not required. The appearance of the field litter carrier, as finally adopted, taken apart for crating for transport, and its manner of use, is shown in figures 9 to 11.

While this litter carrier was in process of development, each succeeding model was given severe tests to determine its utility and stability. The weak points were strengthened, undesirable features were eliminated, and continuing and consistent effort was made to arrive at a type of carrier which contained the maximum of the good and the minimum of the poor features. The device finally evolved and adopted was the "survival of the fittest," and was given every practicable test as to its utility. Motor cycle side-car wheels were



FIG. 11.—Field litter carrier as a trailer

adopted primarily for interchangeability of parts and the presence with the combat troops of the necessary spare parts, a very important consideration for military equipment in use so far from the home territory.

After this carrier had passed all the tests at the ambulance experimental station, Washington, D. C., a pamphlet of Tentative Instructions and Drill Regulations, with appropriate illustrations, was prepared for the litter carrier. This pamphlet was submitted to experienced medical personnel at several training camps for consideration and comment.⁵

The report from the commanding officer, motor units, section B, Camp Greenleaf, Ga., given below, on the carrier and the tentative drill regulations covering its use, is valuable as showing the utility of the device.⁶

1. Submit report on field litter carrier designed for Medical Department, United States Army, and tentative regulations concerning same, in accordance with your verbal instructions.

(a) Recommendation as to advisability of adding field litter carrier to the equipment of the Medical Department:

Recommend strongly uniform equipment of ambulance companies, both motor and animal drawn, with the field litter carrier upon a tentative basis of one to each four ambulances. Aside from the advantages which these vehicles offer of increasing materially the transport facilities of litter bearers and reducing the discomfort to the patient, the present design has certain advantages which are great and obvious. Among them may be mentioned:

(1) The field litter carrier may be attached to the adopted type of motor or animal drawn ambulance, or even motor cycle with side car, without materially increasing the load of that vehicle.

(2) The wheels of the field litter carrier are uniform type adopted for motor cycle side cars and can be procured from the general supply overseas.

(3) The harness attachment for the litter bearers is so devised that the weight is carried practically by the body of the advancing bearers and the handles are only used to steady the vehicle so that the greatest amount of work is performed with the least expenditure of energy.

(4) The carrier may be taken over rough ground, through underbrush, and both steep inclines and declines; is capable of being folded and carried over rough territory by two bearers.

(5) The cost of each vehicle is said to be less than \$200, which sum is a very economical expenditure for the great possible good.

(b) Recommendation as to the tentative drill regulations:

In the absence of any opportunity to give these regulations a thorough test, the tentative instructions have been examined and are recommended as appearing to meet the needs of the service.

Alternate bids were requested early in June, 1918, for 150 and 300 field litter carriers and award was made to a motor company of Racine, Wis. Deliveries were scheduled to begin September 22, 1918, and to be completed at the rate of 60 per week, at a cost of \$160.49 per carrier. An inspector was sent to the factory to supervise manufacture. Deliveries did not begin in sufficient time, however, for these carriers to reach the front in France before the armistice was signed and the need for them ceased. The utility of the device remains to be demonstrated. Theoretically the principle appears sound and the type gives much promise.

WHEELED LITTER CARRIER

As already noted, it was impracticable to develop a litter carrier useful alike in hospitals and on the battle field. A special type was required for each. The need for a suitable hospital litter carrier was felt as soon as the base hospitals at the several training camps began to function. A litter carrier had been found necessary in the general hospitals with their comparatively limited area; it was indispensable in the large base hospitals, scattered over so much greater areas. Litter carriers or carriages of the types illustrated in the catalogues of the various hospital supply houses were purchased and issued to meet this need.

None of the types of litter carriers on the market gave promise of meeting the overseas requirements satisfactorily, especially in evacuation and other

hospitals established near the front. The existent types of carriers were designed for modern hospitals with smooth floors and, consequently, had comparatively small wheels. It was concluded that a different type of carrier would be required for the emergency hospitals established near the front, where ruined buildings and tents with earthen floors must generally be used. Here larger wheels and a more rigid framework would be required. It was expected, under such conditions, that the carrier, using the litter as a top, must often serve for an operating table during the rush of work following military operations. It was essential, also, that these carriers be adaptable for use in any hospital whether at the front or in the rear. Considering the limited ocean tonnage, it was a matter of prime importance that the carrier be



FIG. 12.—Wheeled litter carrier

of such design as to permit it to be taken apart, crated for shipment in the minimum space, and readily assembled with a screw driver or other simple means.

After much study and many experiments, a carrier to meet these exacting requirements was developed early in 1918. Its general appearance is shown in Figure 12. It was provided with an ingenious locking device which fully stabilized the carrier for use as an operating table, preventing both to and fro and lateral motions of the pivoted smaller wheels. This locking device consisted, essentially, of a double sprag secured at the upper end to both sides of the frame at the small wheel end. The two feet of the sprag were incased in rubber crutch tips of suitable size. The sprag was curved and somewhat longer than the distance between its attachments and the floor so that when in place as a

stabilizer it raised both small wheels off the floor and bore the weight of that end of the carrier.

The order for the manufacture of a sample of this carrier was placed February 25, 1918, in which the manufacturing difficulties were overcome.⁷ The electro-galvanized finish was adopted as standard for this carrier. This finish appeared equally well as the white enamel and was very much more durable. Contract was entered into April 3, 1918, for 2,500 of these hospital wheeled litter carriers. Blue prints had been revised and corrected. Detailed manufacturing blue prints were completed and manufacture begun. Delays in deliveries of material were overcome, but for reasons best known to the contractor deliveries did not conform to schedule. The contract provided for the delivery of 100 carriers by May 20 and 200 per week thereafter. Deliveries should have been completed by August 12, 1918, but on that date only 1,395 had been shipped. These litter carriers were inspected during manufacture and prior to shipment and found to conform to the specifications.⁸

The 2,500 litter carriers on the first contract were considered insufficient to provide an adequate number for the hospitals at home and abroad. Three thousand additional such carriers were deemed necessary to provide for the greatly augmented Army then contemplated and for which equipment must be provided. Clearance for this number was requested of the War Industries Board on August 24 in the expectation that deliveries could be made or at least begun before December 1, 1918. That number was then thought sufficient to meet the requirements until the end of the following February. Full data concerning the type of litter desired and the quantities of material required accompanied the application. The application for the clearance of these carriers was not at first considered favorably by the War Industries Board. A substitute carrier made of wood was proposed by the wood products section of the board but was unacceptable to the Medical Department, from both an engineering and a sanitary standpoint. Three prolonged conferences were held between representatives of the Medical Department and those of the clearance committee and the wood and steel products sections of the War Industries Board. At these conferences prolonged discussion was had on the relative merits of the two types of material for litter carriers. The total quantity of steel involved was about 70 tons of tubing and wire.⁹ Clearance for 1,500 steel wheeled litter carriers was finally granted and contract therefor placed.

Upon recommendation of the surgical division, Surgeon General's Office, six of these litter carriers, as soon as they became available, were shipped to the base hospital at each of the large training camps and three to hospitals at the smaller camps.¹⁰

REFERENCES

- (1) Taken from copy of contract on file in Medical Section, New York General Intermediate Depot, Brooklyn N. Y.
- (2) Prior, James C.: *Naval Hygiene*. F. Blakiston's Son & Co. Philadelphia, 1919, 253-254.
- (3) Memorandum for the Surgeon General, by Maj. Pearee Bailey, M. R. C., U. S. A., February 16, 1918, relative to inspections of equipment at Philadelphia, Pa., and New York, N. Y. On file, Finance and Supply Division, S. G. O., 750-715 S. G.

- (4) Letter from the Surgeon General (Maj. W. T. Fishleigh, S. C., N. A.), to the Cyguet Rear Car Co., Buffalo, N. Y., October 20, 1917, relative to collapsible litter carriers. On file, Finance and Supply Division, S. G. O., $\frac{162 \text{ Cyg. Co.}}{1 A}$.
- (5) Letter from the Surgeon General to Camp Greenleaf, Fort Oglethorpe, Ga., and other camps, May 24, 1918. On file, Finance and Supply Division, S. G. O., $\frac{750-714 \text{ S.G.}}{613}$.
- (6) Letter from Lieut. Col. M. Ashford, M. C., U. S. N. A., Camp Greenleaf, Ga., May 24, 1918, to Col. Rodger Brooke, M. C., Camp Greenleaf, Ga. Subject: Report on field litter carrier. On file, Finance and Supply Division, S. G. O., 750-714 S. G.
- (7) Correspondence between the Surgeon General and Bernstein Manufacturing Co. during February, March, and April, 1918, relative to hospital wheeled litter carriers. On file, Finance and Supply Division, S. G. O., $\frac{67 \text{ B. M. Co.}}{6-11}$.
- (8) Letter from medical supply officer, New York, N. Y., to the Surgeon General, August 15, 1918, transmitting inspector's report of August 12 on Bernstein Manufacturing Co.—contract for wheeled litter carriers. On file, Finance and Supply Division, S. G. O., $\frac{67 \text{ B. M. Co.}}{20}$.
- (9) Letter from the Surgeon General to the War Industries Board, Clearance Committee, Washington, D. C., August 31, 1918. Subject: Clearance on contract for 3,000 hospital litter carriers. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N.D.}}{169}$.
- (10) Memorandum for Col. Edwin P. Wolfe, from Col. Wm. H. Moncreif, M. C., N. A., April 29, 1918, relative to distribution of litter carriers. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{549}$.

CHAPTER XIX

SURGICAL DRESSINGS

FIRST-AID PACKET

At the request of the Surgeon General of the Army, December 18, 1905, a joint board of medical officers of the Army and Navy was appointed for the improvement and standardization of first-aid dressing. This board utilized the observations of the medical observers on both sides in the Russo-Japanese war¹ and concluded that a satisfactory first-aid packet must meet the following requirements.²



FIG. 13.—First-aid packet in metal case, and pouch

1. It should be simple in construction and should have few separate parts.
2. It should be easy of application, even by the unskilled.
3. It should be so made and so arranged as to require no handling of that part of the dressing which comes in contact with the wound.
4. The compresses and bandages should be of sufficient thickness and area to afford effective protection to the wound.
5. The compresses and bandages should be made entirely of absorbent material rendered antiseptic by mercuric chloride.
6. The completed packet should be as small and as light as possible consistent with effectiveness.

7. It should be provided with a waterproof hermetically sealed durable covering.
 * * * A case made of brass or copper is the best and, on the whole, much more economical than rubber or cloth covers, and insures to a much greater degree the presence of the packet on the person of the soldier when needed.

8. The container should be easily opened and should have an arrangement for secure attachment to the belt of the soldier.

The board also decided that a larger dressing would be required for the extensive wounds made by fragments of shell, splinters, etc., resulting from the high-explosive shells used by the seacoast artillery. A suitable packet was developed for this purpose and given the name shell wound dressing. The

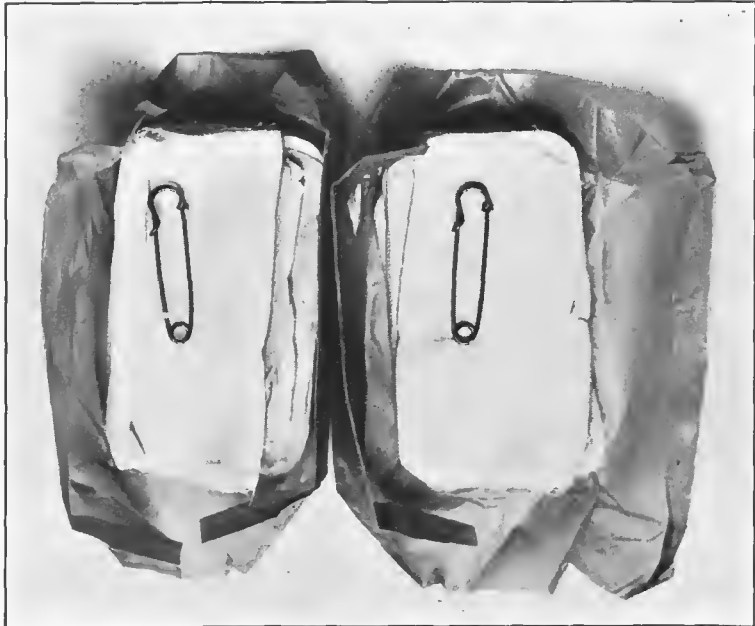


FIG. 14.—Contents of first-aid packet

name of this packet was later changed to first-aid packet, shell wound. Specifications for both these packets were prepared by the board and have undergone but few changes. The findings of the board were published to the Army in May, 1906.² The specifications for these packets used in making purchases during 1917-18 appear below. The quantities purchased during those years are given in the consolidated table of surgical dressings for field use which appears on pp. 329.

SPECIFICATIONS FOR FIRST-AID PACKETS, MEDICAL DEPARTMENT, U. S. A.

First-aid packets to be made up as described below:

Materials.—All gauze to be in accordance with United States Government Standard Specifications for Absorbent Gauze in weight, mesh, and chemical analysis. Gauze for bandages to have 44 threads to the inch in the warp and 40 threads to the inch in the filling. Gauze for compresses to have 32 threads to the inch in the warp and 28 threads to the inch in the filling.

1. Two bandages of absorbent, sublimated (1:1,000) gauze, 4 by 84 inches.

2. Two compresses of absorbent, sublimated (1:1,000) gauze, each composed of one-half square yard of gauze so folded as to make a compress $3\frac{1}{2}$ by 7 inches.

One compress to be placed lengthwise in the center of each bandage and retained in position by sewing along one end and across the center. The loose end of the compress is then folded on the sewed part and held by one or two stitches, thus making a compress $3\frac{1}{2}$ by $3\frac{1}{2}$ inches.

Each bandage thus prepared to be rolled loosely from each end, with the roll toward the back of the bandage, until the compress is reached. The latter is now covered with a strip of standard quality, heavyweight, blue tissue paper 3 by 3 inches, and folded through the center, the flattened rolls of the bandage laid on either side of the folded compress, the strip of paper being between back of compress and the flattened bandages. Each bandage then to be wrapped separately in parchment or wax paper.

3. Two No. 3 safety pins, wrapped in wax paper.

The two compresses and the two safety pins are then wrapped together in tough waxed paper. One copy of the "Directions for application," the specifications for which are attached hereto, to be inclosed in each packet.

4. The packet thus prepared to be placed in a hermetically sealed metal case of No. 30 Brown & Sharpe gauge brass, same provided with the standard stripping device for opening the container. Containers to be sealed by soldering, best grade solder (soft) being used; soldering to be neatly and carefully done. Metal cases to be covered on the outside with olive-drab paint. Dimensions of case, 4 by $2\frac{1}{4}$ by 1 inch over all.

Contents of the case to be sterile.

The words "FIRST-AID PACKET, U. S. ARMY," to be stamped on the metal case, also directions for opening, the manufacturer's name, and the date of the contract.

Packing and delivery.—All packages must be packed in well-made, new boxes, constructed of $\frac{7}{8}$ -inch material. Boxes must be of uniform size, and each box must contain the same number of packages and must be plainly stenciled showing the contents and quantity in box, name of the contractor, and the date of the contract. Boxes must not exceed 5 cubic feet in capacity and must have no dimension greater than 30 inches. Packages must be packed in boxes in multiples of 10. For shipment boxes will be tagged and not stenciled.

Workmanship, finish, etc.—Packets to be made of best materials throughout; workmanship to be first class; finished packets to be equal to and like standard in every respect. Sample packet will be selected at random from deliveries made at this depot and tested as to sealing and sterility, materials, etc., and if found defective the entire lot from which sample was taken will be rejected. Excessive compression of the packet contents will not be permitted.

DIRECTIONS FOR APPLYING FIRST-AID PACKETS, MEDICAL DEPARTMENT, UNITED STATES ARMY

The following is to be printed on a sheet of paper, measuring $3\frac{1}{4}$ by $4\frac{1}{4}$ inches, paper to be of standard quality:

DIRECTIONS FOR APPLYING (In caps.)

Carefully Remove the Wrapper and	} (In dark face smaller letters.)
Proceed as Follows:	

1. If there is only one wound, carefully remove the paper from one of the two packages without unfolding the compress or bandage and hold by grasping the outside roll of bandage between the thumb and fingers.

When ready to dress wound, open compress by pulling on the two rolls, being careful not to touch the inside of the compress with fingers or anything else. The back of the compress is marked by a strip of blue paper. In grasping the rolls, if the thumbs are slipped in the spaces marked by the blue strip the face of the compress will not be touched. Still holding one roll of the bandage in each hand, apply the compress to the wound, then wrap the bandage around the limb or part and tie the ends together or fasten with safety pins. The second compress and bandage may be applied over the first, or it may be used for a sling if the arm is wounded or to bind both legs together if one is injured.

2. If there are two wounds opposite each other, apply to one wound a compress without unrolling the bandage, and hold it in place by the bandage of the compress used to cover the other wound.

3. If there are two wounds not opposite each other, tie compress over each.

4. If the wound is too large to be covered by the compress, find and break the stitch, holding the compress together, unfold it, and apply as directed above.

NOTE.—In printing the above a space should be left at the middle of the sheet so that when the directions are folded to place in the packet the folding line will fall in this space.

United States Government Standard Specifications for Absorbent Gauze

GAUZE, PLAIN, 36 INCHES WIDE

Mesh of picks per inch		Weight per yard, minimum
<i>Warp</i>	<i>Filling</i>	<i>Grams</i>
44	x 40	48
32	x 28	30
32	x 26	29
28	x 24	26
24	x 20	24
22	x 18	22
20	x 16	19

1. A variation in count of one thread in the warp to the inch and one thread in the filling to the inch or two threads to the square inch shall be allowed.

2. Free from loading material and visible particles other than cotton and be colorless,

3. The extract obtained by a hot distilled water extraction of the gauze shall weigh, when dried to constant weight, not more than 0.25 per cent of the weight of the gauze extracted; the weight of inorganic matter is not to exceed 30 per cent of the water extract. The aqueous extract shall be of neutral reaction and free from starch, dextrin, glue, or loading material.

4. One yard extracted with 95 per cent ethyl alcohol in a Soxhlet extractor for five hours shall yield a solid extract, when dried at 100° C., of not more than 0.55 per cent by weight.

5. One yard extracted with ethyl ether in a Soxhlet extractor for five hours shall yield a solid extract, when dried at 100° C., of not more than 0.55 per cent by weight.

6. One yard incinerated in a platinum crucible shall yield not more than 0.06 to 0.08 per cent by weight of ash, containing potassium, sodium, magnesium, calcium, iron, and aluminum, which were originally in combination with hydrochloric, sulphuric, and phosphoric acids.

7. One yard folded into a square, the surface of which measures 16 square inches, with the loose end loosely joined by No. 50 white cotton thread when held nearly in contact with the surface of distilled water and dropped thereon, at 25° C. temperature, shall be completely submerged in five seconds.

SPECIFICATIONS FOR FIRST-AID PACKETS, FOR SHELL WOUNDS, MEDICAL DEPARTMENT, UNITED STATES ARMY

First-aid packets to be made up as described below.

Gauze.—All gauze to be in accordance with United States Government Standard Specifications for Absorbent Gauze, in weight, mesh, and chemical analysis. Gauze for bandages to have 44 threads to the inch in the warp and 40 threads to the inch in the filling. Gauze for compresses to have 32 threads to the inch in the warp and 28 threads to the inch in the filling.

Rubber Sheeting.—To be made of fine quality bleached sheeting, weighing not less than 4 ounces to the linear yard, 36 inches wide, counting not less than 84 threads to the inch in the warp and not less than 76 threads to the inch in the filling; to be thoroughly and uniformly coated with a high-grade white rubber compound, equal to standard sample.

The rubber compound to be calendered on, and not spread upon the sheeting. Sheetting to be vulcanized by steam, and in finish to be equal to and like standard sample. Finished sheeting to have an average tensile strength of not less than 40 pounds in the warp and 30 pounds in the filling, per inch of width.

1. One compress composed of 1 square yard of absorbent sublimated (1 : 1,000) gauze, so folded as to make a pad 6 inches by 9 inches. Across the back of each end of this compress to be placed a piece of gauze bandage 3 inches wide by 48 inches long, the bands to project beyond the compress 21 inches on each side. These bandages to be held in position by securely stitching along the edges of the compress, stitching to pass through all layers of the compress. The tails of the bandages are loosely rolled toward their back and placed on the back of the compress. The compress is then to be folded once across its length face inside, and then from side to side. Thus folded, the compress to be securely wrapped in parchment or waxed paper.

2. One bandage, compressed, 3 inches wide by 6 yards long, wrapped in parchment or waxed paper.

3. Two No. 3 safety pins, wrapped in waxed paper.

The whole dressing, prepared as above, to be wrapped and sealed in a tough waxed paper, compressed to form a package about $2\frac{1}{2}$ inches wide, $4\frac{1}{4}$ inches long, by $1\frac{1}{4}$ inches thick, and then tightly inclosed in a piece of rubber sheeting 6 by 8 inches, the edges and ends of the sheeting to be cemented so as to make the packet waterproof. On the outside of the packet will be printed a list of the contents, directions for using same, together with the name of the contractor and the date of the contract.

On the other side of the container will be securely pasted a standard label on which is printed: "The directions for applying first-aid packet," the specifications for which are attached hereto.

SPECIFICATIONS FOR FIRST-AID PACKETS, FOR SHELL WOUNDS, MEDICAL DEPARTMENT, UNITED STATES ARMY

Packing and delivery.—All packages must be packed in well-made, new boxes, constructed of $\frac{7}{8}$ -inch material. Boxes must be of uniform size and each box must contain the same number of packages and must be plainly stenciled showing the contents and quantity in box, name of the contractor and the date of the contract. Boxes must not exceed 5 cubic feet in capacity and must have no dimension greater than 30 inches. Packages must be packed in boxes of multiples of 10. For shipment, boxes will be tagged and not stenciled.

Workmanship and finish.—Packets to be made of best materials throughout; workmanship to be first class; finished packets to be equal to and like standard in every respect.

The following printing to be on the outer surface of rubber sheeting cover of first-aid packets for shell wounds:

FIRST-AID PACKET FOR SHELL WOUNDS, UNITED STATES ARMY
CONTENTS OF PACKET
<p>1 gauze compress, 6 by 9 inches, made up as a 4-tailed bandage. 1 gauze bandage, 3 inches by 6 yards. 2 safety pins.</p>
DIRECTIONS
<p>1. Unfold compress and apply inner surface to wound. 2. Tie compress in place with short bandage attached thereto. 3. Cover compress by turns of the long roller bandage and fasten with safety pins.</p>
(Name of contractor and date of contract)

INDIVIDUAL DRESSING PACKET

The experience and observation during the years following its adoption in 1906 amply demonstrated the efficiency of the metal covering of the first-aid packet. This packet was able to withstand, for considerable periods, the rough usage to which, from conditions incident to the service, it must be subjected as a part of the individual equipment of combatant troops. This rough usage was materially less in the equipment of the Medical Department personnel. Many of the first-aid packets used in battle by medical personnel would be taken almost directly from the boxes of surgical dressings carried on the ambulances and as a part of the regimental medical combat equipment. Here a great degree of protection against damage by rough usage was not required. The covering of the metal first-aid packet added appreciably to its weight. It also added materially to its cost and limited the sources from which it could be obtained. Its manufacture required extensive and expensive machinery and practically only one firm had such equipment. It was decided, therefore, in 1916, to add another first-aid packet to the list which should be identical in contents with the metal-covered packet but be inclosed in an impervious cover of rubber sheeting, a reversion to the type of covering in use prior to 1906. To this packet was given the name individual dressing packet.³ It was issued with the web belt of the enlisted personnel of the Medical Department, and in the two types of surgical dressings boxes.⁴ The specifications under which these packets were purchased during 1917-18 are given below.⁵ The quantities purchased during those years are given in the consolidated table of surgical dressings for field use which appears elsewhere in this chapter.⁶

SPECIFICATIONS FOR INDIVIDUAL DRESSING PACKETS MEDICAL DEPARTMENT, UNITED STATES ARMY

To be made up as described below.

Materials.—All gauze to be in accordance with United States Government Standard Specifications for Absorbent Gauze, in weight, mesh, and chemical analysis. Gauze for bandage to have 44 threads to the inch in the warp and 40 threads to the inch in the filling. Gauze for compresses to have 32 threads to the inch in the warp and 28 threads to the inch in the filling.

1. Two bandages of absorbent, sublimated (1 : 1,000) gauze, 4 by 84 inches.

2. Two compresses of absorbent, sublimated (1:1,000) gauze, each composed of one-half square yard of gauze, so folded as to make a compress $3\frac{1}{2}$ by 7 inches. One compress to be placed lengthwise in the center of each bandage, and retained in position by sewing along one end and across the center. The loose end of the compress is then folded on the sewed part and held by one or two stitches; thus making a compress $3\frac{1}{2}$ by $3\frac{1}{2}$ inches. Each bandage thus prepared to be rolled loosely from each end, with the roll toward the back of the bandage, until the compress is reached. The latter is now covered with a strip of standard quality, heavy weight, blue tissue paper 3 by 3 inches, and folded through the center, the flattened rolls of the bandages laid on either side of the folded compress, the strip of paper being between back of compress and the flattened bandages. Each bandage then to be wrapped separately in parchment or wax paper.

3. Two No. 3 safety pins, wrapped in wax paper. The two compresses and the two safety pins are then wrapped together in waxed tough paper. One copy of the "Directions for application," the specifications for which are attached hereto, to be inclosed in each packet. The packet thus prepared to be placed in an outer wrapping of rubber sheeting of sufficient size to completely cover same. The edges and ends of the sheeting to be cemented so as to make the packet waterproof. Finished packet to measure 4 by $2\frac{1}{4}$ by 1 inch, over all (these dimensions not to be exceeded).

Rubber sheeting.—Rubber sheeting for outer wrapper of packet to be made of fine quality bleached sheeting, weighing not less than 4 ounces to the linear yard, 36 inches wide, counting not less than 84 threads to the inch in the warp and not less than 76 threads to the inch in the filling; to be thoroughly and uniformly coated with a high-grade white rubber compound, equal to the standard sample. The rubber compound to be calendered on, and not spread upon the sheeting. Sheetting to be vulcanized by steam, and in finish equal to and like standard sample. Finished sheeting to have an average tensile strength of not less than 40 pounds in the warp and 30 pounds in the filling, per inch of width. Contents of package to be sterile.

The words "INDIVIDUAL DRESSING PACKET, U. S. ARMY," to be printed on top of packet; also the date of the contract and the name of the contractor.

FIRST-AID PACKETS FOR INSTRUCTION

To insure the maximum benefit from the first-aid packet it was essential that the individuals who were to be provided therewith should know how to use it. For a number of years after the first-aid packet was adopted, the issue was limited to members of the Hospital Corps and to company bearers.⁷ At that time four men in every company were selected by the company commander to look after the sick and wounded of the company, to administer temporary first aid if the need required it during an engagement, and to carry the wounded to the dressing stations in the rear.⁷ These men were usually selected with the advice of the medical officer with the command.⁷ They were trained with the detachment of the Hospital Corps in the duties of stretcher bearers and in rendering first aid under the immediate supervision of the surgeon. The standard first-aid packet was utilized in this instruction in first aid and the same packages were used repeatedly until worn out. A few years later it was decided that all officers and enlisted men of the Army should be instructed in the use of the first-aid packet.⁸ The number of packets required for this purpose and the expense of the metal first-aid packet led to the development of another packet designed for instruction only.⁹ It was called first-aid packet for instruction. It contained the same materials as the standard first-aid aid packet, but they were put up in pasteboard cartons. These containers were of sufficient size to permit the dressings to be easily replaced in them after use. The instruction packets made their appearance in the supply table of 1911 as one of three forms of first-aid packets authorized.⁹ The Manual for the Medical Department authorized the issue of 20 first-aid packets to each company for instruction purposes.¹⁰ The supply table of 1916 allowed 40 instruction packets per 100 men of the command.¹¹ The specifications under which first-aid packets for instruction were purchased in 1917-18 are given below.⁵ These quantities purchased during those years are given in the consolidated table of surgical dressings for field use which appears at the end of this chapter.⁶

SPECIFICATIONS FOR FIRST-AID PACKETS FOR INSTRUCTION, MEDICAL DEPARTMENT, UNITED STATES ARMY

Packets to be made up as described below.

Materials.—All gauze to be in accordance with United States Government Standard Specifications for Absorbent Gauze in weight, mesh, and chemical analysis. Gauze to have 32 threads to the inch in the warp and 28 threads to the inch in the filling. Muslin to have 56 threads to the inch in the warp and 56 threads to the inch in the filling.

Contents and construction of packet.—1. Two bandages of muslin 4 inches by 84 inches.

2. Two compresses of absorbent gauze, each composed of one-half square yard of gauze, so folded as to make a compress $3\frac{1}{2}$ inches by 7 inches.

One compress to be placed lengthwise in the center of each bandage, and retained in position by sewing along one end and across the center. The loose end of the compress is then folded on the sewed part and held by one or two stitches, thus making a compress $3\frac{1}{2}$ by $3\frac{1}{2}$ inches.

Each bandage thus prepared to be rolled loosely from each end, with the roll toward the back of the bandage, until the compress is reached. The latter is now covered with a strip of standard quality, heavy weight, blue tissue paper, 3 inches by 3 inches, and folded through the center, the flattened rolls of the bandage laid on either side of the folded compress, the strip of paper being between back of the compress and the flattened bandages. Each bandage then to be wrapped separately in parchment or waxed paper.

3. Two No. 3 safety pins wrapped in waxed paper.

The above articles, as prepared, to be placed in a strong dark-brown cardboard box, with slip cover, of standard quality, size, and construction, measuring $2\frac{1}{4}$ inches by $3\frac{3}{4}$ inches by $4\frac{1}{2}$ inches deep, inside measurements. On the face of the container will be securely pasted a standard label on which is printed the following:

U. S. ARMY FIRST AID INSTRUCTION PACKET

This packet to be used only for giving instruction in first aid.

It may be used repeatedly and should be washed and ironed when soiled.

(Name of contractor and date of contract.)

All the contents of the packet must be sterile.

Packing and delivery.—All packages must be packed in well-made new boxes, constructed of $\frac{7}{8}$ -inch material. Boxes must be of uniform size and each box must contain the same number of packages and must be plainly stenciled showing the contents and quantity in box, name of the contractor, and the date of the contract. Boxes must not exceed 5 cubic feet in capacity, and must have no dimension greater than 30 inches. Packages must be packed in boxes in multiples of 10. For shipment boxes will be tagged and not stenciled.

Workmanship, finish, etc.—Packets to be made of best material throughout; workmanship to be first class, finished packets to be equal to and like standard in every respect.

Sample packets will be selected at random from deliveries made at this depot and tested as to sterility, materials, etc., and if found defective the entire lot from which the sample was taken will be rejected. Excessive compression of the packet contents will not be permitted.

GAUZE PACKETS

In providing dressing for field use, particularly in field and evacuation hospitals, it was anticipated that conditions would arise wherein the standard first-aid packet and the shell-wound packet would prove inadequate. In redressing or reinforcing the dressing of wounds it was likely that additional quantities of sterile gauze would be required. To meet these conditions gauze packets in impervious containers were included in the list of field dressings. Two types of packets were provided, plain sterile gauze and sublimated gauze. The plain gauze was intended primarily for evacuation hospitals.¹² The sublimated gauze packets were intended for regimental medical detachments and field hospitals as well as evacuation hospitals.¹³ Two packets of sublimated gauze were carried in packet No. 3 of the Hospital Corps web belt.¹⁴ They were also included in both types of boxes of surgical dressings.¹⁵ Specifications for these gauze packets appear below. The quantities purchased during 1917-18 are given in the consolidated table of surgical dressings for field use which appears elsewhere in this chapter.⁶

SPECIFICATIONS FOR GAUZE, PLAIN, 1-YARD PACKAGE, MEDICAL DEPARTMENT, UNITED STATES ARMY

(28 by 24)

Materials.—All gauze to be in accordance with the United States Government Standard Specifications for Absorbent Gauze, in weight, mesh, and chemical analysis. Gauze to have 28 threads to the inch in the warp and 24 threads to the inch in the filling. Gauze to be sterile and packed by an approved process.

Packages.—Each package to consist of 2 one-half square yards (2 pieces) of gauze; each $\frac{1}{2}$ -yard piece to be properly folded and securely wrapped in a satisfactory paper wrapper, the two pieces thus wrapped to be placed in an outer cardboard container and thoroughly sealed by means of paraffin process; completed package to measure 1 by $2\frac{3}{8}$ by $3\frac{3}{4}$ inches (not exceed measurements). Excessive compression will not be allowed. Each package will bear a label showing its contents, name of the contractor, and the date of the contract.

Packing and delivery.—All packages must be packed in well-made, new boxes constructed of $\frac{7}{8}$ inch material. Boxes must be of uniform size, and each box must contain the same number of packages and must be plainly stenciled showing the contents and quantity in box, name of the contractor, and the date of the contract. Boxes must not exceed 5 cubic feet in capacity and must have no dimension greater than 30 inches. Packages must be packed in boxes in multiples of 10. For shipment boxes will be tagged and not stenciled.

Inspection.—Specimens of gauze delivered at the depot will be subjected to standard tests, cultural and otherwise. If a sample is found to be defective the entire lot from which it was taken will be rejected.

Quality, etc.—Quality of gauze and method of packing to be equal to the standard in every respect.

SPECIFICATIONS FOR GAUZE SUBLIMATED, 1-YARD PACKAGES, MEDICAL DEPARTMENT, UNITED STATES ARMY

(28 by 24)

Materials.—All gauze to be in accordance with United States Government Standard Specifications for Absorbent Gauze, in weight, mesh, and chemical analysis. Gauze to have 28 threads to the inch in the warp and 24 threads to the inch in the filling. Gauze to be sublimated, 1 to 1,000, sterilized and packed by an approved process.

Packages.—Each package to consist of 2 one-half square yards (2 pieces) of gauze; each $\frac{1}{2}$ -yard piece to be properly folded and securely wrapped in a satisfactory paper wrapper, the two pieces thus wrapped to be placed in an outer cardboard container and thoroughly sealed by means of paraffin process; completed package to measure 1 by $2\frac{3}{8}$ by $3\frac{3}{4}$ inches (not exceed measurements). Excessive compression will not be allowed. Each package will bear a label showing its contents, name of the contractor, and the date of the contract.

Packing and delivery.—All packages must be packed in well-made, new boxes, constructed of $\frac{7}{8}$ inch material. Boxes must be of uniform size, and each box must contain the same number of packages and must be plainly stenciled showing the contents and quantity in box, name of the contractor, and the date of the contract. Boxes must not exceed 5 cubic feet in capacity and must have no dimension greater than 30 inches. Packages must be packed in boxes in multiples of 10. For shipment boxes will be tagged and not stenciled.

Inspection.—Specimens of gauze at the depot will be subjected to standard tests, cultural and otherwise. If a sample is found to be defective, the entire lot from which it was taken will be rejected.

Quality, etc.—Quality of gauze and method of packing to be equal to the standard in every respect.

COMPRESSED GAUZE BANDAGES

Two other forms of surgical dressings intended for field use appear on the supply table, viz, compressed gauze bandages and 1-ounce packets of absorbent cotton. These 1-ounce packets of absorbent cotton corresponded in quality, sterility, and general manner of preparation to the 1-pound package, but were

compressed and inclosed in a waterproofed pasteboard carton for protection and for convenience in carrying.

The compressed gauze bandage was made of the same grade of gauze as the standard roller bandage, 44 threads per inch in the warp and 40 threads per inch in the filling, but differed from it in length, manner of rolling, and the carton in which packed. The bandages were of the standard widths, 2½-inch, 3-inch, and 3½-inch, but were only 6 yards long, while the roller bandage was 10 yards long. To permit shaping the compressed bandage into a flat form, for convenience in packing and carrying, it was necessary to roll it loosely and without a central core. The standard roller bandage was rolled as tightly as possible from the center outward. Compressed bandages were individually wrapped and sealed and packed one gross to a pasteboard carton. While this carton differed in shape from that of the roller bandage, it was but little more than half the size. The standard basic specifications for absorbent gauze, already quoted, applied to these bandages. For economy in manufacture, the width of the 3½-inch bandage was reduced one-eighth inch. The salvage could not be used for bandages, and cutting the yard-wide gauze resulted in the waste of the equivalent of one bandage per width. By rearranging the bandage a little it was possible to remove the salvage and still cut nine bandages per width. The quantities purchased during the years 1917-18, both of compressed bandages and of 1-ounce packets of absorbent cotton, are given in the consolidated table of surgical dressings for field use at the end of this chapter.⁶

SPECIAL SURGICAL DRESSINGS DEVELOPED DURING THE WORLD WAR

The surgical dressings for field use, described in the preceding pages, had been developed after years of experience and trial under field and simulated combat conditions. The first-aid packet had proved satisfactory for small arms wounds in open warfare. The compressed bandage and the sublimated gauze packet had served well as supplementary dressings in those cases where the first-aid packet proved inadequate to properly protect the wound. The adequacy of the first-aid packet, shell wound, had never been demonstrated because no occasion for its use had been presented during the years following its adoption. It was still an untried article, but theoretically it should have furnished satisfactory protection to large wounds.

The progress of the World War had marked the advent of new engines of destruction vastly more violent than those witnessed in any previous war. The destruction of tissue caused by the fragments from these missiles was correspondingly greater. Massive wounds became more frequent. The casualties in the various engagements increased. The pollution of the soil greatly enhanced the infection of wounds and increased the problems of first aid. New types and greater quantities of surgical dressings became necessary.

To meet the requirements by the United States Army the commander in chief of the American Expeditionary Forces in France, appointed a board of medical officers in August, 1917, "for the purpose of investigating and reporting upon the advisability of standardizing certain appliances to be used by the Medical Department." The board, in its deliberations, was guided by instruc-

tions from the chief surgeon, A. E. F.¹⁵ While the principal mission of this board was the investigation of splints and surgical appliances for hospital use, it was extended to cover field dressings. The board, in its deliberations on field dressings, was governed by the general principle that¹⁶—

Surgical dressings should protect the wounded man from—

1. Trauma to his wounds;
2. Loss of blood;
3. Secondary infection,

and should be so applied as to add to his comfort during treatment and transportation.

In the manufacture of these dressings it is not essential that absolute accuracy in measurements be observed.

The special dressings recommended by the board are described below. Of these dressings the front-line packets numbered 1, 2, and 3 were used principally by the divisional medical units in the zone of combat. The larger dressings were intended for use in all hospital organizations from front to rear, field hospitals, surgical hospitals, evacuation hospitals, and base hospitals. They were put up in convenient packages and greatly facilitated the work at the hospitals and saved the time of the nurses and attendants. All front-line packets were protected by an impervious covering against moisture and vesicant gases.

SPECIAL SURGICAL DRESSINGS REQUIRED BY THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY

PACKET NO. 1 (RED LABEL), FOR SMALL WOUNDS

This packet contains the following supplies, wrapped up in a paper covering that has been dipped in paraffin to protect its contents from moisture. It is marked with two red bands.

On opening the outer covering there will be found:

1. Two unbleached muslin bandages, 4 inches by 5 yards, cut on the bias; 2 safety pins, 1½ inches long, are attached to each bandage.
2. A muslin bag, which opens at one end. This bag contains dressings which are sterile.

The sterile dressings comprise:

1. One toothpick swab wrapped in oiled paper to be used for applying alcohol or iodine.
2. Two cotton tampons.
3. Four gauze wipes, 4 by 4 inches.
4. One absorbent pad, 4 by 6 inches, attached to a muslin bandage 2 inches by 7 feet long.

* * * * * * *

PACKET NO. 2 (WHITE LABEL), FOR MEDIUM-SIZED WOUNDS

This packet contains the following supplies, wrapped up in a paper covering that has been dipped in paraffin to protect its contents from moisture. It is marked with two white bands.

On opening the outer covering there will be found:

1. Two unbleached bandages, 5 inches by 5 yards, cut on the bias; two safety pins, 1½ inches long, are attached to each bandage.
2. A muslin bag, which opens at one end. This bag contains dressings which are sterile.

The sterile dressings comprise:

1. One toothpick applicator wrapped in oiled paper to be used for applying alcohol or iodine.

2. Four cotton tampons.
3. Four gauze wipes, 4 by 4 inches.
4. One gauze wick, ½ inch by 8 inches.
5. One absorbent pad, 5 by 7 inches, attached to a muslin bandage 2 inches by 7 feet long.

* * * * *

PACKET NO. 3 (BLUE LABEL), FOR LARGE WOUNDS

This packet contains the following supplies, wrapped in a paper covering that has been dipped in paraffin to protect its contents from moisture. It is marked with two blue bands. On opening the outer covering there will be found:

1. Two unbleached muslin bandages, 6 inches by 5 yards, cut on the bias; two safety pins, 1½ inches long, are attached to each bandage.
2. A muslin bag which opens at one end. This bag contains dressings which are sterile.

The sterile dressings comprise:

1. One toothpick applicator wrapped in oiled paper to be used for applying alcohol or iodine.
2. Six cotton tampons.
3. Six gauze wipes, 3 by 7 inches.
4. Two gauze wicks, 1 by 15 inches.
5. One absorbent pad, 11 by 12 inches, attached to a muslin bandage, 4 inches by 7 feet long.

Gauze roll (5 yards).—This dressing is made of one piece of gauze 30 inches wide, 5 yards long, folded to a width of 4½ inches and rolled into bandage form 5 yards long; 2 in a pack.

Gauze roll (3 yards).—This dressing is made of one piece of gauze 30 inches wide, 3 yards long, folded to a width of 4½ inches and rolled into bandage form 3 yards long; 2 in a pack.

Sponges.—Small size cut gauze 9 inches by 16 inches and fold to 2 inches by 2¼ inches; 25 in a package. Large size cut gauze 12 inches by 18 inches and fold to 4 inches by 4½ inches; 25 in a package.

Sterile dressing pads.—One size, cut 16 inches and folded 8 by 4 inches; 25 in a package.

Unsterile dressing pads.—Two types; two sizes.

Type 1, size 1, 8 by 12 inches; one-half absorbent cotton; one-half nonabsorbent cotton; covered with one-half yard of gauze.

Size 2, 14 by 20 inches; one-half absorbent cotton; one half-nonabsorbent cotton; covered with 1 yard of gauze.

Type 2, size 1, 11½ by 18 inches; one-half absorbent cotton, newspaper back; one-half nonabsorbent cotton, newspaper back; covered with 1 yard of gauze.

Size 2, 18 by 23 inches; one-half absorbent cotton, newspaper back; one-half nonabsorbent cotton, newspaper back; covered with 1½ yards of gauze.

The numbers given below indicate the relative quantities required by the forces overseas.

For example, for every ten 3-yard gauze rolls sent there should be 600 red-label packets.

	Number		Number
Packet No. 1 (red label). For small wounds	600	Sterile dressing pads	300
Packet No. 2 (white label). For wounds of moderate size	500	Unsterile dressing pads:	
Packet No. 3 (blue label). For large wounds	400	Type 1—	
Gauze roll:		Size 1	200
5 yards	8	Size 2	150
3 yards	10	Type 2—	
Sponges:		Size 1	75
Small	400	Size 2	50
Large	350		3,043

* * * * *

Standard surgical dressings for field use purchased during 1917-18—Continued

FIRST-AID PACKETS, SHELL WOUND

1917							
June 25	Wilford Hall Laboratories	600,000	\$0.1947	Contractor	162,720	437,280	\$85,138.42
Mar. 20	Johnson & Johnson	50,000	.1947	do	None.	50,000	9,735.00
1918							
May 6	Wilford Hall Laboratories	310,000	.1109	Government	None.	310,080	34,387.87
Apr. 29	Johnson & Johnson	250,000	.10345	do	None.	250,000	25,862.50
May 6	Seabury & Johnson	300,000	.11	do	None.	300,000	33,000.00
July 27	do	300,000	.115	do	254,160	45,840	5,271.60
27	Bauer & Black	1,100,000	.108	do	449,000	651,000	70,308.00
27	Johnson & Johnson	1,000,000	.1106	do	None.	1,100,000	121,660.00
Sept. 16	Bauer & Black	1,000,000	.108	do	1,000,000	None.	-----
17	Johnson & Johnson	1,100,000	.1106	do	1,000,000	None.	-----
	Total	6,010,000	-----		2,865,880	3,144,200	385,363.39
	Add for material furnished by the Medical Department.		-----				320,802.90
			-----				712,166.29

INDIVIDUAL DRESSING PACKETS

1917							
June 25	Ameriean Druggists Syndicate	90,000	\$0.18626	Contractor	None.	90,000	\$16,763.40
July 27	Bauer & Black	700,000	.17	do	None.	700,000	119,000.00
June 25	Seabury & Johnson	2,600,000	.175	do	None.	2,600,000	455,000.00
25	Wilford Hall Laboratories	1,600,000	.1788	do	122,950	1,487,050	265,884.54
Dec. 10	Bauer & Black	1,070,250	.213	do	None.	1,070,250	227,963.25
10	do	14,000	.2118	do	None.	14,000	2,965.20
10	do	915,500	.208	do	None.	915,500	190,424.00
10	do	250	.2068	do	None.	250	51.70
1918							
Mar. 11	Johnson & Johnson	800,000	.215	do	None.	800,000	172,000.00
11	do	200,000	.21448	do	None.	200,000	42,896.00
Apr. 27	Bauer & Black	1,000,000	.107	Government	None.	1,000,000	107,000.00
27	Johnson & Johnson	700,000	.1117	do	None.	700,000	78,190.00
29	Ameriean Druggists Syndicate	150,000	.1175	do	None.	150,000	17,625.00
May 7	Lewis Manufacturing Co	150,000	.115	do	None.	150,000	17,250.00
3	Seabury & Johnson	1,003,000	.112	do	None.	1,060,240	112,026.88
6	Bauer & Black	1,000,000	.107	do	None.	1,000,000	107,000.00
June 27	Ameriean Druggists Syndicate	200,000	.1175	do	108,000	92,000	10,810.00
July 27	Seabury & Johnson	300,000	.116	do	229,350	70,650	8,195.40
27	Watters Laboratories	200,000	.11265	do	None.	200,000	22,530.00
27	Lewis Manufacturing Co	300,000	.116	do	None.	300,000	34,800.00
27	Bauer & Black	2,000,000	.1026	do	None.	2,000,000	205,200.00
27	do	1,300,000	.1026	do	873,500	426,500	43,758.90
Sept. 16	Lewis Manufacturing Co	700,000	.11	do	465,100	234,900	25,839.00
Oct. 3							
	Total	16,990,000	-----		1,788,900	15,201,340	2,283,173.27
	Add for material furnished by the Medical Department.		-----				900,858.90
			-----				\$3,184,032.17

FIRST-AID PACKETS FOR INSTRUCTION

1917							
June 25	Seabury & Johnson	100,000	\$0.21962	Contractor	None.	100,000	\$21,962.00
25	Wilford Hall Laboratories	100,000	.2012	do	None.	100,000	20,120.00
Dec. 21	do	200,000	.2562	do	None.	200,000	51,240.00
	Total	400,000	-----			400,000	93,322.00

GAUZE, PLAIN, STERILIZED, 2½-YARD LENGTHS

1917							
June 25	Seabury & Johnson	1,400,000	\$0.08327	Contractor	None.	1,400,000	\$116,578.00
1918							
May 6	do	450,000	.044	Government	None.	450,000	19,800.00
July 27	do	1,061,000	.46	do	528,440	532,560	24,497.76
27	Bauer & Black	567,000	.04	do	None.	567,000	22,680.00
Sept. 16	do	1,400,000	.04	do	950,000	450,000	18,000.00
Oct. 3	Lewis Manufacturing Co	600,000	.04	do	600,000	None.	-----
Sept. 17	Johnson & Johnson	6,500,000	.04	do	6,500,000	None.	-----
	Total	11,978,000	-----		8,578,440	3,399,560	201,556.76
	Add for material furnished by the Medical Department.		-----				113,313.50
			-----				314,869.26

Standard surgical dressings for field use purchased during 1917-18—Continued

GAUZE, SUBLIMATED, 2½ YARDS PER PACKAGE

1917							
July 27	Bauer & Black.....	9,500,000	\$0.08	Contractor.....	None.	9,500,000	\$760,000.00
June 25	Seabury & Johnson.....	3,000,000	.08386	do.....	None.	3,000,000	251,580.00
23	Johnson & Johnson.....	21,500,000	.07208	do.....	None.	21,500,000	1,549,720.00
1918							
Feb. 21	Bauer & Black.....	48,000	.1173	do.....	None.	48,000	5,630.40
	Total.....	34,048,000				34,048,000	2,566,930.40

COTTON, ABSORBENT, 1 OUNCE IN PACKAGE

1917							
July 27	Bauer & Black.....	5,000,000	\$0.049		None.	5,000,000	\$245,000.00
June 25	Seabury & Johnson.....	1,500,000	.04332		33,600	1,466,400	63,524.45
23	Johnson & Johnson.....	8,500,000	.03776		None.	8,500,000	320,960.00
1918							
Aug. 8	Bauer & Black.....	1,000,000	.04035		None.	1,000,000	40,350.00
	Lewis Manufacturing Co.....	500,000	.04035		500,000	None.	
Oct. 3	Seabury & Johnson.....	1,500,000	.042		700,000	800,000	33,600.00
15	Bauer & Black.....	1,700,000	.04275		None.	1,700,000	72,075.00
Feb. 21	do.....	146,000	.049		None.	146,000	7,154.00
Aug. 17	do.....	500,000	.04035		None.	500,000	20,175.00
	Total.....	20,346,000			1,233,600	19,112,400	803,438.45

RECAPITULATION

	Quantity ordered	Canceled	Accepted	Amount paid
First-aid packets:				
Metal covered.....	13,400,000	1,000,000	12,400,000	\$3,716,409.36
Shell wound.....	6,010,000	2,865,880	3,144,200	712,166.29
Individual dressing packets.....	16,990,000	1,798,900	15,201,340	3,184,032.17
First-aid packets for instruction.....	400,000	None.	400,000	93,322.00
Gauze:				
Plain, sterilized, 2½-yard packets.....	11,978,000	8,578,440	3,399,560	314,860.26
Sublimated, 2½-yard packets.....	34,048,000	None.	34,048,000	2,566,930.40
Cotton, absorbent, 1-ounce packets.....	20,346,000	1,233,600	19,112,400	803,438.45
Total cost (approximate).....				11,391,167.93

REFERENCES

- (1) Letter from the Surgeon General to the Secretary of War, December 18, 1905, relative to improvements in first-aid packets. On file, Record Room, S. G. O., 113655 (Old Files).
- (2) G. O., No. 84, W. D., May 5, 1906, 2.
- (3) Manual for the Medical Department, 1916, par. 969.
- (4) *Ibid.*, par. 954. 955.
- (5) Taken from retained copies of contracts made at the Field Medical Supply Depot and now on file at the Medical Section, New York General Intermediate Depot, Brooklyn, N. Y.
- (6) Data compiled from copies of contracts and schedules of delivery on file in the Office of Chief of Finance, Miscellaneous Section.
- (7) G. O., No. 56, Headquarters of the Army, Washington, D. C. August 11, 1887, pars. 17-18. *Also:* Circular No. 9, Headquarters of the Army, August 8, 1891, Sec. VI.
- (8) Letter from Maj. J. P. Sanger, Inspector General, South Atlantic District, to the Inspector General, January 21, 1896, relative to instruction in first aid, and the recommendations of the Surgeon General thereon. On file, Record Room, S. G. O., 14852-E (Old Files).

- (9) Manual for the Medical Department, 1911, par. 898 (b); *ibid.*, 1916, par. 945.
- (10) *Ibid.*, 1911, par. 394.
- (11) *Ibid.*, 1916, par. 845.
- (12) *Ibid.*, p. 298.
- (13) *Ibid.*, par. 866, 879, 891, 932.
- (14) *Ibid.*, par. 907.
- (15) S. O., No 73, H. Q., A. E. F., France, August 20, 1917, par. 17.
- (16) Manual of Splints and Appliances for the Use of the Medical Department of the U. S. Army, American Red Cross, Second Edition, 1918, p. 17.
- (17) S. O., No. 824, G. H. Q., H. A. E. F., France, October 11, 1918, par. 169.

SECTION IV

MOTOR VEHICLES^a

CHAPTER XX

MOTOR AMBULANCE SUBDIVISION, SURGEON GENERAL'S OFFICE

At the time we entered the World War, and for some time thereafter, the Medical Department was charged with the proper designing of motor ambulances,^b their purchase, inspection, and maintenance. For the effectual conduct of this work there was organized in the finance and supply division a motor ambulance section which, as related in Chapter I, eventually became the motor ambulance subdivision.

While the assistant chief of the finance and supply division was in general charge of the activities concerning automobile ambulances, the chief of the motor ambulance subdivision was an expert from civil life, selected for his special qualifications.

An idea of the organization of the motor ambulance subdivision can best be gained from a description of the manner in which it functioned. This was as follows: The technical expert who was in general charge was charged also with design, production, inspection, and assembly of motor ambulances. The technical assistant was charged with legal matters, contracts, and correspondence. A motor ambulance experimental station was maintained in Washington, D. C., for testing and for development of changes and improvements in detail of design and construction. Inspection groups were detailed at the factory of the General Motors Truck Co., at Pontiac, Mich., and at the factories of the several body manufacturers, for inspection of the work in progress and its acceptance when completed. This personnel directly represented the Surgeon General at the several factories and were responsible for production and periodic reports thereof, and for improvements in methods, processes, and design. A motor ambulance supply depot was established at Louisville, Ky., for receiving, assembling, testing, storing, and shipping motor ambulances, motor cycles, and spare parts therefor.^c

^a The motor ambulance did not entirely eliminate the animal-drawn ambulance. Tables of organization required that one of the four ambulance companies authorized for each Infantry division be animal drawn. So they were in the United States. Overseas, animal-drawn ambulances were not much used, and indeed were not sent over except with the first few divisions, as the 1st and 2d Regular Divisions and the 26th and 42d National Guard Divisions. Animal-drawn ambulances, with all spare parts and repairs, were furnished by the Quartermaster Corps.

^b The motor ambulance board, which was referred to in the introduction to this volume, continued to function for several months after the declaration of war, April 6, 1917, thus accounting for frequent references to it in succeeding pages, in connection with the design of ambulances. Its duties gradually were assumed by the motor ambulance subdivision, Surgeon General's Office.

^c A full account of the activities of this depot appears in Chap. XLI.

The following extract from a memorandum to the Inspector General indicates briefly the functions, duties, and methods of the motor ambulance subdivision of the Surgeon General's Office, as of April 26, 1918:¹

(1) The general problem of "providing motor ambulances of satisfactory quality and design, in necessary quantities, and at the right time" is assigned to one office, including personnel at one motor ambulance experimental station, one body-producing plant, one chassis-producing plant, one motor ambulance supply, repair, and salvage depot. The responsibility of the officer in general charge of this work has been clearly outlined. His authority under the approval of the colonel in charge of the supply branch is clear. The responsibility and authority of each officer in charge of the various stations under the directing Washington office have been clearly outlined.

(2) The general problem of "providing motor ambulances of satisfactory quality and design, in necessary quantities, and at the right time" is regarded as including (1) engineering and design, (2) procurement, (3) production, (4) inspection, (5) proper delivery f. o. b. factories. At the directing Washington office, and at each station, each of the above five subdivisions is intimately involved, and interdependent in the successful solution of the general problem stated. No one can be handled independently, or even without the closest cooperation and knowledge of the others. Division of responsibility and authority, as per these subdivisions, has not been found necessary or desirable. On the contrary, it is believed such subdivision would lead to confusion of responsibility and authority, overlapping if not conflicting effort, mistakes, and delays in the successful emergency solution of the general problem.

(3) Care has been exercised in the selection of experienced officers in charge of this work at its various stations; each has his responsibility and authority clearly outlined on paper, and in a definite, complete production problem; and the Medical Department submits that its system for "providing motor ambulances of satisfactory quality and design, in necessary quantities, and at the right time," is successful.

(4) The officers in charge at the various stations look to one office for authority and direction. They are kept in touch, as far as practicable, with the aims and general operation at other plants and at the Washington office.

(5) The general problem, including its various subdivisions, at the various stations and plants, is not too large for competent experienced officers in charge to successfully handle. On the contrary, there is great advantage, both theoretical and practical, in assigning to officers in charge a definite, complete problem, with responsibility and authority to see it through. Enthusiasm, overtime efforts, exceptional cooperation, and teamwork have resulted in motor ambulance work.

The personnel at the motor ambulance experimental station at Washington was employed continually in working out improvements in design and preparing detail drawings of these improvements, in making road and shop tests, in making inspections of motor ambulances and equipment and Medical Department personnel at the various camps in charge of such vehicles and equipment, and in giving instruction at various Medical Department schools. This personnel was very intimately associated with the ambulance section in the Surgeon General's Office and was used to develop the details that section desired. In the summer of 1918, the personnel on duty at this station consisted of 8 commissioned officers of the Sanitary Corps and 12 noncommissioned officers and 5 privates of the Medical Department.²

The inspection groups at the plants for manufacturing chassis and bodies consisted, August 30, 1918, of 4 officers of the Sanitary Corps and 17 enlisted men (5 noncommissioned officers, 12 privates), Medical Department, at the General Motors Truck Co.'s plant, Pontiac, Mich.; 2 officers of the Sanitary Corps and 5 enlisted men (4 noncommissioned officers, 1 private), Medical

Department, at the Anderson Electric Car Co.'s plant, Detroit, Mich.; and 1 officer of the Sanitary Corps and 4 enlisted men (3 noncommissioned officers, 1 private), Medical Department, at the plant of the Elkhart Carriage & Motor Car Co., Elkhart, Ind. Their principal duties were to supervise production, watch processes of manufacture, correct defects in methods and products, carry out the policies of the central office, and keep it informed of progress in production.²

REFERENCES

- (1) Memorandum from the Surgeon General, April 26, 1918, to Maj. Robert D. Palmer, Office of the Inspector General, April 26, 1918. Subject: Organization of the Medical Department for the provision of ambulances. On file, Finance and Supply Division, S. G. O., $\frac{750-138}{45}$.
- (2) Letter from the Surgeon General to The Adjutant General, August 30, 1918. Subject: Motor Transport Corps. On file, Finance and Supply Division, S. G. O., $\frac{750-519}{1}$.

CHAPTER XXI

THE AMBULANCE CHASSIS

Since chassis for motor ambulances were manufactured for the Medical Department during the World War by one producing plant^a and the bodies for them were manufactured by several other plants, it is essential in the interests of clarity to consider these parts of the motor ambulance separately and as a preliminary to the consideration of other features of the subject of motor ambulances which have a general application.

Following the declaration of war on April 6, 1917, when the question arose as to the selection of a model for the Army motor ambulance advantage was taken of the fact that the General Motors Truck Co., of Pontiac, Mich., had profited by the lessons learned on the Mexican border in 1916, where light ambulances had quickly perished, and had earnestly endeavored to remedy the defects developed in their chassis. They had succeeded, meanwhile, in producing a much improved vehicle—a new $\frac{3}{4}$ -ton truck chassis, which was called model 16.¹ The drawings and specifications of this vehicle were submitted to the Medical Department ambulance board on April 18, 1917, for consideration. They were found to be satisfactory. As the company promised prompt delivery, in quantity, the Surgeon General decided to adopt this model as the standard for all motor ambulances to be used in our Army.

At the request of the Surgeon General the Secretary of War, on April 14, 1917, authorized the purchase of 200 motor ambulance chassis from funds then available to the Medical Department.² Accordingly, contract was made April 25, 1917, with the General Motors Truck Co. for 89 model 15 chassis at \$995 each and 111 model 16 chassis at \$1,117.³ Delivery of the model 15 chassis was completed by July 5, 1918.⁴ Shipment of these chassis was made to the Richs-Marbaker Co.'s plant in Philadelphia, Pa., for the mounting of bodies made by that company on a previous contract, and they were held there in storage.⁵ Delivery of the model 16 chassis began in August and was completed on the 17th of that month.⁴

A contract for 2,000 chassis, model 16, $\frac{3}{4}$ -ton, at \$1,203.04 each, was made with the General Motors Truck Co. June 14, 1917.⁶ It was stipulated in the contract that deliveries should begin not later than July 20, 1917, and that construction should proceed at such a rate that 1,000 chassis would be ready for shipment by September 1, 1917. The remaining 1,000 were to be shipped by September 25, 1917. A supplemental contract added 2,000 heaters, at \$1.56 each. The Government agreed to assist the contractor as much as practicable in securing the needed materials.

^a Except Ford ambulances. These were manufactured primarily for the U. S. Army ambulance service for service with the French Army, and are considered separately in Chap. XXIII.

IMPROVEMENTS

In December, 1917, a conference was held in Washington between representatives of a number of the best known spring makers and representatives of the Medical Department for the purpose of designing an ambulance spring with easier riding qualities than the one previously furnished.⁷ Work on this subject had already been undertaken independently by the Medical Department ambulance inspector at Pontiac, Mich.⁸ A spring with greatly improved riding qualities was developed at this conference and incorporated in the ambulance on the new contract.⁸ The new spring, while conforming in a general way in size and appearance to the one in use, was made of better steel and was provided with a short stiff rebound leaf placed above the main leaf of the spring. In addition, Gabriel snubbers were added.

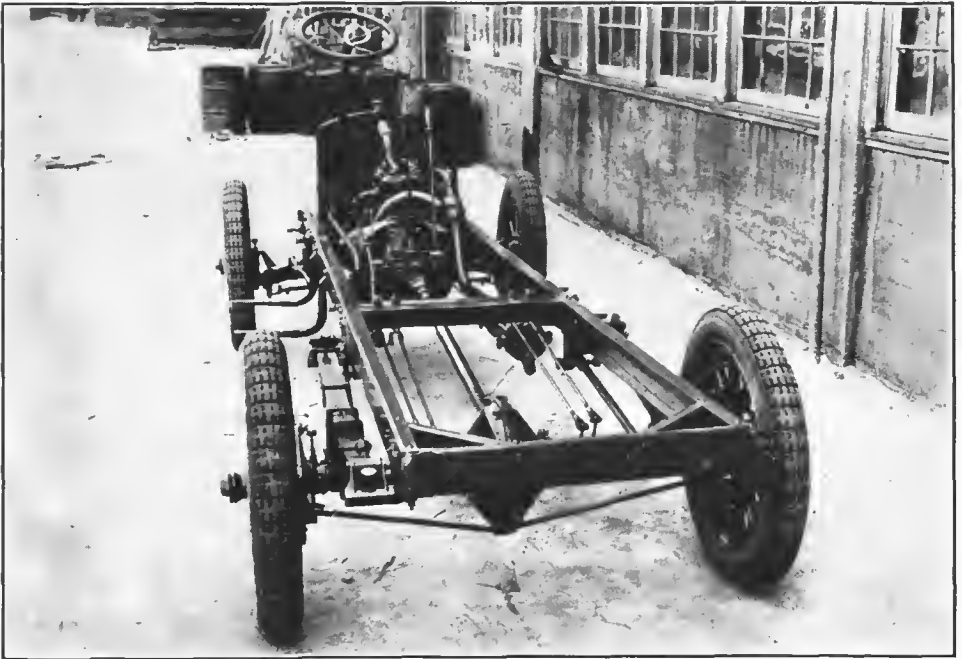


FIG. 15.—G. M. C. chassis, model '16

The chassis, under the contract of March 3, 1918, and its supplemental agreements, had many improvements over those on the former contracts, good as they were thought to be. The majority of the changes and improvements are described in the following agreement of December 23, 1917, between representatives of the General Motors Truck Co. and those of the Surgeon General's Office:⁹

1. *Springs.*—The springs to be used on the new order of chassis are to be those laid down or covered by the approved specifications of the Medical Department, which will be those decided on by the committee present at the recent conference on springs.

2. *Starting device.*—The motor must be made to start satisfactorily. At present the starting of the engine is very unsatisfactory, and the General Motors Co. is to work in cooperation with the Surgeon General's Office to better the starting of the engine. Mr. Whitton

is to take the initiative and to work in conjunction with Captain Browne to remedy the difficulty. There is to be no charge added to the price agreed upon for this work. This work must not be delayed, but improvement must be made immediately.

3. *Spark and throttle.*—The spark lever and the throttle, and the sector from which they move, are to be marked so as to distinguish between the spark lever and the throttle, and to indicate the direction of the spark advance and also when the throttle is open and when closed. These improvements are to be made to the approval of the Surgeon General's representative, and a sample sent to the Surgeon General's Office.

4. *Governors.*—The same governor as is being used—i. e., the Monarch—is to be used on the chassis under the new contract. Part of the starting trouble is due to the governor. A new intake elbow may help to solve the difficulty.

5. *Gasoline tank attachment.*—The gasoline tank is to continue to be attached to the body. If it were attached to the chassis, it would render it difficult to remove the bodies for repairs and would also weaken the support.

6. *Tire irons.*—The sample tire irons submitted are worthless. They were designed on 35-inch circle and should have been dimensioned to a nonskid tread tire. The words "fit to nonskid tire" should be put on the cut on direction sheet. Two sets of the new tire irons are to go with each chassis, one to be placed on either side of the ambulance. They are to be shipped in a box with the chassis. The General Motors Truck Co. is to receive \$5.30 for each extra set of tire irons. Without a written order, the General Motors Co. is advised to order 1,000 sets of tire irons. A supplementary contract for these and probably more will be made within a few weeks. The Surgeon General's Office will need at least 1,000 sets for the overseas shipments which have gone, and at least 1,000 additional sets, so the General Motors Co. will be safe in anticipating the contract by ordering immediately 1,000 sets.

7. *Front whcls.*—Front wheels of the chassis under new contract are to be the same as specified under the former contract. A radial, self-contained bearing would be an improvement.

8. *Rims.*—The rims for the chassis under new contract are to be the same as those specified under the old contract.

9. *Transmission lever ball.*—The ball on the gear shift lever on the new chassis is to be metal instead of hard rubber to prevent breakage. It is to be forged on, but until a reasonable opportunity is given the General Motors Co. to change the die for the lever, it may be screwed on and fastened with a pin. Before adoption, it must receive the approval of the representative of the Medical Department at the factory.

10. *Inspection, testing, and procedure at the factory.*—Inspection and test must be made at the direction and to the approval of the representative of the Surgeon General's Office at the General Motor Truck Co.'s factory. In order to check overseas shipments, inspection thereof may be conducted as follows: This representative, or one of his men, may take out at random any machine ready boxed for shipment, have it placed in a clear space selected by the Surgeon General's representative, unpacked according to his directions, set up according to his directions for his inspection. When it receives his approval, it is to be taken apart and reboxed. If the chassis inspected in this manner is found to be defective, more frequent examination will be necessary, and if many imperfectly packed machines are found, the Surgeon General's representative may require every box to be opened.

11. *Dash choke control.*—A dash choke control was discussed as a probable addition to the chassis under the new contract, but it was decided not to install it, as with such choke control the ordinary driver floods the cylinder with gasoline which destroys the effect of the oil and adds to the wear of the cylinders.

12. *Storage.*—The Surgeon General's representative stated that the Medical Department desires the General Motors Co. to provide for a maximum storage capacity for 500 chassis for three months. The representative of the General Motors Co. stated that the company could not do this without building additional sheds, and that this would make it necessary for them to add to the contract price named. It was finally agreed that without extra charge the General Motors Co. will store not to exceed 200 chassis for a period not to exceed three months.

13. *Quantity production.*—The representatives of the General Motors Co. stated that the company could easily produce 200 chassis every month, including February. If desired by the Surgeon General's Office, the company can produce 500 chassis per month. It was finally agreed that the company is to produce and deliver 400 chassis in February, 400 in March, and 200 in April, on or before the 15th of the month. It was understood that the delivery need not be uniform daily.

14. *The total number ordered.*—The total number of chassis to be covered by the contract is to be 1,000, with an option given to the Surgeon General's Office of ordering an additional 500 or 1,000 to be delivered at the rate of 400 a month. This option is to be exercised on or before March 25, and the company agrees to build any extra chassis ordered under this option at the same price as specified for the 1,000 covered by the contract, plus any actual increase in cost occasioned by necessary advances in the price paid by the company for the materials and labor used in the production of the chassis ordered. Any such advances are to be proved to the commanding officer and approved by him. The price under contract is to be \$1,224 per chassis. If storage of the chassis is made on wheels, the Surgeon General's Office is to arrange for inspection and payment before the machines are boxed and shipped. The company is to box and load on cars the stored machines whenever ordered to do so by the Surgeon General's Office, without extra charge.

15. *Rear fender irons.*—The rear fender irons of the present chassis are too short and the body now bottoms frequently in the fenders. The new contract is to provide for longer fender irons made so as to raise the fenders toward the top of the body.

16. *Heaters.*—The heaters for the ambulances are to be furnished by the Surgeon General's Office, and the General Motors Co. is to attach them to the chassis. The labor of attaching that part of the heater attachment which fastens on the chassis is to be done by the company without extra charge, and any materials not furnished with the heater and required to be used in fastening the same to the chassis are to be furnished by the company without extra charge. The heaters are to be boxed with the chassis without extra charge.

17. The company is to send a trained man or men to Louisville, or to any other place in this country where serious difficulties and emergencies in connection with the operation of their trucks purchased by the Medical Department arise, to assist in the solution of the same. The decision as to the necessity for such action is to rest entirely with the Surgeon General's Office.

18. *Bond.*—If the contract requires a bond to be given by the company, the price of the bond is to be added to the contract.

19. *War excise tax.*—The 3 per cent war excise tax on the value of each motor vehicle sold and any increase thereof levied on the sales covered by this contract is to be added to the price hereinbefore named.

20. *Insurance.*—The company is to insure the stored chassis and to provide a watchman to patrol the storehouse. The Government is to reimburse the company for the premiums on this insurance and for the wages of the watchman.

21. *Cancellation claims.*—The cancellation clause in the regular contract form is to be stricken out.

22. *Improved design and equipment.*—Any desired additions to equipment, over and above those specified, are to be made by the company on the order of the Surgeon General's Office, and the company is to receive, in addition to the compensation hereinbefore named, the cost of such addition plus 10 per cent thereof.

23. *Acceleration of deliveries.*—The company agrees to do everything in its power, at the direction of the Surgeon General's Office, to force deliveries. The order must be gotten out even though getting it out on time adds to the expense of production by the company.

24. *Extra tires.*—It is understood that there are to be no extra tires furnished with the chassis.

25. *Floor board.*—The floor board is to be removable.

MODEL AA CHASSIS

With a view of standardizing the light $\frac{3}{4}$ -ton truck and increasing the range of facilities for its manufacture, the Quartermaster General had four sample chassis built according to a standard design. They were built at four

different automobile factories. The Quartermaster General advised the Surgeon General in December, 1917, that this chassis would be ready for test about January 15 and that it was his intention to turn one of them over to the Medical Department for test and experiment if that department desired it. It was expected that the Medical Department would use a large number of such a chassis and should have an opportunity to experiment with it before it went into production. It was suggested that a suitable body be prepared in time to be installed on the chassis at the factory. This standard chassis was designated model AA.¹⁰ By the time this standard AA chassis was available for delivery the new AA body had been completed and was ready for mounting. The chassis was given a careful, thorough, and extensive test by the personnel of the Medical Department experimental station in Washington. The conclusions reached with regard to this sample AA chassis are contained in the following extract from a report made to the Acting Quartermaster General, March 25, 1918:¹¹

In general, information is forwarded that, at the time when original conferences upon this AA chassis were held, a schedule for experimental work, and for subsequent quantity production, as well as the original designs laid down, were such as to appeal to the Medical Department for a possible use in connection with motor ambulance service.

The time already lost, and the apparent impossibility of getting a satisfactory design in the quantity production for some months yet, together with changes in design which have been made, and which are of critical importance to the Medical Department, when consideration is made of interchangeability of chassis parts already provided in large quantities, and ambulance bodies already produced and under contract for covering practically the entire medical requirement for the next year—all have critical bearing upon the advisability of the Medical Department considering the change over to this chassis at such time as production is begun.

Information is forwarded that in the original conferences, at which technical automobile representatives of the various departments were present, the importance was appreciated of the fact that the Medical Department would perhaps be the largest user of this chassis, and that interchangeability of critical chassis parts, and of bodies for this chassis, were of prime importance. Since the designs were begun, at least four gentlemen have had active executive direction of this work, and, without further conferences or close personal cooperation, it is quite natural that the original considerations which were critical in determining certain important features have been overlooked in subsequent development.

The following specific points deserve consideration:

(1) The latest proposal for spring dimensions, while no doubt making for easier riding qualities, is regarded as unnecessary, even for first-class ambulance service. The lack of interchangeability of springs upon this job and the present ambulance job means that the entire spring supply being carried in spare parts "B" equipment with each ambulance company, and already shipped overseas, must be applicable to the new chassis, necessitating a complete duplication of all spring supply.

(2) The latest proposal of the use of 36 by 6 tires, front and rear, may cause interference with both old and new design ambulance bodies, and will at least necessitate two complete stocks of tires. No consultation has been had on this change, but information comes indirectly that the change is made because of tires already carried overseas by the Signal Corps, and because certain tire manufacturers made this recommendation. Information is forwarded that the Medical Department regards the matter of critical importance, in view of the fact that this department already has thousands of spare tires provided in this country and overseas of the original 35 by 5 size, that we have had assurances from tire manufacturers of satisfactory mileage, and already have sufficient data to show excellent results.

(3) Information comes indirectly to this department that the use of radius rods and torque tube, which was requested by the various War Department representatives at the original conferences, has been discarded in favor of the Hotchkiss drive, which was discussed pro and con at these conferences and not approved. In order to check the opinion of the engineers of the Medical Department, within the last three months this department has taken this matter up personally with four of the most prominent engineers in the United States, all of whom have had extensive experience with touring car and pleasure car Hotchkiss drive designs, as well as the recommended radius rod and torque tube construction, and whose opinion, therefore, can be given weight, with the following result: Three of these engineers recommend the use of the radius rods and torque tube, feeling that, for war service, this construction is as least as good as any possible Hotchkiss drive construction, and all three being of the opinion that their use will provide an additional safety factor. One felt that a Hotchkiss drive might be designed for a truck which would equal the design using radius rods and torque tube.

(4) The question is raised at this time, whether, since the Medical Department has already in service, or in immediate production, 3,100 of these $\frac{3}{4}$ -ton chassis, and has in contemplation the immediate ordering of 1,000 or 2,000 more, and since it is understood that there are practically no jobs of this type in the service of the other departments, in quantity—whether it would not be possible to adopt this type as the standard for the various departments which now contemplate limited use of the same. Information is forwarded that, after severe winter service at the various camps, this chassis has been found to be mainly satisfactory, and inasmuch as it is only an assembled job at best, containing a combination of the various best units assembled by the General Motors Truck Co. at their Pontiac factory, its manufacture in quantities such as to cover the needs of the various departments, could readily be undertaken by any companies in position to handle the AA job. This question is raised in the full realization of the seriousness of the problem confronting the Medical Department in changing horses at this time directly in the middle of the stream, and it is not made without appreciating the detail changes in the design worked up for the AA chassis, which would be of prime consideration if the use of this type of chassis in the service were just being begun.

(5) The tests already conducted upon the AA chassis, by engineers in charge of motor ambulance work for the Medical Department, have developed the following suggestions, which are forwarded:

* * * * *

(a) Grease leaks have developed in the rear right wheel, due to defective packing. (b) The support of the complete steering column is not sufficiently rigid. (c) Maximum governor's speed required for ambulance service is 20 miles per hour. (d) Starting is defective. (e) Radiator tubes vibrate critically at about 25 miles per hour in such way as to promise serious consequences. (f) Clutch and break pedals are crowded too close to steering column. (g) Gasoline tank drain pet cock located directly above exhaust pipe. (h) Grease cups on springs, etc., are quickly broken, and the cover springs easily torn off and covers lost. (i) The clutch spring tension is too heavy for anything like continuous operation. (j) The starting crank is too long, causing interference when cranking. (k) The filler cap on radiator is too much involved. A more simple method of designing is recommended. (l) The oil gauge location on the motor is inaccessible. (m) The running boards should be dropped $1\frac{1}{2}$ inches to permit carrying of necessary ambulance first-aid and food boxes. The running board lower tire carrier can be made $1\frac{1}{2}$ inches less in depth, so that ground clearance at this point remains the same. (n) A deeper frame section or frame reinforcement on this job is recommended. (o) Spring brackets, front and rear, have objectionable offsets and weak sections. (p) The gear shift from "first" to "low" is abnormal, due to the low step between these two gears. While agreeing that a high gear ratio is desirable, it is believed that the interval between shifts should be changed. (q) Riding qualities of the rear end have been quite disappointing, not comparing with the results of the old G. M. C. chassis for the Medical Department with the same springs. Careful study of the proportioning and structure of the radius rods, torque tube, rear springs, and rear axle might explain the trouble, but the Medical Department has not yet undertaken the same.

Extensive and comprehensive tests of the $\frac{3}{4}$ -ton chassis of different makes and designs, including the AA and the General Motors Co. chassis, were made during the late spring of 1918. As a result of these tests, it was decided to adopt the General Motors Co. model 16 design as the standard AA truck. This was done in order that other manufacturers might be put upon the work. Inasmuch as the purchase of all motor chassis had devolved meanwhile upon the Motor Transport Service, that service planned to let contracts on July 27, 1918, for 5,000 AA chassis in addition to those already ordered from the General Motors Truck Co. It was intended to place these contracts with at least three other companies.¹² This number was increased later to 7,200 distributed among 13 factories.¹³ It appears, however, that none of these factories came into production before the cessation of hostilities and all the contracts were canceled.¹³ While the majority of these chassis were intended for use by the Quartermaster Corps, a part of them were intended to meet increased ambulance requirements.

NEW CONTRACTS

GENERAL MOTORS TRUCK COMPANY

The estimated requirements of the Medical Department for motor ambulances during the first year of the World War, prepared about the time of our entry into the conflict, were 4,500 such vehicles. This number was based on an estimate of 70 ambulances per division from front to rear, allowing 25 per cent additional for replacements and providing extras for emergencies. The estimate included ambulances for three motorized ambulance companies with each division, for an evacuation ambulance convoy for each two divisions, and for the ambulances needed at base and general hospitals both in the line of communications and in the home territory. By the end of 1917 a more adequate conception of the military situation and its resultant needs was had by the War Department. The strength of the Army was being rapidly augmented. To meet the ambulance needs of this expansion it early became evident that motor ambulances would be required in ever-increasing number. The original estimates were revised in November, 1917, and again in January, 1918.¹⁴ The latter were the more comprehensive. A summary of the machines previously purchased, available under existing contracts, and those required to be produced June 30, 1919,¹⁴ appears below. It will be seen that the production of chassis was the chief factor in determining the number of motor ambulances in the field.

*Estimates covering United States standard ambulances required by the Medical Department,
United States Army*

CHASSIS

Estimated total ambulances by June 30, 1918.....	4,350
Delivered or contracted for:	
Mar. 15, 1916, Buick.....	6
June 21, 1916, White.....	12
July 7, 1916, White.....	39
July 11, 1916, Service.....	13
July 25, 1916, Service.....	39

Delivered or contracted for—Continued.

Mar. 30, 1916, G. M. C. 15.....	10	
June 16, 1916, G. M. C. 15.....	12	
July 3, 1916, G. M. C. 15.....	65	
Apr. 25, 1917, G. M. C. 15.....	89	
Apr. 25, 1917, G. M. C. 16.....	111	
June 14, 1917, G. M. C. 16.....	2,000	
Total.....	2,396	2,400
Additional deliveries and contracts proposed:		
Feb. 1, 1918, G. M. C. 16 (200 per month).....	1,000	
April, May, June, 1918, AA or G. M. C. 16.....	950	
Total.....		1,950
		<u>4,350</u>
Estimated total ambulances by Dec. 31, 1918.....		6,000
Total during period.....		1,650
Additional deliveries and contracts proposed: AA (6 months, at 275 per month).....		1,650
		<u>7,000</u>
Estimated total ambulances by June 30, 1919.....		7,000
Total during period.....		1,000
Additional deliveries and contracts proposed: AA (6 months, at 167 per month).....		1,000

BODIES

Delivered or contracted for:		
Mar. 15, 1916, Rich-Mar.....	6	
Apr. 4, 1916, Rich-Mar.....	10	
June 1, 1916, Rich-Mar.....	12	
June 19, 1916, Rich-Mar.....	12	
July 10, 1916, Rich-Mar.....	57	
July 25, 1916, Rich-Mar.....	75	
July 1, 1916, J. G. Brill.....	39	
Aug. 29, 1916, Service.....	39	
July 26, 1916, Service.....	3	
Mar. 13, 1917, Babcock.....	500	
June 13, 1917, Babcock.....	2,500	
		3,253
Additional deliveries and contracts proposed:		
March, April, May, June, 1918, AA knock-down body (4 months, at 275 per month).....		1,100
		<u>4,353</u>
1918, AA knock-down body (6 months, at 275 per month).....		1,650
1919, AA knock-down body (6 months, at 167 per month).....		1,000

The original contracts of April 25, 1917, and June 14, 1917, with the General Motors Truck Co. for 200 and 2,000 chassis, respectively, were completed before March 15, 1918.¹⁵ During the production of these chassis a number of minor changes and improvements in design had been made, but more were needed. The General Motors Truck Co. was advised in November, 1917, that if satisfactory changes in several details of design and satisfactory procedure, production, and storage agreements could be reached, an order for an additional 1,000 ambulance chassis would be given it.¹⁶ Satisfactory agreement having been reached, a contract was entered into February 16, 1918,

for 1,000 chassis with option on part of the Government to increase that number to 3,700.¹⁷ A production rate of 200 to 500 chassis per month was stipulated. The price to be paid for the first 1,000 chassis was \$1,224 per chassis. The contract contained a provision for an increase in price to cover Federal taxes and increases in cost of materials and labor on all orders in excess of the 1,000 chassis. The option to increase the number of chassis was exercised by the Government. An order for 1,700 chassis under this option was placed in April, 1918,¹⁸ and a supplemental agreement was entered into July 25, 1918, to cover the order.¹⁷ A second order for the remaining 1,000 chassis was placed with the company in June, 1918,¹⁹ but this order does not appear to have been covered by a supplemental agreement. The prices paid on these orders were 800 at \$1,277.92, 900 at \$1,286.17, and 1,000 at \$1,311.89 plus 3 per cent war tax.

PRODUCTION

Troubles with motors and transmissions had been experienced under former contracts, resulting in annoying delays. The same complaint continued during the early days of production under the new contract. Difficulties in assembly developed in the factory and required drastic action on the part of the Medical Department representative at the factories. Delays were encountered in receiving parts from subsidiary manufacturers.²⁰ Production under the new contract did not begin until the week of April 20, 1918.²¹ Defects in the motors being received, even then, retarded production.²⁰ Production on the new contract and its two increases were as follows: April, 377; May, 361; June, 427; July, 342; August, 509; September, 923; October, 761. Total 3,700.²²

For various reasons the stipulated rate of production could not be maintained. The rate of production actually accomplished was as follows: August 7 to September 10, 1917, 208; September 11 to October 1, 492; October 2 to November 3, 563; November 5 to 28, 202; November 30, 1917, to January 3, 1918, 259; January 4 to 19, 103; February 2 to 28, 104; March 1 to 16, 74; total, 2,000.²³

STORAGE PENDING DISTRIBUTION

One of the difficulties encountered in ambulance production was that of storage pending distribution. Chassis boxed or standing are bulky units and require storage out of the ordinary. The huge boxes of the boxed chassis, weighing 4,000 pounds, could be handled only by power-operated machinery. Either overhead cranes or steam derricks were required for the purpose.

Early in September, 1917, the plant of the General Motors Truck Co. became congested with assembled chassis.²⁴ The motor ambulance supply depot was also crowded with unassembled vehicles and demanded cessation of shipments. There were 127 carloads of material on the tracks in Louisville and many more enroute.²⁵ Tonnage for overseas shipments could not be had. Relief of some sort from this acute congestion was necessary. Storage must be found.

Pontiac, Detroit, and adjacent territory as far as Buffalo, N. Y., were canvassed for storage facilities, but no covered storage at a reasonable rate could be found.²⁶ It was finally decided to box all chassis in excess of the 900

required by the ambulance depot and store them in the open protected by tar paper and canvas. Space for this purpose was found at Watertown, N. Y., in the plant of the H. H. Babcock Co. That company agreed to receive, unload, store, and reload the boxed chassis at \$5 each, plus the cost of insurance.²⁶

Ambulance shipments overseas were to be made at the rate of 120 completed ambulances per month. Such a schedule necessitated the storage of approximately 600 boxed chassis. It was decided to send that number to Watertown. Arrangements accordingly were made October 1, 1917.²⁷ Shipments thereto began October 6, 1917, with 13 carloads of 6 chassis each.²⁸ By the end of the month 252 chassis had been shipped.²⁹ By the end of October, 1918, the congestion both at the General Motors Truck Co. plant and at the

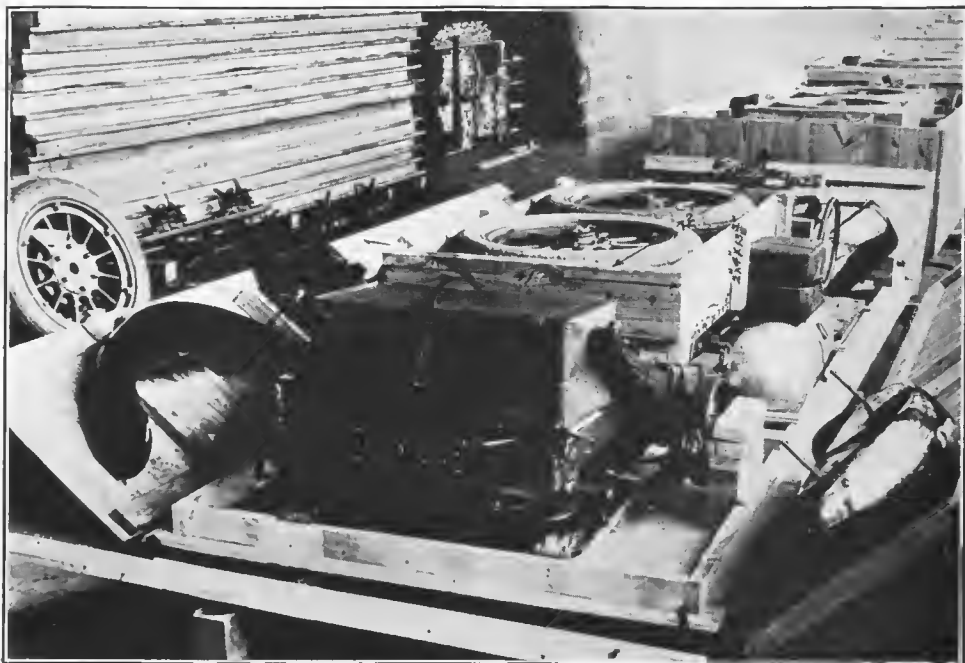


FIG. 16.—This and Figure 17 show a method of boxing G. M. C. chassis for shipment

ambulance supply depot had been cleared. Shipments to Louisville and overseas increased and production of chassis fell off. No further storage difficulties were experienced. By the end of January, 1918, 516 chassis had been forwarded, and shipment ceased.³⁰

FACTORY SHIPMENTS OF BOXED CHASSIS

The first lot shipped from the factory under the February, 1918, contract consisted of 96 chassis and went forward April 27, 1918. Subsequent shipments on this contract, so far as can be determined from records available, were as follows: April, 112; May, 381; June, 395; July, 199; August, 578; September (first 10 days), 302. This gives a total shipment of 1,967 chassis, of which

1,828 went to ports of embarkation. The remaining 139 chassis were shipped for domestic use.³¹

A report from the office of the chief of embarkation service, November 13, 1918, indicated that approximately 1,395 General Motors Co. chassis were at ports of embarkation, 243 were in transit, and 311 had been released for shipment but not placed in transit.³² This would indicate that approximately 1,700 of the 3,700 chassis on these contracts actually found their way to France.

Of the number of chassis produced under the supplemental contracts of April 25, 1917, and June 14, 1918, 36 of the model 15 and 1,094³³ of the model 16, boxed for export, were forwarded to ports of embarkation, or a total of 1,130.

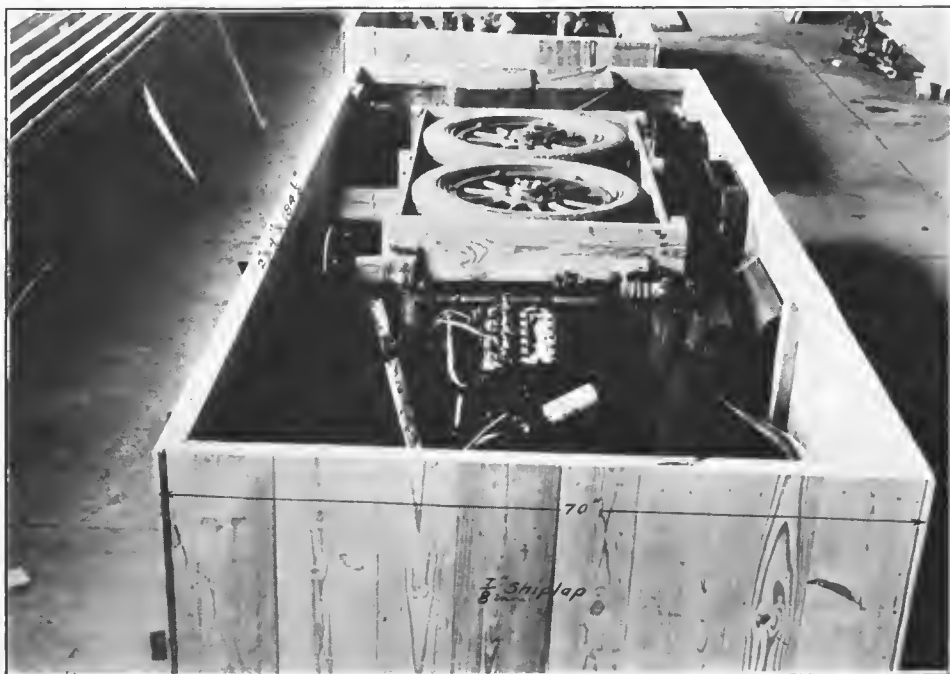


FIG. 17

It would appear, therefore, that only about 2,830 boxed chassis reached France. It is not known how many standing ambulances were shipped, but it is believed that their numbers were not great.

REFERENCES

- (1) Letter from the sales manager, General Motors Truck Co., Pontiac, Mich., to Maj. R. E. Noble, M. C., chairman, motor ambulance board, April 11, 1917. Subject: Model 16 $\frac{3}{4}$ -ton chassis. On file, Record Room, S. G. O., 153,155.-30.
- (2) Letter from the Surgeon General to The Adjutant General, April 7, 1917. Subject: Purchase of G. M. C. chassis, and the First Indorsement thereon, April 14, 1917. On file, Finance and Supply Division, S. G. O., 11,220.-190.

- (3) Contract between Lieut. Col. C. R. Darnall, M. C., and the General Motors Truck Co., April 25, 1917. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, 13,420-F.
- (4) Schedule of deliveries attached to contract of April 25, 1917, with the General Motors Truck Co. On file, Finance and Supply Division, S. G. O., Motor Transport Contract, 13,420-F.
- (5) Correspondence between the Surgeon General to the officer in charge, Field Medical Supply Depot, Washington, D. C., and the Quartermaster General, September 21, 1916-October 18, 1916. Subject: Storage of motor ambulance bodies. On file, Finance and Supply Division, S. G. O., 11,220.-86.-86-1.
- (6) Contract between Lieut. Col. C. R. Darnall, M. C., and the General Motors Truck Co., for 2,000 chassis, dated June 14, 1917. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, 285.
- (7) Report of the activities of the motor ambulance section of the Surgeon General's Office, June 28, 1918, unsigned. On file, Finance and Supply Division, S. G. O., 490 Memo.
310
- (8) Letter from the officer in charge, Sanitary Corps, N. A., General Motors Truck Co. Plant, Pontiac, Mich., to the Surgeon General, December 17, 1917. Subject: Springs. On file, Finance and Supply Division, S. G. O., 511-570 M. A. P.
B.
- (9) Report of conference on the purchase of G. M. C. chassis for ambulances, December 23, 1917. On file, Finance and Supply Division, S. G. O., 239 W. T. F.
31
- (10) Letter from the Quartermaster General, to Major Fishleigh, Motor Car Department, Medical Corps, U. S. A., December 4, 1917. Subject: Medical body for AA truck. On file Finance and Supply Division S. G. O., 750-594 Q. M. G.
54
- (11) Letter from the Surgeon General to the Quartermaster General of the Army, March 25, 1918. Subject: AA chassis. On file, Finance and Supply Division, S. G. O., 750-594 Q. M. G.
110
- (12) Letter from Statistics Branch, General Staff, to Maj. W. T. Fishleigh, July 15, 1918. Subject: Synopsis of contracts for motor vehicles. On file, Finance and Supply Division, S. G. O., 239 W. T. F.
40
- (13) America's Munitions, 1917-18. Government Printing Office, 1919, 502.
- (14) Estimates covering U. S. standard ambulances required by the Medical Department, U. S. Army, January 20, 1918, by Maj. Walter T. Fishleigh, Sanitary Corps, N. A. On file, Finance and Supply Division, S. G. O., Motor Transport Estimates.
- (15) Weekly report from the commanding officer, Sanitary Corps, N. A., General Motors Truck Co., to the Surgeon General, U. S. Army, March 11, 1918. On file, Finance and Supply Division, S. G. O., Pontiac Weekly Reports, 101 A. B. B.
178
- (16) Letter from the Surgeon General to Capt. A. B. Browne, Sanitary Corps, N. A., Pontiac, Mich., November 24, 1917. Subject; Additional model, 16 orders. On file, Finance and Supply Division, S. G. O., 511-570
B.
- (17) Contract of February 16, 1918, between Maj. John P. Fletcher, M. C., and the General Motors Truck Co., Pontiac, Mich., for 1,000 model 16 G. M. C. chassis. On file, Miscellaneous Section, Finance Department, S. G. O.
- (18) Memorandum from Maj. W. T. Fishleigh, Sanitary Corps, N. A., to Col. Edwin P. Wolfe, M. C., April 10, 1918. Subject: Additional G. M. C. ambulance chassis. On file, Finance and Supply Division, S. G. O., 490 memo.
277

- (19) Letter from the Surgeon General to Maj. J. P. Fletcher, M. C., Louisville, Ky., June 5, 1918. Subject: Increase of ambulance chassis order. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{342}$.
- (20) Weekly reports from commanding officer, Sanitary Corps, N. A., General Motors Truck Co., to the Surgeon General for the weeks ending March 11, 1918, to June 10, 1918. On file, Finance and Supply Division, S. G. O., Pontiac Weekly Reports, $\frac{101 A. B. B.}{178}$.
- (21) Weekly report of April 22, 1918, from the commanding officer, Sanitary Corps, Pontiac, Mich., to the Surgeon General. On file, Finance and Supply Division, S. G. O., Pontiac Weekly Reports, $\frac{101 A. B. B.}{178}$.
- (22) Letter from the General Motors Truck Co., by W. F. Maybury, to the Surgeon General, U. S. Army, July 26, 1918. Subject: Ambulance chassis production. On file, Record Room, S. G. O., 451.8-1.
- (23) Schedule of deliveries attached to contract of June 14, 1917, with the General Motors Truck Co. for 2,000 model 16 chassis. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, 285.
- (24) Telegram from the General Motors Truck Co., Pontiac, Mich., to the Surgeon General, September 11, 1917, for relief from congestion of assembled chassis in factory. On file, Finance and Supply Division, S. G. O., $\frac{267}{9}$.
- (25) Letter from Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville Ky., to Lieut. Col. Edwin P. Wolfe, M. C., S. G. O., September 15, 1917. Subject: Excess chassis shipments. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{47}$.
- (26) Telegram from Capt. A. B. Browne, Sanitary Corps, to Maj. W. T. Fishleigh, Sanitary Corps, S. G. O., September 28, 1917. Subject: Storage of chassis. On file, Finance and Supply Division, S. G. O., $\frac{511-570}{B.}$.
- (27) Letter from the H. H. Babcock Co., to the Quartermaster, Eastern Department, October 1, 1917, relative to storage of boxed chassis. On file, Finance and Supply Division, S. G. O., $\frac{45-H. H. B.}{16}$.
- (28) Letter from Capt. A. B. Browne, Sanitary Corps, Pontiac, Mich., to the Surgeon General, October 13, 1917. Subject: Weekly report. On file, Finance and Supply Division, S. G. O., $\frac{101-A. B. B.}{178}$.
- (29) Letter from the officer in charge, General Motors Truck Co. Plant, Pontiac, Mich., to the Surgeon General, October 29, 1917. Subject: Weekly report. On file, Finance and Supply Division, S. G. O., $\frac{101-A. B. B.}{178}$.
- (30) Letter from the officer in charge, Sanitary Corps, N. A., General Motors Truck Co. Plant, Pontiac, Mich., to the Surgeon General, January 28, 1918. Subject: Weekly report. On file, Finance and Supply Division, S. G. O., $\frac{101-A. B. B.}{178}$.
- (31) Letters from the commanding officer, Sanitary Corps, Pontiac, Mich., during the period April 22, 1918, to September 11, 1918, to the Surgeon General and to the Motor Transport Corps, District Officer, Detroit, Mich. Subject: Weekly reports, and trimonthly reports. On file, Finance and Supply Division, S. G. O., Pontiac Reports, $\frac{101-A. B. B.}{178}$.

- (32) Memorandum for Colonel Wolfe from Capt. F. J. Murray, Sanitary Corps, November 13, 1918. Subject: G. M. C. situation. On file, Finance and Supply Division, S. G. O., $\frac{750-519}{17}$ M. T. C.
- (33) Letter from the commanding officer, Sanitary Corps, General Motors Truck Co. Plant, April 15, 1918, to the Surgeon General, Subject: Weekly report. On file, Finance and Supply Division, S. G. O., Pontiac Weekly Reports, $\frac{101 \text{ A. B. B.}}{178}$.

CHAPTER XXII

THE AMBULANCE BODY

MODEL B

The United States standard closed motor ambulance, body model B, 1917, was mounted upon a $\frac{3}{4}$ -ton standard chassis. The body was inclosed front, sides, and top, and carried a canvas curtain, a tail gate, and a step at the rear.

The capacity of the ambulance, in addition to driver and orderly riding on the front seat, was 8 patients sitting, or 4 recumbent on litters, or 4 patients sitting and 2 recumbent.

The ambulance was fitted with two hinged upholstered seats, which, when not used as such, were folded over into the center of the body to form a deck upon which the lower litters were carried. Each of the upper litters was carried at the front end in two spring-supported strap carriers, and at the rear by one spring-supported strap and one spring-supported hook, swiveled upon the rear center post. These general features, together with certain improvements referred to at greater length below, constituted model B.

The ambulance bodies built for the Government in 1916 represented the best design submitted to the ambulance board at the time of their purchase. They were not without defects, however, and the board continued its investigations. Early in January, 1917, there were submitted to the board by a representative of the H. H. Babcock Co., of Watertown, N. Y., manufacturers of commercial truck and delivery bodies, photographs and specifications of a sample ambulance body constructed by that company.¹ The description of this body indicated that it had sufficient merits to justify its purchase. After an examination and tests of the body the board was thoroughly convinced that it represented the best type of construction for ambulance bodies which could be secured and was far superior to any design offered up to that time.¹ It surpassed all other designs in strength, rigidity, lightness, ease of repair, simplicity of construction, and qualities of material and workmanship. The company agreed to make any minor changes the Government might require. On the request of the Surgeon General and representation of the difficulties incident to the procurement of such bodies, authority for the purchase of 500 was granted by the Secretary of War, March 7, 1917.¹ A contract, accordingly, was made with the H. H. Babcock Co., March 13, 1917, for 500 ambulance bodies at \$330, in which the contractor undertook to store the bodies until needed by the Government and to deliver 100 within 70 days and 100 per month thereafter until the contract was completed.² Deliveries were made, 8 in May, 174 in June, 61 in July, 205 in August, and 52 in September.²

During the life of this contract no inspector or other representative of the Medical Department was stationed at the Babcock plant. Inspections were

made by members of the ambulance board ordered to Watertown, N. Y., for that purpose as the work progressed and the contractor requested. The first of these inspections was made April 30 and May 1, 1917. At that time all the material required to fill the contract was on hand or en route. The material in the rough and 24 bodies in process of construction were inspected. The work was done by skilled workmen in a high-class manner. The plant covered 12½ acres, was provided with its own water power, and had a force of 500 employees, which could be increased if necessary.³

The plant was prepared to complete 10 bodies per day, which could be increased to 20 per day with little difficulty. If needed the output could be



FIG. 18.—G. M. C. ambulance, model '16, open type

increased to 30 per day by discontinuing commercial business. The contractor proposed to have spare parts of the bodies numbered and catalogued so that any part could be replaced if required.³ Subsequent inspections were made in the same manner. A permanent inspector was sent from the Surgeon General's Office to the factory in the latter part of September, 1917, and remained there until the contracts of the Babcock Co. with the Medical Department had been completed.⁴

Another contract with the Babcock Co. was entered into June 13, 1917, for 2,308 standard ambulance bodies and 192 spare parts or repair bodies.⁵ The price to be paid for these bodies was \$352.50 completely assembled and painted, \$332.50 unassembled and primed but not painted, and \$340 unassembled, primed, and crated for export. This contract called for the delivery of 1,000 bodies by September 1, 1917, and the balance by November 15, 1917. However, only 235

bodies were delivered by September 1, and the contract was not fully completed until May 11, 1918.⁵ This delay caused no inconvenience except for a short time for spare parts bodies. At no time during the life of this contract was there an actual shortage of bodies.

A number of changes were made in the body and its appurtenances after it was approved. These were covered by supplemental contracts. They included litter trolleys, Vehisote panels for sides and front to inclose the body, storm aprons, and various minor changes.⁵ The total added cost of these changes amounted to \$55.92 on the bodies on which they were made.

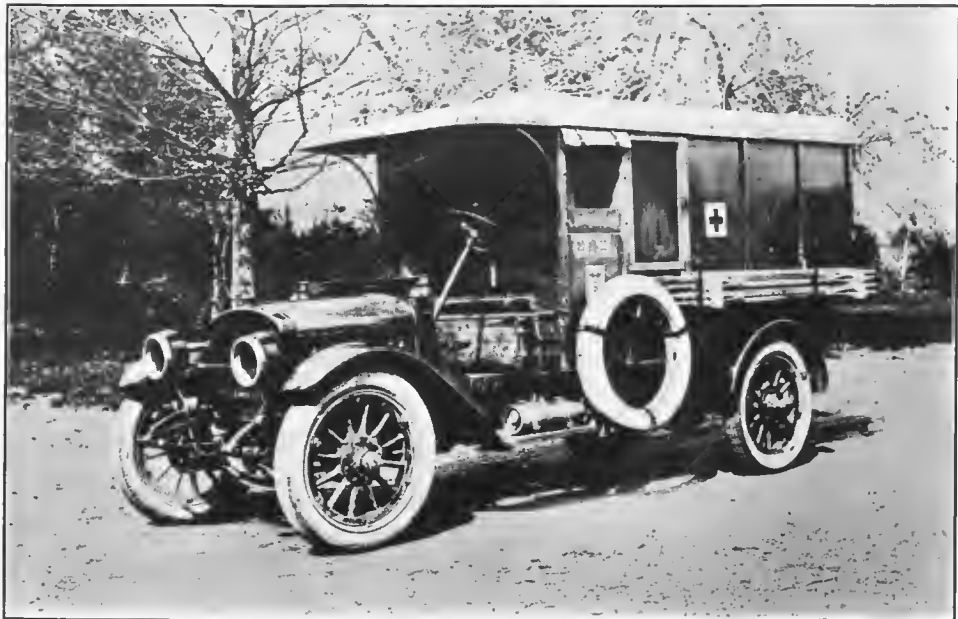


FIG. 19.—G. M. C. ambulance, model, 16, closed type

IMPROVEMENTS

TROLLEY DEVICE FOR UPPER LITTERS

The animal-drawn ambulance had been in use so long and had been improved so often that the body of that vehicle may be said to have reached its ultimate development by 1917. It was but natural that all the better features of this ambulance body should be incorporated in the one now planned. The spring hangers for the upper litters, having proved a great comfort for patients, were continued in the motor vehicles. But, in loading the upper berths of the animal-drawn ambulance it had been necessary for one man to climb into the ambulance and place the front handles of the litter in the hangers. These hangers were attached, one to the bow and the other to the center post, front and rear. Even in the open (curtained) type of motor ambulance body this was a slow and inconvenient procedure. In the closed type it was impracticable. These difficulties led to the development of trolleys on which the

front hangers could run to the rear and back. The bars for these trolleys or tracks at first were placed horizontal; but later were so placed that the rear end was somewhat lower than the front. This arrangement permitted the hanger to gravitate to the rear, when not in use, where it would always be ready for loading. This slope of the trolley bar brought the line of thrust, in pushing the litter forward, more nearly parallel with the track. It resulted in less friction and in greater ease in loading. An entirely suitable trolley-carrying device for the front hangers was finally developed. Metal hoops were placed on the front central upright post, through which the litter handles passed to prevent side sway of the litter.

CHANNELS FOR LOWER LITTERS

The lower litters were carried on a platform, formed by the seats and compartment along the inside of each of the side walls of the ambulance. The hinged seats were inverted to form this platform when used for recumbent patients. These hinged seats, when inverted, rested on metal stops attached at the proper level to front and rear upright center posts. The inner shoes of the litter ran in a channel iron of suitable size attached to the under surface of the hinged seat. This channel prevented the lower litters from slipping sideways. The front end of the body and the tail gate prevented fore and aft motion.

SIDE AND FRONT OPENINGS

The bodies of some of the foreign ambulances were wide enough to provide a passageway in the center, between the two rows of litters. This was for the convenience of the attendants in waiting on patients. The ambulance board, however, concluded that little attention could be given to patients when the ambulance was in motion over ordinary roads, and that the extra width offered no compensating advantages. If dressings had to be adjusted the ambulance must come to a stop. It was thought better policy to take extra precautions in applying the dressings in the first place. In the few cases where such attention was necessary it was advisable to remove the patient from the ambulance to give it. By means of a large window in front, the attendant could watch the patients. A door was placed on each side through which medicines, water, food, etc., could be given, without moving the patient. This door was provided with a suitable stop, so that it could be left partly open for ventilation; or firmly fastened shut, when so desired. The front window was hinged on its upper edge and could be secured in a fixed position above the driver's head. This provided ventilation from front to rear. It also allowed the attendant to watch and assist the patients without leaving his seat.

The ambulance board believed that side overhang of a body wide enough to provide a center aisle would make the body higher and heavier and increase the side sway. It would have been necessary, also, on account of the wheel housing, to raise both tiers of litters. This would have raised the center of gravity; which, with the increased width, would have rendered capsizing more easy. The advantages of lower litters and a lower center of gravity were constantly in mind, particularly in the design of the new AA model body.

HEATERS

At the time of placing the original contracts for motor ambulances in the spring of 1917, the information at hand concerning climatic conditions in France was very meager. The relation of weather conditions to the evacuation of sick and wounded was practically unknown. No reports on the subject had been received. Following the arrival of the American Expeditionary Forces in France more complete and accurate information became available. It was now learned that more adequate protection from both cold and wet proved to be necessary than had been anticipated. This was particularly true for the wounded, generally suffering from shock and its resultant low vitality.

Provisions already had been made for inclosing both the sides and the front end of the ambulance body with composition board, thus affording a thicker and less permeable wall than did the curtains of the open type of body. But even this was considered insufficient protection. Some provision for heating the ambulance was necessary. The heating of automobiles was not a new thing. A common method utilized the exhaust gases from the motor. The device to accomplish this purpose was known to the automobile trade as an "exhaust car heater." This contrivance consisted of a flexible metallic hose from the exhaust pipe of the motor to a radiating device within the car and another line to carry away the exhaust gases.⁶

Such a heating device had been developed for the Ford ambulance and was provided by the Ford Motor Co. on all the ambulances delivered in 1917 and without any special provision being made in the contract for it. Investigations with a view of securing a similar device for the General Motors Co. ambulance were begun in August, 1917. The firm which had supplied the device for the Ford ambulance worked out an installation for the Babcock body and the General Motors Co. chassis.⁷ It was decided to install these heaters on all ambulances sent overseas and on all those at camps in the colder parts of the United States. A contract for 1,500 heaters was made September 29, 1917,⁸ and the first deliveries to the General Motors Truck Co. arrived November 1.⁹ These heaters were found to be faulty in several particulars, but their action was quite good.¹⁰ The defects found by the inspector at the General Motors Truck Co. plant were soon remedied by the maker and the changes suggested were effected.¹¹

That heating devices using exhaust gases were not without danger became evident from a report from France that a patient in one of the Ford ambulances equipped with such a device had died, apparently from carbon monoxide poisoning.¹² This report indicated that the patient, suffering from a mild contagious disease, had been loaded in the ambulance at the place where he was billeted, for transportation to the station hospital. When the ambulance was opened he was found dead. A companion was in a critical condition. It was assumed in this report that the carbon monoxide had escaped into the car body by passing through the metal of the heating device. It is now believed, however, that the gas escaped through a loose connection beneath the body between the flexible pipe and the fixed metal part of the heater and entered the body through cracks in the floor. When these bodies were designed, cracks were

intentionally left in the floor to facilitate flushing or cleansing of the floor when dirty. In this case the ambulance had been allowed to stand 20 minutes with the body closed and the engine idling. The noxious gases escaping from this loose connection might very well have entered the body through the openings in the floor. The board which investigated the case, however, blamed the porosity of the metal heater.¹²

This casualty led to the issuance of a general order from the headquarters of the American Expeditionary Forces, requiring that bodies of ambulances equipped with exhaust gas heaters be especially well ventilated.¹³ It was directed that this ventilation be secured by boring 1-inch auger holes at 3-inch intervals in double row through the wooden front behind the driver and immediately below the roof. Similar holes, 15 in number, were to be bored in the tail gate, grouped about the center canvas litter pocket and between the upright iron braces.

A similar order was issued, upon the recommendation of the Surgeon General,¹⁴ by the War Department in March, 1918, in which it was directed that:¹⁵ (1) No change will be made in the exhaust system of the engine of any motor-driven vehicle. (2) The exhaust pipe leading from the engine to the muffler will be kept intact at all times. (3) Under no circumstances will any attempt be made to attach or to devise a heater using gases from the exhaust.

MODEL AA

In preparing the standard Babcock ambulance body for overseas shipment, very little assembling was attempted before placing the parts in the crate. Practically only the floor was put together. The remaining parts were shaped and many of the holes bored, but the assembling was left to the artificers overseas. This lack of assembly gave rise to many difficulties in the work overseas, especially by personnel unacquainted with the factory method of assembly.¹⁶ These difficulties called for the development of a new type of body in which most of the assembling was done at the factory and only the minimum amount of work left for the assembly unit overseas to do. It was desirable that the assembly to be made overseas be as simple as possible.

Consideration was given to a change in design late in the fall of 1917. An informal "body conference" was held in Washington, D. C., December 17-21, 1917. This conference was attended by representatives of six of the leading body manufacturers of the United States.¹⁷ The representatives of the Surgeon General presented the problem confronting the Medical Department, which was a new body of the knockdown type, with a number of improvements over the body then in use. At this conference the design of the desired new body was developed. By December 29 the drawings and specifications had been completed. They were rushed to the Babcock factory at Watertown for the manufacture of a sample body for test. This body was shipped to Washington, D. C., as soon as completed. It was there mounted upon a suitable chassis and subjected to careful scrutiny and rigid tests. Such changes as were indicated were made and the body finally perfected. Drawings and specifications were revised to conform to these changes and improvements.

On May 10, 1918, contracts were let to two manufacturing companies for 5,000 of these new bodies. A contract for 3,000 bodies was given the Anderson Electric Car Co., of Detroit, Mich., at \$335.25 per body, with \$15.46 additional for crating or \$19.96 for boxing. It was stipulated that delivery would begin July 15, 1918, and continue at the rate of 200 to 500 bodies per month.¹⁸

The other contractor was the Elkhart Carriage Co., of Elkhart, Ind. A contract for 2,000 bodies was given this firm at \$364.13 per body, with an additional charge of \$12 for crating or \$26.50 for boxing. Deliveries were to begin July 15, 1918, and to continue thereafter at the rate of 125 to 300 bodies per month.¹⁹



FIG. 20.—Standard O. M. C. ambulance, 1918, with model AA body, side view

The contract stipulations concerning deliveries could not be maintained nor did delivery begin on the date specified. One of the prime causes of the delay in deliveries was the question of a supply of canvas or duck for the rear curtain, the driver's curtain or apron, and the visor or part of the top of the body projecting forward over the driver's seat. These parts required a canvas 50 inches wide.²⁰ Practically all the looms in the United States making duck were working on contracts with the Quartermaster Corps. The demand for canvas for tents, tarpaulins, shelter tents, and wagon covers was enormous. By the end of May, 1918, the procurement of duck for ambulances had become increasingly difficult. Duck of suitable quality could be had through the Quartermaster Corps in only the 28½-inch width. Other widths could not be had.²⁰ Attention was turned to other fabrics for substitutes. A composite fabric known as Meritas cloth was tried out. This cloth consisted of two plies

of drilling cemented together. Fears were entertained that it might be too heavy and stiff and develop defects of manufacture. These fears proved groundless, however, with the light-weight Meritas cloth, and it was accepted as a substitute for canvas when the latter could not be obtained.²¹

Requests for the requisite quantity and grades of duck were made upon the Quartermaster General early in June, 1918.²² Some difficulty was experienced in getting this request for duck cleared by the Council of National Defense.²³ The contractors were urged to secure suitable duck wherever they could and in such quantities as could be had.²⁰ A sufficient quantity was



FIG. 21.—Standard G. M. C. ambulance, 1918, with model AA body, rear view

secured from the Babcock Co. for approximately 150 bodies.²² Small quantities were picked up from other sources. The Anderson Co. was authorized to substitute the light-weight Meritas cloth for duck on the first 500 bodies.²⁴ The inspector at the Anderson Electric Car Co.'s plant reported June 15, 1918, that arrangements had been made by that company for duck and duck substitute for the first 1,500 bodies. He was of the opinion that sufficient duck for the remainder would arrive before the time it was needed.²⁴

The deliveries of canvas did not materialize as promised. The matter of requisitions for quartermaster duck was turned over to the Motor Transport Service in July. That service was warned that unless a constant urge was applied aggravating delay would occur in the deliveries of the duck. The prospect of securing deliveries was most discouraging. The promises made were

fair enough, but when information concerning actual progress of manufacture and delivery was sought it was found very hard to get.²⁵

The demands from our overseas forces for motor ambulances became more and more insistent. On August 5 the inspector at Detroit, who had general supervision of production of ambulance bodies there, was called upon for a conservative estimate of the number of ambulance bodies which could be produced that month. The total supply of the Babcock bodies had been exhausted. Dependence for the number of bodies required during August and succeeding months had to be placed upon the producing plants. A minimum production of 500 bodies from both plants was essential, and larger production during subsequent months was to be expected.²⁶ The inspector advised that 300 bodies could be produced by September 1, 325 between September 1 and September 15, and 800 per month thereafter. He believed that when both plants were in full swing production could be pushed up to 1,300 bodies per month.²⁷ Vouchers for the first two invoices of bodies from the Anderson Electric Car Co. were forwarded from Detroit September 5, 1918.²⁸ For various reasons no bodies were finished at either plant during August. The first shipments made were 9 bodies from the Elkhart Co. September 3, followed on the 5th by 9 more.²⁹ That company produced 236 bodies during September. Subsequent production was as follows: During 1918, October, 447; November, 461; December, 423; during 1919, January, 433. This completed the original contract for 2,000.³⁰

The Anderson Electric Car Co. began deliveries during the first 10 days of September, during which period 116 bodies were completed and 106 shipped to Newport News, Va., for overseas transport.³¹ Deliveries of bodies by the Anderson Electric Car Co. totaled 2,930³² and were made, by months, approximately as follows: during 1918, September, 428;³³ October, 446; November, 588; December 818; during 1919, January, 579; February, 81.³²

The combined monthly production up to the end of December, 1918, was September, 664; October, 893; November, 1,049; December, 1,241. Assuming that the rate of production during November was uniform, the total production of bodies by these two companies prior to the armistice was 1,980. Adding these to the 3,000 produced by the H. H. Babcock Co. gives an aggregate body production from the date of entry of the United States into the World War until the cessation of hostilities of 4,907. These figures show that body production did not keep pace with chassis production. At the time of signing the armistice the numbers of chassis and bodies produced were, respectively, 5,900³⁴ and 4,980. It may be said, then, that the total number of standard motor ambulances, large, produced prior to the cessation of hostilities did not exceed 5,000.

No information is discoverable as to the number of the AA bodies which reached France. These bodies appear to have been placed en route to the overseas forces as rapidly as they were produced. Approximately a dozen of them were directed to domestic use.³⁵ It appears that 1,980 had been shipped at the date of the beginning of the armistice.³⁶ Of these, 517 were at the ports and 66 were in transit.³⁷ It is assumed, therefore, that approximately 1,386 bodies were actually floated before the cessation of hostilities. When the

armistice was signed there were 1,395 General Motors Co. chassis at the ports, 243 in transit, and 311 released but not in transit.³⁷

REFERENCES

- (1) Correspondence between the ambulance board, the Surgeon General, and The Adjutant General, January 16 to March 8, 1917. Subject: Babcock ambulance bodies. On file, Finance and Supply Division, S. G. O., 11,220.-136.
- (2) Contract between Lieut. Col. C. R. Darnall, M. C., and the H. H. Babcock Co., Watertown, N. Y., for 500 ambulance bodies and schedule of deliveries thereto attached, dated March 13, 1917. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, 14,509-A.
- (3) Letter from Maj. A. W. Williams, M. C., to the Surgeon General, May 3, 1917. Subject: Inspection of Motor ambulance bodies at H. H. Babcock Co.'s plant, Watertown, N. Y. On file, Finance and Supply Division, S. G. O., 153,155.-35-1.
- (4) Letter from the Surgeon General, to the H. H. Babcock Co., Watertown, N. Y., September 24, 1917. Subject: Assignment of inspector. On file, Finance and Supply Division, S. G. O., $\frac{511-570}{B}$.
- (5) Contract between Lieut. Col. C. R. Darnall, M. C., and the H. H. Babcock Co., for 2,308 ambulances and 192 spare parts bodies, and schedule of deliveries attached thereto, dated June 13, 1917. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, 411.
- (6) Second indorsement from the chief quartermaster, A. E. F., to the chief surgeon, A. E. F. November 26, 1917, relative to heaters for ambulances. On file, Finance and Supply Division, S. G. O., $\frac{250 F. R.}{157}$.
- (7) Letter from the Standard Parts Co., Cleveland, Ohio, to Maj. Edwin P. Wolfe, M. C., S. G. O., August 10, 1917, relative to Perfection heaters. On file, Finance and Supply Division, S. G. O., $\frac{708 S. P.}{1}$.
- (8) Contract of September 29, 1917, between Maj. M. A. Reasoner, M. C., and the Standard Parts Co., Cleveland, Ohio, for 1,500 heaters. On file, Miscellaneous Section, Finance Department, S. G. O., 2,449.
- (9) Letter from Capt. A. B. Browne, Sanitary Corps, Pontiac, Mich., to Maj. W. T. Fishleigh, Sanitary Corps, S. G. O., November 1, 1917. Subject: Perfection heaters. On file, Finance and Supply division, S. G. O., Pontiac letters to January 1, 1918.
- (10) Weekly report from the officer in charge, Sanitary Corps, N. A., General Motors Truck Co. Plant, Pontiac, Mich., to the Surgeon General, November 5, 1917. On file, Finance and Supply Division, S. G. O., Pontiac Weekly Reports, $\frac{101 A. B. B.}{178}$.
- (11) Letter from the Standard Parts Co., Cleveland, Ohio, to Maj. W. T. Fishleigh, S. G. O., November 11, 1917, relative to changes in Perfection Heater. On file, Finance and Supply Division, S. G. O., $\frac{708 S. P.}{13}$.
- (12) Letter from commanding officer, Base Hospital No. 17, American Expeditionary Forces, France, to the chief surgeon, A. E. F., December 30, 1917. Subject: Gas asphyxiation in Ford ambulances. On file, Finance and Supply Division, S. G. O., $\frac{55 \#17 B. H.}{3}$.
- (13) General Orders, No. 2, Headquarters, American Expeditionary Forces, France, January 3, 1918.
- (14) Letter from the Surgeon General, U. S. Army, to The Adjutant General of the Army, February 21, 1918. Subject: Automobile ambulances. On file, Finance and Supply Division, S. G. O., $\frac{250 F R.}{220}$.
- (15) General Orders, No. 24, War Department, March 8, 1918.

- (16) Letter from the chief surgeon, A. E. F., to the Surgeon General of the Army, August 9, 1917. Subject: Shipment of automobile ambulances. On file, Finance and Supply Division, S. G. O., ²⁵⁰/₁₁.
- (17) Letters from the Surgeon General, to various manufacturers expressing appreciation for assistance in body design, December 29, 1917. On file, Finance and Supply Division, S. G. O., ^{239, WTF}/₅₄.
- (18) Contract dated May 10, 1918, between 1st Lieut. L. W. Lang, Sanitary Corps, N. A., and the Anderson Electric Car Co., Detroit, Mich., for 3,000 ambulance bodies. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, No. 5008.
- (19) Contract dated May 10, 1918, between First Lieut. L. W. Lang, Sanitary Corps, N. A., and the Elkhart Carriage Co., Elkhart, Ind., for 2,000 ambulance bodies. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, No. 5009.
- (20) Letter from the Surgeon General to Capt. H. E. Smith, Sanitary Corps, N. A., Detroit, Mich., May 31, 1918. Subject: Duck supply. On file, Finance and Supply Division, S. G. O., Detroit letters to July 1, 1918, unnumbered.
- (21) Letter from the Surgeon General to Capt. H. E. Smith, Sanitary Corps, N. A., Detroit, Mich., June 27, 1918. Subject: Substitute. On file, Finance and Supply Division, S. G. O., Detroit letters to July 1, 1918, unnumbered.
- (22) Letter from Capt. H. E. Smith, Sanitary Corps, N. A., Detroit, Mich., to Capt. W. G. Stoner, Sanitary Corps, N. A., Motor Transport Service, Washington, D. C., June 10, 1918. Subject: Requisition of duck supply. On file, Finance and Supply Division, S. G. O., Detroit letters to July 1, 1918, unnumbered.
- (23) Letter from the Surgeon General to the officer in charge, Anderson Electric Car Co., Detroit, Mich., June 1, 1918. Subject: Duck supply. On file, Finance and Supply Division, S. G. O., Detroit letters to July 1, 1918, unnumbered.
- (24) Letter from Capt. H. E. Smith, Sanitary Corps, N. A., to Capt. W. G. Stoner, Sanitary Corps, N. A., Quartermaster's Department, Washington, D. C., June 15, 1918. Subject: Duck curtains. On file, Finance and Supply Division, S. G. O., Detroit letters to July 1, 1918, unnumbered.
- (25) Letter from Capt. W. G. Stoner, Sanitary Corps, N. A., S. G. O., to Capt. H. E. Smith, Sanitary Corps, N. A., Detroit, Mich., July 26, 1918, relative to transfer of personnel to the Motor Transport Service. On file, Finance and Supply Division, S. G. O., Detroit letters to July 1, 1918, unnumbered.
- (26) Letter from the Surgeon General to the officer in charge, Anderson Electric Car Co., Detroit, Mich., August 5, 1918. Subject: Ambulance body production. On file, Finance and Supply Division, S. G. O., Detroit letters, July 1, 1918, to September 30, 1918, unnumbered.
- (27) Letter from Capt. H. E. Smith, Sanitary Corps, N. A., Detroit, Mich., to the Surgeon General. Subject: Ambulance body production. On file, Finance and Supply Division, S. G. O., Detroit letters, July 1, 1918, to September 30, 1918, unnumbered.
- (28) Letter from Capt. H. E. Smith, Sanitary Corps, N. A., to the Surgeon General of the Army, September 5, 1918. Subject: Anderson invoices. On file, Finance and Supply Division, S. G. O., Detroit letters, September 1, 1918, to December 1, 1918, unnumbered.
- (29) Letter from First Lieut. W. L. Dauner, Sanitary Corps, N. A., to the Surgeon General of the Army, September 4, 1918. Subject: Weekly report. On file, Finance and Supply Division, S. G. O., Elkhart letters, September 1, 1918, to December 1, 1918, unnumbered.
- (30) Letter from the Elcar Motor Co., Elkhart, Ind., to Col. Edwin P. Wolfe, M. C., War Department, S. G. O., August 7, 1918. Subject: Body production. On file, Record Room, S. G. O., 451.8-1.
- (31) Trimonthly production report, September 10, 1918, from Capt. H. E. Smith, Sanitary Corps, N. A., Anderson Electric Car Co., Detroit, Mich. On file, Finance and Supply Division, S. G. O., Detroit letters, September 1, 1918, to December 1, 1918, unnumbered.

- (32) Schedule of deliveries attached to original contract. Account of Maj. C. E. Gray, Q. M. C. On file, Miscellaneous Section, Finance Department.
- (33) Trimonthly production report, September 30, 1918, from Capt. H. E. Smith, Sanitary Corps, N. A., Anderson Electric Car Co., Detroit, Mich. On file, Finance and Supply Division, S. G. O., Detroit letters, September 1, 1918, to December 1, 1918.
- (34) Letter from the General Motors Truck Co., Detroit, Mich., to Col. Edwin P. Wolfe, M. C., S. G. O., July 26, 1926. Subject: G. M. C. chassis production. On file, Record Room, S. G. O., 451.8-1.
- (35) Trimonthly production report, September 10, 1918, from First Lieut. W. L. Dauner, Sanitary Corps, N. A., Elkhart, Ind. On file, Finance and Supply Division, S. G. O., Elkhart letters, September 1, 1918, to December 31, 1918, unnumbered.
- (36) Daily production reports, November 6, 1918, from Capt. H. E. Smith, Sanitary Corps, N. A., Detroit Mich, and First Lieut. W. L. Dauner, Sanitary Corps, N. A., Elkhart, Ind. On file, Finance and Supply Division, S. G. O., $\frac{750-519 \text{ M. T. C.}}{17}$.
- (37) Memorandum, from Capt. Fred J. Murray, Sanitary Corps, N. A., Embarkation Service, for Col. Edwin P. Wolfe, M. C., S. G. O., November 13, 1918. Subject: G. M. C. ambulances. On file, Finance and Supply Division, S. G. O., $\frac{750-519 \text{ M. T. C.}}{17}$.

CHAPTER XXIII
FORD AMBULANCES

1917 MODEL

During the visit of the French mission to the United States in April, 1917, there was presented to the War Department a request from the French Government for 100 ambulance sections, consisting of 20 machines and approximately 25 men each, for service with the French troops.¹ This request seems to have been suggested by the presence of units of the American Ambulance Service (private organizations) with the French armies, maintained by volunteer subscription and enlistments in France and the United States. The Surgeon General received authority from the Secretary of War to raise the force and provide the equipment.² The question of body design was at once taken up by the Medical Department ambulance board. Ford ambulances having been specifically designated in the request of the French Government, every source of information covering materials and design was investigated as fully as time would permit. Every individual who had seen service with the American Ambulance Service in France, and who could be located, was consulted and his views solicited. A special effort was made to elicit the reasons for the design developed by that organization during its many months of service in France. It was assumed that the design then in use was the most suitable. An attempt was made to duplicate it, as closely as could be done from the photographs and information available, and from the suggestions of those who had had experience in its use. Several sample bodies were ordered, mounted on standard Ford chassis, and compared, point by point, with the pictures and meager description of the French body. The design was finally completed and adopted in the latter part of May, 1917. The request by the French for 100 sections, was increased by them to 120 sections, requiring 2,400 ambulances, before the work on the body design had been completed.

The sources from which bodies could be obtained were investigated and their maximum output determined. A survey was made of the total output of all the ordinary sources of supply. This survey showed those sources to be totally inadequate to produce so great a number of bodies within the available time. It was thought, in view of its facilities, organization, and reputation for quantity production, that there was no company so well equipped to produce the completed ambulances as the Ford Motor Co. itself, if it could be induced to undertake the task. This the company readily agreed to do.

California redwood was considered the best material to inclose the sides; yellow pine as best for the floor; and oak or ash as best for the subsills. Investigation by the Ford Motor Co. showed that delivery of the redwood lumber could not be had under 60 days, which placed it out of consideration. The

possibility of using a composition board for the sides, in place of redwood suggested by a member of the ambulance board, received prompt consideration, was fully investigated by the engineer of the company, and found to be satisfactory. It could be obtained immediately in sufficient quantity. A body was constructed of this material, in accordance with the design adopted, inspected, its riding qualities for both sitting and recumbent patients tried out over unfavorable roads, and found satisfactory.³ It was accepted and a contract given the Ford Motor Co. for the full 2,400 ambulances, boxed for export shipment. The price paid for the complete ambulance was \$475, for a set of spare parts for each machine \$22.72 per set, and for sets of additional spare parts for 20 machines, \$561.81 per set.⁴ Production began in July and proceeded with

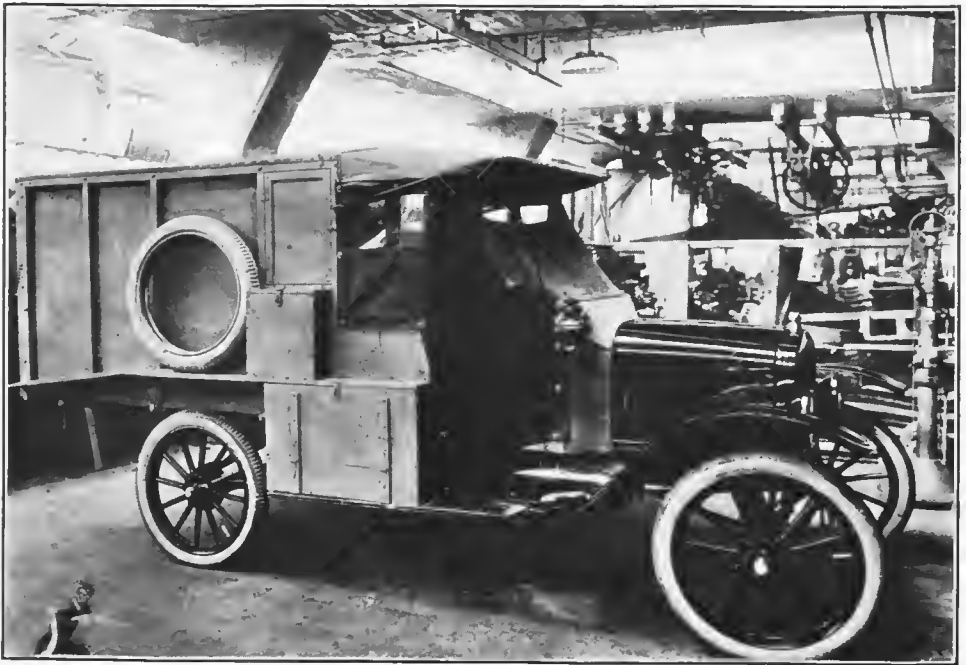


FIG. 22.—Standard Ford ambulance of 1917, side view

such rapidity that considerable difficulty was experienced in moving the output from the factory to the seaport, due to lack of storage at the port of embarkation. In order to relieve the congestion, 100 complete ambulances were ordered to the newly established motor ambulance supply depot, Louisville, Ky., where the majority of them were assembled and shipped to various organizations in the United States. A few, boxed for export, were shipped to organizations about to proceed overseas. The contract was completed in the early part of September, and 2,350 ambulances had been shipped to France by October 15, 1917. The remaining 50 were shipped to the United States Army Ambulance Service at Allentown, Pa., for training purposes. That service was being organized for service with the French Army.

The body design was shortened as much as possible, even to the extent of requiring the front end of the litter poles to project under the driver's seat and the rear ends of the poles to project through the tail gate of the ambulance, the apertures being covered with canvas, thus causing a great overhang of the rear end of the body beyond the rear axle line. This overhang was the cause of much criticism by all who saw it, but no means of avoiding it could be found which still secured that short turning radius, regarded as so essential by all who had seen service with Ford ambulances in France. Many devices for lengthening the wheel base, to avoid this overhang, were submitted and the ambulance board was importuned by sales agents of those devices to adopt them. But it adhered to its decision to make the type supplied conform to that used in France, if material and construction available could effect it.

The composition board body received considerable criticism from the units overseas to which they were assigned; due largely to the use of $\frac{1}{4}$ -inch material in the side walls instead of $\frac{3}{8}$ -inch material, as used in the standard closed-type ambulance body of

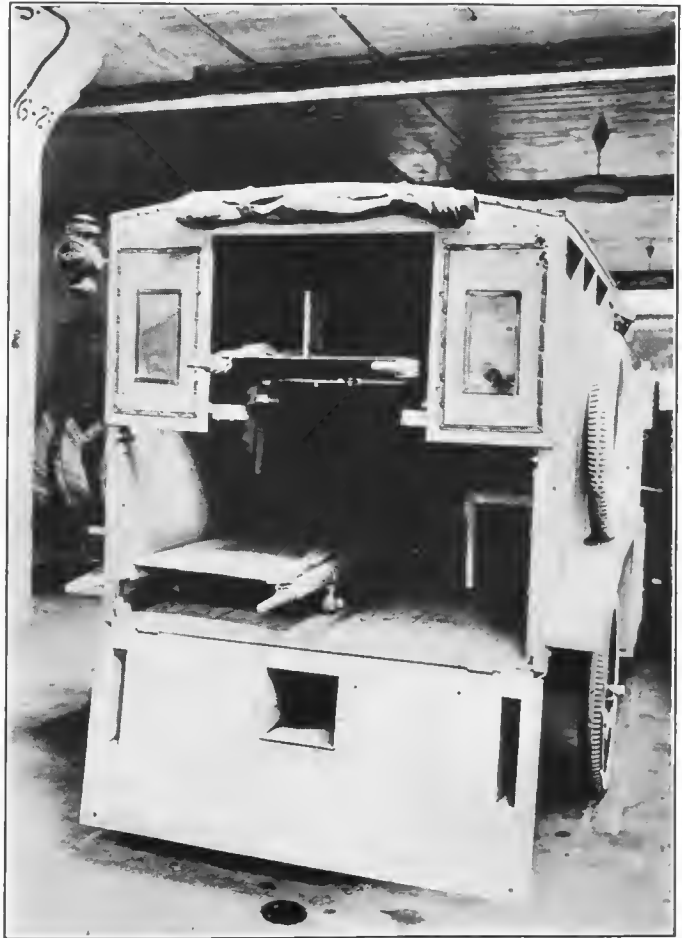


FIG. 23.—Standard Ford ambulance of 1917, rear view

1918; and to the belief that it would be readily broken and could not be patched. Nevertheless this type of body stood up well. Machines so equipped were found to be in good condition in 1919.

The advantages of having the work done by a firm with facilities as extensive and an organization as efficient as the Ford Motor Co. were many; but the operations of an organization as efficient as that company are not always coordinated and harmonized, as was evident from the difficulties encountered in assembling the bodies of the lot shipped to the motor ambulance supply depot

at Louisville. It was found that the jigs used for boring the holes of the wood-work were neither uniform nor correct, requiring many new holes to be bored.⁵ To remedy some of the difficulties experienced in assembling these ambulance bodies, the Ford Motor Co. prepared and forwarded to the Surgeon General in September, 1917, 2,500 copies of instruction for setting up Ford ambulances.⁶ These instructions were promptly forwarded overseas. The Ford Motor Co. gave assurance that defects in the first lot had been noted and corrected in later production and that trouble with only a few need be expected.⁷

In May, 1918, a contract for 100 Ford ambulances was made with the Ford Motor Co. The Medical Department needed a light ambulance at many of the smaller posts, where ambulance service was not extensive and where such ambulances could be used to advantage. The prices paid on this contract were, for ambulances complete, \$500 each, and for sets of spare parts for individual ambulances \$50 per set.⁸ These ambulances were shipped to the Ford branch in Louisville where they were assembled and delivered to the motor ambulance supply depot. The local branch also experienced difficulty in assembling the bodies owing to the improper location of bolt holes in the materials received.⁹

To overcome the extensive overhang and the side sway, and to improve the riding qualities, it was decided to equip this lot of chassis with a Hay Dec 15-inch extension. Changes in the chassis by the application of this extension were made by the personnel of the motor ambulance supply depot before the bodies were mounted. This extension was criticized by the depot personnel as being a rather crude piece of work.⁹ Improvements in design of the cross members were devised at the depot.

1918 BODY MODEL

The type of body designed in 1917, and supplied with Ford ambulances shipped overseas in the summer of 1917, was criticized by the chief of the United States Army Ambulance Service with the French Army.¹⁰ The principal complaints about the body were that it was too small in all directions; that the internal arrangements were defective, especially the runner for the upper litter; that the tail gate was too wide; that the protection of the drivers was poor; that the tool boxes was fragile, and that the material of which the body was made was too fragile. The body constructed in France was heavier, made of wood, and the top was sufficiently rigid to carry the spare tires. One of these bodies was shipped to the United States as a sample of the accepted design. It was carefully examined by personnel of the finance and supply division of the Surgeon General's Office. The standard specifications were modified to correspond in dimensions to this body.

A new AA type body for the General Motors Co. ambulance had been designed, built, and perfected. Contracts for the estimated needs of the Army had been let and work on them begun when information was received in June, 1918, that it was the intention to equip one of the ambulance companies of each division with Ford ambulances. The qualities and conveniences of the new AA body were sufficient to justify the extension of the principle to the Ford ambulance. Instructions were issued on July 1, 1918, to the Medical Department representative on duty with the Anderson Electric Car Co. to

construct an experimental Ford ambulance body combining the most desirable features of the special French Kellner body and the old-type Ford body.¹¹ The criticisms of the old Ford body by the chief of the United States Army Ambulance Service with the French Army were furnished as a further guide.¹² Work on the new design was pushed rapidly. The Kellner body was brought to the Anderson factory and studied. The sample body was finished by the end of July.¹³ This new body was patterned after the new AA body in most of its details. The length of the experimental body was 6 feet 10 $\frac{3}{4}$ inches over posts, and conformed to the Kellner body. Its weight was 636 pounds. The weight of the Kellner body was 811 pounds. The experimental body was designed for either the standard Ford wheel base or with Hay Dee 15-inch extension.¹⁴



FIG. 24.—This and Figures 25 to 27 show the Ford ambulance of 1918

Certain changes were made in the experimental body. A sample body was mounted on a special Ford chassis with a 15-inch Ford extension and the job driven to Washington and returned to Detroit.¹⁵ The design of the body was accepted with a few minor changes.¹⁶ The new design Ford ambulance, with extended wheel base and special body, was officially approved by the War Department October 18, 1918.¹⁷

One of the important improvements in this body was the device for loading and suspending the third patient. In the old-type ambulance the shoes of the litter ran in channels on both sides of the rear opening. The narrowness of this opening caused considerable difficulty in loading the upper patient and gave rise to complaints. In the new body the entire rear end was inclosed with a curtain as in the AA body. The trolley system of loading and suspension of the

upper patients in the AA body was adapted to the Ford body. The trolley tracks were placed along the upper part of the inner side of the side walls. The rollers of the trolley were attached through proper extension to a wooden bar or yoke. This yoke had a slot cut in its upper margin at a proper place for the reception of the right handle of the litter. This slot was of a size to receive comfortably the litter handle. Another slot, of the same depth but considerably wider was cut in the yoke to receive the left handle. The width of the slot permitted the use of litters of different widths. When not in use this yoke was fastened to the roof near the rear end. When the upper patient was loaded, this yoke traveled forward with the litter until the handles were against the rear of the front end of the body. The rear handles of the litter



FIG. 25

were supported by straps attached to the rear side post near the top. The lower end of these straps passed through rings of sufficient size to slip easily over the litter handle. Side sway and rear thrust of the loaded litter, when in position, were prevented by two check straps with snaps fastened one to each rear side post near the bottom. The snaps of these check straps were snapped into the ring of the upper strap after it had been placed in position. These check straps anchored the rear end of the litter and held it securely against side sway.

1918 CHASSIS MODEL

The rear overhang of the old-type Ford ambulance had always been considered undesirable and objectionable. This overhang had been materially reduced by the application of a 15-inch Hay Dee extension on the 100 Ford

ambulances purchased in May, 1918. The lengthening of the wheel base proved very satisfactory and improved both the appearance and the riding qualities of the vehicle. The experience gained with this lot of ambulances indicated the desirability of extending the wheel base on the ambulances to be purchased for France in conformity with the requests and estimates above noted. The Ford Motor Car Co. agreed to lengthen the wheel base of their standard model T chassis 15 inches in preference to having the Hay Dee extension applied, and to equip the chassis with demountable rims, Gabriel snubber, and Timken front-wheel roller bearings.¹⁸ The changes in body design and wheel base made the new ambulance an easy-riding vehicle and greatly improved its appearance.



FIG. 26

NEW CONTRACTS

The shipment of Ford ambulances to France after the first 2,350 were forwarded in 1917 was discontinued in response to cabled request from the commander in chief, September 27, 1917.¹⁹ This cablegram indicated that there was an abundance of these ambulances on hand. The urgent need for motor transportation of some sort and the shortage of cargo trucks led to the conversion of a number of Ford ambulances into trucks and their distribution to organizations needing such trucks. All excess of these ambulances above the French requirements were converted into trucks.²⁰

The need for ambulance service in the United States had been met by the issue of General Motors Co. ambulances and the 200 Ford ambulances purchased

in July, 1917, and May, 1918. The Medical Department did not again have need for recourse to the facilities of the Ford Motor Co. until June, 1918, when cabled requests were received from France for the immediate shipment of 50 Ford ambulances²¹ and for monthly shipments of 100 Ford ambulances for six months.²² These requests were augmented at short intervals as follows: June 14, automatic monthly replacement supply of 100 Ford ambulance



FIG. 27

chassis;²³ July 3, 136 Ford ambulances complete, and a monthly supply of 100 for five months;²⁴ August 6, present shortage 306 Fords;²⁵ August 17, actual shortage that date, 1,600 Ford ambulances.²⁶ Information furnished from France on August 19 indicated the need of 1,678 Ford ambulances in addition to General Motors Co. ambulances for the proper equipment of the overseas forces and a small allowance for the Services of Supply.²⁷ These cabled requests and information had a bearing upon the estimates prepared in the Surgeon General's Office. They are reflected in the following estimate of August 1, 1918:²⁸

Estimated requirements for Ford ambulances (chassis and bodies) Medical Department, United States Army

BY JUNE 30, 1918—26 DIVISIONS OVERSEAS

Estimated number of ambulances:

Overseas—

In United States Army Ambulance Service shipped by the Medical Department	2,400
Absorbed, American Ambulance Service	800
	<u>3,200</u>

United States camps and hospitals—

Purchased by Medical Department	200
Total	<u>3,400</u>

BY DEC. 31, 1918—52^a DIVISIONS OVERSEAS

Estimated number of ambulances:

Overseas—

Loss, ambulances already in service (25 per cent of 3,200)	800
Additional divisional ambulances (52×16)	832
Loss (25 per cent)	208
	<u>1,840</u>

United States camps and hospitals—

Loss, ambulances already in service (15 per cent of 200)	30
Additional ambulances	100
Loss (15 per cent)	15
	<u>145</u>

Total

1,985

Grand total required

5,385

BY JUNE 30, 1919—80 DIVISIONS OVERSEAS

Estimated number of ambulances:

Overseas—

Loss, ambulances already in service (25 per cent of 4,032)	1,008
Additional divisional ambulances (28×16)	448
Loss (25 per cent)	112
	<u>1,568</u>

United States camps and hospitals—

Loss, ambulances already in service (15 per cent of 300)	45
Total	<u>1,613</u>

Grand total required

6,998

BY DEC. 31, 1919—90 DIVISIONS OVERSEAS

Estimated number of ambulances:

Overseas—

Loss, ambulances already in service (25 per cent of 4,480)	1,120
Additional divisional ambulances (10×16)	160
Loss (25 per cent)	40
	<u>1,320</u>

^a Decided in June, 1918, to equip one ambulance company per division overseas with Ford ambulances. No information as to whether any of the Ford ambulances previously overseas are to be used for this purpose.

Estimated number of ambulances—Continued.

United States camps and hospitals—

Loss, ambulances already in service (15 per cent of 300).....	45
Total.....	1,365
Grand total required.....	8,363

Estimated requirements for Ford ambulance spare parts D (overseas supply), Ford ambulance spare parts C (United States supply), Medical Department, United States Army^a

Date	Divisions overseas	Estimated number of Ford ambulances in service		Spare parts, D complements required as per Quartermaster Corps lists ^b
		Overseas	United States camps and hospitals	
By June 30, 1918.....	26	3,200	200	Overseas, 1 large, 31 small; United States, 1 large, 1 small.
By Dec. 31, 1918.....	52	4,032	300	Overseas, 40 small; United States, 3 small.
By June 30, 1919.....	80	4,480	300	Overseas, 45 small; United States, 3 small.
By Dec. 31, 1919.....	90	4,640	300	Overseas, 47 small; United States, 3 small.

^aInformation was received in June, 1918, that one ambulance company per division overseas is to be equipped with 16 Ford ambulances. No information as to whether any of the Ford ambulances in the service of the U. S. Army Ambulance Service overseas on and before June 1, 1918, are to be used to equip overseas divisions under this order. In the absence of such information, this estimate is based on the assumption that U. S. Army Ambulance Service Ford ambulances will not be used for such purpose.

^bThe term "Complements of spare parts C or D" indicates base supplies overseas and in the United States respectively, sufficient to supply parts for base repairs for 100 cars for a period of 6 months.

Contract and delivery estimates for Ford ambulances (chassis and bodies), Medical Department, United States Army

Date	Estimated total required	Required during period	Delivered or delivery contracted for during period	Additional deliveries to be contracted for during period
By June 30, 1918.....	3,400	3,400	3,400	None.
By Dec. 31, 1918 ^a	*5,385	1,985	None.	1,985
By June 30, 1919 ^a	*6,998	1,613	None.	1,613
By Dec. 31, 1919 ^a	*8,363	1,365	None.	1,365

^aThese estimates will be decreased by the use, as divisional ambulances, of Ford ambulances now overseas with the U. S. Army Ambulance Service.

CONTRACT AND DELIVERY ESTIMATES FOR SPARE PARTS D (FOR OVERSEAS MAINTENANCE),
MEDICAL DEPARTMENT, UNITED STATES ARMY

Responsibility for spare parts D equipment for overseas maintenance of Ford ambulances has always rested with the Quartermaster Corps, and will be continued automatically in the Motor Transport Service. Complete lists covering Ford spare parts D are in the hands of the Quartermaster Corps, together with information on contracts and deliveries. Contracts and deliveries of Ford spare parts D must be maintained by the Motor Transport Service.

Responsibility for Ford spare parts C equipment for United States maintenance of Ford ambulances purchased prior to the establishment of the Motor Transport Service rested on the Medical Department. Sufficient equipment has been purchased and furnished by the motor ambulance supply depot, Louisville, Ky., to cover needs to June 30, 1918.

Contracts and deliveries of Ford spare parts C must be maintained by the Motor Transport Service.

REFERENCES

- (1) Memorandum from the chief of U. S. Army Ambulance Service to the commanding general, A. E. F., August 17, 1917. On file, A. G. O., World War Division, Chief Surgeon's Files, 322.3211.
- (2) G. O., No. 75, W. D., June 23, 1917.
- (3) Letter from Maj. H. W. Jones, M. C., to the Surgeon General, June 13, 1917. Subject: Final acceptance and inspection of Ford model ambulance. On file, Finance and Supply Division, S. G. O., 153,155.59.
- (4) Contract of July 13, 1917, between Maj. Percy L. Jones, M. C., and the Ford Motor Co., for 2,400 Ford motor ambulances complete, 2,400 sets spare parts equipment for individual ambulances and 120 sets of spare parts for section of 20 ambulances. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, 841.
- (5) Letter from Capt. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Mr. P. W. Avery, Ford Motor Car Co., Detroit, Mich., July 25, 1917. Subject: Assembling Ford ambulance bodies. On file, Finance and Supply Division, S. G. O., $\frac{246}{1}$.
- (6) Letter from the Surgeon General to the Ford Motor Co., Detroit, Mich., September 21, 1917. Subject: Instructions for building Ford ambulances. On file, Finance and Supply Division, S. G. O., $\frac{247}{4A}$.
- (7) Letter from Capt. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Maj. Edwin P. Wolfe, M. C., S. G. O., July 24, 1917. Subject: Ford ambulances. On file, Finance and Supply Division, S. G. O., 14,842.3.
- (8) Contract of June 3, 1918, between First Lieut. W. Lang, Sanitary Corps, and the Ford Motor Co., for 100 ambulances and 100 sets spare parts. On file, Finance and Supply Division, S. G. O., Motor Transport Contract, 6,204.
- (9) Letter from Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., June 20, 1918. Subject: Ford ambulances. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{351}$.
- (10) Letter from the chief, U. S. Army Ambulance Service with the French Army, to the officer in charge of motor transportation, Medical Department; Office of the Surgeon General, February 22, 1918. Subject: Specifications for Ford Ambulances. On file, Finance and Supply Division, S. G. O., $\frac{250 F 2}{280}$.
- (11) Letter from the Surgeon General to Capt. H. E. Smith, Sanitary Corps, N. A., Detroit, Mich., July 1, 1918. Subject: Experimental Ford body. On file, Finance and Supply Division, S. G. O., $\frac{247 \text{ FORD}}{10}$.
- (12) Letter from the Surgeon General to Capt. H. E. Smith, Anderson Electric Car Co., Detroit, Mich., July 12, 1918. Subject: Report on old-type Ford ambulance. On file, Finance and Supply Division, S. G. O., $\frac{247 \text{ FORD}}{10}$.
- (13) Letter from Capt. H. E. Smith, Sanitary Corps, N. A., to the Surgeon General, July 15, 1918. Subject: New design Ford ambulance body. On file, Finance and Supply Division, S. G. O., $\frac{247 \text{ FORD}}{10}$.
- (14) Telegram from Capt. H. E. Smith, Sanitary Corps, N. A., Detroit, Mich., to Maj. W. T. Fishleigh, Sanitary Corps, S. G. O., August 10, 1918, relative to weight and dimensions of sample Ford body. On file, Finance and Supply Division, S. G. O., $\frac{247 \text{ FORD}}{10}$.

- (15) Report of trip of Ford ambulances from Washington, D. C., to Detroit, Mich., and return, September 10-26, 1918. On file, Finance and Supply Division, S. G. O., 247 FORD.
10
- (16) Telegram from Maj. W. T. Fishleigh, Sanitary Corps, N. A., to Mr. C. W. Avery, Ford Motor Car Co., Detroit, Mich., September 30, 1918, relative to new design Ford ambulance. On file, Finance and Supply Division, S. G. O., 247 FORD.
10
- (17) First indorsement, War Department, The Adjutant General's Office, to the Motor Vehicle Board, Seventh and B Streets, seventh wing, first floor, Washington, D. C., October 18, 1918, approving recommendations relative to standardizing new-type Ford ambulance. On file, Finance and Supply Division, S. G. O., 750-519 MTC.
6
- (18) Telegram from Maj. W. T. Fishleigh, Sanitary Corps, N. A., to Capt. W. G. Stoner, Office of the Surgeon General, Washington, D. C., September 6, 1918. Subject: Ford ambulances. On file, Finance and Supply Division, S. G. O., 247 FORD.
10
- (19) Paragraph 4, Cable 183-S, Headquarters, A. E. F., to The Adjutant General, Washington, D. C., September 27, 1917. On file, Finance and Supply Division, S. G. O., Cables—France.
- (20) Paragraph 1-B, Cable 466-S, Headquarters, A. E. F., to The Adjutant General, Washington, D. C., January 8, 1918. On file, Finance and Supply Division, S. G. O., Cables—France.
- (21) Paragraph 5, Cable 1258-S, Headquarters, A. E. F., to The Adjutant General, Washington, D. C., June 6, 1918. On file, Finance and Supply Division, S. G. O., Cables—France.
- (22) Paragraph 3, Cable 1237-S, June 3, 1918, repeated in paragraph 2-A, Cable 1376, June 27, 1918, Headquarters, A. E. F., to The Adjutant General. On file, Finance and Supply Division, S. G. O., Cables—France.
- (23) Paragraph 1-C, Cable 1306-S, Headquarters, A. E. F., to The Adjutant General, Washington, D. C., June 14, 1918. On file, Finance and Supply Division, S. F. O., Cables—France.
- (24) Paragraph 7-A, Cable 1407-S, Headquarters, A. E. F., to The Adjutant General, Washington, D. C., July 3, 1918. On file, Finance and Supply Division, S. G. O., Cables—France.
- (25) Paragraph 4, Cable 1566-S, Headquarters, A. E. F., to the Adjutant General, Washington, D. C., August 6, 1918. On file, Finance and Supply Division, S. G. O., Cables—France.
- (26) Paragraph 1-A, Cable 1606-S, Headquarters, A. E. F., to The Adjutant General, Washington D. C., August 17, 1918. On file, Finance and Supply Division, S. G. O., Cables—France.
- (27) Paragraph 2, Cable 1611-S, Headquarters, A. E. F., to The Adjutant General, Washington, D. C., August 19, 1918. On file, Finance and Supply Division, S. G. O., Cables—France.
- (28) Estimates covering U. S. standard ambulances and other motor equipment required by the Medical Department, United States Army, by Walter T. Fishleigh, major, Sanitary Corps, N. A., August 1, 1918. On file, Finance and Supply Division, S. G. O., Estimates, Motor Transport.

CHAPTER XXIV

MOTOR CYCLES

The various acts of Congress appropriating funds for the support of the Army during the fiscal years 1917-1919,¹ inclusive, beginning with the act of August 29, 1916, contained a provision under the title "Medical and Hospital Department," for the purchase of motor cycles as well as motor ambulances for medical service. The previous acts had provided for motor ambulances but not for motor cycles. The Indian motor cycle with side car, military model NE, manufactured by the Hendee Manufacturing Co., of Springfield, Mass., was adopted as the standard of the Medical Department. No other type was purchased for its use.

The first contract for motor cycles was placed with the Hendee Manufacturing Co. June 14, 1917.² This contract called for 120 motor cycles with side cars, at \$345.53 for each complete outfit; 120 sets rider's spare parts, at \$9.52 per set; 20 sets field spare parts each for 6 machines, at \$67.82 per set; 5 sets field spare parts for each 36 machines, at \$1,202.15 per set; and one base spare parts set for 120 machines, at \$7,549.33. Itimization of these sets was a part of the contract.

The second contract placed with the Hendee Manufacturing Co. was dated June 25, 1917.³ This contract called for 500 motor cycles, at \$286.50 each; 500 side cars, at \$74 each; and 500 sets rider's spare parts, at \$10.05 the set. Provision was made for crating these machines for overseas shipment at an additional cost of \$4 per motor cycle and \$6 per side car. The aggregate cost of the complete vehicle crated for overseas shipment was \$380.55.

Three additional contracts for motor cycles with side cars and rider's spare parts were placed by the Medical Department with the Hendee Manufacturing Co., aggregating 800 machines. The prices in these three contracts remained the same as those in the contract of June 25, 1917, above noted. The dates of these contracts and the number of machines on each were, September 14, 1917, 100;⁴ November 23, 1917, 100;⁵ January 10, 1918, 600.⁶

The purchase and technical supervision of motor-propelled vehicles had been devolved by General Orders, No. 38, War Department, April 18, 1918, upon the Motor Transport Service. Request was made upon that service, June 20, 1918, to procure for the Medical Department 1,000 motor cycles with side cars and the requisite quantity of spare parts A and B.⁷ This request called for Indian motor cycles or such other standard motor cycle as might have been adopted by the motor transport board.

Increasing numbers of troops in France resulting from increased transportation facilities during the summer of 1918, called for a revision of the estimated requirements of the Medical Department for motor cycles. Revised estimates were submitted to the Motor Transport Service early in August of that year.⁸

Under these new estimates that service was requested to supply, during the period July 1, 1918, to December 31, 1918, 4,606 motor cycles with side cars with spare parts A, 40 sets spare parts B, 32 complements spare parts D, and 6 complements spare parts C. The C complements were for domestic depot stock and the D complements for overseas depot stock.

These contracts included a set of rider's spare parts, later known as motor cycle spare parts A, for each machine purchased. A list of factory parts and tools suitable for five motor cycles and side cars had been made up in the latter part of 1917 and designated motor cycle equipment B. This set was intended to provide for roadside repairs for the motor cycles in the same manner as the ambulance spare parts B provided for the ambulances. This set was to be carried in the spare parts car with each ambulance company. The five motor cycles included the three with the ambulance company and the two with its associated field hospital company. This set was afterwards carried in the spare parts trailer.

Two contracts for spare parts B were placed with the Hendee Manufacturing Co. The first, dated December 31, 1917, called for 275 such sets at a unit price of \$388.43 per set.⁹ Deliveries on this contract were rather slow in coming in. They began April 22, 1918, and were completed by the end of the following June.⁹ The second contract was dated August 9, 1918, and called for an extensive list of factory parts not assembled into unit sets.¹⁰ Deliveries on this contract were not completed until after the armistice had begun.¹¹ The articles on this latter contract were intended for depot use and for issue within the United States.

A similar arrangement was made with the Quartermaster Corps for the supply of motor cycle spare parts overseas as obtained for ambulance spare parts. The Quartermaster General advised the Surgeon General on December 21, 1917, that ample provision had been made for Indian motor cycles shipped to France; that provision had been made for base repair of this type of motor cycle; that expert motor cycle mechanics had been provided in all the quartermaster mechanical repair shops; that repairs to motor cycles with mobile units would be made by mechanics with machine shop truck units; and that at least one machine truck unit was attached to each division.¹²

The Hendee Manufacturing Co. had a special representative make an exhaustive inspection, during the early part of 1918, of all the Indian motor cycles in service at a large number of camps.¹³ This inspection included motor cycles with the Quartermaster Corps as well as those with the Medical Department. This representative found a great many machines in an unserviceable condition awaiting the action of an inspector so that they might be turned in for salvage or repair. Several causes were found for the unserviceable machines. The greatest source of trouble was improper lubrication. The lubricating oil was not of the proper grade. Bearings were burned out in less than 1,000 miles due to this poor oil. The next cause in importance was lack of proper upkeep, due to lack of capable mechanics and proper supervision. Most of the men riding these machines had had no previous experience with any kind of a

gasoline motor before they were assigned to the motor cycle. In only three camps was there any supervision by the company officers of the use of these machines. This resulted in extensive use of the vehicles for absolutely non-official purposes. Difficulty was experienced in getting spare parts. Requisitions for parts were not promptly filled. The instructions intended for the information of the individual rider sent out from the motor ambulance supply depot seldom reached the rider. The men actually using the machines failed to receive proper instruction in their use. No one seemed to regard himself as responsible for the upkeep and maintenance of motor cycles. The net result was that the machines often were put into service improperly assembled; were not properly cared for, even lubricated; were placed in the custody of untrained and ignorant drivers; and were kept going without supervision, maintenance, or repair until they refused longer to run. Many machines were discarded which, at comparatively small cost, could have been repaired and continued in service.¹³

Whether any of the difficulties experienced with this make of motor cycle were due to defects in design or construction was not definitely determined.

REFERENCES

- (1) Acts March 4, 1915 (38 Stats. 1079); August 29, 1916 (39 Stats. 639); May 12, 1917 (40 Stats. 60); June 15, 1917 (40 Stats. 196); October 6, 1917 (40 Stats. 364); June 4, 1918 (40 Stats. 597); July 9, 1918 (40 Stats. 865); November 4, 1918 (Stats. 1030).
- (2) Contract of June 14, 1917, between Maj. Percy L. Jones, M. C., and the Hendee Manufacturing Co., of Springfield, Mass., for 120 motor cycles with side cars and spare parts. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, No. 356.
- (3) Contract of June 25, 1917, between Lieut. Col. C. R. Darnall, M. C., and the Hendee Manufacturing Co., Springfield, Mass., for 500 each motor cycles, side cars, and sets rider's spare parts. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, No. 398.
- (4) Contract of September 14, 1917, between Maj. M. A. Reasoner, M. C., and the Hendee Manufacturing Co., Springfield, Mass., for 100 each motor cycles, side cars, and rider's spare parts. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, No. 1571.
- (5) Contract of November 23, 1917, between Maj. M. A. Reasoner, M. C., and the Hendee Manufacturing Co., Springfield, Mass., for 100 each motor cycles, side cars, and rider's spare parts. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts No. 2283.
- (6) Contract of January 10, 1918, between Maj. John B. Fletcher, M. C., and the Hendee Manufacturing Co., Springfield, Mass., for 600 each motor cycles, side cars, and rider's spare parts. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, No. 3193.
- (7) Letter from the Surgeon General, to the Director, Motor Transport Service, War Department, June 20, 1918. Subject: Motor cycles. On file, Finance and Supply Division, S. G. O., $\frac{750-594}{6}$.
- (8) Letter from the Surgeon General, to the Quartermaster General, U. S. Army, Motor Transport Service, Procurement Division, August 8, 1918. Subject: Requirement of motor ambulances, motor cycles, and equipment for Medical Department. On file, Finance and Supply Division, S. G. O., $\frac{750-519}{6}$.

- (9) Contract of December 31, 1917, between Maj. John P. Fletcher, M. C., and the Hendee Manufacturing Co., Springfield, Mass., for 275 sets of equipment for Indian motor cycles. On file, Finance and Supply Division, S. G. O., Motor Contracts, No. 3163.
- (10) Contract of August 9, 1918, between Maj. John P. Fletcher, M. C., and the Hendee Manufacturing Co., Springfield, Mass., for motor cycle spare parts. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, No. 6930.
- (11) Voucher 5723, March, 1919, accounts Maj. C. E. Gray, Q. M. C. On file, Miscellaneous Section, Finance Department.
- (12) Letter from the Quartermaster General, to the Surgeon General, December 21, 1917. Subject: Motor cycle spare parts and repairs. On file, Finance and Supply Division, S. G. O., $\frac{750-594}{61}$.
- (13) Letter from Maj. John P. Fletcher, M. C., Motor Ambulances Supply Depot, Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., April 27, 1918. Subject: Motor cycle difficulties. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{347}$.

CHAPTER XXV

SPARE PARTS; SUPPLIES

SPARE PARTS

The influence which an adequate supply of spare parts would have upon the ambulance service was early appreciated. It was one of the principal reasons, even before the declaration of war, for the decision to have but one standard chassis and one standard body. It was obvious that all spare parts should be uniform and applicable to any standard vehicle. But one series of such supplies would need to be kept. Promptness and efficiency of supply would be facilitated. The material difficulties and aggravating delays experienced in providing with spare parts the few ambulances operating on the Mexican border in 1916 had been keenly felt by everyone in any way connected with the ambulances. The need for these parts from the beginning of the World War, as had been anticipated, was very great. At no time before the signing of the armistice had this need been fully met. But, great as was the need for "parts" to keep the machines running, the need for whole machines to run was greater. These machines were so sturdy and so well built that apparently only great violence or the grossest neglect could cause an early need for spare parts. From June to October, 1917, every effort was made to get ambulances to the camps and to the organizations awaiting transportation overseas.

To systematize the supply, spare parts and accessories were divided into two classes, A and B. Class A parts were issued to and carried on the individual ambulance. They consisted of factory parts and accessories. The factory parts were obtained from the General Motors Truck Co., and consisted of spark plugs and fan belts. The accessories consisted of miscellaneous articles needed in the operation of the vehicle—tires, inner tubes, tire chains, fire extinguishers, canvas buckets, grease guns, and the like.

The class B parts were more extensive and comprehensive. They included all articles likely to be needed in making such repairs as could be made along the roadside by a skilled automobile mechanic. All ordinary engine, axle, differential, transmission, ignition, and cooling system trouble could be repaired, using these parts. It was not contemplated that major repairs would be attempted at the roadside. All ambulances requiring extensive repairs or overhauling were to be either salvaged or sent to the nearest repair shop. The class B set of spare parts included an extensive list of factory parts and a lot of miscellaneous articles—tools, funnels, lanterns, bolts, and the like.

There was another group of spare parts known as class C, carried as depot stocks and used to supply ambulances not attached to divisions, and to replenish the class B set. The entire list was not completed until May, 1918.

SPARE PARTS CAR

The spare parts B set was at first carried on a spare parts car. This car consisted of a modified ambulance body mounted on a standard $\frac{3}{4}$ -ton model '16 General Motors Co. chassis. It had a cabinet placed crosswise of the body just behind the driver's seat. This cabinet had drawers and compartments for the various small parts, tools, and accessories. Back of this cabinet was a clear space of sufficient extent to permit the opening of any or all of the drawers. The top of the cabinet was of suitable height and size for a small workbench. Back of the clear space and extending to the tail gate were folding seats for carrying sitting eases in emergencies. The more bulky spare parts

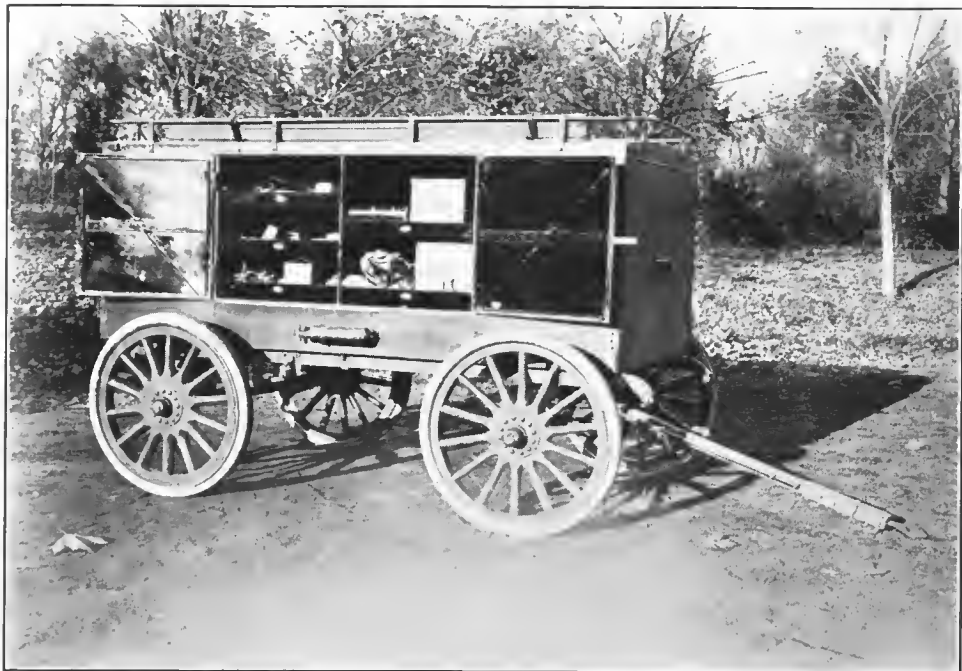


FIG. 28.—Spare parts trailer, side view

were carried in this space when on the road. In general appearance, when the side curtains were down, this spare parts car could not be distinguished from an ambulance. It was intended to provide the ambulance company with a roadside repair shop.

SPARE PARTS TRAILER

Further information of conditions at the front led to the conclusion that this type of vehicle was not the most suitable for carrying spare parts. It was expensive and bulky, took one chassis from its prime function, was as liable to be disabled as any other chassis in the unit, and when so disabled would be of very little use to the company. Other means of transportation were investigated. After making due allowances for the difficulties in towing a trailer, it was decided

that the advantages to be derived from carrying the spare parts B in a specially designed trailer, were sufficient to justify substituting it for the spare parts car. Such a trailer would be smaller and more compact; would cost less than half that of the car; could be towed by any of the ambulances to a disabled car or place; the ambulance which towed it out could resume its normal function; and the trailer could be towed in by the disabled car after the latter had been repaired.

Work on the design of such a trailer was begun at the ambulance supply depot at Louisville early in 1918.¹ A satisfactory model both as to chassis and body had been developed by the end of March² and contracts for 300 were let during April.³ As with the standard ambulance, the chassis was obtained from one manufacturer, the body from another, and the assembling was done at Louisville. Deliveries of chassis began in April and were completed in August. Delivery of bodies began in May and was completed in July.⁴ Such articles of the B set as it was intended should be carried in the trailer were

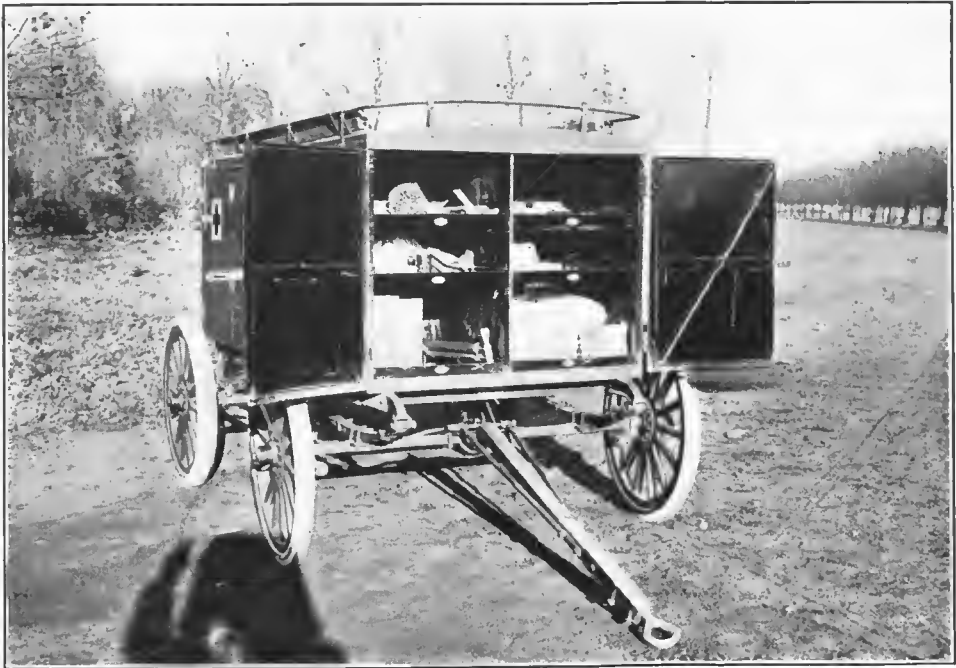


FIG. 29.—Spare parts trailer, front view

packed therein at the Louisville ambulance supply depot. The trailer and all the remaining articles in the B set were then inclosed in a suitable box, if for overseas shipment, or in a suitable crate if intended for domestic shipment.⁵

Of the trailers boxed for export, 140 were placed in transit to the overseas forces during the months July to October, inclusive, 1918.⁶ There is no record of the number of them which reached their destination. Such of them as were actually placed in service overseas proved very convenient and gave satisfaction. Within the United States 75 trailers were distributed to the various

camp and stations having ambulances in numbers equivalent to an ambulance company.⁶

Material difficulty was experienced in securing both factory parts and the miscellaneous accessory articles. Instructions were issued May 29, 1917, for the purchase of 2,000 sets of spare parts equipment A, 200 sets of equipment B, and 12 sets of equipment for groups of 52 ambulances.⁷ It was not until the beginning of August that the purchasing officer was able to report that he had succeeded in completing negotiations for the factory parts. Even then the miscellaneous or nonfactory parts had not been secured.⁸ Contract for these factory parts was finally signed and was approved in the Surgeon General's Office on August 13.⁹ Instructions were given to have these spare parts



FIG. 30.—Spare parts trailer, rear view

assembled in sets and each set packed in a separate container¹⁰ for facility in shipment. The first delivery of factory spare parts B was received at the Louisville ambulance supply depot October 1, 1917, neatly packed in a single box 68 inches by 28 inches by 15 inches, weighing 625 pounds net.¹¹ Deliveries of 35 sets B and 932 sets A had been completed by December 15, 1917.¹² Twenty sets B parts and 350 sets A parts were shipped to France in November, 1917.¹³

Another contract for 3,000 sets spare parts A and 305 sets spare parts B, with a large quantity of articles for depot stock, was made with the General Motors Truck Co. in November, 1917. Deliveries on this contract began in February, 1918, and were finally completed August 24, 1918.¹⁴



FIG. 31.—Spare parts trailer, showing equipment carried

Even greater difficulties were experienced in the earlier procurements of the miscellaneous accessory components of both the A and B sets. Advertisements for bids brought very few replies. Deliveries promised were slow and prices high. Finally, after much canvassing, satisfactory bids were received and contracts let. Deliveries were made in conformity with the contract stipulations.¹⁵

A somewhat different policy was followed in providing spare parts for ambulances overseas. For each General Motors Co. ambulance sent overseas a complete set of parts A was furnished. Some 50 sets of spare parts B were furnished, in addition to those in the 140 trailers previously mentioned.¹⁶ These parts, however, were slow in being delivered.

Arrangements were made with the Quartermaster General in September, 1917, for the quartermaster depots in France to carry an adequate supply of



FIG. 32.—Spare parts trailer, road side set up

factory parts, General Motors Co.,¹⁷ as well as Ford. These parts were to be secured by the ambulance companies in France and settlement made by Treasury transfer of funds. The lists of factory parts prepared by the Quartermaster Corps contemplated practically one car in parts for every 25 cars sent over.¹⁷

Spare parts for the maintenance of 800 General Motors Co. ambulances and 3,200 Ford ambulances were ordered through the depot quartermaster September 22, 1917.¹⁸ The General Motors Truck Co. promised shipments to France by the end of November, 1917, in quantities to meet immediate requirements.¹⁹ The purchase of miscellaneous equipment for 900 ambulances was authorized by the Quartermaster General December 22, 1917.²⁰ This equipment was to be boxed for export, addressed to motor transport repair shops, Quartermaster Corps, United States Expeditionary Forces, marked "Miscellaneous equipment,

ambulance service." The instructions to purchase directed that the equipment be prepared for immediate shipment and the first complement shipped at the earliest possible date. The remainder was to be shipped as soon thereafter as practicable.

No record is discoverable of the quantity of the spare parts and miscellaneous equipment which actually reached France and was issued to the troops. The impression gathered from the correspondence and from conversations with officers on duty with ambulance companies overseas indicates that there was a chronic shortage of spare parts for the General Motors Co. ambulances, at least with the ambulance companies.

SUPPLIES

GASOLINE, OILS AND GREASE

In the early days of the use of the motor ambulance in the Army, these vehicles were operated in conjunction with motor vehicles of the Quartermaster Corps. Gasoline, lubricating oils, and cup grease for them were secured from the supply maintained by the local quartermaster. Settlement was made by transfer of funds in the Treasury Department from the appropriation of the Medical Department to those of the Quartermaster Corps. This was generally more convenient for the officer in charge of the ambulances. Later, authority was granted medical officers for the purchase of these commodities in the open market when a better price could be obtained in that manner.²¹

After the training camps were established arrangements were made with the Quartermaster General to have the gasoline and lubricants required by Medical Department motor vehicles in the camp obtained from the camp quartermaster with transfer of funds.²² This procedure was changed in February, 1918, and the supply of gasoline for all motor vehicles was devolved upon the Quartermaster Corps without transfer of funds.²³

The Medical department was required from time to time to submit estimates of its requirements in gasoline and lubricants. A comprehensive estimate was made of gasoline and oil which would be required daily and monthly for the motor ambulance service. Both Ford and General Motors Co. ambulance and motor cycles as well, were included in this estimate. Since motor trucks and touring cars were furnished by the Quartermaster Corps, the number of vehicles which would be in use with Medical Department organizations was given in the estimate. The requirements of those trucks and motor cars for gasoline and oil were omitted. A copy of the estimate showing upon what it was based appears below:²⁴

Estimate of gasoline and oil for motor ambulance service

1. UNITED STATES STANDARD AMBULANCES (G. M. C.)

DATA AND ESTIMATE

One motor ambulance company: (12 ambulances and 1 spare parts car).....cars..	13
Motor ambulance companies per division.....	3
Company ambulances per division.....	39
Base hospitals per division.....	4
Motor ambulances attached to each base hospital.....	3
Base hospital ambulances per division.....	12

Motor ambulance convoy for 2 divisions.....	companies.....	5
Convoy ambulances per division (65 for 2 divisions)		33
		84
Total motor ambulances per division.....		84
Estimated average daily mileage.....		70
Estimated average mileage per gallon of gasoline.....		8
Estimated average mileage per gallon of lubricating oil.....		200
Estimated transmission and differential oil per 3,000 miles.....		gallon 1
Estimated cup grease per car per day.....		pound ¼

	Quantities			
	Gasoline	Lubricating oil	Transmission and differential oil	Cup grease
	Gallons	Gallons	Gallons	Pounds
Per standard ambulance, per day.....	8.75	0.35		
Per standard ambulance, per month.....	262.5	10.5	0.7	7.5
Per standard ambulance company, per day.....	114	4.5		
Per standard ambulance company, per month.....	3,420	135	9	100
Per division, per day.....	735	30	2	21
Per division, per month.....	22,050	900	60	630

2. FORD AMBULANCES

DATA AND ESTIMATE

One Ford motor ambulance company (20 Ford ambulances (1 Quartermaster Corps spare parts Ford truck)).....	20
Total number Ford ambulance companies, Nov. 1.....	169
Total number Ford ambulances.....	3,380
Estimated average daily mileage.....	50
Estimated average mileage per gallon of gasoline.....	12
Estimated average mileage per gallon of lubricating oil.....	150
Estimated differential oil per 3,000 miles.....	gallon ½
Estimated cup grease per car per day.....	pound ¼

	Quantities			
	Gasoline	Lubricating oil	Differential oil	Cup grease
	Gallons	Gallons	Gallons	Pounds
Per Ford ambulance per day.....	4.2	1/3		
Per Ford ambulance per month.....	136	10	1/4	
Per Ford ambulance company per day.....	84	6.7	1/6	5
Per Ford ambulance company per month.....	2,520	201	5	150
Total, 3,380 Ford ambulances per day.....	14,100	1,127	28	845
Total, 3,380 Ford ambulances per month.....	423,000	33,810	840	25,350

3. MOTOR CYCLES

DATA AND ESTIMATES

Number of motor cycles attached to 1 standard ambulance company.....	3	
Number of motor cycles attached to standard ambulance companies per division.....	9	
Number of motor cycles attached to field hospital per division.....	8	
Total motor cycles per division.....		17
Estimated average daily mileage.....		100
Estimated average mileage per gallon of gasoline.....		30
Estimated average mileage per gallon of lubricating oil.....		400

	Quantities	
	Gasoline	Lubricating oil
	Gallons	Gallons
Per motor cycle per day.....	33 $\frac{3}{8}$	0.25
Per motor cycle per month.....	100	7.5
Per standard ambulance company per day.....	10	7.5
Per standard ambulance company per month.....	300	22.5
Per division, per day.....	57	4.25
Per division, per month.....	1,710	127.5

4. MONTHLY OVERSEAS QUANTITY ESTIMATE

	Gasoline	Lubricating oil	Transmission and Differential oil	Cup grease
	Gallons	Gallons	Gallons	Pounds
For 3380 Ford ambulances.....	423,000	33,810	840	25,350
For 1 division:				
United States standard ambulances.....	22,050	900	60	630
Motor cycles.....	1,710	127		
	23,760	1,027		
For 10 divisions:			600	6,300
United States standard ambulances.....	220,500	9,000		
Motor cycles.....	17,100	1,270		
	237,600	10,270		
For 40 divisions:			2,400	25,200
United States standard ambulances.....	882,000	36,000		
Motor cycles.....	68,400	5,080		
	950,400	41,080		
For hospital sterilizers.....	1,500			

NOTE.—The above quantity estimates cover Medical Department ambulances and motor cycles. In addition thereto, gasoline and oils must be provided for the Quartermaster Corps touring cars and trucks regularly attached to the ambulance companies or hospitals, as follows:

(a) Touring cars:			
Per ambulance company.....			1
Per Division.....			3
Per each of 3 field hospitals.....			1
Per division.....			3
Total touring cars per division.....			6
(b) Trucks:			
Per Ambulance company.....			3
Per division.....			9
Per each of 3 field hospitals.....			11
Per division.....			33
Total trucks per division.....			42
(c) Ford 1-ton Trucks:			
Attached to each Ford ambulance company or spare parts car.....			1
Number attached to 169 Ford companies.....			169

5. MONTHLY UNITED STATES QUANTITY ESTIMATE.

Number of camps and cantonments.....	33
Number of standard ambulance companies per camp.....	2
Number of standard ambulances and spare parts cars per camp.....	26
Total standard ambulances and spare parts cars at camps.....	858
Estimated ambulances in United States not at camps.....	330
Total in United States.....	1,188
Number of motor cycles per ambulance company.....	3
Total motor cycles at camps.....	198

	Quantities			
	Gasoline	Lubricating oil	Transmission and differential oil	Cup grease
Based on estimates under (1) and (3):				
1,188 standard United States ambulances and spare parts cars.....	<i>Gallons.</i> 311,850	<i>Gallons.</i> 12,474	<i>Gallons.</i> 832	<i>Pounds.</i> 8,910
198 motor cycles.....	19,800	1,485		
Total per month.....	331,650	13,959		

NOTE.—The above quantity estimates cover Medical Department ambulances and motor cycles. In addition thereto, gasoline and oils must be provided for the Quartermaster Corps touring cars and trucks regularly attached to the ambulance companies or hospitals in the United States.

SUMMARY OF THE TOTAL REQUIREMENTS OF THE AMBULANCE SERVICE PER MONTH

Vehicle	Gasoline	Lubricating oil	Transmission and differential oil	Cup grease
For 40 divisions:				
G. M. C. ambulances and motor cycles.....	<i>Gallons</i> 950,400	<i>Gallons</i> 41,080	<i>Gallons</i> 2,400	<i>Pounds</i> 25,200
3,380 Ford ambulances.....	423,000	33,800	840	25,350
Total.....	1,373,400	75,907	3,240	50,550

REFERENCES

- (1) Letter from Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Maj. W. T. Fishleigh, Sanitary Corps, N. A., S. G. O., February 20, 1918. Subject: Spare parts trailer. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{207}$.
- (2) Letter from the Surgeon General to Maj. J. P. Fletcher, M. C., Louisville, Ky., March 25, 1918. Subject: Special delivery letter. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{230}$.
- (3) Contracts dated April 17, 1918, between Maj. John P. Fletcher, M. C., and the Trailmobile Co. of Cincinnati, Ohio, for 300 trailer chassis. On file, Finance and Supply Division, S. G. O., Motor Transport Contract, 4669. Also: Contract dated April 13, 1918, between Maj. John P. Fletcher, M. C., and Glascock Bros. Co., of Muncie, Ind., for 300 trailer bodies. On file, Finance and Supply Division, S. G. O., Motor Transport Contract, 4596.
- (4) Louisville Motor Ambulance Supply Weekly Reports, April to August, 1918, inclusive. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{398}$.
- (5) Letter from the Surgeon General to Maj. John P. Fletcher, M. C., Louisville, Ky., April 29, 1918. Subject: Boxing of spare parts trailer. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{288}$.
- (6) Louisville Daily Shop Records, July to October, inclusive, 1918. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{401}$.

- (7) Letter from the Surgeon General to the officer in charge, Field Medical Supply Depot, Washington, D. C., May 29, 1917. Subject: Spare parts for ambulances. On file, Finance and Supply Division, S. G. O., 11,220.260.
- (8) Letter from the officer in charge, Field Medical Supply Depot, Washington, D. C., to the Surgeon General, August 3, 1917. Subject: Spare parts. On file, Finance and Supply Division, S. G. O., 11,220.260.
- (9) Contracts dated July 9, 1917, between Capt. John P. Fletcher, M. C., and the General Motors Truck Co., of Pontiac, Mich., for spare parts for model 16 chassis and for model 15 chassis. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, 868 and 870.
- (10) Letter from Col. Edwin P. Wolfe, M. C., S. G. O., to Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., September 22, 1917. Subject: Depot affairs. On file, Finance and Supply Division S. G. O., $\frac{713-440}{105}$.
- (11) Letters from Maj. John P. Fletcher, M. C., Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., September 24, 1917, and October 2, 1917. Subject: Motor ambulances and spare parts. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{105}$.
- (12) Statement of deliveries attached to contract No. 3849, December 27, 1917, between Maj. John P. Fletcher, M. C., and the General Motors Truck Co., modifying contract No. 870. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts.
- (13) Telegram from the Surgeon General to Motor Ambulance Supply Depot, Louisville, Ky., November 8, 1917, directing shipment of spare parts to Newport News, Va. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{125}$.
- (14) Contract dated November 30, 1917, between Maj. John P. Fletcher, M. C., and the General Motors Truck Co. for spare parts and schedule of deliveries and payments attached thereto. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, 2324.
- (15) Letters from Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., October 22, 1917, and December 27, 1917. Subject: Motor ambulances and spare parts. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{99-A}$ and $\frac{713-440}{133}$.
- (16) Louisville Daily Spare Parts Reports, July to October, 1918. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{402}$.
- (17) Letter from Col. Edwin P. Wolfe, M. C., S. G. O., to Maj. John P. Fletcher, M. C., Louisville, Ky., October 22, 1917. Subject: Motor ambulances and spare parts. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{99-A}$.
- (18) Letter from Maj. W. T. Fishleigh, Sanitary Corps, N. A., to Col. Edwin P. Wolfe, M. C., S. G. O., October 16, 1917. Subject: Ambulance spare parts status. On file, Finance and Supply Division, S. G. O., $\frac{250}{18}$.
- (19) Second indorsement from Depot Quartermaster, Chicago Ill., to the Surgeon General, October 27, 1917, relative to G. M. C. spare parts for France. On file, Finance and Supply Division, S. G. O., $\frac{250}{18}$.

- (20) Letter from the Quartermaster General, authorization No., Washington, 5077, to the Depot Quartermaster, Washington, D. C., December 22, 1917. Subject: Purchase of miscellaneous equipment for ambulances. On file, Finance and Supply Division, S. G. O., $\frac{750-594 \text{ Q. M. G.}}{61}$.
- (21) Circular 74 $\frac{1}{2}$, Office of the Department Surgeon, Southern Department, October 4, 1916.
- (22) Par. 134 $\frac{1}{2}$, 1916 Supplement to Compilation of Orders, Changes No. 5, November 24, 1917.
- (23) Par. 134 $\frac{1}{2}$, 1916 Supplement to Compilation of Orders, Changes No. 7, March 14, 1918.
- (24) Estimate of gasoline and oil required by the Medical Department for Motor Ambulance Service, compiled October 24, 1917, by Maj. Walter T. Fishleigh, Sanitary Corps, S. G. O. On file, Finance and Supply Division, S. G. O., $\frac{239 \text{ W. T. F.}}{15}$.

CHAPTER XXVI

CONSOLIDATION OF PROCUREMENT

Until July, 1918, the Medical Department purchased its motor ambulances and motor cycles; thereafter its procurement of motor vehicles was consolidated with that of other bureaus.¹

During the early months of 1918 the question of consolidation of procurement began to receive more and more attention by the War Department. Motor vehicles were among the first to attract attention as a suitable commodity for the application of the principle of consolidated procurement. A proposal was put forward in March for consolidation of the procurement of motor vehicles under the Ordnance Department. The Surgeon General, to whom a copy of the proposal was referred, commented thereon in substance as follows:²

The production of motor vehicles for the Medical Department handled by its own organization was, at the time, proceeding satisfactorily in quality, quantity, and time. If it were to be taken over by another department, an organization, preferably the same, with direct authority and responsibility for the whole problem of design, specification, purchase, production, inspection, and acceptance of motor ambulances, would be absolutely necessary for success. In the plan proposed, the production of motor ambulances would be under various divisions, all with overlapping and conflicting authority, and none with direct and full authority or responsibility for the complete project. The problem of procurement of motor vehicles seemed to be too large for efficient concentration under one office or detail directing head. Separation into various divisions, each one handling the procurement of a distinct type of motor vehicle, would at once be necessary. Each such division would require its own technical staff. No advantage would be gained by having these several divisions under any one bureau. The organization of the Medical Department for the procurement of motor ambulances was based upon the principle of direct authority and responsibility.

It was finally decided by the War Department, April, 1918, to consolidate the procurement of all motor vehicles under the Motor Transport Service of the Quartermaster Corps, except certain special Artillery vehicles left with the Ordnance Department.³

Although the order creating the Motor Transport Service was issued April 18, 1918, that service was not sufficiently organized to function until the 21st of the following May.⁴ Even then it was not ready to assume the duties imposed upon it. That service assumed charge of the purchase, production, and inspection of motor ambulances July 1, 1918.¹ The personnel and organizations of the Medical Department had continued to perform their duties in connection with ambulance production during the interval between the date of

issue of the order and the actual assumption of duties by the Motor Transport Service.¹

In the following August the procedure relative to motor ambulances was again changed. A separate and independent agency under the title of Motor Transport Corps was created and its functions were defined in General Orders, No. 75, War Department, August 15, 1918. The order creating the Motor Transport Service was rescinded by General Orders, No. 75, and a part of that service passed automatically to the Motor Transport Corps. Practically all the personnel of the Medical Department formerly engaged on the production and inspection of ambulance bodies and chassis were attached to the Motor Transport Corps⁵ and continued to perform those duties until production was stopped by the signing of the armistice.

It was the intention of General Orders, No. 75, to devolve upon the Motor Transport Corps the design, production, procurement, and reception of all motor vehicles, spare and repair parts, tools, accessories, and supplies for motor vehicles as well as the storage, maintenance, replacement, and accounting for the same. However, before the Motor Transport Corps could take over these functions an order was issued by the purchase, storage, and traffic division, General Staff, which divested that corps of them.⁶ That order directed that on and after September 6, 1918, the Quartermaster Corps was to have sole charge for the Army of making all purchases, following production, conducting inspection, and making acceptance of and payment for all motor-propelled vehicles of whatsoever kind, type, or description, including chassis, bodies, loads, and accessories, except as might be modified by mutual agreement between the procuring and issuing bureaus and approved by the director of purchase, storage, and traffic.

Paragraph 7, General Orders, No. 75, provided for the transfer to the Motor Transport Corps of all motor vehicles regardless of the original sources of their procurement. As a preliminary to that transfer the following telegram was sent out August 27, 1918, by The Adjutant General of the Army to the commanding generals of all territorial departments, training camps, and ports of embarkation and to commanding officers of all stations exempted from the control of department commanders.⁷

Preparatory to organization of Motor Transport Corps issue immediate instructions by telegraph to accountable officers of all staff corps under your command to make physical inventory of all bicycles, motor cycles, automobiles, trailers, and trucks with present equipment, also spare and repair parts, tools, garages, shops, parks, etc. After inventory completed careful record to be made of all transactions affecting disposition of vehicles and property. All cargo carrying chassis hereby classed as trucks. Caterpillar type tractors designed primarily for traction purposes and tanks excepted. Ordnance Department charged with procurement and maintenance these as heretofore. Direct subordinates exercise extreme accuracy and promptness to permit transfer of property by invoice and receipt about first proximo. Designate officers at each station to act as Motor Transport Corps officer to be accountable officer. Inventory should show make and type of vehicles, serial numbers of chassis and motor numbers, cost date of procurement, by whom purchased, cost of repairs, conditions, and remarks. This data necessary for vehicle descriptive cards. Chiefs of bureaus have been advised.

In order to effect the details of the transfer of motor vehicles procured by the Medical Department, a conference was held among representatives of the Surgeon General's Office and the Motor Transport Corps, September 4, 1918,

at which it was agreed that all motor vehicles were to be invoiced to Motor Transport Corps and that accountability was to be made to the Chief of Motor Transport Corps by organizations concerned.⁸ It was decided that ambulance bodies, mobile operating bodies, and other special bodies were to be purchased by the Motor Transport Corps on designs and specifications furnished by the Surgeon General. That the Medical Department, when desirable, was to send inspectors and liaison officers to factories where bodies were being manufactured. That bodies were to be installed on chassis by the Motor Transport Corps and chassis and bodies shipped or delivered to any point designated by the Medical Department. That chassis and bodies were to be accounted for to the Motor Transport Corps. That special equipment was to be purchased and installed on bodies by Medical Department; or when so requested by Medical Department, Motor Transport Corps was to install special equipment in Motor Transport Corps shops. That chassis and bodies were to be repaired and maintained by the Motor Transport Corps and that special equipment of bodies was to be maintained and repaired by Medical Department, except that when so requested by Medical Department Motor Transport Corps shops were to make repairs not requiring special technical skill and tools not available in Motor Transport Corps shops. That the ambulance depot at Louisville was to be transferred to the Motor Transport Corps to operate. That ambulances to be overhauled were to be sent to the Louisville depot shops as formerly.

The workings of this plan are set forth in the following indorsement from the Surgeon General, November 1, 1918.⁹

Paragraph 7, General Orders, No. 75, August 15, 1918, requires all motor vehicles and their spare parts, tools, and accessories purchased by other staff corps or services to be turned over to and invoiced to the Motor Transport Corps, and paragraph 9 of the same order makes this transfer effective August 31, 1918.

Immediately upon the accomplishment of this transfer, which is purely a paper transaction, the motor vehicles so transferred will be at once reissued by the Motor Transport Corps officer on memorandum receipt to the responsible officers by whom the vehicles have been used, and under whose control they have been operated.

Inasmuch as the Motor Transport Corps is charged with the maintenance of all motor vehicles, the spare parts and accessories transferred from the Medical Department to that corps will be expended or utilized in making repairs of the appropriate vehicles by the Motor Transport Corps.

All trucks and touring cars in use by the Medical Department and which have hitherto been regarded as the property of the Quartermaster Corps, whether they are purchased by that corps or donated to the Federal Government and formally accepted by an officer thereof, are likewise transferred to the Motor Transport Corps under the provision of the before mentioned General Orders, No. 75.

In conformity with the requirements of paragraph 9 of the above quoted General Order No. 75, a list of the personnel of the Medical Department engaged in the design, purchase, inspection, and operation of motor ambulances and other motor vehicles of the Medical Department was furnished The Adjutant General, August 30, 1918, divided into two groups, those to be transferred to the Motor Transport Corps and those to be retained in the Medical Department. The former group included 11 officers, 41 enlisted men, and 12 civilian employees. The latter group included 18 officers, 30 enlisted men,

and 3 civilian employees.¹⁰ Of this latter group, 8 officers, and 8 enlisted men were recommended later for transfer to the Motor Transport Corps.¹¹

REFERENCES

- (1) Letter from the Surgeon General, U. S. Army, to the officer in charge General Motors Truck Co., Pontiac Mich., July 23, 1918. Subject: Reports and correspondence relating to production and inspection of motor ambulances. On file, Finance and Supply Division, S. G. O., 750-519 M. T. C.
1
- (2) Memorandum for the Chief of Staff, March 29, 1918, from Col. C. R. Darnall, M. C., S. G. O. Subject: Proposed consolidation of procurement of motor vehicles in the Ordnance Department. On file, Finance and Supply Division, S. G. O., 750-138 C. S.
45-A
- (3) General Orders, No. 38, W. D., April 18, 1918.
- (4) Letter from the Quartermaster General to the Surgeon General of the Army, May 16, 1918. Subject: Designation of representation to Motor Transport Service. On file, Finance and Supply Division, S. G. O., 750-590 Q. M. G.
152
- (5) Letter from the Surgeon General of the Army, August 30, 1918, to The Adjutant General of the Army. Subject: Motor Transport Corps. On file, Finance and Supply Division, S. G. O., 750-519 M. T. C.
1
- (6) Supply Circular No. 87, Purchase, Storage, and Traffic Division, General Staff, September 5, 1918. Subject: Consolidation of procurement motor-propelled vehicles.
- (7) Telegram from The Adjutant General to Commanding General, Camp Fremont, Palo Alto, August 27, 1918. Subject: Motor Transport Corps. On file, Finance and Supply Division, S. G. O., 750-14 A. G.
200
- (8) Memorandum from Lieut. Col. B. F. Nuther, M. T. C., to Colonel Drake, September 4, 1918. Subject: Conference with Surgeon General in regard to G. O., No. 75, W. D., 1918. On file, Finance and Supply Division, S. G. O., 750-519 M. T. C.
10-A
- (9) First indorsement, Surgeon General, to the surgeon, Port of Embarkation, Hoboken, N. J., November 1, 1918. Subject: Motor Transport Corps. On file, Finance and Supply Division, S. G. O., 583-340 Hoboken.
116
- (10) Letter from the Surgeon General to The Adjutant General, August 30, 1918. Subject: Motor Transport Corps. On file, Finance and Supply Division, S. G. O., 750-519 M. T. C.
1
- (11) Letter from the Acting Surgeon to The Adjutant General, October 3, 1918. Subject: Transfer of personnel to Motor Transport Corps under G. O. No. 75. On file, Finance and Supply Division, S. G. O., 750-519 M. T. C.
1-A

CHAPTER XXVII

OVERSEAS SHIPMENTS

It was early manifest that if equipment were to be shipped to the American Expeditionary Forces in quantities commensurate with the needs, it must be condensed into the smallest possible bulk, even at the expense of more extensive assembly at ports of debarkation. It was also evident, for the same reason, that shipments of building material for shops and warehouses would be very limited. Reports indicated a dearth of all kinds of building material in France. These considerations led the Medical Department to the decision to ship all standard ambulances, both chassis and bodies, in tight boxes of average lumber. The size of the boxes in which the chassis were shipped was 186 inches long, 71 inches broad, and 32 inches high. They contained more than 255 board feet of lumber, most of which, it was believed, would be in a serviceable condition when the chassis were uncrated at their destination. This plan offered a means of transporting to France a considerable quantity of lumber which could be readily salvaged and used for building purposes. A motor ambulance assembly unit, which was organized and sent to France, within a short time after its arrival in France did erect its own assembly shops, using this material for the purpose.¹

In boxing the chassis the wheels, steering column, dashboard, radiator, and a few other parts were removed from the frame and secured within the box.^a Many of the chassis boxed earlier lay out in the open, in storage, at ports of embarkation awaiting tonnage space, or at ports of debarkation awaiting assembly, where they were subjected to all kinds of weather conditions. It was but natural that complaints of rusted parts should arise when they were unpacked for assembling. A report from the commanding officer of the motor ambulance assembly unit in France, received early in February, 1918, after 90 machines had been assembled, indicated that the General Motors Co. chassis were in very bad condition from rust and breakage. The boxes and machines showed evidences of rough usage in transit. Broken compression plugs, drain cocks, and radiator goosenecks were of common occurrence. Frozen clutches were numerous, due to rusting of the splines and plates. These clutches were very difficult to loosen without dismantling and cleaning plates and splines. It was recommended in this report that greater care be taken in packing, that all parts be so firmly secured that they could not become loose in transit, and that a heavy oil be applied to all moving parts to keep them from rusting.¹

Several months had elapsed between the boxing of these chassis for shipment and the uncrating of them for assembly. During that interval most of

^a See Figure 16

the defects reported, if not all of them, had been noted by the Medical Department representative at the General Motors Truck Co. plant. Measures had been taken to correct them and to produce a boxed chassis that would withstand even unreasonably rough usage in shipment. A copy of the report on defects found in General Motors Co. ambulances mentioned in the preceding paragraph was furnished the inspector at the General Motors Truck Co. plant February 6, 1918,² with instructions to take extra precautions and insure additional strength in boxing.³ Subsequent shipments appear to have arrived in good condition.

That ambulances should arrive in France in as perfect condition as could be effected was one of the determining factors in arriving at the decision to ship them knocked down and boxed for export. Standing ambulances which had been in service for training purposes in the several camps during the winter of 1917-18 had seen hard usage and were in poor mechanical condition. To ship them overseas would not only require more shipping space but also a complete overhaul and repair before shipment and would leave the camps short of ambulance transportation. The winter had been severe, a majority of the machines had been without shelter, and the drivers had been inexperienced. It was decided, therefore, to leave them in the camps for the training of subsequent organizations and to provide new ambulances for all divisions on their arrival overseas.⁴ The earlier policy had contemplated that National Guard organizations would take with them motor ambulances for two ambulance companies.⁵ This was done because the Militia Bureau had provided funds for the purchase of that amount of equipment. Ambulances for the third company were to be provided in France. All ambulances for National Army divisions were to be provided in France.⁵ So far as can be ascertained very few used machines were sent to France. Those few went with the earlier divisions embarking for overseas service.

The policy of shipping motor trucks knocked down for overseas service was extended to all shipments of such vehicles, as will appear from the following instructions from the Quartermaster General, January 8, 1918:⁶

1. In order to conserve in every way possible transport space for the shipment of supplies and equipment for the forces abroad, instructions have been issued to the commanding general of each of the ports of embarkation that all motor trucks, including their bodies, shall be knocked down and crated. This work will be done on all trucks that have reached ports of embarkation or are en route thereto.

2. It is therefore suggested that necessary instructions be issued, in connection with motor trucks that may be furnished by your department, to have this crating done prior to forwarding to ports of embarkation all shipments destined for overseas.

All the 2,400 Ford ambulances purchased on the contract of July 13, 1917, except 50 for the United States Army ambulance service at Allentown, Pa., were shipped to France very rapidly. The Ford Motor Co. advised the Surgeon General, August 8, 1917, that 1,700 ambulances had already been shipped and that the remainder of the order for 2,400 would be delivered by August 15.⁷ The ambulance service at Allentown informed the Surgeon General that 50 ambulances had been received at that station for training purposes.⁸ The medical supply officer, Port of Embarkation, Hoboken, N. J., reported, September 24, 1917, that 2,218 Ford ambulances had been shipped to that date and

that 132 were on hand awaiting shipment.⁹ These 132 ambulances were floated shortly thereafter. A large part of these ambulances had arrived in France before the end of September.¹⁰ The sending of this large number of ambulances at that time called forth a severe statement from the commander in chief, November 24, 1917, that there were at that time many hundreds of these machines in excess of the needs.¹¹ And yet these machines proved a blessing in disguise. Approximately 500 of them were transferred to the Quartermaster Corps, Engineer Corps, Signal Corps, and other services in France,¹² for truck duty.

Of the 2,200 ambulances delivered under the first two contracts with the General Motors Truck Co., it was estimated that 900 would be required for domestic use. The remainder were to be sent overseas.¹³ Increasing domestic needs reduced the number for shipment overseas by approximately 200 cars.¹⁴ The chassis alone weighed 2,878 pounds. The box in which it was packed weighed approximately 1,200 pounds. The gross weight of the packed box was 4,000 pounds. It occupied 245 cubic feet of space. This bulk could be handled efficiently only by a crane, derrick, or other power machinery.

The first instructions for the shipment of General Motors Co. ambulances to France were issued May 24, 1917, when it was directed that 48 model 15 chassis and as many bodies be boxed and held for shipment upon telegraphic instructions.¹⁵ This number was later reduced to 36, all of which appear to have arrived in France.¹⁶ The ambulance company accompanying the first convoy took its assembled ambulances, Service Truck Company No. 120.¹⁷

As soon as information was received concerning the prospective embarkation of the 26th and 42d Divisions, instructions were issued for the shipment of 108 ambulances and 7 spare parts cars complete.¹⁸ These ambulances were shipped through Pier 45, North River, New York City, and were intended for Sanitary Train Nos. 101 and 117, with the 26th and 42d Divisions, respectively.¹⁸ The next shipment was authorized October 25, 1917, and called for 120 chassis, 111 ambulance bodies, and 9 spare parts bodies boxed for export. They were forwarded through the port of Baltimore.¹⁹ Thereafter practically all shipments of General Motors Co. chassis were made through the port of embarkation at Newport News, Va.²⁰ By the end of November, 1917, 452 ambulances had been placed in transit to the ports for shipment overseas.²¹ From the 1st of December, 1917, to the end of March, 1918, 120 more ambulances were shipped.²² By the end of June, 1918, 1,283 more ambulances had been forwarded, of which 706 were shipped direct from the factories²³ and 577 from storage (497 at Watertown, N. Y.,²⁴ and 80 at Louisville, Ky.²⁵). Of the 577 shipped from storage 430 were issued to the fourth overseas contingent, United States Army ambulance service, scheduled for service in Italy.²⁶ Thirty additional chassis (without bodies) were turned over to the Quartermaster Corps for issue as gasoline tank trucks to this contingent. This brings the total number of ambulances placed in transit for shipment overseas to the end of June, 1918, up to 1,855. To this should be added the 36 model 15 and the 12 Service Motor Truck No. 120, giving an aggregate of 1,903.

Shipments fell off during July, when only 191 went forward.²⁷ This was improved by the shipment of 475 during August.²⁸ The peak was reached in

September when 1,041 chassis were shipped.²⁹ This brings the shipments during the quarter ending September 30, 1918, to 1,707, and the total shipments of model 16 General Motors Co. chassis from the beginning in 1917 to that date 3,562, with a total aggregate of 3,610. The shipping records of October and November are not available and the number forwarded during those months is unknown, but the contract appears to have been completed in October and probably all of the chassis left the factory.

The shipping box for General Motors Co. chassis was modified in September, 1918, whereby it not only was made stronger but was reduced in size so that it required but 207 cubic feet of shipping space.³⁰

The difficulties experienced in starting production of new pattern ambulance bodies and the delays in their shipment have already been described. At one time ambulance chassis in considerable numbers were shipped overseas without bodies.

The number of ambulances, General Motors Co. and Ford, produced prior to the cessation of hostilities never reached the estimated requirements. The estimated overseas requirements of April 12, 1918, when the war plans, as transmitted to the Surgeon General, contemplated 26 divisions in France by June 30, 1918, and 40 divisions by the end of the following December, appear below:³¹

ESTIMATE

Number of divisions overseas by June 30, 1918.....	26
Number of divisions overseas by Dec. 31, 1918.....	40

AMBULANCES PER DIVISION OVERSEAS

3 motor ambulance companies, 13 ambulances each	39
1 supply train, divisional.....	1
1 Heavy Artillery regiment.....	3
1 Light Artillery regiment.....	2
1 field signal battalion (operating independently).....	1
Total divisional ambulances per division overseas.....	46

ADDITIONAL AMBULANCES PER ARMY OVERSEAS

20 evacuation companies, 20 ambulances each.....	400
1 army sanitary train, 4 companies, 13 ambulances each	52
138 base hospitals, 10 venereal hospitals, 12 convalescent camps, 1 convalescent depot; 161 hospitals as above, 4 ambulances each	644
60 evacuation hospitals, 4 ambulances each	240
Total army ambulances overseas.....	1,336

TOTAL AMBULANCES OVERSEAS JUNE 30, 1918

26 divisions, 46 ambulances each.....	1,196
Army ambulances overseas	1,336
Total.....	2,532

TOTAL AMBULANCES OVERSEAS DEC. 31, 1918

40 divisions, 46 ambulances each.....	1,840
Army ambulances overseas	1,336
Total.....	3,176

This does not include any ambulances to take care of losses, but for purpose of determining the amount of acetylene gas used ambulances for replacement purposes need not be considered. We are figuring 25 per cent loss each six months of service.

As the war plans changed and the flow of troops to France became augmented, the estimated requirements of ambulances rose. Based upon the information available June 20, 1918, and taking wastage into account, the estimated overseas requirements June 30, 1918, were 3,333 ambulances and December, 1918, 5,505.³² The estimate of August 1, 1918, based upon 52 divisions overseas indicated the need by the end of December, 1918, of 6,795 ambulances, or 900 in excess of those delivered and due on contract.³³

The shipment of spare parts for ambulances was never entirely satisfactory. The first shipment went forward November 15, 1917, and consisted of 20 sets of factory spare parts B and a corresponding quantity of spare parts A.³⁴ During June to October, inclusive, 1918, there were placed in transit to France 140 spare parts trailers complete with B equipment, 30 sets of spare parts B equipment, and 2,057 sets of spare parts A equipment.³⁵ These spare parts were provided out of supplies procured by the Medical Department.

SHORTAGE OF AMBULANCES 1918

With the steadily increasing stream of troops transported to France during the spring and summer of 1918 there was a corresponding increase in the demand for motor ambulances for the expeditionary forces. This demand was augmented by the major operations planned for September and by the unexpected epidemic of influenza. While ambulances had been manufactured, boxed for export, and shipped to the ports of embarkation, there was always a tedious delay before they were actually floated. These delays were augmented by the time intervening between the arrival at ports of debarkation and their assembly for delivery to the troops. Loadings on board ship were often so made and the destination of the vessel so changed while at sea that chassis arrived at one port and bodies at another.³⁶ This materially added to the difficulties of assembly. While the ambulance assembly unit left the United States fully equipped with the necessary machinery and parts, conditions at the bases overseas limited the efficiency of this unit.³⁷ These numerous and probably unavoidable delays always left a very wide margin between the number of vehicles shipped from the factory and those available for use in France.

The representative of the Medical Department on duty with the General Motors Truck Co. reported March 18, 1918, the completion of the contracts of April 25, 1917, and June 14, 1917. This report also shows that 1,094 chassis boxed for export had been shipped to ports of embarkation.³⁸ Yet on June 9, 1918, when it would seem that ample time had elapsed to have all these ambulances running on the roads in the rear of the Army in France, a cablegram was received from the commander in chief of the American Expeditionary Forces that there were then available 562 model 16 G. M. C. ambulances, 20 ambulances of miscellaneous models, and 2,611 Ford ambulances.³⁹ A cablegram from the same source a few days earlier had stated that the Medical Department required 100 Ford ambulances and 250 G. M. C. ambulances per month for

six months beginning July 1, exclusive of the needs of the United States Army ambulance service.⁴⁰

By the end of July, 1918, the ambulance situation with the American Expeditionary Forces, due to increased combat activity, was growing serious. A cablegram from General Pershing of August 6 stated:⁴¹

Motor ambulance shortage at present date extremely acute. Present shortage is 1,019 G. M. C. and 306 Fords. These figures consider as available for A. E. F. which you state are ready to float or now en route to Newport News. For month of August M. T. C. priority calling for total of 605 G. M. C. and Ford ambulances will cover monthly needs only and will not reduce our accumulated shortage of this transportation. It is imperative that the shortage quoted above, 1,325 ambulances, be made up without delay. If G. M. C. cars can not be furnished, request the entire shortage be covered by shipment of lighter type. Figures given above are in all instances exclusive of needs of U. S. A. A. S.

The commander in chief, A. E. F., was advised by cable, July 12, that 432 G. M. C. ambulances complete were at Newport News ready to float and 55 additional en route.⁴² On August 16, he was advised by cable:⁴³

There are available and embarkation service have stated that they expect to float during August 100 Ford ambulance chassis and 200 G. M. C. ambulances; 924 available for floating during September, 300 Ford ambulances, 200 Ford ambulance chassis, and 350 G. M. C. ambulances. It is estimated that during October there will be available for shipment 400 Ford ambulance chassis and 800 G. M. C. ambulances. Additional orders on Ford ambulances sufficient to cover your total cable requirements will be placed within two weeks and delivery can be had during September and October.

On August 31, the commander in chief, A. E. F., was further advised that 136 Ford ambulances and 209 G. M. C. ambulances had been freighted, docked, or floated since August 17.⁴⁴ Rate of production then was Ford ambulances 50 per day, increasing to 126 per day, September 3, and G. M. C. ambulances 400 per month. Shipments were to go forward as follows: 50 Ford ambulances by special train daily until September 3, and then at the rate 126 per day until order for 1,500 was complete. G. M. C. ambulances were being withdrawn from the training camps to balance shortage.

This program apparently did not meet the requirements in the American Expeditionary Forces, for a cable therefrom of September 5 stated that the ambulance shortage there was critical; that 2,000 were needed to make up the existing shortage; that only 150 had been received in August; that 625 were called for on the September priority; and that it was very important that all G. M. C. and Ford ambulances available at seaboard be floated at the earliest possible date.⁴⁵

On September 14, a reply was made to the foregoing cable to the effect that 511 ambulances had been floated during July and August; that 200 General Motors Co. and 258 Ford ambulances had been shipped to ports of embarkation during the first 12 days of September, of which 109 had been floated; that 479 ambulances were then moving from the camps to the seaboard.⁴⁶

These various calls for ambulances constrained the Secretary of War to order some hundreds of used ambulances at the various camps to be collected and sent overseas. It was planned to ship these ambulances to the Motor Transport Corps motor repair park at Camp Holabird, Baltimore, Md., for

repairs before loading them on the transports.⁴⁶ On September 6 telegraphic orders were sent to the commanding generals at all the larger camps directing them to send without delay to designated central points from 12 to 24 ambulances.⁴⁷ At these central collecting points the cars loaded with ambulances from the several camps were made up into solid trains of ambulances and moved as special trains to Camp Holabird.

By the time these used ambulances had been loaded on flat cars, assembled at the collecting points, shipped to Camp Holabird, and overhauled and repaired, the armistice had been signed and there was no longer any need for them. It is believed that very few of them ever reached France. New ambulances, both G. M. C. and Ford, were by that time being produced and delivered to the ports more rapidly than they were being floated. At the cessation of hostilities, November 11, 1918, there were at ports of embarkation 1,395 G. M. C. chassis and 517 bodies.⁴⁸ At the end of October there were 440 Ford ambulances complete at the same ports.⁴⁹ During October there were floated from all ports 741 Ford ambulances, 58 Ford chassis, 41 G. M. C. ambulances complete, 511 G. M. C. chassis, and 221 G. M. C. bodies.⁴⁹

AMBULANCE ASSEMBLY UNIT

After their arrival overseas both chassis and bodies had to be assembled, painted, and tested before they could be delivered to the using organizations. Because of the lack in France of personnel familiar with chassis and bodies, considerable difficulty was experienced in assembling the earlier lots sent overseas. These difficulties gave rise to a request from the American Expeditionary Forces, in August, 1917, for personnel trained in the assembling, repair, and maintenance of G. M. C. ambulances.⁵⁰

This cablegram indicated the need overseas for a motor ambulance assembly base at which all of the heavy type motor ambulances could be assembled. Measures were at once initiated for the development and organization of a suitable unit for this work. Some time was consumed in finding suitable personnel to have charge of the work and in securing commissions for them. Three such persons were selected. Two of them were sent to the H. H. Babcock Co., Watertown, N. Y., to familiarize themselves with the details of assembling bodies and to organize a section for that particular work.⁵¹ The third officer was sent to the General Motors Truck Co., Pontiac, Mich., for a like purpose in chassis assembly. Steps were taken by these officers to secure and train the enlisted personnel in the duties of their respective sections. The enlisted personnel selected were obtained through the draft and all had special qualifications for the particular duties to which they would be assigned overseas. Of the two officers sent to Watertown one was to have general charge of the assembly base overseas and the other to have charge of the body assembly work. The enlisted men sent to the Babcock Co. plant for this work were given a course in body construction and actual work in the assembling department to familiarize themselves with the appearance and location of the individual components of the body. They crated the partly assembled bodies for shipment. They uncrated these bodies and assembled them, following in detail the procedure to be observed overseas.⁵¹

Similar instruction and training were given to the section organized at the General Motors Truck Co. plant for chassis assembly and testing. Both sections of this unit were then sent to the motor ambulance supply depot, Louisville, Ky., for training in mounting the bodies on the chassis and in the testing and inspection of the assembled ambulance for delivery to the using organization.

Tools and a complete equipment for the assembly base were selected by the personnel and prepared for shipment overseas. An ample stock of parts likely to be needed in this assembly were also secured and prepared for shipment.

The personnel of the motor ambulance assembly unit as finally organized consisted of 3 officers and 61 enlisted men, including a property sergeant and two cooks. This unit arrived at Fort Jay, N. Y., complete with equipment, early in November, 1917. The unit sailed for France in November, 1917.⁵² Its equipment, with a few minor exceptions, had preceded it and was located after a prolonged search.⁵³ The unit was broken up into three sections not long after its arrival and assigned to as many different base ports.⁵⁴

REFERENCES

- (1) Letter from First Lieut. J. B. Streit, Sanitary Corps, Base Section 1, A. E. F., to Maj. W. T. Fishleigh, Sanitary Corps, S. G. O., January 8, 1918, on conditions at Base Section No. 1, A. E. F. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{78}$.
- (2) Letter from the Surgeon General to Capt. A. B. Browne, Sanitary Corps, N. A., Pontiac, Mich., February 6, 1918. Subject: G. M. C. report from overseas. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{78}$.
- (3) First indorsement, Surgeon General, to the Quartermaster General, February 26, 1918. Subject: Cable No. 594, par. 9, G. M. C. ambulances. On file, Finance and Supply Division, S. G. O., $\frac{250 \text{ France}}{247}$.
- (4) Letters from The Adjutant General, to the commanding generals of all National Guard, National Army, and Regular Divisions, June 17, 1918. Subject: Motor transportation for divisions ordered overseas. On file, Finance and Supply Division, S. G. O., $\frac{534-129 \text{ Wheeler}}{140}$.
- (5) Paragraph 2, Cable No. 439-R, November 24, 1917, from The Adjutant General, to the C. in C., Amexforee, France, reference motor ambulances. On file, Finance and Supply Division, S. G. O., $\frac{250 \text{ F.}}{111}$.
- (6) Letter from the Quartermaster General to the Surgeon General of the Army, January 8, 1918. Subject: Knocking down and erating trucks for overseas shipment. On file, Finance and Supply Division, S. G. O., $\frac{750-594 \text{ Q. M. G.}}{140}$.
- (7) Letter from Ford Motor Co., Detroit, Mich., to the Surgeon General Gorgas, U. S. Army, Washington, D. C., August 8, 1917, relative to completion of order for 2,400 ambulances. On file, Finance and Supply Division, S. G. O., $\frac{247}{2}$.
- (8) Second indorsement, Headquarters, U. S. Army Ambulance Service, Allentown, Pa., to the Surgeon General, September 17, 1917. Subject: Receipt of Ford ambulances. On file, Finance and Supply Division, S. G. O., $\frac{247}{2}$.

- (9) Fifth indorsement, Medical Supply Depot, Port of Embarkation, Pier 45, North River, New York City, to the Surgeon, Port of Embarkation, 209 River Street, Hoboken, N. J., September 24, 1917. Subject: Ford ambulances. On file, Finance and Supply Division, S. G. O., $\frac{247}{2}$.
- (10) Paragraph 4, Cable No. 183-S, Headquarters, A. E. F., to the Adjutant General, September 17, 1917. Subject: U. S. Army Ambulance Service. On file, Finance and Supply Division, S. G. O., Cables—France.
- (11) Paragraph 1, Cable No. 302-S, Headquarters, A. E. F., to The Adjutant General, November 24 1917. Subject: Ford ambulances. On file, Finance and Supply Division, S. G. O., Cables—France.
- (12) Sixth indorsement, chief of U. S. Army Ambulance Service with the French Army, to the commanding general, Headquarters, Services of Supply, A. E. F., April 6, 1918. Subject: Transfer of Ford ambulances to other departments. On file, Finance and Supply Division, S. G. O., $\frac{20\text{ Allentown}}{48}$.
- (13) Letter from the Surgeon General, to the officer in charge, Field Medical Supply Depot, Washington, D. C., October 6, 1917. Subject: Export shipment of ambulance chassis. On file, Finance and supply Division, S. G. O., $\frac{713-750}{65}$.
- (14) Letter from the commanding officer, Sanitary Corps, N. A., General Motors Truck Co., to the Surgeon General, March 25, 1918. Subject: Weekly reports. On file, Finance and Supply Division, S. G. O., Pontiac Weekly Reports $\frac{101\text{ A. B. B.}}{178}$.
- (15) Letter from the Surgeon General, to the officer in charge, Field Medical Supply Depot, Washington, D. C., May 24, 1917. Subject: Motor ambulances. On file, Finance and Supply Division, S. G. O., 11220.-252.
- (16) Letter from the Surgeon General to the officer in charge, Field Medical Supply Depot, Washington, D. C., May 26, 1917. Subject: Motor ambulances. On file, Finance and Supply Division, S. G. O., 11220.-252.
- (17) Memorandum from the Surgeon General to Colonel McCarthy, Q. M. C., June 1, 1917. Subject: Motor ambulances for France. On file, Finance and Supply Division, S. G. O. 11220.-257.
- (18) Letter from the Surgeon General to the officer in charge, Field Medical Supply Depot, Washington, D. C., August 23, 1917. Subject: Issue of motor ambulances and spare parts cars to France. On file, Finance and Supply Division, S. G. O., $\frac{713-750}{27}$.
- (19) Letter from the Surgeon General to the officer in charge, Field Medical Supply Depot, Washington, D. C., October 25, 1917. Subject: Shipment of motor ambulance chassis. On file, Finance and Supply Division, S. G. O., $\frac{713-250}{21}$.
- (20) Weekly reports from the commanding officer, Sanitary Corps, N. A., General Motors Truck Co. Plant, Detroit, Mich., to the Surgeon General, September 29, 1917, to September 11, 1918. On file, Finance and Supply Division, S. G. O., Pontiac Weekly Reports $\frac{101\text{ A. B. B.}}{178}$.
- (21) Letter from the officer in charge, Sanitary Corps, N. A., General Motors Truck Co. Plant, Pontiac, Mich., to the Surgeon General, November 29, 1917. Subject: Weekly report. On file, Finance and Supply Division, S. G. O., Pontiac Weekly Reports $\frac{101\text{ A. B. B.}}{178}$.
- (22) Letter from the commander of Sanitary Corps, N. A., General Motors Truck Co. Plant, Pontiac, Mich., to the Surgeon General, U. S. Army, undated. Subject: Weekly report. On file, Finance and Supply Division, S. G. O., Pontiac Weekly Reports $\frac{101\text{ A. B. B.}}{178}$.

- (23) Letter from the commanding officer, Pontiac, Mich., April 29, 1918, to the Surgeon General, U. S. Army. Subject: Weekly report. On file, Finance and Supply Division, S. G. O., Pontiac Weekly Reports, $\frac{101 \text{ A. B. B.}}{178}$.
- (24) Letters from First Lieut. Charles A. Woodfield, Sanitary Corps, National Army, Watertown, N. Y., April 1, 1918, and Capt. H. E. Smith, Sanitary Corps, National Army, Watertown, N. Y., April 6, and 29, 1918, to the Surgeon General. Subject: Weekly report. On file, Finance and Supply Division, S. G. O., Watertown Weekly Reports, $\frac{685 \text{ H. E. S.}}{60}$.
- (25) Letter from Maj. John P. Fletcher, M. C., Motor ambulance Supply Depot, Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., June 1, 1918. Subject: Ambulances to Newport News. On file, Finance and Supply Division, S. G. O., $\frac{713-440 \text{ Louisville}}{352}$.
- (26) Letter from the Surgeon General to the medical supply officer, Pier 45, North River, New York, N. Y., April 25, 1918. Subject: Supplies for the 4th Overseas Contingent, U. S. A. Ambulance Service. On file, Finance and Supply Division, S. G. O., $\frac{20 \text{ Allentown}}{20}$.
- (27) Letter from the commanding officer, General Motors Truck Co. Plant, Pontiac, Mich., to Motor Transport Service, District Office, Detroit, Mich., August 1, 1918. Subject: Trimonthly report, July 21-31, inclusive, 1918. On file, Finance and Supply Division, S. G. O., Pontiac Weekly Reports, $\frac{101 \text{ A. B. B.}}{178}$.
- (28) Letter from the commanding officer, Pontiac, Mich., to the Motor Transport Corps, District Office, Detroit, Mich., September 2, 1918. Subject: Trimonthly report, August 21-31, 1918, inclusive. On file, Finance and Supply Division, S. G. O. Pontiac Weekly Reports, $\frac{101 \text{ A. B. B.}}{178}$.
- (29) Letter from the general manager, General Motors Truck Co., Pontiac, Mich., to Maj. W. T. Fishleigh, Motor Transport Corps, Seventh and B streets, Washington, D. C., October 1, 1918. Subject: Chassis production, September. On file, Finance and Supply Division, S. G. O., Pontiac letters October 1 to December 31, 1918.
- (30) Letter from First Lieut. W. P. Staebler, Sanitary Corps, Pontiac, Mich., to Maj. A. B. Browne, Sanitary Corps, Motor Transport Service, Quartermaster Corps, Washington D. C., September 26, 1918. Subject: Boxing ambulance chassis. On file, Finance and Supply Division, S. G. O., Pontiac letters, July-October, 1918.
- (31) Letter from the Surgeon General, U. S. Army, to the Motors Division, Quartermaster General's Office, April 12, 1918. Subject: Estimates of overseas ambulances. On file, Finance and Supply Division, S. G. O., $\frac{750-594 \text{ Q. M. G.}}{125}$.
- (32) Estimates Covering U. S. Standard Ambulances and Other Motor Equipment Required by the Medical Department, United States Army, June 20, 1918, by Walter T. Fishleigh, Major, Sanitary Corps, Office of the Surgeon General. On file, Finance and Supply Division, S. G. O., Estimates, Motor Transport.
- (33) Idem., August 1, 1918.
- (34) Letter from the officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., to the Surgeon General, November 15, 1917. Subject: Shipments. On file, Finance and Supply Division, S. G. O., $\frac{713-250 \text{ Fr.}}{20}$.
- (35) Compiled from the following reports on file, Finance and Supply Division, S. G. O., Louisville Weekly Reports and Daily Spare Parts Reports. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{398}$, and $\frac{713-440}{402}$.

- (36) Letter from the chief surgeon, A. E. F., to the Surgeon General, U. S. Army, March 27, 1918. Subject: Shipment of motor ambulances and bodies, and the fourth indorsement thereon, from the medical supply officer, Port of Embarkation, Newport News, Va., May 8, 1918. On file, Finance and Supply Division, S. G. O., $\frac{250 \text{ Fr.}}{319}$.
- (37) Personal letters from First Lieut. J. B. Streit, Sanitary Corps, N. A., to Maj. W. T. Fishleigh, Sanitary Corps, S. G. O., January 8 and 15, 1918, relative to the progress of the motor ambulance assembly unit. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{78}$.
- (38) Letter from the commanding officer, Sanitary Corps, N. A., General Motors Truck Co., Pontiac, Mich., to the Surgeon General, U. S. Army, March 18, 1918. Subject: Weekly report. On file, Finance and Supply Division, S. G. O., Pontiac Weekly Reports, $\frac{101 \text{ A. B. B.}}{178}$.
- (39) Subparagraph A, Cable No. 1278-S, Headquarters, A. E. F., to The Adjutant General, Washington, D. C., June 9, 1918. On file, Finance and Supply Division, S. G. O., Cables—France.
- (40) Paragraph 3, Cable No. 1237-S, Headquarters, A. E. F., to The Adjutant General, Washington, D. C., June 4, 1918. On file, Finance and Supply Division, S. G. O., Cables—France.
- (41) Paragraph 4, Cable No. 1566-S, Headquarters, A. E. F., to The Adjutant General, Washington, D. C., August 6, 1918. On file, Finance and Supply Division, S. G. O., Cables—France.
- (42) Paragraph 1-N, Cable 1708-R, War Department, Washington, July 12, 1918, to the commander in chief, Amexforce, France. On file, Finance and Supply Division, S. G. O., Cables—France.
- (43) Paragraph 4, Cable No. 7-R, from The Adjutant General, Washington, D. C., to the commanding general, Services of Supply, Amexforce, France, August 16, 1918. On file, Finance and Supply Division, S. G. O., Cables—France.
- (44) Paragraph 1, Cable 1897-R, from The Adjutant General, Washington, D. C., to the commander in chief, Amexforce, France, August 31, 1918. On file, Finance and Supply Division, S. G. O., Cables—France.
- (45) Paragraph 3, Cable No. 86-S, from the commanding general, Services of Supply, Amexforce, France, to The Adjutant General, Washington, D. C., September 5, 1918. On file, Finance and Supply Division, Cables—France.
- (46) Paragraph 4, Cable No. 75-R, from The Adjutant General, Washington, D. C., to the commanding general, Services of Supply, Amexforce, France, September 14, 1918. On file, Finance and Supply Division, S. G. O., Cables—France.
- (47) Telegrams from The Adjutant General, Washington, D. C., to the commanding generals of 23 National Guard and National Army Camps, September 6, 1918, in reference to shipment of motor ambulances. On file, Finance and Supply Division, S. G. O., $\frac{750-519 \text{ M.T.C.}}{15.A}$.
- (48) Memorandum for Colonel Wolfe from Capt. Fred J. Murray, S. C., U. S. A., November 13, 1918. Subject: G. M. C., situation. On file, Finance and Supply Division, S. G. O., $\frac{750-519 \text{ M.T.C.}}{17}$.
- (49) Memorandum for Lieut. Col. Dean Halford, from Capt. I. M. Obreight, M. T. C., November 7, 1918. Subject: Ambulances. On file, Finance and Supply Division, S. G. O., $\frac{750-519 \text{ M.T.C.}}{17}$.
- (50) Paragraph 5, Cable 102, H. A. E. F., Paris, August 15, 1917. Subject: Repair trucks and mechanics. On file, Finance and Supply Division, S. G. O., $\frac{250 \text{ France}}{2}$.

- (51) Letter from Maj. W. T. Fishleigh, Sanitary Corps, S.G.O., to the H. H. Babcock Co., Watertown, N. Y., September 20, 1917. Subject: Body assembly unit. On file, Finance and Supply Division, S. G. O., $\frac{511-570}{59}$.
- (52) Report of the Supply Division, S. G. O., to the Surgeon General, for the period ending November 10, 1917. On file, Finance and Supply Division, S. G. O., $\frac{750-714}{1}$.
- (53) Letter from First Lieut. J. B. Streit, Sanitary Corps, Motor Ambulance Assembling Base, A. E. F., to Maj. W. T. Fishleigh, Sanitary Corps, S. G. O., January 8, 1918. Subject: Conditions at the base. On file, Finance and Supply Division, S. G. O., Overseas Letters, $\frac{713-440}{78}$.
- (54) Letters from Capt. J. B. Streit, Sanitary Corps, to Maj. W. T. Fishleigh, Sanitary Corps, S. G. O., January 15, 1918, and March 12, 1918, relative to the experiences of the motor ambulance assembly unit. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{78}$.

CHAPTER XXVIII

DONATED AMBULANCES

The question of acceptance by the Federal Government of donations of motor ambulances early came before the War Department. The first of these offers was made by the citizens of Fort Wayne, Ind., who, on April 2, 1917, offered to the Medical Department a modern motor-driven ambulance.¹ On April 6, 1917, The Stutz Automobile Co., of Indianapolis, Ind., offered six motor ambulances complete for use by one of the ambulance companies of the Indiana National Guard.² The Surgeon General, thereupon, requested authority from the Secretary of War to accept the particular gifts and general authority to accept similar donations in the future.³ The Stutz Co. was willing to provide bodies conforming to the standard of the Medical Department.³ The action of the Secretary of War upon this request appears in the following indorsement:

2570177.

[Fourth indorsement]

WAR DEPARTMENT,
ADJUTANT GENERAL'S OFFICE,
April 17, 1917.

To the SURGEON GENERAL:

The second indorsement hereon, being approved, this being in accordance with the general policy approved by the Secretary of War, which authorizes the Surgeon General "to accept such gifts when they conform to the plans and specifications in his office, mounted on a suitable chassis; such gifts to be taken up and accounted for as medical property."

By order of the Secretary of War:

EDWARD T. DONNELLY,
Adjutant General.

1 inclosure.

A body conforming to that of the standard Army motor ambulance was always required as requisite to the acceptance of the gift. In the earlier acceptances the donors were advised that any commercial chassis upon which such a body could be well affixed would be acceptable. They were notified that the $\frac{3}{4}$ -ton chassis made by the General Motors Truck Co. was preferred.⁴ This policy, naturally, resulted in the acceptance of a heterogeneous lot of motor vehicles. Many ambulances were given to ambulance companies and camps without the knowledge of the Surgeon General's Office. Many ambulances which did not conform to Army standards were also brought to camps for which no authority had been given and for which gas, oil, greases, and spare parts could not be supplied. Great difficulty was experienced in determining the number of donated ambulances at the camps. Many of the Red Cross ambulance companies accepted into the service were provided with the model 15 equipment, which could not be sent overseas. This equipment had to be left behind and the units equipped from the overseas base.

The evils of this policy soon made themselves known, and acceptances were limited to chassis and bodies not only conforming to the Medical Department standard but to those manufactured by the firms supplying them to the Army. Absolute standardization both in the United States and with the forces overseas was thereby assured. Arrangements were made by the Surgeon General's Office with the manufacturers to furnish the equipment to prospective donors at the same price as to the Government. The General Motors Truck Co. notified all its dealers and salesmen in April, 1918, that all ambulances purchased for the service must be exact duplicates of the model 16; that thereafter all ambulances bought by the Red Cross would be deducted from the Government's allotment and must be sold at the price the Government paid; that all inquirers concerning gifts of ambulances were to be referred to the Surgeon General's Office; that all purchases of both chassis and body must be made direct at the price paid by the Government. This eliminated the charge of middlemen's profit and manipulation of ambulance prices in connection with the donation of ambulances.⁵

A final report of the General Motors Truck Co. states that 78 model 16 chassis, included in their total of 5,900, were donated by various organizations and persons. Others were given to organizations and not reported to the Surgeon General's Office.

The donation of Ford ambulances was also authorized, but later suspended on cabled information that they were not needed in France and that shipments of them should be discontinued.

Donors were permitted to have a suitably inscribed plate attached to the ambulances given by them, but the gift had to be made outright without any restrictions as to place of use or by whom used.

The outstanding lesson of the ambulance donation experience is clear. The donation of miscellaneous ambulances, by various persons at various places was, on the whole, a waste of effort and money. Some had a limited use in this country; others were of little or no value. The Ford ambulances were intended for use with the French Army, and a sufficient number was received early. There was but one ambulance that it was worth while to purchase and donate; in fact but one that could be made, the G. M. C. model 16. As the Government was taking the factory output of this model, the simple and effective method of donating an ambulance was to send a certified check of \$1,600, the cost of one ambulance.

The following circular, issued by the Surgeon General on May 30, 1918, gives in full the requirements as to donations.

GIFTS OF AMBULANCES TO THE MEDICAL DEPARTMENT, UNITED STATES ARMY

1. *General.*—The Medical Department, since the beginning of the war, has been in receipt of many patriotic offers of assistance in the way of purchasing and equipping motor ambulances for service with the United States Army. Citizens, clubs, schools, societies, associations, have generously given of time and funds, and their efforts have, in the majority of cases, been of great assistance to the Medical Department, and have been appreciated thereby.

In general, however, the tremendous problems involved in the supply, equipment, upkeep, operation, and repair of motor ambulances, with a large army, are not understood.

The importance of standard types, interchangeable parts, uniform equipment, and standard shipments is not appreciated.

The information contained herein is furnished with the idea of assisting prospective donors, and making their efforts and gifts of maximum value and service of the Government.

2. *Ambulance gifts.*—The Medical Department, through the Office of the Surgeon General, will accept for service with the United States Army one or more ambulances, provided such ambulances are complete and standard in chassis, body, equipment, and boxing for shipment as specified hereinafter.

Due to the impracticability of successful operation, upkeep, and repair of other than standard ambulances, miscellaneous types can not be accepted.

3. *Standard ambulance.*—The United States standard ambulance, complete, includes the following:

1. United States standard ambulance chassis, complete.
2. United States standard ambulance body, complete.
3. Ambulance spare parts A.

4. *Purchase and price.*—For the assistance of prospective donors of ambulances, and in order to enable them to secure the standard ambulance at a low price, arrangements have been made with the manufacturers of the chassis and body, respectively, by which sale of chassis and body will be made by the manufacturers thereof to the persons desiring to give an ambulance or ambulances to the Medical Department for service with the United States Army at the same price as that charged the Medical Department under its contracts with such manufacturers.

In order to secure this low price, the following conditions must be observed:

(1) The chassis must be ordered direct from the General Motors Truck Co., Pontiac, Mich.; and the body must be ordered direct from the Anderson Electric Car Co., at Detroit, Mich.

(2) The delivery of the chassis and body to the Medical Department must be made at the factory of the respective manufacturer.

(3) Payment for the chassis and body must be made to the respective manufacturer by the donor in advance of delivery.

The present prices of the chassis and body are stated on the leaflet inclosed herewith.

The observance of the foregoing conditions (1) eliminates selling expense to the manufacturer, (2) reduces correspondence and bookkeeping expense to a minimum, and (3) permits the handling and shipping to be conducted in the same routine manner as is pursued in Government purchases, and so eliminates special charges on this account.

On receipt by the manufacturer of an order from a prospective donor, for chassis or body, a release of the chassis or body for sale to the donor is requested by the manufacturer from the Medical Department; when this release is granted by the Medical Department, the manufacturer is enabled, so far as production is concerned, to treat the body or chassis sold to the donor as sold under the Government contract, the total number to be delivered to the Government on its contract being reduced proportionately by the number sold to donors on release. In this way the manufacturer is able to purchase material and parts for 1,000 or more ambulances at a time, and to manufacture in large quantities, without assuming any risk that the ambulances manufactured may not be sold, as the number contracted for will all be taken by the Medical Department in the event that none is sold to donors on Government release. This arrangement procures for the donor a low price, which is only made possible by quantity production and the economies effected by handling donor's orders in the routine manner secured by the foregoing regulations.

A corps of Government inspectors is maintained at each of the plants manufacturing the chassis or body for the United States standard ambulance, and ambulances purchased for gift to the Government will receive the same careful inspection as those purchased by the Medical Department. This will insure the receipt by the purchaser of complete and standard chassis, body, and fittings, and proper boxing.

The ambulance spare parts A for ambulances given to the Medical Department will be furnished by that Department without charge and without request by the donor.

5. *Inspection and acceptance.*—Upon notice of completion of one or more ambulance chassis or bodies by the above-named companies, inspection thereof will be made by a Government representative, and report of acceptance made to the donor. Acceptance will be made of standard ambulance body and chassis complete with standard fittings, with standard boxing, f. o. b. cars, the producing plant.

6. *Painting, Insignia, Marking.*—Painting and insignia will conform to United States ambulance standard. A metal plate, not to exceed 6 by 8 inches carrying such marking or notation as desired by the donors, may be placed in prominent position, reserved therefor, on the dash. If such a plate is to be attached, it must be furnished by the donor to the manufacturers of the chassis for attachment thereto before the delivery of the same to the Medical Department.

No other special marking, names, or insignia are to be placed upon chassis or body.

7. *Destination.*—The exact destination or service of each ambulance can not of course be prescribed or determined. Where desired in particular cases, however, donors may be assured, subject to the emergencies of war:

- (1) Of service with the United States Army overseas; or,
- (2) Of service with the United States Army in the United States camps.

8. *Ceremonies.*—Due to the impracticability of unboxing and assembling the present type of ambulance body and chassis, then reassembling and reboxing properly for shipment, it will not be possible to arrange for having a gift ambulance at presentation or other ceremonies.

Where gift of a standard ambulance has been made to the Medical Department, and presentation or other ceremonies are desired, a photograph will be furnished upon request, by the office of the Surgeon General, which may be framed as desired and used in lieu of the ambulance.

9. *Acceptance in person.*—In the present military emergency, it will not be possible to arrange for acceptance in person by a representative of the Office of the Surgeon General.

REFERENCES

- (1) Telegram from Capt. Geo. L. Byroade, U. S. Army, Fort Wayne, Ind., the Surgeon General of the Army, April 2, 1917, inquiring whether donation of motor ambulance would be accepted by Medical Department. On file, Record Room, S. G. O., 157,829-E.
- (2) Telegram from the Adjutant General of Indiana, Indianapolis, Ind., to the Surgeon General of the Army, April 6, 1917, requesting authority to accept ambulances. On file, Record Room, S. G. O., 157,829-F.
- (3) Memorandum from the Surgeon General for the Secretary of War, April 7, 1917, and second indorsement of Surgeon General's Office, April 11, 1917, to The Adjutant General, relative to acceptance of offer of 6 Stutz ambulances. On file, Record Room, S. G. O., 157,829-F.
- (4) Sixth indorsement, Surgeon General's Office, April 19, 1917, to Capt. George L. Byroade, U. S. Army, retired, Fort Wayne, Ind., relative to acceptance of ambulance by the Medical Department. On file, Record Room, S. G. O., 157,829-E.
- (5) General Motors Truck Co. Dealers' Bulletin, No. 213, April 30, 1918. On file, Finance and Supply Division, S. G. O., 267 G. M. T. C.

SECTION V

CAMP MEDICAL SUPPLY SERVICE

CHAPTER XXIX

CAMP MEDICAL SUPPLY DEPOT

In the plans for the construction of a base hospital at all the large training and embarkation camps, three buildings were provided for storehouses for the reserve of medical property for the hospital and the camp. Because the hospital was the logical place for the organizations in the camp to look for things needful for the care of the sick, it was decided to use these buildings for the camp medical supply depot instead of accepting space in the general warehouse group.¹ The bulk of the supplies in the hospital storehouses would naturally pertain to the base hospital, but there was sufficient space for those required by the infirmaries and organizations. However, the last buildings to be erected at several of the camps were those of the hospital group. In not a few cases medical supplies arrived before the hospital storehouses were ready. As a result of this delay, it was necessary to utilize one of the buildings in the general warehouse group for the camp medical supply depot until the storehouses in the hospital group were ready. The layout of one of these buildings adapted to the needs of a medical supply depot,² is shown in Figure 33.² Figure 34 shows the floor plan and side elevation of one of the standard base hospital storehouses.

PERSONNEL

MEDICAL SUPPLY OFFICERS

It was early foreseen that at every divisional training camp, whether National Army or National Guard, there would be required an officer of the Medical Department to look after the medical property therein and to have charge of the medical supply depot to be established there. The duties required of these medical supply officers called for a familiarity with Army Regulations, with the customs of the service, and with governmental methods of property procurement and accounting. This familiarity could not be obtained in a few days, and the need of trained men became daily more urgent. Since there was no provision whereby nonprofessional men could be commissioned in the Medical Corps, attention was turned to the noncommissioned list of the Medical Department for men for this purpose. They, too, like the commissioned personnel, were all too few and were required for many other duties. It was thought that the retired list might furnish a sufficient number to tide the situation over until the camps could be established and new

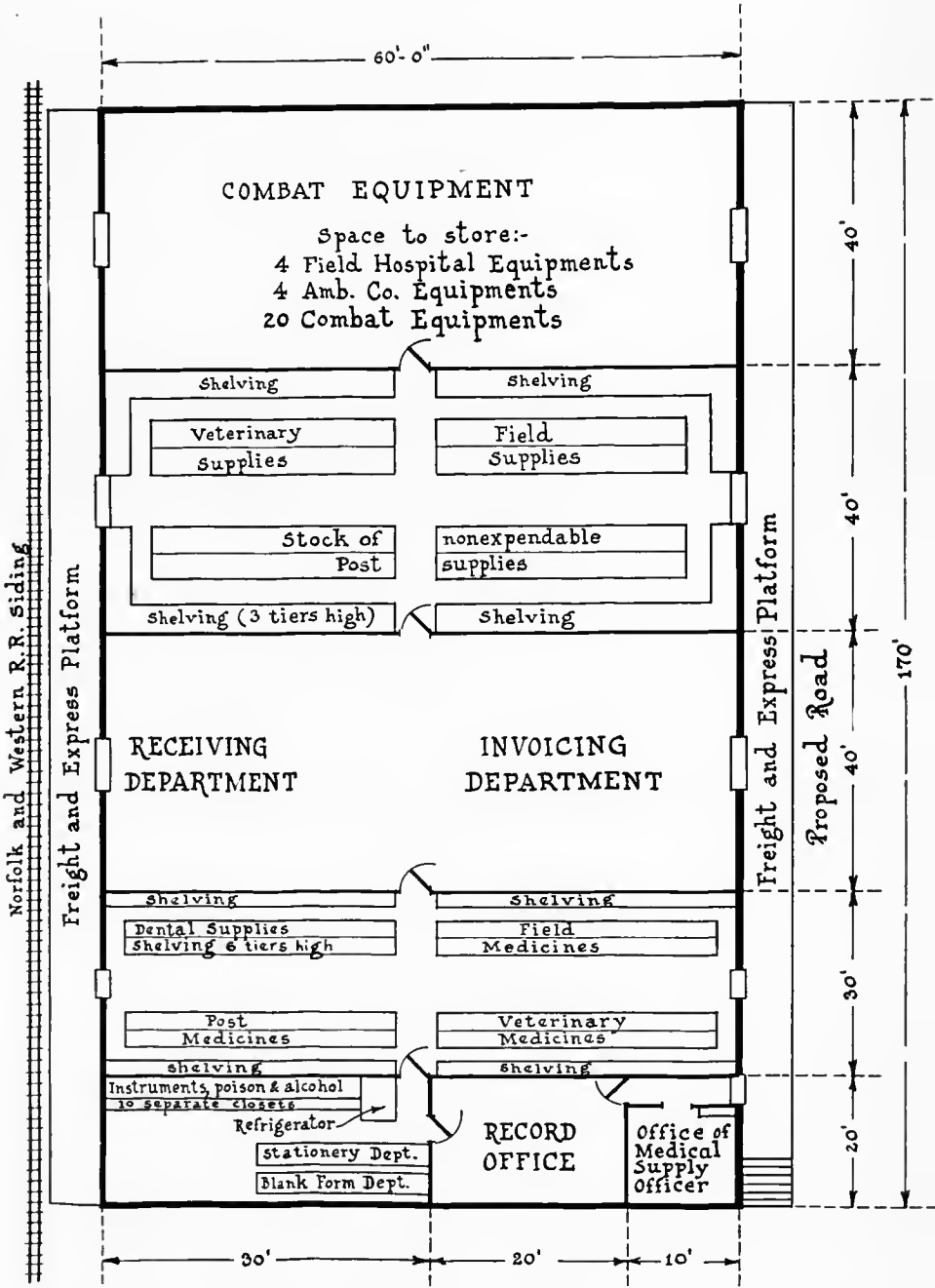
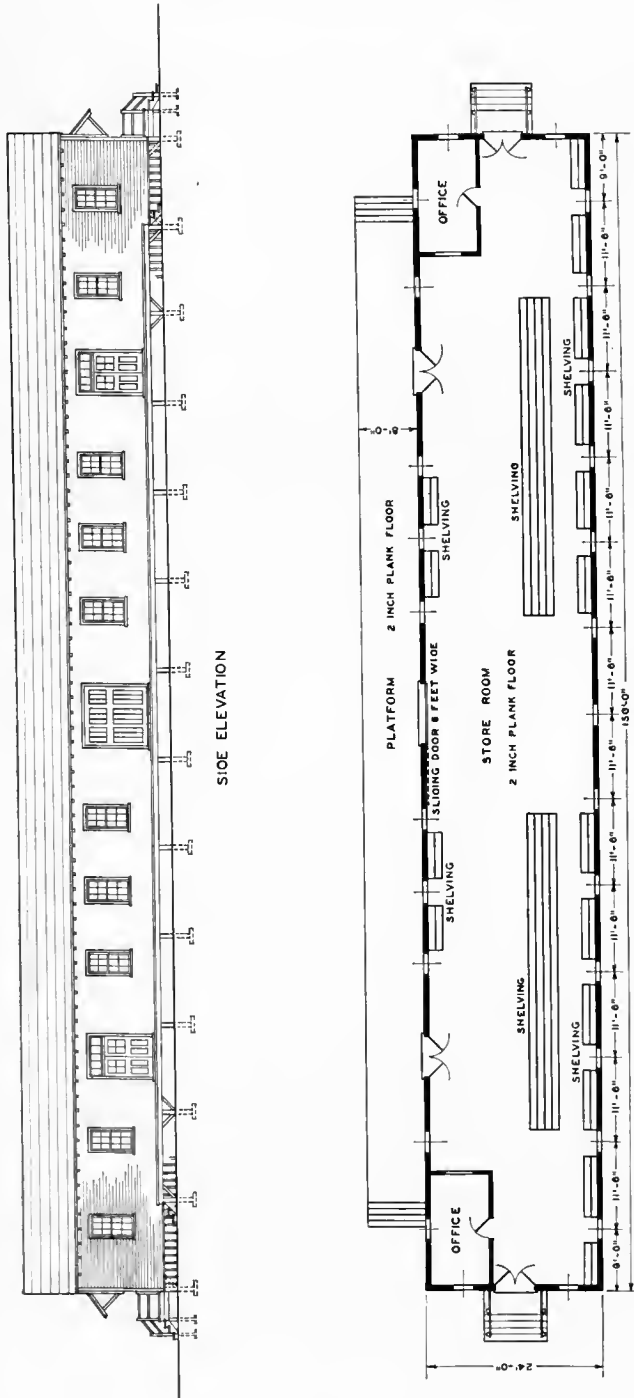


Fig. 33.—Layout of a camp medical supply depot in one of the buildings of the general camp warehouse group



FLOOR PLAN
Fig. 34.—Floor plan and side elevation of one of the standard base hospital storehouses

men trained. Authority for the employment of these retired noncommissioned officers as civil employees was first considered.³ Difficulties on account of their lack of civil service status arose, and time was spent in endeavoring to secure a waiver of the requirements. An Executive order was issued May 9, 1917, amending paragraph 2, section IV, schedule B, of the civil service rules so as to permit the appointment of noncommissioned officers as military storekeepers through noncompetitive examination.⁴ Before appointments under this order could be made an act was passed, May 18, which authorized the employment on active duty of retired enlisted men of the Regular Army, either with their rank on the retired list or in higher grades, with the full pay and allowances of the grades in which they were actually employed. Under this provision orders were requested, May 21, for the assignment of 19 of these noncommissioned officers to active duty at the several supply depots.⁵ Other retired noncommissioned officers were recalled to active duty from time to time and assigned to supply depots for temporary duty and for instruction in depot methods.

A satisfactory solution of this difficult problem came at the end of June, 1917, when the President directed the organization under the Medical Department of a Sanitary Corps for the period of the existing emergency.⁶

The officers in charge of the several medical supply depots to which retired noncommissioned officers had been assigned for instruction were directed to submit recommendations of their suitability for commission.⁷ Such of them as were physically fitted for active duty, and were recommended as possessing the necessary technical qualifications for supply work, were commissioned in the Sanitary Corps and assigned to duty as medical supply officers at the several cantonments and general hospitals. The number of retired noncommissioned officers available being insufficient to fill all the positions, a number of qualified noncommissioned officers on the active list were commissioned and assigned to supply work.⁸ Several of the retired noncommissioned officers who were commissioned were later relieved from duty and returned to the inactive list by reason of physical disability.⁸

The original plan contemplated that the camp medical supply depot would be located at the camp base hospital and that the camp medical supply officer would be the property officer of that hospital and the supply officer of the division.⁹ As the various camps received their quotas of troops and the activities of the base hospital increased it became evident that one officer could not possibly give the time and attention required in looking after the medical property of the division as well as that of the hospital.¹⁰ The various surgeons of divisions and commanding officers urged the appointment of an additional officer to act as supply officer for the division.¹¹ Medical supply officers were not available in sufficient numbers to provide one for every hospital in the service. The commanding officers of base and other large hospitals had the option, if they so desired, of detailing a suitable medical officer to duty as property officer of the hospital.¹² Tables of organization as amended December 21, 1917, authorized a divisional medical supply organization consisting of 1 officer as division supply officer, 8 enlisted men, and provided with 2 motor trucks (1½ ton each) and 2 motor cycles with side cars.¹³ As rapidly as suitable men

could be found and trained in supply work, additional medical supply officers were appointed and sent to the divisional training camps to provide two at each camp.

Although two officers were assigned by the War Department to the camp for medical supply duty, the selection of the officer to accompany the division overseas as divisional medical supply officer was left to the camp authorities. Later, when a sufficient number of such officers had been trained and commissioned, an officer of the Sanitary Corps was assigned to every base and general hospital as its medical supply officer.

ENLISTED PERSONNEL

When the camp medical supply officer reported for duty at the camp to which assigned he not infrequently found conditions in a chaotic state. Shipments had been received by the local quartermaster and given temporary storage in the general warehouse group. Neither clerical personnel nor a warehouse force had been assigned. Supplies had to be sorted out, unpacked, and prepared for issue. Assistance had to be provided from organizations and personnel on other duties in the camp; for example, at Camp Taylor, Ky., the civilian laborers authorized by the Surgeon General, August 18, 1917, for the installation of heavy fixed equipment at the hospital, were utilized so far as practicable in the habilitation of the depot, construction of counters, shelving, and the like.¹⁴ Division surgeons at National Army camps were informed, August 17, 1917, that large quantities of medical supplies had been ordered to the camp and were cautioned to use every effort to provide the supply officer with the necessary assistance and to have the infirmary supplies placed in the buildings allotted to sanitary detachments on their arrival in camp.¹⁵

With the arrival of troops and drafted men in the camps conditions began to improve. At Camp Lee, Va., for example, applicants with suitable qualifications were selected by the camp medical supply officer and enlisted in the Sanitary Corps for this duty.¹⁶ At other places detachments were assigned to the camp medical supply depots by division orders. These men had little or no military training, but the majority of them showed aptitude and a desire to learn. Such as did not were transferred elsewhere. At some places, Camp Dix, N. J., for example, the men thereafter assigned to the depot were carefully selected by the supply officer on account of their special qualifications for the work.¹⁷

To insure a supply of competent and adequately trained men and a uniformity in their selection, the following letter was sent to all National Army cantonments. A similar letter was sent to all National Guard camps.

OCTOBER 4, 1917.

From: The Surgeon General, United States Army.

To: The division surgeon, National Army cantonment. (To all National Army cantonments.)

Subject: Medical supply depot personnel.

1. There is urgent need for trained men for duty in medical supply depots both in this country and with the troops overseas. You are requested to take the matter up with your division commander with a view to selecting capable men and detailing them for duty in the cantonment medical supply depot.

2. The men selected should be high grade in every respect, and should be chosen with particular reference to their qualifications for supply work. Men who have had experience in the offices and shipping departments of wholesale drug firms, manufacturing concerns, express companies, etc., should be sought out and carefully examined.

3. If possible, the entire enlisted personnel of the depot should be selected men. If that can not be done, at least six such men should be detailed.

4. From men thus selected and trained at the depots will be chosen the medical supply contingent to accompany the divisions overseas, and from this personnel we should be able to secure suitable men for commission in the Sanitary Corps as supply officers.

So long as enlistments were permitted, enlisted personnel for the Sanitary Corps were obtained in that manner. After voluntary enlistments had been discontinued, personnel was obtained by the assignment to that corps of men inducted into the service under the draft law. In both methods pains were taken to select men not only physically fit but with such qualifications as would render them particularly fitted for supply work. Conscientious and consistent instruction was given to all men assigned to supply work, technical and military. Training schools were established and every effort was made to insure that every man of the Sanitary Corps assigned to medical supply duty was fully qualified for the task. By the end of June, 1918, there were 1,471 enlisted men of the Sanitary Corps on duty in the various supply depots at home and abroad. As a result of native ability and the training they had received in supply work, 288 enlisted men of the Sanitary Corps were promoted through the various noncommissioned grades to commissioned officers.

Courses of instruction similar to that at Camp Devens, quoted below, were given at all the camp medical supply depots.

Depot Order No. 2

CAMP MEDICAL SUPPLY DEPOT,
Camp Devens, Mass., March 29, 1918.

1. Commencing Monday, April, 1918, a course of instruction in supply depot work will be started and the following schedule will be observed:

Reveille	6 a. m.
Setting-up drill	6 to 6.15 a. m.
Breakfast	7 a. m.
Practical depot work	8 a. m. to 12 m.
Drill	8 to 10 a. m.
Lecture	10.15 to 11.45 a. m.
Dinner	12.30 p. m.
Practical depot work	1.30 to 5 p. m.
Drill	1.30 to 3.30 p. m.
Lecture	3.45 to 4.45 p. m.

One-half of the detachment will receive instructions in practical depot work in the forenoon and the other half in the afternoon. Those not engaged in practical depot work will attend drill and lectures. Drill will include school of the soldier, school of the squad, and school of the detachment, as prescribed in Drill Regulations for Sanitary Troops, including shelter-tent drill.

Lectures will be given by student officers on duty at the depot and will include personal hygiene, sanitation, care of the soldier's feet on the march, first aid, Articles of War, military courtesies, Army Regulations, Manual for the Medical Department, as far as it pertains to the care and handling of public property.

Drills will be conducted by the noncommissioned officers of the detachment assigned to this duty from time to time.

2. A school for noncommissioned officers will be held on Monday, Wednesday, and Friday evenings of each week from 4.30 to 5.30 p. m.

All noncommissioned officers will attend, subjects as follows:

Monday, drill regulations.

Wednesday, Army Regulations and Manual for Courts-Martial.

Friday, Manual for the Medical Department.

3. There will be two men detailed daily, by roster, and ordered to report to the non-commissioned officer in charge of enlisted men's mess for duty.

4. There will be one man detailed daily as room orderly, who will be in charge of the building occupied as quarters. He will allow no unauthorized person to enter this building and will allow no property of any of the men to be removed therefrom, except upon authority from the detachment commander.

DEPOT OPERATION

The object of developing in these camp medical supply depots a high degree of efficiency was constantly in the mind of the officer in charge of the finance and supply division of the Surgeon General's Office. Uniformity of operation and procedure was eminently desirable. In an endeavor to disseminate the correct principles of depot operation and to secure uniformity, the following instructions were issued by the Surgeon General:

WAR DEPARTMENT,
OFFICE OF THE SURGEON GENERAL,
Washington, July 10, 1918.

The following tentative instructions are supplemental to the Manual for the Medical Department, and are not intended to supersede the latter. They will be put into effect upon their receipt at camps.

W. C. GORGAS, *Surgeon General.*

DUTIES OF MEDICAL SUPPLY OFFICERS

COMMISSIONED PERSONNEL

The following commissioned personnel of the Sanitary Corps will, as far as practicable be assigned to each cantonment, and their relation to each other will be as follows:

1. *The camp medical supply officer.*—He will be in full charge of all medical property in use or stored at the camp, and will be the accountable officer for same. He will be held responsible that all organizations at the camp are properly supplied. He will be in command of all commissioned and enlisted personnel on duty with the medical supply branch.

2. *The divisional medical supply officer.*—He will, while at a camp, act as an assistant to the camp medical supply officer, irrespective of rank. As such, he will attend to all issues of supplies to divisional organizations and requisitions for such supplies. He is the responsible officer for all such property. He is also in charge of the authorized divisional transportation, which consists of:

2 motor trucks, 1½ tons each.

2 motor cycles with side cars.

This transportation should be utilized at camp medical supply depots, when available.

3. *The property officer of the base hospital.*—He will act as an assistant to the camp medical supply officer with special reference to requisitions, issues, and care of all medical property used at the base hospital. He is the responsible officer for all such property.

4. If any additional officers of the supply branch of the Sanitary Corps are detailed at a camp for duty, they will be assigned as assistants to the camp medical supply officer and will perform such duties as this officer may direct.

ENLISTED PERSONNEL

While at cantonment, all enlisted men assigned to duty with the supply branch are under the direct command of the camp medical supply officer. They are divided into the following permanent detachments:

1. *Camp medical supply detachment.*—One hospital sergeant, two sergeants, first class, two sergeants, 15 privates, first class, or privates.

2. *Divisional medical supply unit.*—One sergeant, first class, one sergeant, six privates, first class, or privates.

3. *Base hospital property office detachment.*—One sergeant, first class, one sergeant, six privates, first class, or privates.

All men assigned to duty with any of the above mentioned detachments will be transferred from any organization to which they may now belong and permanently assigned for duty with the medical supply branch. They may be rationed and quartered with either the camp medical detachment or the detachment of the base hospital as the camp or division surgeon may direct.

The divisional medical supply unit will be assigned to the camp medical supply depot for duty and instructions while the division to which they belong is at a cantonment.

Additional men sent to camps for training in supply work will form a part of the enlisted personnel of the supply branch under the command of the camp medical supply officer, who will assign them to duty with the camp medical supply depot, or the property office of the base hospital, as understudies to the permanent personnel.

INSTRUCTION OF ENLISTED PERSONNEL

In addition to the practical instructions which each man receives in the performance of his duties, the following theoretical course of instruction will be given as far as practicable to all enlisted men on duty with the medical supply branch at a camp:

Lectures on personal hygiene, sanitation, care of the soldier's feet on the march, first aid, articles of war, military courtesies, Army Regulations, Manual for the Medical Department as far as it pertains to the care and handling of public property, reports and returns used in the supply branch of the Medical Department, Quartermaster Corps, and Ordnance Department, and general orders of the War Department relating thereto.

The following schedule may be used as a guide for practical and theoretical instructions:

Reveille.....	6.00 a. m.
Setting-up drill.....	6.00 to 6.15 a. m.
Breakfast.....	7.00 a. m.
Practical depot work.....	8.00 to 12.00 a. m.
Drill.....	8.00 to 9.00 a. m.
Lecture.....	10.15 to 11.45 a. m.
Dinner.....	12.30 p. m.
Practical depot work.....	1.30 to 5.00 p. m.
Drill.....	1.30 to 2.30 p. m.
Lecture.....	3.45 to 5.00 p. m.

One half of the detachment will receive instruction in practical depot work in the forenoon and the other half in the afternoon. Those not engaged in practical depot work will attend drill and lectures. Drill will include school of a soldier, school of the squad, and school of the detachment, as prescribed in drill regulations for sanitary troops, including shelter-tent drill.

Lectures will be given by officers on duty at the depot, while drills will be conducted by noncommissioned officers of the detachment, assigned to this duty from time to time, under the supervision of a commissioned officer of the Sanitary Corps.

A record in book form must be kept of every individual's progress, and his aptitude will be indicated by marks, using 0 as lowest and 10 as highest mark.

Should any member of the detachment, after having received instruction for a reasonable length of time, prove to be not adaptable for this work, he should be reported to the Surgeon General as being unsuited for duty in the supply branch of the Medical Department, with a view to having him placed in a more suitable branch. All qualifications which a man possesses must be reported on the proper form.

REQUISITIONS

All requisitions for medical supplies from any camp must emanate from the office of the camp medical supply officer. For this reason, requisitions from all organizations must be submitted to the camp medical supply officer, through the camp or division surgeon. These requisitions will be filled as far as practicable from stock on hand. Articles not in stock will be consolidated on a monthly requisition by the camp medical supply officer, unless the camp or division surgeon should decide that they are so urgently needed as to justify an emergency requisition.

The camp medical supply officer must endeavor to keep a well-balanced stock of medical supplies on hand at all times, and if the necessary care is exercised in the preparation of his monthly requisition for replenishment of supplies it will seldom be necessary to resort to emergency requisitions.

In preparing requisitions, the nomenclature, order of entry, classification, and the weights and measures of the supply table will be followed. To facilitate the handling of these papers, one line of writing only will be placed in each interlineal space.

In requesting supplies, the possibility of the different classes being supplied from the different depots should be borne in mind, and the articles listed accordingly:

Field supplies from Washington.

Dental supplies from New York.

Veterinary supplies from St. Louis.

Automobile supplies from Louisville, Ky.

A request for these different classes of supplies should therefore be made on separate requisitions.

All requisitions will be made on Form 35, M. D.; they must be prepared in quadruplicate and forwarded to the Surgeon General through the camp or division surgeon. The medical supply officer will find it to his advantage to prepare a fifth copy to be retained by him until the fourth copy is returned to him with action indicated.

All requisitions should be consecutively numbered and kept in a separate file for ready reference. Special instructions issued from time to time and the directions given in the Manual for the Medical Department should be freely consulted in the preparation of requisitions.

The quantities to be asked for replenishment of supplies will be determined in the following manner: Previous month's consumption to be multiplied by 3 and deducting the actual amount on hand, will give a balance which should be requisitioned for. If this is done, a two months' supply will always be on hand, and a third month will be in transit.

PROPERTY ACCOUNTABILITY

The camp medical supply officer is the only accountable officer for medical property at a camp.

Nonexpensible articles.—These will be issued on memorandum receipts to the divisional medical supply officer for all organizations belonging to the division, and to the property officer of the base hospital for all supplies issued to the base hospital, upon requisitions approved by the camp or division surgeon. This relieves the camp medical supply officer of the responsibility, but not of the accountability.

Memorandum receipts will be numbered and all items on these receipts abstracted on a stock card. As this stock card also shows the amount in storerooms, the total shown on stock cards must correspond with the balance carried on return of medical property. At least once every three months the stock cards must be carefully checked with the property return. Any surplus, the cause for which can not be determined, which may appear at this

time must be taken up on the property return as "Found at camp," and any shortage must be carefully investigated, and if the missing article can not be located a survey must be made at once.

Expendable property.—This will be issued on approved requisitions, or issue slips in case of base hospital. Receipt for these articles will be acknowledged on requisition or issue slips. These receipts will be consolidated daily, the consolidated record numbered, and total amounts entered on stock card. Once a month, total entries on stock cards for that month will be dropped from the return of medical property. This should be done at the time when monthly requisition for replenishment of supplies is prepared, as it will show balance on hand at that time. This balance will be verified by a commissioned officer, by taking inventory of stock in storerooms.

Red Cross supplies.—Supplies issued by the Medical Department should not be asked for from the Red Cross. When supplies are given by this organization, the camp medical officer should be informed at once, so as to enable him to take them up on his return of medical property. All Red Cross property must be accounted for in the same manner as regular medical property. A copy of the receipt furnished the Red Cross or, if no receipt is given, a certificate covering those supplies received will be used as a voucher to the return.

Unserviceable property.—When nonexpendable property in use becomes unserviceable, it should be turned into the camp medical supply depot, with affidavits in triplicate showing how the property became unserviceable. These affidavits are attached to the report of survey or to the inspection report, which will finally dispose of these articles. Unserviceable bed linen, towels, and ward clothing should be torn up when surveyed and used for cleaning rags, instead of being turned over to the reclamation or conservation officer. Care should be enjoined in the use of these rags, lest the supply become exhausted.

Divisional sanitary equipment.—This will be issued by the camp medical supply officer to the divisional medical supply officer on memorandum receipt, and by the latter in turn to the organizations. The divisional medical supply officer must inspect this equipment at least once a month, to see that same is kept intact, in good repair, and that none of the expendable supplies are used while the division is at a cantonment. This equipment will be invoiced to the divisional medical supply officer when orders for overseas duty for the divisions are received.

CARE OF PROPERTY AT THE BASE HOSPITAL

The property officer is responsible, but not accountable, for all medical property in use at the base hospital. He must be able to tell at all times where nonexpendable articles, held by him on memorandum receipt, are located. To enable him to do this, the following system will be put into effect:

The property officer will make a list of all nonexpendable articles in each department of the base hospital, to which he will attach the following certificate:

I certify that I have this date received the above-mentioned articles of medical property from the property officer, base hospital, for which I will be fully responsible until this property has been either returned by me to the property officer, or until I have been relieved of this responsibility by another officer.

[Rank]

This list of property will be submitted to all officers responsible for medical property, with the request that these receipts be accomplished at once. All items listed on these memorandum receipts should be entered on the location card. The total of the articles shown on the location card and all articles in stock in the storerooms should be the total amount of property for which the property officer is responsible.

An envelope will be used for each department of the base hospital in which will be placed the memorandum receipt for nonexpendable property, signed by the officer in charge

of the department, and to this should be added from time to time future issue or credit slips. Once a month, a new memorandum receipt of nonexpendable property should be prepared for each department, with the necessary additions and deductions made. Issue and credit slips can then be destroyed.

These memorandum receipts should be frequently verified by actual check of property in use in each department.

BUILDINGS

The four warehouses generally built at the base hospital for the storage of medical supplies will be turned over by the commanding officer of the base hospital to the camp medical supply officer for his use, with the exception of one-half of one of the warehouses, which may be assigned for use of the base hospital quartermaster.

The following distribution of storage space will be found to be of advantage and should be followed as nearly as practicable:

Warehouse No. 1.—(a) Office of camp medical supply officer.

(b) Open stock of field supplies and supplies issued to camp infirmaries, arranged on shelves.

(c) Blank forms.

(d) Dental supplies.

(e) Veterinary supplies.

Warehouse No. 2.—(a) Property office of base hospital.

(b) Open stock of base hospital supplies arranged on shelves.

(c) Original cases containing base hospital supplies.

Warehouse No. 3.—(a) Automobile supplies.

(b) Original case goods, field and base hospital supplies.

Warehouse No. 4.—(a) Original case goods, field and post supplies.

(b) Gas defense supplies.

(c) Unserviceable property.

GENERAL PROVISIONS

The return of medical property, which is to be rendered upon transfer of property to another officer only, will be kept up to date at all times; vouchers must be entered as soon as they are accomplished. Medical supplies may be received on approved requisitions or upon the order of the Surgeon General from medical supply depots, or direct from the manufacturers. If they are received from a medical supply depot the property should be promptly checked and receipt acknowledged on Form 28. If received directly from the manufacturer—the medical supply depot, having placed the order, should at once be notified of the receipt of the articles so that they may be invoiced in the usual manner.

As far as practicable medical property not in original cases should be arranged in store-rooms in the order as enumerated in the Manual for the Medical Department.

Poisons, liquors, narcotics, and instruments, as well as silverware, should be kept in a closet under lock and key, the key to be kept in the possession of the supply officer. A record must be kept of issues of all liquors and narcotics. (See par. 514, M. M. D.)

Antitoxins, serums, and all other perishable articles must be kept in an ice box, but freezing of serums must be prevented.

Rubber goods must be carefully examined from time to time to see that they are not deteriorating; to prevent this, they should be packed in talcum.

Field chests should be carefully gone over at least once a month to see that they are in good condition.

Blankets should be frequently inspected and well taken care of so as to prevent their becoming infested with moths.

Whenever an excess in medical property exists which can not be used at the camp to advantage, the Surgeon General should be notified in order that instructions for their proper disposition may be issued. Only serviceable property will be reported if in excess.

DEPOT INSPECTION

About the time the foregoing instructions were issued it became essential to supervise and coordinate the work of medical supply officers at the training camps and larger hospitals. Two officers of the Sanitary Corps, qualified by long training and experience, were selected for this purpose. They were detailed as inspector-instructors and placed on an itinerary covering in their respective circuits all the training camps in a period of approximately two months. This resulted in what amounted to a monthly inspection of medical property and property methods at all camps. The object of these inspections was twofold: To ascertain existing conditions and defects and correct them, and to impart instruction concerning methods of medical supply work. Their work along this line was effective and resulted in material good to the service. A written report of each inspection was forwarded to the Surgeon General. A copy of one of the earlier reports while these two officers were working together in the evolution of the plan above outlined appears below. It is typical of those which followed.

INSPECTION OF CAMP MEDICAL SUPPLY DEPOT, CAMP DEVENS, MASS.

JULY 8-9, 1918.

Personnel.—Captain, Sanitary Corps, camp medical supply officer, second Lieutenant, Sanitary Corps, assistant to supply officer.

Enlisted personnel.—List by qualifications and adaptability as to supply work herewith attached. Instructions are given daily for eight hours; four hours practical, four hours theoretical. The type of men sent to this depot is very good and come from civil life with occupations adapted to medical supply work. The conduct of the men is excellent in every respect, and very little occasion for discipline was necessary. The men are not equipped for field duty; when men are ordered for duty overseas, equipment is issued to them. A schedule of instructions given is attached hereto. Men are rationed and quartered at the base hospital, which is satisfactory. The records pertaining to the detachment are kept in the office of the camp medical supply officer. The enlisted strength of the detachment at date of inspection is:

Sergeants, first class.....	2
Sergeants.....	5
Privates, first class.....	7
Privates.....	65
Total.....	79

Records.—Records are properly kept and up to date. Property return is rendered upon the transfer of property only. A separate record is kept for alcohol, liquors, and narcotics. Stock record is kept on Form 17 and is very satisfactory. Issues of supplies are made on approved requisitions of camp surgeon only. Only one property accountability is maintained at this camp, and all supplies not expendable are issued out on memorandum receipts. These memorandum receipts are abstracted, thus showing location of nonexpendable property. This system is considered very satisfactory and the use of Form 17 as stock card is excellent because these forms are on hand at all depots, and if adopted at other camps this would make an excellent uniform stock record throughout the country.

Qualification cards of men are kept by camp personnel officer in compliance with existent orders.

Buildings.—Of the four storerooms, three are used for supply depot, and one is the medical property storeroom for the base hospital. These storerooms are sufficient for the needs of this camp. Office is well equipped. Water barrels, fire extinguishers, and water

buckets are placed throughout each storeroom and 1 noncommissioned officer and 12 men are detailed to man hose reel No. 29, which is part of base hospital fire apparatus. A sentry from cantonment patrols grounds where storehouses are located, which provides ample security against theft.

Transportation.—One motoreycle with side car for use at depot. It is desired that one 1-ton truck be provided for transporting medical supplies about the cantonment. Organizations now call for supplies, but it would greatly facilitate work if supplies could be delivered with depot transportation. It sometimes requires several days before organizations are able to secure transportation from quartermaster.

Supplies.—Post supplies are received from Philadelphia and New York depots; field supplies from Washington. It takes approximately thirty days from time requisition is made until supplies are received. Express shipments are satisfactory with the exception that these shipments are generally received in broken lots. In case of loss or damage of property by transportation companies the responsibility is fixed by a survey; the survey report contains the necessary data as to accountable officer, appropriation involved and fiscal year. Generally, supplies arrive in good shape, are well packed, and very little damage has thus far been caused which could be traced to faulty packing. Direct shipments are promptly acknowledged upon receipt of same. These shipments are not made very promptly as specified on order, but this seems to be due to difficulty caused by transportation of same. A maximum or minimum allowance has not been established; this is impracticable due to the fluctuations in strength of command and certain supplies used more at certain seasons than others. Requisitions are submitted once monthly, on the 20th day of each month, and are consolidated by the camp medical supply officer; one requisition only made for all needs at camp. Sufficient supplies for three months will be on hand after requisition for this month has been submitted. A list of excess needs of supplies turned into this depot from Camp Bartlett, Mass., was submitted to Surgeon General's Office, and authority was granted to ship these supplies to the Philadelphia depot; this will be done in the near future.

The provisions of paragraph 514, Manual for the Medical Department, in regard to liquors and narcotics are strictly enforced and keys are kept by one noncommissioned officer only, who is detailed in charge of storeroom; these supplies are issued upon approved requisition by camp surgeon only and receipt is taken on Form No. 16-a for each individual issue of liquor or narcotics. Check of liquors and narcotics is made once monthly by a commissioned officer.

Biological products are received from Army Medical School and the Squibb Agency at Fitchburg, Mass., and Lederle Laboratories; it takes from one to four days to receive these products from time they are ordered, which is satisfactory.

Post supplies.—There has been no shortage within the past four months; there is now a two months' supply on hand, and requisition will be submitted to bring this up to a three months' supply. Bed capacity of base hospital is 2,000. No supplies have thus far been submitted to the action of an inspector. Articles of furniture which become temporarily unserviceable are repaired. Woolen textiles are protected and those in use are freely aired. Rubber goods are kept in dark room and protected with talcum.

Field supplies.—These are issued intact and in original packages and not turned over to organizations until they are under orders for duty overseas. They are issued on memorandum receipts to organization surgeons and invoiced to division medical supply officer prior to leaving camp. There are at present no divisional units on hand, but requisition will be submitted as soon as a new division is formed at this camp. There are 19 infirmaries at this camp supplied from this depot; they are permanent organizations belonging to the cantonment. Chests stored at depot are kept in their original packages.

Dental supplies.—There are 31 base dental units at this cantonment supplied from this depot and a two months' supply of dental articles is on hand at present. These supplies are received very promptly from New York, and requisitions are filled as sent in from here. There are three portable dental outfits at this camp, placed in camp infirmaries at the cantonment; these are only temporarily used until base dental infirmary is completed.

Veterinary supplies.—These are supplied from St. Louis and Philadelphia and are satisfactory with the exception that it takes a considerable time to receive these supplies

from St. Louis. A two months' supply is now on hand; one requisition has not yet been filled. There are approximately 8,068 animals at camp and the capacity of the veterinary hospital is 400.

General remarks.—The following sanitary equipment is on hand:

Regimental hospital equipment.....	number..	1
Litters.....	do.....	463
Officers' equipment.....	do.....	6
Enlisted men's equipment.....	do.....	11

Sufficient first-aid packages, foot powder, and adhesive plaster is on hand to equip command. A full divisional equipment is now needed to equip a division, and requisition for same will be submitted this month.

Unserviceable spare parts of ambulances are turned in to reclamation officer and rubber tires are sent to Louisville, Ky., by freight. At present a small percentage of the permanent organization use field dressings; i. e., compressed bandages, small packages of gauze, etc.

There is no excess demand of any supplies and no wastage has been noted in any of the departments.

In emergency supplies can be purchased in Boston, a distance of 35 miles from camp. Total amount of local market purchases during past three months was \$5,603.56, of which \$2,835.48 was for biological products, animals for laboratory, and feed for same. When Royal typewriters are in need of repair they are repaired by a mechanic sent by the Royal Typewriter Agency in Boston without cost to the Government.

Remarks.—The depot at this camp is run in a very efficient manner. The men are well trained in their respective duties. Understudies are continuously broken in, and there are now two or more men available for each important work. If a man shows no adaptability for supply work, recommendations should be made to transfer him to another branch of the Medical Department, but this has thus far not been necessary, as all men detailed here like the special work assigned to them. It requires at least three months of training to qualify a man in supply work, and about 3 per cent of the men thus trained would make good supply officers, based on past experience of about 200 men who received training within the past eight months. This small percentage is given because the supply officer has not had an opportunity to test the full capacity of a man who has been with him for a short time. If more time were given the supply officer in testing out these men, a much larger percentage would undoubtedly qualify for commissions. In order to give the men a full course of valuable instructions in supply work, at least one additional commissioned officer of the Sanitary Corps should be detailed as assistant to the medical supply officer to act as instructor, detachment commander, and personnel officer.

Recommendations.—(1) That one 1-ton truck be provided for use at depot.

(2) That veterinary supplies be shipped from Philadelphia depot instead of St. Louis.

(3) That no field dressings be used by permanent organizations in camp, and post supplies only be furnished on approved requisitions by camp surgeon.

(4) That at training camps one additional officer of the Sanitary Corps be detailed as assistant instructor and detachment commander for the men detailed at supply depot.

INSPECTION OF PROPERTY OFFICE, BASE HOSPITAL, CAMP DEVENS, MASS.

Property officer.—First Lieutenant Sanitary Corps, National Army.

Enlisted men.—Noncommissioned officers: Sergeant, first class, 1; sergeant, 1; corporal, 1. Privates: Privates, first class, 2; privates, 10.

These men are permanently assigned to duty with the property office of the base hospital and are rationed and quartered at the base hospital.

The records are kept by the detachment commander.

Each man is assigned to a certain position in the property office and is not interchanged, except when necessity demands it.

No course of instruction is being given to them.

Buildings.—The property office of the base hospital is located in one of the warehouses intended for the camp medical supply depot.

The laundry is stored in the laundry building, built in the rear of the base hospital. These buildings are sufficient for all the needs of the base hospital property office.

The building is protected by 8 water barrels located on the outside of the building and 35 water buckets. A fire extinguisher and 6 water buckets are located on the inside of the building. The building itself is located in the vicinity of the fire house, about 200 feet from same. This protection is deemed sufficient.

The buildings are locked at night and the keys kept in the possession of two noncommissioned officers. A regular guard is provided for the base hospital who patrols the vicinity of the warehouse.

Requisitions.—The base hospital has a capacity of 2,000 beds, of which at the present time about 1,200 are in use.

Requisitions are prepared in the following manner:

The head of each department of the base hospital prepares an original requisition which is submitted to the property officer on the 5th of each month for supplies needed for the following month.

The property officer consolidates these requests and forwards this requisition, through the division surgeon, to the camp medical supply officer. This requisition is then filled by the camp medical supply officer, as far as his stock will allow.

Additional articles which he may not have on hand are requisitioned for by the camp medical supply officer and as soon as they are received by him are issued to the base hospital.

Supplies.—The property officer states that on the whole supplies have been ample and satisfactory. This, too, is concurred in by the commanding officer of the base hospital. Supplies are generally received within two weeks from the time when requisition was submitted.

No maximum or minimum limit on stock records has been established, but the property officer states that he intends to do so in the future. A month's supply of expendable articles is carried in the storeroom by the property officer.

All narcotics and liquors are kept in a closet under lock and key. A record is being kept of the amount on hand and issues made. These records are balanced once a month and are inspected by the property officer from time to time. The key is kept in the possession of the sergeant.

A sufficient amount of biological products is kept on hand at the laboratory. They are procured from the camp medical supply officer and no difficulty has been experienced in obtaining them at any time.

Accountability.—The property officer holds all nonexpendable property on memorandum receipt from the camp medical supply officer. These memorandum receipts at the present time are made on issue slips (Form 16B, M. M. D.). No consolidation of these slips has as yet been made, but the property officer is starting a consolidated record of his nonexpendable property. As yet he is unable to state the quantity of each article on hand.

Every department in the base hospital is charged with all nonexpendable property in use therein. These receipts are signed by the officer in charge of the individual department. Credits and debits are added from time to time and are posted to date.

A consolidated location card is being kept by the property officer, showing the location of every article of nonexpendable property for which the property officer is responsible, and as soon as the consolidated memorandum receipt record is completed the total responsibility of each article can be shown on these cards.

Supplies.—Three regular issues are made weekly.

Emergency requisitions are only made upon the approval of the adjutant. Receipt is taken for all expendable property for the protection of the property officer. These receipts are consolidated daily and posted on the stock record and the stock record balanced daily.

Requisitions are carefully scrutinized and only the quantity which is actually needed is issued.

The property officer states that no medical property is being used improperly. He bases his statement on the fact that no medical property is being issued by him for improper purposes.

The property rendered unserviceable is being surveyed by the property officer of the base hospital and the completed survey reports turned over to the camp medical supply officer.

Red Cross property.—Red Cross supplies have been received and are being issued. The property officer keeps a lists of this property and issues it on memorandum receipt to the different wards. None of this property is being carried on the return of medical property of the camp.

Recommendations.—The following recommendations are made:

1. That the property officer give a course of instruction to the men on duty at the property office, covering duties of men in the supply branch.
2. That the men be interchanged in their duties from time to time.
3. That the property officer retain a key to the warehouse in his possession at all times and that the other key be intrusted to the senior noncommissioned officer on duty at the property office.
4. That the key to the liquor room be kept in the possession of the property officer and that the property officer check all liquors in the closet once a week.
5. That the property officer be instructed to make frequent visits to all parts of the base hospital and assure himself of the fact that all medical property is not being used improperly.
6. That the property officer make an inventory of all supplies received from the Red Cross, which inventory he should turn over to the camp medical supply officer, to have these articles taken up on the return of property. The property officer should receipt to the camp medical supply officer for these articles, on memorandum receipt.
7. That all unserviceable property be exchanged for serviceable property by the camp medical supply officer and that the camp medical supply officer dispose of the unserviceable property.

ACCOUNTABILITY

The regulations in force prior to and for several months following the declaration of war required an officer in every Medical Department organization to take up and account for all medical property which came into the possession of the organization.¹⁸ Every such officer was required to render a return upon being relieved of such duty, or yearly, as the case might be, of all medical property received by him. It was early appreciated that under this system, a vast number of such returns would be rendered and by a multitude of different officers, from the training camps; furthermore, it would be very difficult to settle many of them satisfactorily if it could ever be accomplished. To lessen the number of returns and to increase the efficiency of the medical supply service at the camps the following instructions were issued by the Surgeon General, October 12, 1917, to all camps having a medical supply officer:¹⁹

1. In order to reduce the clerical work as much as possible it is proposed to have all accountability for the Medical Department property at the camps and cantonments confined to the medical supply officer.

2. The medical supply officer will be accountable for all medical, dental, and veterinary property, except web belt equipment in the personal possession of medical officers. The latter will render individual returns for such equipments as required in paragraph 507 (a), Manual for the Medical Department.

3. All nonexpendable property will be issued on approved requisitions by the medical supply officer, who will take memorandum receipts for it.

4. When an organization is relieved from duty at the camp the Medical Department property taken with it will be invoiced to the proper medical officer by the supply officer.

5. Nonexpendable property now held by medical officers of organizations should be invoiced by them to the medical supply officer, who, after verification of the property, will receipt for it and will take memorandum receipts from the invoicing officer. The invoicing officer will then close his accountability by rendering a final return in the usual manner, dropping thereon the expendable supplies for which he may be accountable as well as the nonexpendable supplies transferred to the medical supply officer.

6. Unserviceable property should be disposed of, as provided in paragraph 678, Army Regulations, as amended by C. A. R. No. 30, July 24, 1915.

7. Returns of Medical Department property will be rendered by the medical supply officer, as provided in paragraph 507, Manual for the Medical Department.

8. You are directed to institute such measures as may be necessary to impress upon all officers in the Medical Department (medical, dental, and veterinary) of your division that this arrangement is made for the purpose of reducing clerical work and that responsibility for the proper use and care of Government property rests with them as heretofore.

9. If the plan herein outlined is found to be a practicable solution of the accountability problem, it is the purpose of this office to extend the method by having provided a division medical supply officer who will secure and distribute all Medical Department supplies for the division and who will be accountable for same.

10. If any serious objections to this plan should occur to you, or if you have any suggestions to make in regard thereto, please communicate them to this office as soon as possible.

Under this plan officers having unserviceable property on memorandum receipt could take it to the local medical supply depot and exchange the damaged article for a new or serviceable one with no other formality than the necessary certificates showing how the property became unserviceable. It gave the medical officer a better opportunity to keep an efficient check upon the methods used by different organizations in the care of their equipment.²⁰ It was intended by these instructions to make the medical supply officer the only officer at the camp who would account for and make a return of medical property. Accountability for expendable property ceased upon issue to organizations. The medical supply officer was expected to secure duplicate receipts from the officer to whom the expendable property was issued, but he was not expected to invoice it.²¹

REFERENCES

- (1) Supply Letter No. 17, S. G. O., July 6, 1917.
- (2) Report of the Medical Supply Officer, Camp Lee, Va., October 1, 1917. Subject: Monthly Report, Medical Supply Depot, for September, 1917. On file, Finance and Supply Division, S. G. O., 534-Misc.
18
- (3) Letter from the Surgeon General, U. S. Army, to the Secretary of War, April 21, 1917. Subject: Employment of retired noncommissioned personnel, Medical Department. On file, Record Room, S. G. O., 169, 559.
- (4) Letter from the Assistant and Chief Clerk, War Department, to the Surgeon General, May 18, 1917. Subject: Military Storekeepers. On file, Record Room, S. G. O., 169, 559-A.
- (5) Letter from the Surgeon General, U. S. Army, to The Adjutant General, May 21, 1917. Subject: Recommendation that retired men be ordered to active duty. On file, Record Room, S. G. O., 169, 559-C and D.
- (6) G. O. No. 80, War Department, June 30, 1917, as amended by G. O. No. 113, War Department, August 22, 1917.

- (7) Telegrams from the Surgeon General, U. S. Army, to Medical Supply Officers, New York, N. Y.; St. Louis, Mo.; San Francisco, Calif.; Chicago, Ill.; Atlanta, Ga.; Philadelphia, Pa.; San Antonio, Tex.; and El Paso, Tex., July 24, 1917. On file, Finance and Supply Division, S. G. O., 14, 039-174.
- (8) Personal reports. On file, personnel division, S. G. O.
- (9) Telegram from the Surgeon General to the Department Surgeon, Southeastern Department, August 3, 1917. On file, Finance and Supply Division, S. G. O., 14,738-13.
- (10) Letter from the commanding officer, Base Hospital, Camp Sevier, S. C., to the Surgeon General, U. S. Army, November 22, 1917. Subject: Accountability for medical property. On file, Finance and Supply Division, S. G. O., $\frac{534-Misc.}{18}$.
- (11) Letters and indorsements from division surgeons and commanding officers of base hospitals at various National Army and National Guard camps, October 18, 1917, to November 22, 1917, relative to medical supply officers and property and property accountability. On file, Finance and Supply Division, S. G. O., $\frac{534-Misc.}{18}$.
- (12) Second Indorsement, from the Surgeon General, to the commanding officer, Base Hospital, Camp Sevier, S. C., December 1, 1917, relative to a separate supply officer for that base hospital. On file, Finance and Supply Division, S. G. O., $\frac{534-Misc.}{18}$.
- (13) Letter from the Adjutant General, to the Chiefs of War Department Bureaus and Commanding Generals of all National Army and National Guard Divisions, December 21, 1917. Subject: Medical supply officers for divisions and cooks for regimental medical detachments. On file, Record Room, S. G. O., 320.3-1.
- (14) Monthly report of the camp medical supply officer at Camp Taylor, Ky., to the Surgeon General, U. S. Army, August 31, 1917, on operation of the camp medical supply depot. On file, Finance and Supply Division, S. G. O., $\frac{531-129}{17}$.
- (15) Letter from the Surgeon General to the division surgeons, at all National Army camps. August 17, 1917. Subject: Prompt issue of supplies. On file, Finance and Supply Division, S. G. O., $\frac{531-123}{1}$.
- (16) Letter from the camp medical supply officer, Camp Lee, Va., to the Surgeon General, U. S. Army, October 1, 1917. Subject: Monthly report of medical supply depot. On file, Finance and Supply Division, S. G. O., $\frac{534-Misc.}{18}$.
- (17) Letter from the camp medical supply officer, Camp Dix, N. J., to the Surgeon General, U. S. Army, September 30, 1917. Subject: Monthly report of medical supply depot. On file, Finance and Supply Division, S. G. O., $\frac{531-123}{22}$.
- (18) Manual for the Medical Department, U. S. Army, 1916, paragraphs 501-502.
- (19) Mimeographed letter from the Surgeon General to division surgeons, October 12, 1917. Subject: Accountability of Medical Department property.
- (20) Letter from the medical supply officer, Camp Lee, Va., to Col. H. A. Shaw, M. C., S. G. O., August 31, 1917. Subject: Issue of nonexpendable medical, dental, and veterinary equipment. On file, Finance and Supply Division, S. G. O., $\frac{534-Misc.}{18}$.
- (21) Personal letter from Col. Edwin P. Wolfe, M. C., S. G. O., to Lieut. Col. Levy M. Hathaway, M. C., Division Surgeon, 33d Division, Camp Logan, Tex., October 6, 1917. On file, Finance and Supply Division, S. G. O., $\frac{534-127}{16}$.

CHAPTER XXX

SUPPLIES AND EQUIPMENT

INITIAL ALLOWANCE

The decision of the War Department to divide the United States into 16 training areas, with a divisional concentration camp in each for the men to be drafted in the given area,¹ gave rise to new problems in furnishing medical supplies. Nor were these problems lessened by the further decision to establish 16 divisional training camps for the National Guard.¹ Since the personnel to be assigned to the concentration, or National Army, camps were without military training, they were to remain in those camps until sufficiently trained for duty overseas, and temporary buildings were provided in which to house them; hence these places, although they bore the appellation Camp Sherman, etc., were, in the beginning, generally referred to as cantonments. The National Guard personnel, on the other hand, were supposed to have had some military training. Many of them had seen service on the Mexican border the year before, and it was thought that they could be prepared for the field by a comparatively short period of intensive training.¹ In view of the shortness of the period during which these troops were to remain in camp and the expense and difficulties incident to the construction of the necessary temporary buildings, it was decided to house them under canvas; buildings were provided for camp headquarters, hospitals, kitchens and messes, warehouses, and such utilities as required them.² Later, infirmary or dispensary buildings were provided for the medical activities of regiments and other large organizations or equivalent groups. Thus, while there were to be two distinct types of camp—concentration and mobilization—because the concentration camps were to be used also for training purposes, the designation “training camp” came early to be applied to them as well as to the camps of the National Guard.

The Manual for the Medical Department prescribed that the equipment for a camp hospital at mobilization camps would be supplied without requisition;³ that all individuals and organizations would be equipped at those camps with such articles of medical property as were required by existing orders;⁴ that all individuals and organizations pertaining to the Medical Department would be completely equipped there; that unit medical equipment and supplies in the hands of organizations temporarily at mobilization camps would be kept intact and used only for instruction purposes; and that all necessary supplies for the treatment of the sick would be furnished from the camp medical supplies in addition to the unit equipment.⁵

It was early decided by the Surgeon General to apply these general principles to the training camps. Initial equipment for the number of Medical

Department units to be organized at each of the several camps, and a sufficient quantity of medicines, surgical dressings, etc., to last three months were to be sent to the camps without requisitions. Unit equipment was to be used for training purposes; replenishments were to be obtained on requisition by the camp medical supply officer. These principles will be taken up in detail subsequently.

Because of the apprehension that unforeseen delays might prevent the arrival of the initial allowance of supplies, as well as the base hospital equipment, in time to be available on the arrival of the troops, and to insure each camp having some supplies, the officers in charge of the respective distributing medical supply depots were instructed August 7, 1917, to issue a field hospital equipment complete, less tentage, to each of the National Army camps in their districts.⁶ They were instructed to notify the medical supply officer to whom the equipment was sent to turn it over, when no longer needed for camp use, to one of the field hospital companies to be organized at that camp.⁶ A different policy was followed in supplying the National Guard camps. It was assumed, from the information furnished by the Chief of the Militia Bureau, that there would be at least one organized hospital company with equipment among the troops assigned to each such camp. This equipment could be used for the temporary care of the sick in camp until such time as the other equipment arrived. Instructions were issued accordingly.⁷

UNIT

As stated above, the original plan of distribution contemplated that every National Army camp would receive all its initial medical equipment without requisition. This included the combat or organization unit medical equipment as listed in the Manual for the Medical Department. The instructions to the distributing depots included in the list of articles to be sent to each camp as initial equipment a sufficient number of combat equipments to provide one for every organization entitled thereto.⁸

It will be observed from the list of contents of the combat equipment ^a that certain articles contained therein were furnished by the Quartermaster Corps. In time of peace these quartermaster articles were habitually secured by the medical supply depot assembling the equipment and added to it before its issue to the using organization. The equipment as issued, then, was complete. Since the plan of the War Department ⁹ contemplated that each supply bureau would provide at the camp all articles furnished by it for the troops being assembled there, the combat equipment as issued contained only the articles furnished by the Medical Department.

A similar condition obtained in regard to the equipment for camp infirmaries, ambulance companies, and field hospitals, paragraphs 869-871, 874, and 879, respectively, Manual for the Medical Department, 1916. It became necessary, then, to procure at the camp the articles in these various equipments which ordinarily were issued by other supply bureaus.

To obviate the failure of any Medical Department organization, through lack of information, to secure all the component articles of equipment to which

^a See Chap. IV.

it was entitled, the following letter was sent to the division surgeons of all National Army camps except Camps Merritt and Johnston, and to all National Guard camps:¹⁰

1. Table of allowances of field equipment for a division provides 25 combat equipments and 8 camp infirmary equipments.

2. The medical supply officer at your camp should make requisitions on the camp quartermaster and the camp ordnance officer, respectively, for the supplies listed in paragraphs 866 and 869, as supplied by those departments, which are necessary to complete this number of equipments.

3. At the same time requisition should be made for the necessary quartermaster and ordnance supplies pertaining to ambulance companies and field hospitals to complete the equipment of three motorized and one animal-drawn organization in each section, less any supplies which may have been received with the Medical Department equipment, paragraphs 874 and 879. A copy of the list of articles to be omitted from the standard supply table to adapt them to motorized organizations is inclosed.

1. Requisitions for field hospital equipment should specify whether organization is motorized or animal drawn.

2. The following supplies listed under field hospital (par. 879, M. M. D., 1916) needed for animal-drawn field hospital will be omitted from the equipment of a motor field hospital:

Broom, stable.
Brush, marking.
Buckets, galvanized-iron, No. 4.
Case, pocket, farrier's.
Forks, stable.
Head nets, mosquito.
Iron, bar, assorted.
Jack, wagon.
Lampblack.
Leather, harness, black.

Marking outfit, for leather, model 1910.
Medicines and dressings, veterinary.
Nails, horseshoe.
Needles, harness, assorted.
Rivets and burrs, copper, assorted.
Rope, picket line, $\frac{3}{4}$ -inch.
Shoes, horse and mule, extra.
Thread, saddler's, assorted.
Wax, saddler's.

3. The following articles in paragraph 880, Manual for the Medical Department, 1916, will not be requisitioned for a motor field hospital:

Calks, toe, horseshoe.
Coal, smithing.
Cover, mule, blanket-lined.
Equipments:
Horse (par. 943).
Horse, Quartermaster.
Individual, Quartermaster Corps.
Forage.
Horses, riding:
For enlisted men.
For officers.

Mules:
Draft.
Riding.
Oil, neat's-foot.
Salt, rock.
Shoes, horse and mule, fitted horses (riding),
mules (draft).
Wagons, escort, with harness, complete.

4. Requisitions for quartermaster supplies listed in paragraph 880, Manual for the Medical Department, must be made on blank forms of the Quartermaster Department and forwarded through the proper channels.

1. Requisitions for ambulance company equipment should specify whether organization is motorized or animal drawn.

2. The following supplies listed under ambulance company (par. 874, M. M. D., 1916) needed for animal-drawn ambulance company will be omitted from the equipment of a motor ambulance company:

Bags, nose.	Leather, harness, black.
Bags, water, pack mule.	Marking outfit, for leather, model 1910.
Boxes, pack mule, empty, Nos. 2, 3, 4, 5, 6, 7, and 8 (par. 909).	Medicines and dressings, veterinary.
Brooms, stable.	Nails, horseshoe.
Brush, horse.	Needles, harness, assorted.
Buckets, galvanized-iron, No. 4.	Oil, sperm.
Case, pocket, farrier's.	Pannier, veterinary.
Comb, curry.	Rivets and burrs, copper, assorted.
Forge, portable.	Rope, picket-line, $\frac{3}{4}$ -inch.
Forks, stable.	Saddles, pack (par. 953).
Head nets, mosquito.	Shoes, horse and mule, extra.
Horseshoer's emergency equipment.	Thread, saddler's, assorted.
Iron, bar, assorted.	Tools:
Irons, branding, hoof, set.	Farrier's and blacksmith's, kit, and set.
Jack, wagon.	Saddler's.
Lampblack.	Wax, saddler's.

3. The following articles in paragraph 875, Manual for the Medical Department, 1916, will not be requisitioned for a motor ambulance company:

Ambulances, with harness, complete.	Mules:
Calks, toe, horseshoe.	Draft.
Coal, smithing.	Pack.
Covers, mule, blanket-lined.	Oil, neat's-foot.
Equipments:	Salt, rock.
Horse (par. 943).	Shoes, horse and mule, fitted horses, mules (draft and pack).
Individual, Quartermaster Corps.	Wagons, escort, with harness, complete.
Forage.	
Halters and straps.	
Horses, riding:	
For enlisted men.	
For officers.	

4. Requisitions for quartermaster supplies listed in paragraph 875, Manual for the Medical Department, must be made on blank forms of the Quartermaster Department and forwarded through the proper channels.

The authorized unit equipments were issued to the organizations entitled thereto at as early dates as they could be assembled in order that each organization might become familiar with the equipment upon which it must depend in the combat zone. It was not contemplated that any of the expendable articles in these equipments would be used while at training camps. It was intended that every Medical Department organization, when it entrained at its camp for overseas duty, would have its unit equipment complete and intact. Repeated instructions were given to this end and that the organizations be kept supplied from the camp medical supply depot with such quantities of medicines, surgical dressings, and other articles as it actually needed.¹¹ These instructions were given that there might be no excuse for having an outfit depleted in any respect when the order came for the organization to embark.

Such was the time required to secure from the several manufacturers the various articles included in the unit medical equipment that several months

elapsed before all the organizations in the original call for troops could be supplied. The quantities due organizations were issued on both a priority and a pro rata basis. The continuing effort first was to equip completely those divisions and smaller organizations under orders to embark in the order of their priority for overseas duty. Whatever was available after they were supplied was distributed pro rata to the remaining organizations. It was not until well along in 1918 that sufficient articles were available to complete the equipment of all the organizations included in the original call for a million men. New groups were being called and new organizations were being formed at frequent intervals and some difficulty continued to be experienced in securing equipment in sufficient quantities to meet the ever-increasing demand.

Reports on the state of equipment of Medical Department units were called for so that current information might be available in the Surgeon General's Office. Equipment was distributed in conformity with these reports.¹²

The issue of the individual web belts was made from the field medical supply depot, Washington, D. C., where the belts and contents were purchased and the equipment assembled. To insure the issue of these belts to organizations in their proper sequence, the following instructions were issued:¹³

1. The following list shows priority for shipment of web belts for officers and enlisted men, to be supplied by you as the belts become available. Requisitions that you now have on file for this equipment for these organizations may be cancelled.

2. 100 officer's belts and 1,304 enlisted men's belts are the authorized allowance for a division. There should be a reserve stock of 150 officer's belts and 2,000 enlisted men's belts kept at your depot for emergency issue.

3. Should future requisitions for belts be received for any of the organizations listed below, they should be filled in the order shown unless instructions are given to expedite shipment, when such requisition will be given priority over other shipments.

4. Future requisitions marked "Expedite" should be given priority.

Regular Army:

7th Division.
8th Division.
15th Division.

National Guard:

36th Division.
37th Division.
38th Division.
39th Division.
40th Division.

National Army:

76th Division.

National Army—Continued.

79th Division.
81st Division.
84th Division.
85th Division.
86th Division.
87th Division.
88th Division.
89th Division.
90th Division.
91st Division.
92d Division.

CAMP INFIRMARY.

As stated above, the plans for the camps and cantonments contemplated the provision of a small infirmary for each regiment or equivalent group of smaller organizations. In general it was intended that these regimental infirmaries would house the medical detachment with the regiment, provide an office for the regimental surgeon and for his commissioned assistants a place in which to hold sick call, a dispensary, a room in which to treat the trivial surgical cases, and a small ward of 6 to 10 beds in which minor cases of illness could be treated,

or serious cases cared for until transferred to the camp base hospital. Folding metal cots with cotton mattress pads and cotton pillows were provided these infirmaries instead of the standard hospital bed, mattress, and pillow. The object in view was to keep the requirements of the infirmary as near those of actual field conditions as possible.

Many of the National Guard regiments which saw service on the Mexican border had been provided with a regimental hospital equipment, and it was concluded that such equipment could be utilized in the regimental infirmaries while in concentration camps, hence a smaller quantity of equipment was included in the allowance for National Guard camps than in that for the National Army camps. It was known that the organizations in the latter camps would be wholly without equipment when mustered into the service.

A variation was made in the hospital arrangements at Camp Shelby, Hattiesburg, Miss. The size of the infirmaries was increased and the base hospital fixed at 500 beds. The regimental infirmaries were of sufficient size to provide for 20 patients in an emergency.¹⁴ They were utilized to supplement the base hospital and to relieve the latter of the care of the milder cases. They were provided with suitable ward and mess equipment for that number.

The purpose in issuing equipment and supplies to these infirmaries in addition to the unit equipment issued to the regiment was to make provision for the adequate treatment of the regimental sick and yet avoid using up the supplies in the unit equipment. It was intended that the unit equipment be kept intact and used only for drill and demonstration purposes. Also that when a new organization came to use the infirmary the equipment would be available.

BASE HOSPITAL

At the time of the entry of the United States into the World War the Medical Department had regulations for the establishment and operation of general hospitals and a standard list of equipment for mobile base hospitals of 500 beds. The regulations for the general hospital in so far as practicable applied equally to base hospitals. There was no list of equipment for temporary or semipermanent hospitals at training camps, or for temporary general hospitals in the home territory. The base hospital equipment of the standard supply table was meager and built up of various cases, chests, and other types of field unit containers. Past experience had shown that equipment of that type was notoriously difficult to procure and could be had only after prolonged delays. In making plans to equip the large hospitals at the training camps, this type of equipment was excluded as being neither satisfactory nor available for the purpose. The Surgeon General felt that such hospitals, although temporary, would be general hospitals for all practical purposes, and should be provided with the same type of equipment. Since articles of standard hospital equipment could be provided much more promptly and at less expense than the field type and were more satisfactory and comfortable, it was decided to provide them with standard hospital equipment in such variety and quantity as might become necessary. A list of equipment, thought to be suitable for a hospital of 500 beds, was compiled as the initial equipment to be issued to the hospitals at all the large training camps. The quantities of individual articles were based on

actual peace-time experience of general hospitals and of other large hospitals established on the Mexican border. The quantities were thought to be sufficient for three months, or until additional supplies could be obtained on requisition. The equipment provided for these hospitals included practically all the articles in the standard supply table listed under the heading "Post supply table." The primary list was supplemented from time to time by lists of equipment required for the special services, such as the ophthalmological, otolaryngological, orthopedic, X-ray, and laboratory. Except for the eye service, which always was very modest in its demand for equipment, the articles required by the special services were quite elaborate.

When it was learned that the hospitals to be established at the several camps were all to have a capacity of from 800 to 1,000 beds, the equipment was augmented accordingly. Medicines, mess equipment, and ward equipment were doubled. The other classes of articles were increased as needed but to a lesser extent than those just mentioned. By the end of 1917 the equipment for these institutions had become quite extensive and elaborate. The articles supplied them, however, were standardized and uniform. The surgical equipment was limited to articles included in the list of "Staple medical and surgical supplies," Part I, Surgical Instruments. The X-ray outfits and supplies likewise were standardized, as were the laboratory and dental equipments.

Studies on this hospital unit equipment were completed in May, 1917, and copies furnished the New York medical supply depot and the several department surgeons.¹⁵ The nonexpendable supplies included in it were calculated on the actual bed capacity of the unit. The nonexpendable supplies, medicines, dressings, etc., were estimated on the basis of a three months' consumption period. The object of this original study was not so much to provide an ideal unit as to provide a working equipment. Dependence could be placed upon experience to demonstrate the changes and additions necessary to complete it. Due account had to be taken of the probable quantity of supplies which would be available at the time distribution would be made. For camps requiring a 1,000-bed hospital it was contemplated that the 500-bed unit would be used as the basis, that 50 ward units would be added, and that the medicines, stationery, mess equipment, and surgical supplies would be doubled.¹⁶

In the original plan for issuing base hospital equipment it was contemplated that the bulky articles—bedsteads, mattresses, pillows, chairs, refrigerators, sterilizing outfits, X-ray apparatus—would be issued to these base hospitals from the New York medical supply depot or shipped direct from the contractors. The remaining articles would be issued by the distributing depot to which the camp had been assigned for supply.¹⁷ In view of the quantities of supplies at the St. Louis depot, the entire initial base hospital equipment, excepting sterilizing outfits and X-ray apparatus was issued therefrom to the camps assigned to that depot for supply.¹⁷ Issues were to be made by the distributing depots upon receipt of information from the department surgeons of the date when the hospitals at the respective camps would be ready to receive their equipment.¹⁸ The distributing depot, at the same time, was to notify the officer in charge of the New York depot of the place and name of the officer designated to receive the supplies.

The original plan, however, had to be modified. Supplies were slow in becoming available in sufficient quantities to equip all the camps. It was foreseen by the end of July that the initial equipment could not reach the camps before the arrival of the troops if any part of the equipment or supplies were sent to the distributing depots for issue. It was decided, therefore, to issue the entire equipment from the New York depot¹⁹ to all camps, except those for which equipment could be provided from stock at the depots at St. Louis, San Antonio, and San Francisco. The St. Louis depot was able to supply its five camps and San Antonio and San Francisco were able to each supply one or two of those assigned to them for supply.²⁰ All sterilizing and X-ray outfits were to be distributed from the New York depot. The officer in charge of the New York depot was instructed early in August to issue the initial base hospital equipment to all camps not supplied by other depots. A list of the camps to be supplied from that depot was furnished him at the same time. This officer reported on August 7 that a large force was then engaged in packing the medicines and other articles which needed to be packed, that shipments of the other articles were to be made from stock or direct from the factories, and that it was expected to have the equipment in the camps by September 1.²¹

Such was the delay in the construction of the hospitals at the several cantonments that it was feared for a time that they would not be ready for either equipment or patients when the camps were occupied. Nevertheless, equipment and supplies were placed in transit as rapidly as they became available. In many instances the base hospital equipment in whole or in part arrived at the camps before storage space was available for it. The various articles so arriving were stored wherever space could be secured in existing buildings, or in the open under canvas.²² Reports received from the various camps between September 1 and 10 indicated a shortage of many articles of equipment.²³ In the majority of cases these shortages were relieved before the need of the particular article became acute.

In order that there might be no unnecessary delay in getting the equipment in place, the surgeons at all National Guard camps except Deming, N. Mex., and Fort Sill, Okla., and all the National Army cantonments, except Camp Funston and Camp Travis, were authorized to purchase the materials and employ the labor necessary to install the sterilizers and other apparatus requiring it which were issued the hospital. Vouchers were to be rendered the Surgeon General in the usual manner.²⁴

MOTOR AMBULANCES

DISTRIBUTION

Tables of Organization issued by the War Department in May, 1917, provided for two motorized ambulance companies and field hospitals in the sanitary train of an Infantry division.²⁵ New Tables of Organization, published in the following April, provided for three motorized ambulance companies and field hospital companies.²⁶

Tables of Organization in force, then, at the time of assembling the troops in the divisional camps called for two motorized ambulance companies. To equip these two companies in all the camps and to provide ambulance service

for the base hospitals thereat required approximately 900 ambulances. That number of machines could not be produced during the short interval between the time when funds became available for the placing of the contract and the date fixed for the camps to be occupied. Ambulance service would be required as soon as the camps were occupied for the transportation of the sick of the organizations to the base hospital. The size and arrangements of the camps were such that many organizations were more than a mile distant from the hospital. The Surgeon General decided to place the base hospitals at the head of the list to be supplied with ambulances. Accordingly, instructions were issued to the motor ambulance supply depot, Louisville, August 16, for the distribution of two motor ambulances to the base hospital at each camp and to expedite the shipment.²⁷ The shipments began August 28 and were completed September 7.²⁸

A number of ambulance companies had been organized under the auspices of the American Red Cross.²⁹ Several of them had provided themselves with motor ambulances of various types. When these companies were mustered into the military service of the United States, as units,³⁰ considerable difficulty was experienced in the Surgeon General's Office in the effort to determine just how many of these organizations had motor equipment and to what camps they had been sent. Pending the receipt of this information, instructions were issued by the Surgeon General, September 14, to the motor ambulance supply depot, to issue the required number of ambulances, including spare parts car for one company, to each National Army and National Guard camp.³¹ Shipments under these instructions began September 10 and were completed, except for a few spare parts cars, October 25.³² The delay in issuing spare parts cars was due to the slowness in receiving a sufficient number of spare parts bodies at the ambulance depot.³³

The number of ambulance companies providing their own equipment having been determined, instructions were given November 11, to issue the authorized ambulance equipment for the second company at the remaining National Army camps.³⁴ Practically all the National Guard camps in the meantime had received their ambulance equipment. Arrangements for supplying National Guard organizations with motor ambulances through the Medical Department previously had been made by the chief of the Militia Bureau.

MOTOR EQUIPMENT OF AN AMBULANCE COMPANY

It is appropriate to state here that the motor equipment of a motorized ambulance company consisted of 12 standard General Motors Co. ambulances;^b 1 spare parts car or trailer; 3 motor trucks, 1½-ton capacity; 3 motor cycles with side cars; 1 rolling kitchen (trailer); 1 motor car, 5-passenger; and 1 water cart. Of this equipment the ambulances, spare parts car or trailer, and the motor cycles with side cars were furnished by the Medical Department and the remainder by the Quartermaster Corps.³⁵

The following pamphlet was distributed in December, 1917, to all organizations to which the standard General Motors Company ambulance had been issued:³⁶

^b For details concerning the motor equipment supplied by the Medical Department, consult Sec. IV.

1. *General*.—Extended consideration has been given by the Office of the Surgeon General to the matter of proper equipment and spare parts for motor ambulance service in the United States and overseas.

Lists, as follow, have been prepared, and methods of procedure outlined, based upon extended experience in the automobile industry, on the United States border, and in the service of the allies:

United States standard motor ambulance: This list includes standard chassis parts, standard body parts, and spare parts A, which, together, make up the United States standard motor ambulance, complete.

Ambulance spare parts A: Includes spare parts and equipment which are to be furnished to and carried by each ambulance and spare parts car in the company.

Ambulance spare parts B: Includes spare parts and equipment which are to be furnished to and carried by each spare parts car.

Ambulance spare parts C: Includes spare parts and equipment which are to be purchased and maintained by the motor ambulance supply depot, United States Army, Louisville, Ky., for service supply of ambulance companies in the United States.

Ambulance spare parts D: Includes spare parts and equipment which are to be purchased and maintained by the Quartermaster Corps for service supply of ambulance companies overseas.

2. *United States standard motor ambulance*.—This list, which includes standard chassis parts, standard body parts, and spare parts A, which together make up the United States standard motor ambulance, complete, is furnished for the information of each commanding officer. Standard ambulances should be checked over against this list and shortages reported to:

(a) In United States: Motor ambulance supply depot, United States Army, Louisville, Ky.

(b) Overseas: Motor ambulance assembling depot, American Expeditionary Forces, France.

3. *Road and service repairs (class B), spare parts cars*.—Ambulance spare parts B: In each standard ambulance company of 13, one car is designated as a spare parts car, and will carry the equipment known as spare parts B. This spare parts B is designed to cover roadside and service repairs and upkeep (class B) over a minimum of six months. This equipment is to be in charge of, and proper condition of company cars maintained by the mechanics assigned to the spare parts car, with assistance of operators of the individual ambulances concerned.

Spare parts B equipment, together with the individual ambulance equipment, should be adequate for all normal service of the ambulance company, and should further provide against any except major accidents or overhaul.

4. *Ambulance company independent*.—With its complete equipment, each ambulance company should be self-sustaining and independent of garage or base service station or their tools or equipment. It is of greatest importance that this be clearly understood by commanding officers, and that ambulance companies be trained as self-sustaining units, with only their own mechanics and their standard spare parts A and spare parts B equipment available for operation and maintenance.

Much is to be gained in placing ambulance companies at once upon field service basis, in the matter of personnel, spare parts, equipment, repairs, and in establishing, from the beginning, procedure which is absolutely independent of that elaborate and unnecessary equipment found in many service and repair stations. Ability and resourcefulness in mechanics are far more effective than intricate and special machinery.

5. *Mechanics for spare parts car*.—The choice of mechanics to man the spare parts car and handle repair work is of vital importance. Conservative, older men of experience should be chosen for this work, which is critical to satisfactory service of the company. Three mechanics should be assigned to each spare parts car.

6. *Maintenance of spare parts B*.—The stock in spare parts B is to be maintained in the spare parts car:

(a) In United States: By special requisition on Form 35, through the Office of the Surgeon General, Washington, D. C., accompanied by detailed report, explaining the need for parts or equipment requisitioned.

(b) Overseas: By requisition upon the motor transport supply depot, maintained by the Quartermaster Corps.

7. *Major repairs (class C, class D).*—Ambulance spare parts C, ambulance spare parts D: Parts for major repairs of United States standard ambulances, and for overhauling, will be stocked:

(a) In United States (spare parts C), at motor ambulance supply depot, Louisville, Ky.

(b) Overseas (spare parts D), at the motor transport supply depot maintained by the Quartermaster Corps.

8. *Major repairs or overhauling in the United States* will be done:

(a) By the mechanics of ambulance company, if competent.

(b) By the Quartermaster Corps repair shops.

(c) By a local garage, under supervision, if competent.

(d) By the motor ambulance supply depot, United States Army, Louisville, Ky., when the repairs or overhaul necessary are such as to warrant approval by the Surgeon General's Office, for the shipment to the Louisville depot, of the unit or ambulance in question, for repair or replacement.

Spare parts, or equipment, for major repairs or overhauling in the United States will be requisitioned upon Form 35, through the Office of the Surgeon General, Washington, D. C., accompanied by detailed report explaining the need for parts or equipment requisitioned.

9. *Major repairs or overhauling overseas* will be done:

(a) By the mechanics of ambulance company, if competent.

(b) By the Quartermaster Corps base repair shops, upon requisition by the commanding officer.

10. *Detailed reports*, explaining the need for parts or equipment, are to be made with special care, as these reports will be given weight as indicating the success of spare parts A and spare parts B, as well as the competence of the mechanics in charge.

Suggestions looking toward improvement of ambulance equipment, addressed to the Office of the Surgeon General, will receive consideration.

11. *Inspection of motor ambulance equipment* and procedure will be made from time to time, and report returned to the Office of the Surgeon General.

SPARE PARTS

The instructions covering the issue by the motor ambulance supply depot of ambulances to ambulance companies also directed that the full set of spare parts equipment be issued. Owing to the delay in receiving the factory parts, many requisitions could not be filled. Authorities were granted for the local purchase, if obtainable, of factory parts when they could not be furnished by the motor ambulance supply depot.

The list of ambulance spare parts B equipment was revised in the spring of 1918. A spare parts trailer in which to carry them was developed to take the place of the spare parts car originally contemplated. One of these trailers was to be furnished each motorized ambulance company. Distribution was made in May and June, 1918.³⁷ In order that the full complement of spare parts in accordance with the revised list³⁸ might be on hand, the following instructions were issued July 18, 1918, to the medical supply officers at all camps and cantonments:³⁹

1. Information is forwarded that, through the motor ambulance supply depot, Louisville, Ky., spare parts trailers, complete with spare parts B, have been shipped to all camps and cantonments, one for each ambulance company of 12 ambulances. Information is

further forwarded that shipment has been completed of one complete spare parts A equipment for each ambulance and motor cycle at the various camps, base hospitals, etc.

2. Spare parts B equipment is designed to cover roadside and service repairs and upkeep over a minimum of six months. This equipment is to be in charge of and the proper condition of the motor vehicles maintained by the mechanics assigned to the spare parts car, with the assistance of the operators of the individual vehicles concerned.

3. It is directed that once a month an inventory be taken of spare parts B stock, and regular requisition for complete replacement of same be executed in the regular way on Form 35.

4. For general operation and procedure, reference is made to "Information and instructions," pages 1 to 5.

OPERATION AND MAINTENANCE

As reports came in from the camps concerning defects discovered in this equipment and difficulties encountered in its operation or maintenance, they were carefully studied and efforts made to correct them. The solutions of these problems were mimeographed at the motor ambulance supply depot and distributed in the form of maintenance letters⁴⁰ to all stations to which ambulances had been sent. Much of the information in these maintenance letters was crystallized and, with other important instructions, printed in a pamphlet and distributed to the service in May, 1918.³⁸ This pamphlet contained complete instructions for the operation, inspection, and repairs of these motor vehicles.

The following instructions were provided for each organization furnished Medical Department transportation to be conspicuously displayed:⁴¹

MOTOR AMBULANCE OPERATION, MEDICAL DEPARTMENT, UNITED STATES ARMY

I. Motor ambulances are to be used for the transportation of the sick or wounded, and necessary attendants only, except under special authority, as provided in Army Regulations.

II. The governor on motor ambulances should allow a maximum speed of 20 miles per hour. Only under the most favorable conditions should a speed of over 15 miles per hour be allowed. Speed, except under the most favorable conditions, marks the inexperienced and inept automobile driver.

III. Noise of any kind calls for immediate investigation and cure. Knocking of engine, rattles, squeaks, grinding of gears, loose parts, are bad for the reputation of driver and mechanic and ambulance. "A stitch in time saves nine."

IV. The engine must not be left running while ambulance is stopped.

V. Drivers and mechanics will be held strictly responsible for "driver's daily inspection" and "mechanic's inspection" prescribed in Information and Instructions, covering motor ambulances and motor cycles, published by the Surgeon General.

VI. If inspection shows carelessness, recklessness, or violation of orders, the responsible officer will take necessary steps to have the cost of repairs charged against the driver or mechanic, and order proper disciplinary measures.

VII. Daily motor ambulance record will be kept up and filed by each ambulance driver as directed.

VIII. In no service are proper equipment and expert drivers and mechanics more critically important to success. The success of the ambulance service of the United States Army depends upon the teamwork and success of each sanitary train and ambulance company. The success of each sanitary train and ambulance company depends upon the individual drivers and mechanics. The individual driver and mechanic means YOU.

GASOLINE, OILS, AND GREASES

The congressional appropriations for the Medical and Hospital Department provided funds for the purchase of motor ambulances and, by analogy, motor cycles used by the Medical Department of the Army in the performance of its mission. Since this appropriation was chargeable with the cost of the vehicles, it was held chargeable with the cost of their maintenance and repair. It was, by the same reasoning, held to be chargeable with the cost of the gasoline, lubricating oils, and greases required in the operation of such vehicles. The gasoline, lubricating oils, and greases could be obtained locally by the officer responsible for motor ambulances and motor cycles by purchase from any reliable dealer.

The distance of the training camps from cities where gasoline and lubricating oils could be obtained made their local purchase inconvenient and required some kind of storage at the camp. To relieve this situation, authority was obtained from the Quartermaster General in September, 1917, for Medical Department organizations to obtain these supplies from the camp quartermaster in such amounts and at such times as required.⁴² It was then estimated that the quantities required per month for the Medical Department vehicles at each camp would approximate 3,000 gallons of gasoline and 120 gallons of lubricating oil. The Quartermaster Corps appropriations were to be reimbursed by transfer of funds from the Medical and Hospital Department appropriation. This information was published to all Medical Department organizations September 30.⁴²

This procedure was modified in February, 1918, by orders from the War Department, by the following change in paragraph 134½, 1916 Supplement to the Compilation of Orders, 1881-1915:⁴³

134½. *Motor vehicles, searchlights, and other power equipment* (p. 46, 1916 Supp. C. of O.; changed by C. C. of O. Nos. 5 and 6, W. D., 1917).—1. The Ordnance Department will procure all caterpillar tractors, four-wheel drive trucks, tanks, and other authorized types of special vehicles normally furnished by that department, and will provide for the repair and maintenance thereof. Reimbursement will be made by transfer of funds for equipment or spare parts furnished and repairs done by the Ordnance Department for any other bureau.

2. The Quartermaster Corps will procure, repair, and maintain motor equipment of the authorized quartermaster standard types and, except as indicated in the preceding paragraph, will provide for the repair and general upkeep of all other motor vehicles pertaining to the Army, but any bureau ordering nonstandard equipment will be required to supply the spare parts necessary for the accomplishment of repair work.

3. The gasoline and lubricants for motor vehicles and other power equipment, including airplanes, pertaining to all bureaus will be furnished by the Quartermaster Corps.

4. In order that suitable gasoline and lubricants may be furnished for the various types of power equipment supplied by the different bureaus, the chief of each bureau concerned will keep the Quartermaster General informed of the quality of gasoline and of the different kinds of lubricants required for the different types of engines, furnishing specifications if necessary, and the Quartermaster General will take the necessary steps to conform therewith.

MOTOR CYCLES

Tables of Organization, War Department, 1917, authorized three motor cycles with side cars for a motorized ambulance company and two motor cycles with side cars for a motorized field hospital.²⁵ Motor cycles for such organizations were provided by the Medical Department, as well as motor ambulances.

The problems of maintenance, repair, and spare parts were entirely analogous for both. For the sake of economy and simplicity of supply it was early decided to adopt some one of the standard makes of motor cycles as standard for the Medical Department. In carrying out this policy the Indian motor cycle with side car, military model (N. E.), was selected. A set of equipment for use with each machine was provided. This set was known at first as rider's spare parts and later as motor cycle spare parts A as distinguished from the more extensive set provided each ambulance company.³⁸ It was contemplated that the mechanics of the ambulance company would take care, also, of the motor cycles assigned to the field hospital company of the same number. It was also contemplated that all repairs, except those requiring shopwork, would be done by those mechanics with the equipment furnished in motor cycle spare parts B. A complete set of motor cycle spare parts A was included in the original crate with every Medical Department motor cycle issued.

The plan of distribution of motor cycles differed somewhat from that of ambulances. Ambulance chassis were manufactured at one place and the bodies at another, which required a third place for their assembly. Motor cycles were complete with side car and spare parts when they left the factory, and required no assembly before issue. Accordingly, 25 motor cycles were sent to each of the medical supply depots at Philadelphia and San Francisco, 30 to Atlanta, 50 to San Antonio, and 220 to Louisville for distribution.⁴⁴ Philadelphia distributed its quota to Camp Lee, Petersburg, Va., and Camp Meade, Admiral, Md., and to Ambulance Company No. 29 and Field Hospital Company No. 29, at Gettysburg, Pa.⁴⁵ Issues to Camps Devens, Dix, and Upton were made direct from the factory at Springfield, Mass. Atlanta distributed its quota to Camp Greenleaf, Fort Oglethorpe, Ga.; Camp Gordon, Atlanta, Ga.; and Camp Jackson, Columbia, S. C. San Antonio made its initial distribution to the ambulance companies and field hospitals of the Regular Army then stationed in the Southern Department. San Francisco distributed to the ambulance companies and field hospitals in Honolulu, Hawaii Territory, and in the Western Department, and to Camp Lewis, American Lake, Wash. Louisville distributed to the remaining ambulance companies and field hospitals of the Regular Army and to the remaining National Army camps. Shipments from the several depots to camps and separate organizations went forward about the middle of September.⁴⁶ Louisville also supplied the various National Guard camps.⁴⁷

Because of continued reports of shortage of transportation from base hospitals and division surgeons at the various training camps, instructions were sent October 19, 1917, to the motor ambulance supply depot to issue two additional motor cycles with side cars to the medical supply officers of all National Army and National Guard camps.⁴⁸ These motor cycles were intended primarily for the use of base hospitals, but their use for such purposes in connection with Medical Department administration as deemed most expedient by the division surgeon, was authorized.⁴⁹

Spare parts for these machines were issued from the motor ambulance supply depot upon requisitions forwarded through prescribed channels. In some instances the local purchase of parts was authorized. Gasoline, lubricating

oils, and greases were obtained for motor cycles in the same manner as like articles for motor ambulances. The component articles in the spare parts list underwent revision in 1918; as did also the spare parts B equipment.³⁸

FIELD INSPECTIONS

When the Medical Department undertook to provide its units with motor ambulances and motor cycles it was aware, in a measure, of the problems which would confront it, problems of supply of spare parts, and of maintenance and repair, as well as those of personnel. From the manner of assignment of personnel to organizations at the establishment of the training camps in the latter part of 1917, it was inevitable that a large part of those assigned to operate motor vehicles would be unskilled therein. This could have but one result—hard usage and lack of intelligent care of the machines. There was a lack of trained chauffeurs and of skilled mechanics.

When the ambulance companies of the earlier divisions left for overseas service they were replaced by companies organized for camp service.⁵⁰ The personnel of these companies were selected with greater care than had those of the earlier divisions. A much larger proportion of trained chauffeurs and mechanics were found among them, and it was possible to overhaul the machines as required and to keep them in condition. By this time, too, sets of standard spare parts equipment A and B had been furnished and were available with which to make the repairs.

One of the objects sought by the Surgeon General was a force of traveling inspectors who would visit the several camps at stated intervals, investigate the condition of the motor vehicles supplied by the Medical Department, correct defects, and advise with and instruct the personnel operating such vehicles. This object was not attained until the summer of 1918. Competent personnel had to be found and trained for the work. But the development of inspection organizations at the plants manufacturing ambulance chassis and bodies necessarily had the precedence. Improvements in design and construction demanded attention. Schools for the training of chauffeurs and mechanics had to be organized. This all required especially selected and trained personnel.

By July, 1918, it was possible to detail selected officers of the Sanitary Corps to visit the camps and inspect the ambulances and motor cycles of the Medical Department there in use. During these inspections a careful record was made of every ambulance, motor cycle, spare parts car, and spare parts trailer, showing its condition and the repairs and adjustments required. At the completion of the inspection a report was sent to the Surgeon General for the information and action of the motor ambulance section of the finance and supply division. Not only was report made of the individual vehicle on the prescribed form, but an additional report on the general conditions of equipment and personnel was also required. The scope of these inspections and reports is evident from the following report of an inspection of Camp Jackson, S. C., ending August 3, 1918. This report has been selected as typical of those made during the period July to September, inclusive, 1918.

COMPLETE MOTOR VEHICLE EQUIPMENT MEDICAL DEPARTMENT, UNITED STATES ARMY

Camp, Jackson.

Division, none; sanitary train, none; ambulance company 377.

Location, Columbia, S. C.

Date (end of inspection) August 3, 1918.

Motor vehicle equipment	Total number on hand	Serviceable	Unserviceable	Where assigned
Model 16 ambulance chassis (G. M. C.)	14	14	0	8 base hospital, 6 ambulance companies 377.
Open ambulance body	14	14	0	Do.
Closed ambulance body (Garford)	1	1	0	Base hospital.
Ambulance spare parts car (G. M. C.)	1	1	0	Do.
Ambulance spare parts trailer	1	1	0	Ambulance company 377.
Motor cycles and side cars (Indian)	2	0	2	See note.
Ambulance spare parts A	12	12	0	Ambulance company 377.
Motor cycle spare parts A	0	0	0	
Spare parts B (ambulance and motor cycle)	1	1	0	Do.
Ford ambulance	0	0	0	
Touring cars (Quartermaster Corps), Dodge	1	1	0	Camp surgeon.
Cargo trucks (Quartermaster Corps)	0	0	0	
Rolling kitchens (Quartermaster Corps)	0	0	0	
Water carts, trailer (Quartermaster Corps)	0	0	0	
Horse-drawn ambulances (Quartermaster Corps)	0	0	0	
Miscellaneous types not included in above:				
Ford 1-ton truck	2	2	0	Base hospital.
Dodge light truck	1	1	0	Do.
Ford touring	1	1	0	Do.
Chevrolet touring	3	3	0	Do.
Packard touring (7)	1	1	0	Do.

NOTE.—Camp surgeon's office, medical supply officer.

MOTOR AMBULANCES

There were 14 G. M. C. model 16 and 1 Garford closed ambulances at Camp Jackson at the time of arrival of the inspector; 9 of these were in operation by the base hospital, for the regular camp ambulance service. The remainder were parked in an open field with the curtains down and the wheels jacked up and covered with tar paper. The 377th Ambulance Company, which had been formed for a very few days, had no motor equipment. The inspector obtained the 6 cars in the field, a trailer, and complete spare parts A for the company. These 6 ambulances and 6 in use by the base hospital had been sent to Camp Jackson from Camp Hancock. The 6 in the field had not been operated since their arrival. No trouble was experienced in starting them.

All the ambulances were in running condition. Those at the base hospital showed hard service, with little attention. This is especially true of the two original cars assigned to the hospital. One of these two machines had not had an overhauling since it came and was in very poor condition. Three cars had loose bearings, one very serious. Nearly all had head lamp reflectors broken and the driver's cushions were badly damaged, though still serviceable. The bodies had loose fittings all over. The doors, horns, hinges, and nuts were loose and tail gate irons were bent. The steps had been broken, but repaired. The pyralin in the driver's curtains on every car in camp was broken out and on several cars the curtains had been removed. Governors had been removed from the engines because, according to mechanics, they had given trouble. Two had been sent to Louisville for repair several weeks ago and had not been returned, but no attempt had been made to repair the remaining ones. Two governors had been lost. No tools of any kind were carried in the cars, but six were equipped with spare tires. The tire irons had been broken away from the bodies on the other two. The pump gland nuts leaked on all cars.

Of the six cars taken from the field by the ambulance company, three had loose bearings, two had external brakes which needed relining, and all were dirty. Reflectors and head lamp front glasses were broken. The driver's seat cushions were in fair condition, as these machines were all equipped with angle-iron seat supports. One radiator outlet elbow was found cracked. These cars were repaired under the direction of the inspector and are now

in first-class running condition. On all cars in camp, fan belts were either loose or had been replaced by rope belts. It was necessary to requisition five belts to replace those unserviceable and two other new ones had been purchased in the open market.

According to the mechanic at the base hospital, the men were given very little time to do the proper work on the machines and, from what the inspector observed, this was quite true. The cars were going all day long and had to be held out of service to give the inspector time to do his work on them. For some time the two original ambulances at the base hospital were all there were in camp, and during this time they were kept running day and night. It may be said that the cars had been given the proper amount of oiling and greasing, but very little more had been done. The base hospital adjutant claims that they have not sufficient transportation and that this is the cause of the severe use of the cars. This phase will be discussed later.

The base hospital also has one spare parts car and one Garford closed ambulance. Authority has been received for the shipment of spare parts car to Louisville, and this will be done in the near future. The Garford was a gift to the hospital and is a closed city-type ambulance, the same as the one at Camp Lee. Both were in fair condition.

No ambulances were equipped. The tools had been removed from those in the field out of service and most of the tools had been lost from those in service. The supply officer had 12 sets of spare parts A on hand, but these had not been issued even to the cars in use. When the ambulance company took over there six cars, the inspector had them equipped immediately with spare parts A, one spare tire, and as near a complete set of tools as could be obtained from the tools on hand. The remaining six sets of A equipment will be placed in the ambulances at the base hospital as soon as they are taken over by the ambulance company. That will leave two cars without the spare parts A, and these will be requisitioned for. The new type tire iron and pintle hook and reinforcements had not arrived at the time the inspector left, but instructions as to the installation and use of these parts were given. Two cars at the ambulance company were equipped with power tire pumps. The two original cars at the base hospital were not equipped with snubber straps, front bumper, or starting crank boot. All machines except the original two at the base hospital were equipped with new "motor ambulance operation" sheets. Sheets for these two cars were supplied by the inspector.

Recommendation is made that repairs be made in accordance with instructions left and that time be given the chief mechanic by the commanding officers to do the necessary repair work. This includes not only that repair work necessary to be done at present, but that which will be necessary in the future. If a machine is in such condition that it should not make a run, the commanding officers should see that the car is held out of service while the repairs are being made. A great amount of trouble comes from the fact that the cars are held in service as long as they will run instead of putting them in the garage for repair.

MOTOR CYCLES

Two Indian motor cycles with side cars are held by the Medical Department. Both are out of commission. One had been robbed of parts by the division when they left. This machine had been taken down for repairs and had been rebuilt as far as possible. All worn and unserviceable parts have been removed and must be replaced by new parts requisitioned for. The other motor cycle was found by the inspector between two of the hospital wards, in the open, with no shelter. According to reports it had been there for two weeks. This machine was held on memorandum receipt by the camp surgeon's office. It apparently was in good condition except for the battery. This was dead. Slight adjustments on the clutch linkage were necessary to allow changing of gears. This machine was starting to rust just because no care or attention was given to it and because it had been allowed to remain out in the weather with no shelter.

Parts are being requisitioned for the replacement of those taken from one machine, and it is recommended that the second motor cycle be given to the ambulance company mechanics for necessary repairs. This machine by all means should be put under shelter and oiled immediately to prevent further rusting and abuse. It is necessary to send one magneto-generator into the factory for repair. Outside of the fact that it had been left out in the open, the machine had been well kept up.

SPARE PARTS B AND TRAILER

Spare parts B and trailer were both held by the supply officer when the inspector arrived. The parts had not been opened except to check them. The first thing done was to take over this equipment and load the trailer under the direction of the inspector. It is kept at present behind the company quarters, and keys are held by the chief mechanic and company supply officer. Parts are issued by the chief mechanic only. When they are given out, the factory number and name of the part is recorded and the old part taken in exchange. In this way a complete record is had at all times of the parts issued, and requisition can be made to complete the equipment at any time without taking inventory. The equipment was complete when taken from the supply officer and signed for.

Care should be taken to record all parts taken out exactly as they are listed in the parts catalogue, and requisition should be made once a month to replace equipment in accordance with instructions given by the Surgeon General's Office.

PERSONNEL

The camp surgeon, Lieut. Col. ————, has placed Capt. ————, M. R. C. in command of the 377th Ambulance Company with First Lieut. ————, M. R. C., as assistant. Lieutenant ———— acts as supply and transportation officer. Neither of the officers in the company are acquainted with mechanical construction of automobiles, and this part of the organization will have to be handled entirely by Sergt. ————, chief mechanic. Captain ———— has driven his own car some, but has done no work on it. Lieutenant ———— has done no automobile work whatever. Sergt. ———— is essentially a motor-cycle man, having handled their repair in his own shop for several years. His automobile experience is limited to work done on cars he had driven and on cars which were owned by men bringing motor cycles to his shop for repair. However, he has a good knowledge of automobile construction and is bright and intelligent. Besides Sergeant ————, there are at present five other men who have had some experience in garage work, and all of them are graduates of the Government automobile schools. These schools were especially for the training of truck mechanics and drivers and were for two months' duration. The training consisted of lectures, driving, overhauling, and repairing. There are at present only 28 men in the company with the intentions of raising this number to 122 enlisted personnel. The mechanics available now, together with those whom it is reasonable to expect will come with the additional 90 men, make the future of the company look very favorable as far as the mechanical work is concerned. The 6 men whom the inspector has classed as mechanics are all good drivers. Besides these, there are at least 6 men in the organization at present who can be classed as good drivers. These men are also capable of doing all minor repair work on machines. Nearly all of the men have done some driving, but can not be called good drivers.

At the base hospital the chief mechanic is a sergeant, first class. He is essentially a motor cycle repair man, but has had some automobile work. Together with two other good automobile mechanics, they can handle the work if given time. The difficulty is that the cars are running all day long, and no chance is given the men to keep the machines in proper condition. There is a fairly complete set of tools at the garage supplied by the hospital, and it will probably not be necessary to turn the cars in to the ambulance company for repair work.

When the inspector arrived, the 377th Ambulance Company had just been organized, with a complement of 2 officers and 28 enlisted men. There were no cars and no mechanics or drivers had been chosen except Sergeant ————, who had been on duty at the camp surgeon's office as a driver. No system had been devised for running the ambulance service. During the stay of the inspector, the commanding officer put aside all of his plans and allowed the inspector to have full charge of his men with the view of getting some of the major repair work accomplished, the personnel chosen, and of giving some instruction as to the repair of the cars and the procedure of handling the work and equipment. This the inspector did. As has been stated, six cars, trailer, and spare parts A and B were obtained immediately. The trailer was loaded and full instructions as to its use were given. All the

men who claimed to be mechanics were given a chance to work on repairs. Their work was carefully observed, instructions and advice were given, and in this way a line on the ability of the men was obtained. Drivers were watched and, together with the chief mechanic, assistant mechanics, and temporary drivers were selected.

A system for operation of the ambulance service, which will be taken over as soon as more men are secured, was suggested and explained in detail to the commanding officer. This system will undoubtedly be adopted. The forms for reports will be used only until such time as the regulation form arrives from the Surgeon General's Office. The system suggested is nearly identical with that in operation at Camp Lee. It is as follows: To use a board showing the location of cars at all times. This will show cars that are out of service for any reason, cars that are waiting call, and cars that are out on special duty. This applies to motor cycles as well as ambulances. Space is reserved on the board for special orders. Holes are drilled in the board under the headings listed above and numbered pegs corresponding to the car numbers are placed in the proper hole showing where the car is located. The driver is to receive a written order from the dispatcher, giving the car number, the time of receiving the call and of sending the car, the destination, and nature of the case. Upon the return of the driver he will turn in his order with the time of return, number of patients and passengers carried, and mileage recorded on it. All the data recorded on the order will be recorded in an office record, and from this record a monthly report is made. This monthly report contains a sheet for each car and the data are entered on it daily. The data shown should include number of patients, number of passengers other than patients, number of trips, total mileage, total gasoline and oil consumption for each day. Totals for the month should be entered, and from these miles per gallon of oil and gasoline should be shown. As has been said, the paper work in connection with this system should be used only until such time as the regulation daily car report forms come from the Surgeon General's Office.

No inspection is held at the base hospital garage, nevertheless the cars are kept very clean and orderly. No mechanical inspection is held. It is doubtful if a mechanical inspection would be of much use under present circumstances, because as it is the mechanic knows that there is lots of work to be done, but no time is given him to do it.

After talking with Captain —— it is thought best to hold inspection of the ambulance company cars in the following manner: The driver and his orderly will make the daily inspection in accordance with notes in "Instructions and information." The commanding officer will make weekly inspection relative to the cleanliness of the car and the mechanical parts he is capable of handling. The chief mechanic and his assistants will make weekly inspection to check up the driver and his orderly.

If anything is found out of order by the driver or his orderly, it is to be reported immediately in writing to the chief mechanic, whose duty it shall be to determine as closely as possible the extent of the repair work necessary. If the driver and orderly are capable of making the repair themselves, they should be allowed to work on the machine in connection with the mechanics. The driver and orderly should by all means be held responsible for keeping the car well oiled, greased, and tightened. In order to minimize the loss of tools, the drivers are required to sign memorandum receipts for the tool and spare parts A equipment. In this way the driver will be more careful of his equipment, and the entire equipment will be checked once a week by the commanding officer during his regular time for inspection.

HOUSING

At present the ambulance company is housed in temporary quarters and keeping its cars in the open. No buildings are available, however, for the housing of the ambulances or for a garage. The camp surgeon has put in a request to the constructing quartermaster, however, for a building, sufficiently large to accommodate all the motor equipment of the company and also to provide additional space for a garage. This building should be heated in winter, and the garage should be equipped with a concrete floor and work bench. The garage should be large enough to hold at least two cars, one spare parts trailer, and a good-sized work bench. This building is recommended by the inspector.

The base hospital at present has a heated garage containing a concrete floor and bench and sufficiently large to hold 4 cars. An additional building has already been approved which will be used for car storage. This will be heated and contain 10 cars and will readily supply their needs.

MOTOR TRANSPORTATION

The base hospital is equipped with the following transportation secured from the sources noted:

Ford 1-ton trucks (gifts)-----	2
Ford touring car (gift)-----	1
Dodge light truck (canteen fund)-----	1
Chevrolet touring car (canteen fund)-----	1
Chevrolet touring cars (base hospital fund)-----	2
Paekard, 2-25 7-passenger car (base hospital fund)-----	1

The two Ford trucks are in very bad shape. They are in service from early morning to late at night, and no time is given for repair. Parts are bought for them from local dealers as they are needed, and the sole idea seems to be to keep them running regardless of the condition they are in. The remaining cars are in fair condition.

Gasoline, oil, and spare parts for the trucks are purchased with the money from the hospital and canteen funds, according to instructions given by Colonel _____.

The Paekard is used exclusively by the nurses for their own personal affairs. The Ford is used for messenger service in the camp because of an order which states that communications between headquarters will be delivered by messenger and not by mail. The remaining touring cars are used for transporting officers around the camp in their regular line of duty. The inspector had a conversation with the adjutant and the commanding officer at the base hospital in regard to the transportation, and they desired three motor cycles in addition to the transportation they now have. As it is at present they have one 7-passenger car which is not used in the regular line of duty. These cars were bought out of their own funds because it was necessary to have transportation in addition to that which the Medical Department gives them; the Quartermaster's Department will not give them anything. Two additional 1-ton trucks have been ordered, but have not arrived. The trucks are used for hauling supplies for the canteen, for the mess, and for hauling medical supplies from the supply depot to the hospital.

The medical supply officer has no transportation at present. His motor cycle is waiting for parts which, according to him, were requisitioned for last March. Some of the parts came, but others he ordered were left out and the machine could not be put together. The Quartermaster Corps does haul his supplies, but they are delayed and sometimes he has great difficulty in getting them at all. This problem sometimes arises when the situation is acute. There is no transportation available for the commanding officer of the ambulance company other than ambulances, and there is no doubt but what ambulances will be used for carrying on the company administration if motor cycles are not provided.

At the Camp Surgeon's office there is one Dodge touring car for the use of the entire office. This Dodge is held on memorandum receipt from the quartermaster. It is by no means adequate for their needs, and the inspector is informed that if more transportation is not secured it will be necessary to obtain more medical officers to do the required amount of work for this camp.

The matter of additional transportation was talked over with the camp surgeon, base hospital adjutant, medical supply officer, and the ambulance company commander. The following additional transportation is necessary to carry out the required work in satisfactory manner:

The detachment Sanitary Corps at present has no transportation and is in need of two 1½-ton trucks for the transportation of labor and material and one motor cycle with side car.

The camp surgeon's office requires in addition to one touring car, 3 motor cycles with side cars and 1 other touring car.

The base hospital requires 3 motor cycles with side cars, the medical supply depot is in need of one 1-ton truck for hauling supplies from freight cars to the warehouses, and the

ambulance company is in need of 2 motor cycles with side cars. After consultation with the medical officers concerned, it is the inspector's opinion that the above additional transportation noted does not appear to be in excess of their respective needs.

DENTAL

The earlier conception of the need for dental treatment required in the training camps contemplated only emergency work. This conception probably evolved from the manner in which, for many years, dental treatment had been administered in the Army. The extent to which restoration procedures were later carried at the various camps was not and, in the absence of a knowledge of the conditions which would arise, could not have been visualized at that time. The original orders placed for dental equipment were for portable outfits for camp organizations and a base dental outfit for the base hospital. Having in mind the difficulties and delays encountered during the preceding year in the purchase of these outfits, slow delivery was expected. In the original distribution an effort was made to have it as equitable as possible. Department surgeons were informed that two outfits would be sent to each camp and the number increased in accordance with actual deliveries.⁵¹ Officers in charge of the distributing depots were instructed September 18, 1917, to distribute pro rata among the camps supplied by them the portable outfits ordered to them from the New York medical supply depot.⁵² The demand for these outfits becoming insistent, authority was given for the local purchase of such supplies authorized on the standard supply table as were obtainable.⁵³ It became necessary on account of the shortage of dental supplies to forward all dental requisitions to the New York depot for issue.⁵⁴

The principal difficulty in providing dental equipment continued to be in 1917, as in 1916, the dental engines and the chests in which to pack the equipment. It became apparent in November, 1917, that if the dental surgeons going overseas were to be provided with portable dental outfits some different equipment must be furnished for camp use. Less difficulty was experienced in procuring heavy standard base dental chair and electric dental engines. Since there were approximately 30 dental surgeons with mobile organizations at the camps, two dental infirmaries were established at each camp.⁵⁵ These dental infirmaries were designed to provide space for the dental surgeons. The equipment for a unit of nine operating dental surgeons and one exodontist was developed, and three such units ordered to each National Army camp early in November, 1917.⁵⁶ Division surgeons were instructed to place these unit equipments in use immediately upon receipt in any suitable space available pending the construction of dental infirmaries. As soon as these dental units had been placed in use, the portable dental outfits were to be turned into the camp medical supply officer, who was directed to replenish and complete them, and hold them for issue upon instructions from the Surgeon General.⁵⁷

Although dental unit equipments were authorized for all camps in November, 1917, reports from the various camps indicate that it was not until May and June of the following year that dental infirmary buildings were sufficiently complete to receive the equipment.⁵⁸ In most of the camps, both National

Army and National Guard, some organizations were housed at a considerable distance from the dental infirmaries. It was inconvenient and often impracticable for these organizations to receive treatment at the dental infirmaries. There were, too, as a rule, more dental surgeons in the camp than there were chairs in the dental infirmaries and base hospitals; to provide these extra dental surgeons with equipment and to bring the treatment within easy reach of the distant organizations, portable dental outfits in sufficient number were issued for their use. These portable outfits were left at the camp when the division left for duty overseas. By the end of May, 1918, practically every division had been provided with 30 portable outfits.⁵⁹ Tables of organization were amended in March, 1918, to provide for the attachment of 31 dental surgeons, of whom one was an acting division dental surgeon, and 32 enlisted assistants to each division ordered overseas.⁶⁰ This made necessary the 30 outfits furnished.

It having been reported by the inspectors of medical property at camps that excessive quantities of certain dental supplies were on hand at some of the camps, a report of the quantities on hand and monthly expenditures of dental cements, cotton rolls, and dental napkins was called for July 23, 1918. The reports received in response to this call indicated a total monthly expenditure of these articles, at 23 camps reporting, to be cement, 2,067 boxes; cotton rolls, 640 boxes; dental napkins, 333 boxes. The averages for the camps reporting were cement, 89.87 boxes; cotton rolls, 27.82 boxes; dental napkins, 14.47 boxes. The maximum quantities expended at any one camp were, cement, 500 boxes; cotton rolls, 100 boxes; dental napkins, 40 boxes; and the minimum, cement, 6 boxes; cotton rolls, 5 boxes; dental napkins, 3 boxes.⁶¹

VETERINARY

In planning the initial distribution of supplies and equipment to both the National Army and the National Guard camps, veterinary equipment and supplies received full consideration. The great difficulty in planning for this distribution, until the revision of Tables of Organization in August, 1917, had been furnished the supply bureaus, was the uncertainty in the number and distribution of public animals, the number and location of remount depots, and the relation of the auxiliary remount depots to the camps, whether an activity of the camp or an independent unit. While the actual number of animals for which provision had to be made differed at the various camps, it was assumed to be about 10,000 animals, including those at the auxiliary remount depot adjacent to the camp.

Using 10,000 animals as a basis, a list of the initial equipment and stock of supplies was compiled in August, 1917. Copies of these lists were furnished the medical supply officers at all distributing and camp depots August 17, 1917. The officer in charge of the medical supply depot at St. Louis, Mo., was instructed on that date to issue quantities of the various articles on that list, less stationary, to the medical supply officer at the 14 National Army and 9 National Guard camps lying to the eastward of the western boundaries of the States, Minnesota to Louisiana, inclusive, and including Camp Funston, Fort Riley, Kans.⁶² The officer in charge of the San Antonio depot was expected to supply the camps in the Southern Department⁶³ from the stock turned over to

him by the local depot quartermaster. The San Francisco medical supply depot was expected to supply the camp on the Pacific coast either from supplies received from the depot quartermaster in that city or from those to be transferred to him from St. Louis.⁶⁴ The instructions of August 17 directed that shipments be expected so as to reach the several camps before September 1, if that were possible. If the entire quantities on the list were not available, shipment was to be made of such articles and quantities as were available.

A further study was made of the quantities to be issued as the initial supply contemplated to be sufficient for a division for three months. A revised list was furnished the St. Louis Depot on September 17, with instructions to substitute it for the one previously sent.⁶⁵ Instructions were issued the same date for the shipment to the San Francisco medical supply depot of three times the quantities on the revised list.⁶⁶

A complete veterinary supply table was published September 29, 1917, in tentative form pending its formal publication, and widely distributed for the guidance of veterinary and other officers of the Medical Department. It became official in Changes No. 4, Manual for the Medical Department, published November 19, 1917. This list was furnished all division surgeons, all department surgeons in the United States, and the officers in charge of distributing depots, December 20, 1917. Articles in excess of the allowance were to be issued only upon conclusive evidence that the authorized quantities were inadequate. The same instructions directed that all requisitions for veterinary supplies be sent to the Surgeon General for approval.⁶⁷

It became evident early that, to comply with interstate commerce regulations governing the shipment of horses, large quantities of mallein would be required. Those regulations required that horses be shown to be free from glanders before they were placed on cars for interstate shipment. To make these tests, it was essential that comparatively fresh mallein be used. The Bureau of Animal Industry, Department of Agriculture, used large quantities of this substance in its routine work and readily agreed to supply the Army with the quantities it needed. Accordingly arrangements were made with that bureau in September, 1917, to furnish each auxiliary remount depot 2,000 doses of mallein per week for five weeks.⁶⁸ Most of our Cavalry organizations were in the Southern Department at this time. Changes of station of these organizations were frequent and often unexpected. Glanders was more prevalent in that department than elsewhere. The delay incident to forwarding to the Surgeon General telegraphic requests for mallein often proved inconvenient and caused some confusion. To overcome this difficulty the Surgeon General made arrangements with the Bureau of Animal Industry to forward, during October, 1917, to the medical supply depot, San Antonio, Tex., 50,000 doses of mallein. Of this quantity, 25,000 doses were placed at the disposal of the department surgeon for issue to organizations under the control of the department commander. The remaining 25,000 doses were held for issue, subject to telegraphic instructions from the Surgeon General to the various training camps in that department, directly under the War Department.⁶⁹ Mallein was furnished thereafter to all organizations requiring it upon telegraphic request to the Surgeon General. Upon receipt of these requests, they were transmitted to

the Bureau of Animal Industry by telephone and confirmed in writing. Shipments then were made by that bureau direct to the using organization.

The quantity of mallein furnished the Army by the Bureau of Animal Industry reached huge proportions. During the month of August, 1918, more than 350,000 doses were furnished. During the preceding five months the quantity had averaged 273,000 doses per month.⁷⁰

Other biologicals for veterinary use were procured from the same sources and in the same manner as those for human use. The veterinarian who required them, if at or in proximity to a training camp, made request upon the local medical supply officer, who purchased from the designated biological manufacturer. Requests from veterinarians at stations under the control of a department commander were sent to the department surgeon of that department. Those from other exempted places were sent to the Surgeon General. Issues were made promptly in all cases. The biological products authorized for veterinary use were very few, principally mallein and tetanus antitoxin.

The allowance of veterinary officers was fixed in October, 1917, at the ratio of 1 to 400 animals. On that basis the number of veterinary officers allowed at that time was approximately 800. The individual equipment ordered for such officers was considerably in excess of that number.⁷¹ The number was increased later.

Veterinary surgical instruments proved to be difficult to obtain and did not become available for distribution until the early part of 1918. They were supplied, as they became available, by the depot at St. Louis, Mo., in accordance with original instructions.⁷²

REQUISITIONS

Requisitions for medical property originating within the training camps may be grouped definitely into two classes: Those requiring the shipment of supplies to the camp medical supply depot (depot requisitions); those contemplating distribution within the camp of supplies from that depot (unit requisitions).

DEPOT REQUISITIONS

The Manual for the Medical Department provided for two general classes of depot requisitions, annual and special, for use in time of peace and within the home territory in time of war. Annual requisitions usually were prepared on a printed form known as Form 33. This form contained the names, arranged in proper sequence, of every article for which a fixed annual allowance was prescribed on the standard supply table. In preparing this requisition, there were entered opposite each item the quantities "on hand" and the quantities "wanted" represented the difference between the quantities "on hand" and the quantities allowed in the standard supply table for the authorized strength of a garrison of the size stated at the top of the requisition to be that of the garrison whence it was forwarded. This requisition was required to be forwarded to the department surgeon of the territorial department wherein it originated, not less than 20 days before the beginning of the year commencing January 1, unless otherwise designated by the Surgeon General. After examination, modification, if need be, and approval by the

department surgeon, a copy, with his action indorsed thereon, was forwarded to the depot designated to make the issue. Another copy was forwarded to the Surgeon General. The third copy was retained in his files, and the fourth copy was returned to the officer forwarding the requisition. The medical supply depot receiving the requisition shipped the supplies in due course and invoiced them to the surgeon of the station whence the requisition came.⁷³

Special requisitions were requests for supplies in excess of the quantities allowed on the standard supply table, for articles on that table but for which no annual allowances were prescribed, and those for articles which did not appear on the standard supply table. These requisitions were prepared on Form 35, typewritten, and the articles were entered in accordance with the general arrangement of the supply table. The reasons for the items and quantities entered on this form of requisition were required to be entered in the column of remarks. Special requisitions, as well as annual, were forwarded to the department surgeon unless they originated with an independent unit. In the latter case they were sent direct to the Surgeon General. The department surgeon, after taking such action as in his judgment was appropriate, indorsed his action on all four copies of the requisition, retained one copy for his office file and forwarded the three remaining copies to the Surgeon General. The latter approved or altered the requisition as seemed appropriate, retained one copy for file, forwarded one copy to the designated medical supply depot for issue, and returned the third copy to the surgeon, through the department surgeon, with the modifications, if any, noted thereon. Issue and invoice was made by the depot in the same manner as with the annual requisition. Special requisitions were forwarded annually, quarterly, or in an emergency. All copies of the requisition were signed by the surgeon of the post where they originated.⁷⁴

This regulation, requiring the action of the Surgeon General's Office on all special requisitions, was found to be impracticable during the mobilization of 1916 on the Mexican border, and authority to act on all requisitions within the Southern Department was delegated to the department surgeon of that department. Requisitions for supplies for the medical supply depots in that department, with few exceptions, were forwarded to the Surgeon General. With the impending entry of the United States into the World War, this authority was extended to the department surgeons of the other territorial departments within the United States, but requests for articles not on the supply tables, or in excess of the quantities allowed by the tables, still required the action of the Surgeon General.⁷⁵

The department surgeons were informed, May 25, 1917, that at each cantonment the divisional hospital was expected to issue to the regimental infirmaries such articles, dressings, and medicines as they might need for routine use.⁷⁶

While it was contemplated that the camp medical supply officer would be the one officer at the camp to forward requisitions for medical supplies for the given camp, many requisitions from individual units in the camps found their way to the distributing depots, probably because the camp depot did not have the articles in stock. This materially increased the work of the distributing depots and added to the confusion and congestion of supplies in the camps. The demands for supplies in the quantities approved threatened to exhaust

the stock of supplies at an early date. It was apparent that some way must be found whereby the quantities issued could be controlled to such an extent and the available supply so distributed that all camps might have an equitable share. It appeared necessary, to accomplish this end, that all requisitions, except those of the utmost emergency, be reviewed in the Surgeon General's Office. To effect this change the following instructions were issued to all camps.⁷⁷

1. All requisitions for supplies from divisional training camps will be prepared by the camp medical supply officers and forwarded through their respective division surgeons to this office for action. These requisitions should be prepared separately for post, field, dental, X-ray, laboratory, veterinary, and automobile supplies. Three copies are required. Division surgeons are directed to scrutinize all requisitions very carefully, with a view to eliminating all unnecessary supplies.

2. Medical supply officers at camps are authorized to make local purchases of articles on the supply tables (excepting portable dental outfits or other expensive equipment) which are not in stock and for which urgent need exists, in such quantities as will last until supplies can be had on requisition.

3. The purchase of articles not on the supply table not to exceed \$100 per quarter may be made without reference to this office, but in every such instance the purchase must be covered by a certificate from the officer directing the purchase, showing the necessity therefor and stating why the articles on the supply table could not have been used for the purpose. Printing and rubber stamps are included in this allotment (Everson & Reed, New York, furnish satisfactory stamps). Purchases should be vouchered monthly in conformity with Army Regulations and the instructions on Form, 330, public service voucher.

The various instructions covering the preparation and forwarding of requisitions were revised and published December 5, 1917, as paragraph 25, Supply Letters Nos. 1-23, inclusive.^c Sufficient copies of this compilation were sent to every camp to provide one for every officer of the Medical Department on duty thereat with a personal copy.

The date on which the monthly requisition was to be forwarded differed at different camps. The total number of camps, hospitals, etc., from which requisitions were received was 75. This number was divided into three groups, and a different date assigned to each group, so that the receipt of the requisitions in the Surgeon General's Office would be fairly evenly distributed throughout the month. The 1st, 10th, and 20th were the days designated for forwarding the requisitions. Each camp was notified on which of these three days its requisition would be forwarded.

Although efforts were made constantly to prevent waste and to insure economy in the use of supplies, it was never the purpose of the Surgeon General to impose hardships upon the hospitals in the care of the sick. It was realized that the majority of the professional personnel on duty at these hospitals were unfamiliar with Army methods and Army supplies, that many emergencies would arise where new and different remedies or apparatus would be required, and that many demands would be made which could not be met from stock and where material inconvenience would result from the delay in securing the needed articles by requisition even if submitted by telegraph. To provide for such conditions and to obviate delays in receipt of supplies and the resultant complaints, commanding officers of the hospitals at the various camps

^c See appendix, p. 864.

were authorized to make local purchases. The extent of the authority, its limitations, and requirements are given in the following letter:

FEBRUARY 26, 1918.

From: The Surgeon General, United States Army.

To: The commanding officer, base hospitals.

Subject: Authority to purchase medical supplies.

1. Referring to paragraph 25a of "Supply Letters 1 to 25, inclusive," your attention is invited to the provision therein made for purchasing locally such articles as may be needed to save life or prevent suffering.

This provision should be given a liberal interpretation, especially as regards medicines, dressings, instruments, and appliances urgently needed to care properly for the sick or injured.

Purchases made under these circumstances need not necessarily be limited to articles listed on the supply table if other articles of a similar character are considered better or if they are more readily procurable. If articles not enumerated in the supply table are needed for the proper operation of your hospital and such articles can not be procured promptly in the local market, requisition should be made for same by telegraph if the need is urgent.

2. An allotment of \$100 per month has been made to your hospital, to be used as you may consider necessary for making purchases properly chargeable to the appropriation "Medical and hospital supplies." Great care should be taken that no purchases be made that can not be paid for from that fund. Should such illegal purchases be made, the expenditure will be disallowed by the Treasury Department.

3. For emergency purchases involving expenditures in excess of your allotment you should, unless the need for immediate action is urgent, telegraph the Surgeon General for authority to make the purchase.

4. The purchases should, when practicable, be made by the camp supply officer. Properly executed vouchers for purchases made under this authority should be rendered promptly at the end of each month.

5. The authority for emergency purchases herein given is not to be construed as in any way relieving you from the responsibility of making timely requisition for supplies necessary in the proper administration of your hospital. In this connection you should bear in mind present transportation difficulties and make liberal allowance for delays in the delivery of supplies.

6. It is requested that the receipt of this letter be acknowledged.

By order of the Surgeon General:

C. R. DARNALL,
Colonel, Medical Corps.

To provide a definite basis upon which to determine the quantities to be entered upon the monthly requisitions, the following plan was adopted and issued to the medical supply officers at all National Army and National Guard camps and posts of embarkation, and to all numbered general hospitals and other large hospitals:

JUNE 3, 1918.

From: The Surgeon General.

To: Medical supply officers.

Subject: Requisitions.

1. Beginning with the next requisition forwarded by you after receipt of this letter, the following instructions will be observed:

(a) Change the heading of column 1 to read "Issued during previous month." Enter in this column all articles actually issued by you whether on memorandum receipt or other manner of transfer.

(b) In the second column, "Amount on hand," enter in the case of expendable articles the quantities actually in the storeroom on that date. In the case of nonexpendable articles, the quantities in the storeroom and on memorandum receipt.

(c) In the column "Wanted" enter, for expendable articles, three times the quantity in the first column less the quantity in the second column. In the case of nonexpendable

articles, enter the probable requirements, and in the column of "Remarks" opposite each item a statement showing the necessity for the increased issue.

2. This will serve to provide you with two months' stock in the depot and one month's supply in transit.

3. Every article of your stock should be carefully checked once per month. If the quantity of any article on hand does not equal a three months' supply as determined by multiplying the last preceding month's issue by 3, you should request a quantity sufficient to cover the deficiency.

By order of the Surgeon General:

EDWIN P. WOLFE,
Colonel, Medical Corps.

This method continued in force until the supply activities of the Medical Department were absorbed by the purchase, storage, and traffic division of the General Staff, November 24, 1918. Reports from the camp depots during the closing months of the war indicated that the supplies on hand were ample except for a few minor items of dental supplies. Organizations were receiving their unit equipment promptly. Those arriving at the embarkation camps with shortages in unit equipment had their equipment promptly completed.⁷⁸ Existing orders required that troops embarking for overseas duty take with them as baggage their medical combat equipment less litters and a camp infirmary reserve (par. 871, Manual for the Medical Department, 1916).⁷⁹

UNIT REQUISITIONS

The organizations whose requests for medical supplies are classed under this heading were the detachments of Medical Department personnel attached to regiments, detached battalions, companies, divisional trains, and other like organizations of the line of the Army, and the component elements of the sanitary train, ambulance companies, and field hospital companies. The equipment provided in the Manual for the Medical Department for these medical detachments when the organizations to which they were attached operated as part of an assembled division consisted of the individual equipment of the Medical Department enlisted men and a combat equipment. Additional surgical dressings and a few litters were carried on the ammunition wagons.

The combat equipment was devised to meet the requirements of regiments of strength from 1,000 to 1,200 men. When the regiments were so increased in size during the fall of 1917 that a single battalion numbered 1,000 men, the number of combat equipments allowed a regiment was increased from 1 to 3. This provided one for each battalion.⁸⁰

In addition to the combat equipments, there was allowed a camp infirmary equipment for each regiment. Eight such infirmary equipments were allowed an Infantry division.⁸¹

It was contemplated that the surgeons of regiments, separate battalions, trains, and other organizations would keep their supplies and equipment replenished by timely requisitions.⁸² It had been contemplated that a certain number of the camp infirmary equipments issued to a division would be held in reserve by the officer in charge of medical supplies and placed under the immediate charge of the director of ambulance companies.⁸³ It was also contemplated that, in time of combat, the expenditure of dressings, etc., from the equipment of regimental organizations would be replenished from the reserve supplies of the nearest ambulance company.⁸⁴

The complete medical unit equipment of an Infantry division at war strength in 1918 consisted of the following:

Division surgeon's office (par. 884).....	number..	1
Division medical supply office.....	do.....	1
Field desk No. 1 complete.....	do.....	1
Typewriter.....	do.....	1
Blank forms and stationary as required.		
Combat equipments (par. 866) less pack saddles litters with slings, and ambulance boxes of surgical dressings.....	number..	29
Litters with slings.....	do.....	527
Surgical dressings, ambulance boxes of (par. 954).....	do.....	203
Veneral prophylaxis units (par. 958).....	do.....	30
Ambulance company:		
Motorized (par. 874 modified).....	do.....	3
Animal-drawn (par. 874).....	do.....	1
Field hospital company:		
Motorized (par. 879 modified).....	do.....	3
Animal-drawn (par. 879).....	do.....	1
Camp infirmaries (par. 869).....	do.....	8
Camp infirmary reserve (par. 871).....	do.....	8
Chest medical and surgical (par. 932).....	do.....	1
Chest medical and surgical, supplementary (par. 933).....	do.....	1
Box, pack mule, empty ⁸⁵	do.....	1
Box surgical dressings (par. 955).....	do.....	1

This equipment was distributed in the division as follows: 1 camp infirmary and camp infirmary reserve to the headquarters of each regiment; 1 combat equipment, less litters, and ambulance boxes of surgical dressings to each battalion of the regiment and to each separate organization except the sanitary train and trench mortar battery; 1 veneral prophylaxis unit to each organization; 1 ambulance company equipment to each ambulance company; 1 field hospital equipment to each field hospital company.

Litters and ambulance boxes of surgical dressings were distributed as follows:

	Litters	Surgical dressings
Infantry regiment (Table 4).....	21 for each combat equipment. 6 for headquarters company. 3 for supply company. 4 for machine-gun company. Total, 76.	8 for each combat equipment. 3 for headquarters company. 1 for supply company. 2 for machine-gun company. Total, 30.
Field Artillery regiment, 3-inch, horse (Table 13).....	12 for each combat equipment. 4 for headquarters company. 2 for supply company. Total, 30.	4 for each combat equipment. 2 for headquarters company. 1 for supply company. Total, 11.
Field Artillery regiment, 6-inch howitzers (Table 17).....	Same as Field Artillery regiment, 3-inch, horse.	3 for each combat equipment 2 for headquarters company. 1 for supply company. Total, 12.
Regiment of Engineers (Table 29).....	16 for each combat equipment. 2 for headquarters company. Total, 34.	6 for each combat equipment. 1 for headquarters company. Total, 13.
Machine-gun battalion, 4 companies (Table 10).....	16 for each combat equipment. 8 for combat equipment.	6 for each combat equipment 3 for combat equipment.
Machine-gun battalion, 2 companies (Table 9).....		
Trench mortar battery (Table 21).....	3.	
Field signal battalion (Table 23).....	10 for combat equipment.	4 for combat equipment.
Train headquarters, military police (Table 24).....	7 for combat equipment.	3 for combat equipment.
Ammunition train (Table 25).....	13 for each combat equipment. Total, 26.	5 for each combat equipment. Total, 10.
Supply train (Table 26).....	9 for combat equipment.	4 for combat equipment.

Division headquarters, the equipment consists of the following: 1 medical and surgical chest; 1 medical and surgical chest supplementary; 4 litters with slings; 1 veneral prophylactic unit; 1 pack mule box No. 1, empty; 1 box surgical dressings (par. 955, M. M. D.) (contents only).

In addition to the above, there was provided by the Medical Department for each motorized ambulance company 12 motor ambulances, 1 spare-parts trailer, and 2 motor cycles with side cars, and for each motorized field hospital company, 3 motor cycles with side cars. The remainder of the transportation and equipment was obtained from the Quartermaster Corps.

Every organization of a division leaving the training camp for duty overseas was expected to have with it as personal baggage its complete combat equipment for use on the voyage. The camp infirmaries, camp infirmary reserves, and the equipment of ambulance companies and field hospitals were expected to be loaded with other organizational property.⁸⁵ All medical units with the division thereafter looked to the medical supply officer of the division for the replenishment of their supplies and equipment. That officer secured his supplies as previously described.

It was contemplated in regulations and such instructions as were issued from the Surgeon General's Office from time to time, that the requests of surgeons of divisional units for supplies would be scrutinized by the division or camp surgeon before the issue by the divisional or camp medical supply officer of the articles and quantities contained in such requests. No specific directions so to do were issued to division or camp surgeons. The method of issuing and conserving supplies was left to the judgment of the division surgeon, acting in conformity with the general principles enunciated in the Manual for the Medical Department. The practice in this matter was not altogether uniform in the different camps. As the duties of the division surgeon multiplied, matters pertaining to requisitions and the issue of supplies within the division came more and more to be delegated to the divisional medical supply officer. The chief object was the prompt and effectual supply of the units with a sufficient quantity of all articles authorized for issue to them.

REFERENCES

- (1) Memorandum from Chief of War College Division, General Staff, to Chief of Staff, May 4, 1917. Subject: Designation of camp sites for training new troops. On file, Record Room, A. G. O., Correspondence Files 2,593,945 (Old Files).
- (2) Annual Report of the Chief of the Reconstruction Division, W. D., 1918.
- (3) Manual for the Medical Department, U. S. Army, 1916, par. 596.
- (4) *Ibid.*, par. 594.
- (5) *Ibid.*, par. 597.
- (6) Letter from the Surgeon General to the medical supply officer, Philadelphia, Pa., Chicago, Ill., Atlanta, Ga., and St. Louis, Mo., August 7, 1917. Subject: Issue of field hospitals. On file, Finance and Supply Division, S. G. O., $\frac{531}{17}$.
- (7) Telegram from the Surgeon General to the Division Surgeon, Camp Logan, Tex., August 28, 1917. On file, Finance and Supply Division, S. G. O., $\frac{534-127}{2}$.
- (8) Letters from the Surgeon General, U. S. Army, to officer in charge, Medical Supply Depot, Atlanta, Ga., Chicago, Ill., Philadelphia, Pa., St. Louis, Mo., San Antonio, Tex., and San Francisco, Calif., August 13, 1917. Subject: Initial equipments to National Army camps. On file, Finance and Supply Division, S. G. O., $\frac{531-Misc.}{1}$.
- (9) G. O. No. 137, W. D., October 30, 1917.

- (10) Letter from the Surgeon General, U. S. Army (with two inclosures dated December 14, 1917), to the division surgeon, all camps, December 20, 1917. Subject: Equipment. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{78}$.
- (11) First indorsement from the Surgeon General, U. S. Army, to the division surgeon, 35th Division, Camp Doniphan, Fort Sill, Okla., October 9, 1917. Subject: Supplies. On file, Finance and Supply Division, S. G. O., $\frac{534\text{-123}}{25}$.
- (12) Letter from the Surgeon General, U. S. Army, to division surgeons, November 13, 1917. Subject: Equipment required by sanitary personnel. On file, Finance and Supply Division, S. G. O., $\frac{534}{30}$.
- (13) Letter from the Surgeon General, U. S. Army, to the officer in charge, Field Medical Supply Depot, Washington, D. C., March 21, 1918. Subject: Priority for shipment of web belts. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-750 W.}}{212}$.
- (14) Letter from the camp surgeon, Camp Shelby, Miss., to the Surgeon General, U. S. Army, October 5, 1917. Subject: Supplies for regimental infirmaries, and various indorsements thereon. On file, Finance and Supply Division, S. G. O., $\frac{534\text{-128}}{18}$.
- (15) Letter from Maj. Edwin P. Wolfe, M. C., to Lieut. Col. Henry D. Snyder, M. C., New York Medical Supply Depot, May 17, 1917. Subject: Mess tables for base hospitals. On file, Finance and Supply Division, S. G. O., 14,039-54.
- (16) Letter from the Surgeon General to the medical supply officer, New York, N. Y., July 3, 1917. Subject: Beds. On file, Finance and Supply Division, S. G. O., 14,039-200.
- (17) Letter from the Surgeon General to the medical supply officer, Chicago, Ill., May 29, 1917. Subject: Medical Supply Depot, Chicago Ill. On file, Finance and Supply Division, S. G. O., 14,823-A.
- (18) Letter from the Surgeon General to the department surgeon, Central Department, Chicago, Ill., June 8, 1917. Subject: Medical supplies. On file, Finance and Supply Division, S. G. O., 13,937-O.
- (19) Letter from Lieut. Col. E. P. Wolfe, M. C., to Maj. M. A. Reasoner, M. C., Chicago, Ill., August 11, 1917. Subject: Issue of initial equipment to camps. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-130}}{4}$.
- (20) Memorandum from chief clerk, Medical Supply Depot, St. Louis, Mo., to chief clerk, Finance and Supply Division, S. G. O., August 15, 1917. Subject: Field Units on hand. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-707}}{29}$.
- (21) Letter from the medical supply officer, New York, to the Surgeon General, August 7, 1917. Subject: Camps to be supplied with Wolfe base hospital units. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-539}}{52}$.
- (22) Annual Report of the Surgeon General, U. S. Army, 1918, 320.
- (23) Telegrams from camp medical supply officers, to the Surgeon General, U. S. Army, September 5, 6, 7, 1917, reporting degree of completeness of equipment. On file, Finance and Supply Division, S. G. O., under respective camp file numbers, for example, Camp Dix, $\frac{531\text{-123}}{6}$; Camp Meade, $\frac{531\text{-127}}{12}$.
- (24) Letter from the Surgeon General to the surgeon, base hospital, all National Army cantonments, August 10, 1917. Subject: Authorization of labor. On file, Finance and Supply Division, S. G. O., $\frac{531}{1}$.
- (25) Tables of Organization, United States Army, May 3, 1917, Table 36, Trains—Infantry Division—Sanitary.

- (26) Tables of Organization, United States Army, Series A, April 17, 1918, Table 28, Sanitary Trains.
- (27) Telegram from the Surgeon General, U. S. Army, to the officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., August 16, 1917. Subject: Motor ambulances and spare parts. On file, Finance and Supply Division, S. G. O., $\frac{713-446}{6}$.
- (28) Report of G. M. C. ambulances shipped from Motor Ambulance Supply Depot, Louisville, Ky., from August 24, 1917, to October 6, 1917. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{398}$.
- (29) Letter from the Director, Bureau of Medical Service, American Red Cross, Washington, D. C., to the Surgeon General, U. S. Army, April 26, 1917. Subject: Red Cross ambulance companies. On file, Record Room, S. G. O., 171,059.
- (30) Telegram from the Surgeon General, U. S. Army, to the commanding officers of various Red Cross ambulance companies. Subject: Enlistment Red Cross ambulance companies, July 31, 1917. On file, Record Room, S. G. O., 171,059-D.
- (31) Letter from Col. Edwin P. Wolfe, M. C., S. G. O., to Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., September 14, 1917. Subject: Motor ambulances and motor ambulance depot. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{54}$.
- (32) Compilation of shipments of motor ambulances from Motor Ambulance Supply Depot, Louisville, Ky., August 28, 1917, to December 31, 1917. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{130}$.
- (33) Letter from Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., October 9, 1917. Subject: Spare parts equipment. On file, Finance and Supply Division, $\frac{713-440}{99}$.
- (34) Letter from the Surgeon General, U. S. Army, to the officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., November 11, 1917. Subject: Motor ambulances. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{123}$.
- (35) First indorsement from the Surgeon General, to the commanding officer, Ambulance Company No. 33, U. S. Army Mobilization Camp, Syracuse, N. Y., October 18, 1917. Subject: Ambulance equipment. On file, Finance and Supply Division S. G. O., 22-33.
3
- (36) Pamphlet, Surgeon General's Office, issued December 1, 1917. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{104}$.
- (37) Letters from Maj. John P. Fletcher, M. C. Motor Ambulance Supply Depot, Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., May 27, 30, 1918. Subject: Spare parts trailers. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{340}$.
- (38) Information and Instruction Covering Equipment, Spare Parts, Repairs, and Maintenance for U. S. Standard Motor Ambulances and U. S. Standard Motor Cycles in the Service of the Medical Department, U. S. Army, Office of the Surgeon General, Washington, D. C., May 1, 1918. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{400}$.
- (39) Letter from the Surgeon General, U. S. Army, to the medical supply officer (all camps and cantonments), July 18, 1918. Subject: Monthly requisition for completing spare parts B equipments in ambulance spare parts trailers. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{400}$.

- (40) Maintenance Letters, Nos. 1 to 19, inclusive, Motor Ambulance Supply Depot, Louisville, Ky. On file, Finance and Supply Division, S. G. O., Louisville maintenance letters file, unnumbered.
- (41) Instructions, "Motor Ambulance Operation, Medical Department, U. S. Army." On file, Finance and Supply Division, S. G. O., $\frac{713-440}{400}$.
- (42) Supply letter No. 22, S. G. O., September 30, 1917. Subject: Motor vehicles—Gasoline lubricants, etc. On file, Finance and Supply Division, S. G. O., $\frac{531-Misc.}{39}$.
- (43) Changes No. 7, 1916 Supplement to the Compilation of Orders, 1881-1915, Washington, March 14, 1918.
- (44) Letter from the Surgeon General, U. S. Army, to the officer in charge, Field Medical Supply Depot, Washington, D. C., July 31, 1917. Subject: Motor cycles. On file, Finance and Supply Division, S. G. O., 14, 101-105.
- (45) Letters from the Surgeon General, U. S. Army, to the officers in charge, Medical Supply Depots, Atlanta, Ga., Philadelphia, Pa., Louisville, Ky., San Antonio, Tex., and San Francisco, Calif., July 31, 1917. Subject: Motor cycles. On file, Finance and Supply Division, S. G. O., 15, 101-105.
- (46) Letters from officers in charge, Medical Supply Depots, Atlanta, Ga., Philadelphia, Pa., San Antonio, Tex., and San Francisco, Calif., to the Surgeon General, U. S. Army, during September, 1917. Subject: Motor cycles. On file, Finance and Supply Division, S. G. O., 14, 101-105.
- (47) Weekly reports, Motor Ambulance Supply Depot, Louisville, beginning August, 1917. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{398}$.
- (48) Letter from the Surgeon General, U. S. Army, to the officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., October 18, 1917. Subject: Issue of motor cycles. On file, Finance and Supply Division, S. G. O., 531-Misc.
- (49) Letters from the Surgeon General, U. S. Army, to the division surgeon, all camps, October 18, 1917. Subject: Motor cycles. On file, Finance and Supply Division, S. G. O., $\frac{531-Misc.}{58}$.
- (50) Based on reports from camp surgeons. On file, Historical Division, S. G. O.
- (51) Letters from the Surgeon General to department surgeons in the United States, June 8, to August 5, 1917. Subject: Distribution of medical supplies. On file, Finance and Supply Division, S. G. O., 13, 937-0.
- (52) Letter from the Surgeon General to medical supply officer, Philadelphia, Pa., September 18, 1917. Subject: Portable dental outfits. On file, Finance and Supply Division, S. G. O., $\frac{531-123 Devens.}{17}$.
- (53) Telegram from the Surgeon General to division surgeon, Camp Dodge, Iowa, September 15, 1917, authorizing the purchase of five sets of supplies for portable dental outfits, less chairs. On file, Finance and Supply Division, S. G. O., $\frac{531-123}{22}$.
- (54) Second indorsement from the Surgeon General to the surgeon, Southern Department, September 27, 1917, relative to dental supplies for that department. On file, Finance and Supply Division, S. G. O., $\frac{713-641}{28}$.
- (55) First indorsement from hospital division, S. G. O., to finance and supply division, S. G. O. Subject: Dental infirmaries. On file, Record Room, S. G. O., 632 (Dental Infirmaries).
- (56) Seventh indorsement from the Surgeon General to the division surgeon, Camp Taylor, Ky., October 30, 1917. Subject: Dental supplies. On file, Finance and Supply Division, S. G. O., $\frac{531-129 Taylor.}{19}$.

- (57) Letter from the Surgeon General to the division surgeon, all National Army camps, December 12, 1917. Subject: Dental outfits. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{76}$.
- (58) Telegrams from camp surgeons to the Surgeon General, June 12, 1918, to July 24, 1918, relative to installing dental equipment. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{119}$.
- (59) Correspondence between the Surgeon General and the various division surgeons during May, 1918. Subject: Dental equipment. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{114}$.
- (60) Letter from The Adjutant General to the Surgeon General, March 26, 1918. Subject: Dental personnel attached to division. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{108}$.
- (61) Correspondence between the Surgeon General and camp surgeons during July to September 1918. inclusive. Subject: Dental supplies. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{130}$.
- (62) Letter from the Surgeon General to the officer in charge, medical supply depot, St. Louis, Mo., August 17, 1917. Subject: Issue of veterinary supplies. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-707}}{26}$.
- (63) Letter from the Surgeon General to the medical supply officer, San Antonio, Tex., August 17, 1917. Subject: Issue of veterinary supplies. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-641}}{6}$.
- (64) Letter from the Surgeon General to the medical supply officer, San Francisco, Calif., August 17, 1917. Subject: Issue of veterinary supplies. On file, Finance and Supply Division, S. G. O., $\frac{534}{10}$.
- (65) Letter from the Surgeon General to the medical supply officer, St. Louis, Mo., September 17, 1917. Subject: Veterinary supplies. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-707}}{94}$.
- (66) Letter from the Surgeon General to the medical supply officer, St. Louis, Mo., September 17, 1917. Subject: Issue of veterinary supplies to San Francisco. On file, Finance and Supply Division, S. G. O., $\frac{713\text{-707}}{94}$.
- (67) Letter from the Surgeon General to all division surgeons, medical supply officers, San Francisco, Calif., San Antonio, Tex., St. Louis Mo., Philadelphia, Pa., and Atlanta, Ga., December 20, 1917. Subject: Paragraph 968, Manual for the Medical Department, 1916. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{79}$.
- (68) Fourth indorsement of the Surgeon General to the Quartermaster General, September 27, 1917. Subject: Mallein. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{14}$.
- (69) Correspondence between the Surgeon General and the department surgeon, Southern Department, September and October, 1917. Subject: Mallein. On file, Finance and Supply Division, S. G. O., $\frac{188\text{-641 S. A.}}{321}$.
- (70) Letter from the Chief, Bureau of Animal Industry, Department of Agriculture, to Col. C. F. Morse, M. C., Director of Veterinary Service, Office of the Surgeon General, September 21, 1918. Subject: Personnel for the production of mallein. On file Record Room, S. G. O., 220.3 (Assign Bureau of Animal Industry, Washington, D. C.) F.

- (71) Third indorsement of the Surgeon General to the medical supply officer, St. Louis, Mo., October 31, 1917, relative to veterinary saddlebags. On file, Finance and Supply Division, S. G. O., $\frac{713-707}{75}$.
- (72) Third indorsement of the Surgeon General to the Division Surgeon, Camp Lee, Va., January 25, 1918, relative to shortage of equipment at the auxiliary remount depot at that camp. On file, Finance and Supply Division, S. G. O., $\frac{531-127-Lee}{148}$.
- (73) Paragraph 477-481, Manual for the Medical Department, 1916.
- (74) Paragraph 482-488, Manual for the Medical Department, 1916.
- (75) Letters from the Surgeon General to department surgeons, Eastern Department, Central Department, Northeastern Department, Southeastern Department, and Western Department, April 3, 1917. Subject: Requisitions. On file, Finance and Supply Division, S. G. O., 13,969-S.
- (76) Letter from the Surgeon General to all department surgeons in the United States, May 25, 1917. Subject: Divisional hospital and dental supplies. On file, Finance and Supply Division, S. G. O., 13,969-Z.
- (77) Letter from the Surgeon General to all division surgeons, November 16, 1917. Subject: Requisitions and purchases of supplies. Copy on file, Historical Division, S. G. O.
- (78) Report from medical supply officer, Camp Upton, N. Y., to the Surgeon General, August 3, 1918. Subject: Monthly report of working of medical supply depot. On file, Finance and Supply Division, S. G. O., $\frac{531-129 Upton}{120}$.
- (79) Letter from The Adjutant General to all department and camp commanders, ports of embarkation, bureau chiefs, and excepted places, September 27, 1918. Subject: medical supplies as baggage with troops embarking for service overseas. On file, Finance and Supply Division, S. G. O., $\frac{531-Misc.}{100}$.
- (80) Memorandum from Colonel Wolfe to personnel division, Surgeon General's Office, December 19, 1917. Subject: Organization equipment. On file, Finance and Supply Division, S. G. O., $\frac{534-127 Logan}{39}$.
- (81) Personal letter from Col. Edwin P. Wolfe, M. C., to Col. Levy M. Hathaway, M. C., Camp Logan, Tex., November 16, 1917. Subject: Camp infirmaries. On file, Finance and Supply Division, S. G. O., $\frac{534-127 Logan}{39}$.
- (82) Manual for the Medical Department, U. S. Army, 1916, paragraph 634 (g).
- (83) Ibid., paragraphs 658-659.
- (84) Ibid., paragraph 633 (f).
- (85) First indorsement from the Surgeon General to the division Surgeon, Camp Devens, Mass., June 8, 1918. Subject: Medical supplies. On file, Finance and Supply Division, S. G. O., $\frac{531-123 Devens}{221}$.

CHAPTER XXXI
SPECIAL SUPPLIES
LABORATORY SUPPLIES

Prior to the World War the Medical Department maintained laboratories at the Army Medical School, Washington, D. C.; Fort Leavenworth, Kans.; Fort Sam Houston, Tex.; Letterman General Hospital, San Francisco, Calif.; Honolulu, Hawaii Territory; and at Manila, P. I.¹ Of these, the laboratory at the Army Medical School was the largest and most elaborately equipped. That at Fort Sam Houston was next in importance because of the amount of work done and the number of troops it served.¹ The amount of this kind of work done and the number of officers specializing in laboratory procedures had increased from year to year. At the largest military posts, also, laboratory work was done to some extent as the time, abilities, and inclinations of the local medical officers demanded.

To meet the requirements of the laboratory service, a list of laboratory supplies and equipment, with allowances for posts of various sizes, had been added to the standard supply table, 84 items being listed under this head.² The articles in this list served their purpose very well for the laboratories at the larger military posts, but were supplemented at the department laboratories by more extensive and elaborate equipment obtained on special requisition.

A consideration of the number of troops assigned to the various training camps at the beginning of the World War indicated that the amount of bacteriological and serological work to be done at each such camp would be equal to that performed at the larger department laboratories. It was evident that the list of articles in the standard supply table needed revision, augmentation, and standardization. This revision was completed in the early part of June, 1917.³ Instructions were given the officer in charge, medical supply depot, New York, during the same month to purchase and issue to each of the 32 division training camps a complete set of equipment in accordance with that list.³

The revised list not proving entirely adequate, a number of other items were added and instructions were given, September 22, 1917, for their issue to all camps.⁴ As the requirements of the laboratory service grew, even this equipment proved insufficient, and additional equipment was authorized.

The initial laboratory equipment and its additions were supplied to all camps without requisition. Replenishment and new articles were obtained thereafter on requisition. Delays in the delivery of this equipment were numerous. Issues were made as fast as the supplies could be had from the manufacturers.

BIOLOGICALS

The initial equipment of medical supplies for National Army and National Guard camps made no provision for smallpox vaccine and other biologicals, or for typhoid-paratyphoid vaccine. It was intended originally to have the distribution of smallpox vaccine made from the distributing medical supply depots upon instructions issued by department surgeons. General Orders, No. 96, War Department, July 20, 1917, however, divested department surgeons as well as other chiefs of services at department headquarters of all authority over the supply of the camps, and made necessary a change in the policy.

SMALLPOX VACCINE

The plan adopted in the Surgeon General's Office for providing the initial supply of vaccines at the National Army camps differed in some respects from that employed at National Guard camps. Because of the probability that none of the men directed to report at the National Army camps for induction into the military service had previously been immunized against the typhoid group of diseases, and that very few of them had been vaccinated against smallpox within recent years, all would require immunization against both groups. The number of men to be assembled at each National Army camp had been determined by the War Department and the strength of the different camps furnished the several supply bureaus. From these numbers the quantities of vaccine required at each camp readily were determined.

Because of the vast quantity of smallpox vaccine required to protect the number of men being called to the colors, it became advisable to allot to each of the several biological manufacturers producing smallpox vaccine quantities commensurate with their abilities to produce. The United States was districted and a certain number of camps, posts, and stations were assigned to each producer to supply. Instructions were issued by the Surgeon General on August 19, 1917, in the following form, to the different producers of smallpox vaccine.⁵

The following National Army camps have been allotted to your firm for the purpose of furnishing smallpox vaccine, as listed below:

Name of camp	Location	Quantity
Camp Jackson.....	Columbia, S. C.....	40,800
Camp Custer.....	Battle Creek, Mich.....	36,100
Camp Dodge.....	Des Moines, Iowa.....	22,350

* One-half of the vaccine should reach the camp on Sept. 1, and the balance on Sept. 15, 1917.

The vaccine should be fresh; should be furnished in capillary tubes and shipped in ice. It should be plainly labeled "Smallpox vaccine—keep in cold storage."

The shipments should be plainly addressed to the "Medical Supply Officer, United States Army, National Army Camp," giving address as indicated above. Promptly inform the medical supply officer at the camp the date and method of shipment in order that he may be on the lookout for it. A carbon copy of your letter should also be furnished to this office for its information.

This office should be promptly informed whether you are in a position to furnish smallpox vaccine in the quantities indicated on the dates mentioned. It is imperative that

the vaccine shall be on hand at the camps, in good condition, on these dates, and in case no reply is received from you within a reasonable time, the allotments above referred to will be made to some other firm.

The stipulation in these instructions that the vaccine be shipped in ice was inserted because of the essentially perishable nature of the product. Exposure to room temperature for even a few days during August would be sufficient to render the product inert. It was necessary, too, that it be kept in cold storage while in the camp pending its use. In order that suitable facilities might be available at the camp upon the arrival of the vaccine and that it would be properly preserved, instructions were issued, August 20, to all camps. The following instructions to the medical supply officer, Camp Lewis, Wash., with suitable changes in name of firm, quantity of vaccine, and name of consignee, are identical with those sent to all National Army camps.⁶

1. The Cutter Laboratories have been instructed to send you by express, packed in ice, 46,800 capillary tubes of smallpox vaccine. One-half of this quantity will be sent in time to reach you September 1 and the balance September 15. The packages will be made "Medical Supply Officer, United States National Army, Camp Lewis, American Lake, Wash." The firm has been instructed to write you on the day the shipment is made, in order that you may be on the lookout for it.

2. It is imperative that this vaccine should be kept in cold storage until used, and in case the facilities are not already on hand you are authorized to purchase the necessary ice box and ice. It is presumed, however, that arrangements can be made to keep this vaccine in a quartermaster ice box.

A large percentage of the National Guard troops had been in the Federal service during the previous year and already had been vaccinated. It could not, for this reason, be determined in the Surgeon General's Office just how much smallpox vaccine would be required at the National Guard camps. A different procedure became necessary for those camps. Each individual camp was allotted to a definite manufacturer, who was to supply it with vaccine upon receipt of telegraphic information from the camp medical supply officer, of the quantity and date required. Instructions covering the ordering of smallpox vaccine with the name of the producer designated to supply it were issued to the medical supply officers at all National Guard camps by the Surgeon General August 20. The following instructions to the medical supply officer, Camp McClellan, Anniston, Ala., with suitable change in the name of the firm designated to supply the camp, are typical of those sent to all National Guard camps.⁷

1. The Lederle Laboratories, 170 Williams Street, New York City, have been designated to furnish you with the quantity of smallpox vaccine necessary to vaccinate the unprotected troops in your camp.

2. You should telegraph to the above-mentioned company at the earliest possible moment the total number of capillary tubes of smallpox vaccine which will be required for this purpose, in order that the biological firm may make appropriate arrangements to ship the vaccine in ample time to reach your camp when needed. In case you desire to have the vaccine shipped in two lots you should so inform the company, stating the dates upon which it should arrive at the camp. The company has been instructed to ship the vaccine packed in ice, and to have it plainly labeled "Smallpox vaccine—keep in cold storage." It will be addressed to the "medical supply officer" at the camp, and the Lederle Laboratories have been instructed to write you on the date of shipment, in order that you may be on the lookout for it.

3. It is imperative that this vaccine should be kept in cold storage until used, and in case the facilities are not already on hand, you are authorized to purchase the necessary ice box and ice. It is presumed, however, that arrangements can be made to keep this vaccine in a quartermaster ice box.

4. The biological firm has been instructed to render bills to your office, and you should forward vouchers to this office in the usual manner.

Reports received from the various medical supply officers during September and October, 1917, at all National Army and National Guard camps indicated that satisfactory vaccine had been received in good condition. Shipments were made in ice in accordance with instructions and arrived at camp within 24 hours of the date specified in the instructions.⁸

TYPHOID-PARATYPHOID VACCINE

All the typhoid and paratyphoid vaccine issued to the Army during the World War was prepared and placed in ampoules in the laboratory of the Army Medical School, Washington, D. C. In July, 1917, instructions for the distribution of this vaccine were issued, after decision had been reached by the War Department concerning the locations of the various camps and the number of men to be assigned to each.⁹ It was assumed that none of the men to be sent to the National Army camps had previously been immunized against either typhoid or paratyphoid fever. Accordingly, the combined typhoid and paratyphoid vaccine was sent to these camps. This vaccine was commonly known as triple typhoid because it contained three types of bacilli of the typhoid group, typhoid, paratyphoid A, and paratyphoid B. The instructions covering the issue of this vaccine contemplated that a sufficient quantity of triple typhoid would be sent to each National Army camp to immunize the number of men to be inducted at the particular camp. This vaccine was expected to arrive at the camp before September 1, 1917. At the same time, instructions were issued by the Surgeon General to place a stock of this vaccine in certain medical supply depots, 30 liters at Philadelphia and 50 liters at Atlanta.

In keeping with this policy of having smallpox and typhoid-paratyphoid vaccine on hand at these camps in usable condition upon the arrival of the troops, instructions were sent by the Surgeon General to the several supply depots on August 2, 1917, to issue a large standard refrigerator to each camp.¹⁰ Shipment was to be made in sufficient time for the refrigerators to arrive at the camps not later than August 25. On the same date the surgeon at the camp was informed of the contemplated shipment of vaccines and refrigerator and was authorized to purchase the necessary ice for the preservation of vaccines and sera.¹¹

It was known that many of the men assigned to the National Guard camps had received preventive inoculation against typhoid fever while in camp during the mobilization on the Mexican border the previous year. Some of them, too, had received paratyphoid immunization during that period. It could not be determined, therefore, how many men to be sent to any National Guard camp had been immunized against one or both diseases. Consequently the commandant, Army Medical School, was instructed, July 30, to issue to the medical supply officer at all National Guard camps, 10 liters of paratyphoid vaccine and 10 liters of the combined typhoid-paratyphoid vaccine.¹² The

same provision for the preservation of these vaccines and sera was made at the National Guard camps as at the National Army cantonments. It was contemplated that vouchers for the ice procured for the preservation of biologicals would be prepared by the camp medical supply officer and forwarded to the Surgeon General's Office for payment.¹³

Replacements of the typhoid-paratyphoid vaccine were to be obtained upon requisitions sent to the department surgeons, who were to instruct the medical personnel under their respective jurisdictions accordingly. Department surgeons could depute authority, if they chose, to the division surgeons at the camps to call directly upon the distributing depot designated to supply their respective camps.¹⁴

OTHER BIOLOGICALS

It early became evident that biological products other than smallpox vaccine and typhoid-paratyphoid vaccine would be required at the camps. Measures were undertaken early in September to arrange for the supply of diphtheria antitoxin, tetanus antitoxin, antimeningitis serum, antipneumococcus serum and antistreptococcus serum, all for human use.¹⁵ Provision was made also for tetanus antitoxin and antistreptococcus serum for veterinary use.

The country was districted and the various camps distributed among the biological producers to supply in accordance with the products prepared by them.¹⁵ Some producers could supply only smallpox vaccine, diphtheria antitoxin, and tetanus antitoxin. Other producers could furnish other products also. One or two producers could supply the entire list. Arrangements were made during September, 1917, with the producers to establish a depot or deposit of the products assigned them near the camps which they had been selected to supply. A minimum stock for each article to be kept in these local depots was prescribed. The camp medical supply officers were notified of the arrangement and instructed to call upon the designated producers from time to time for such biological products as were needed at the camp. The producers were required to have properly preserved the biological products at these subdepots and to keep the respective medical supply officers informed of their location. It was further required that bills for supplies furnished should be rendered monthly to the camp supply officer.

The various camp medical supply officers were instructed, October 5, 1917, to maintain in their respective depots a small stock of the biological products mentioned above for emergency use.¹⁶ This was done in order that a small quantity might be available for immediate use while awaiting the arrival of supplies ordered as the emergencies arose. Twenty vials of antimeningitis serum were ordered to each camp for emergency use. Medical supply officers at the camps were instructed not to let this quantity fall below five vials and to forward to the Surgeon General's Office a telegraphic request for an additional supply immediately upon the appearance of meningitis in the camp, stating the probable number of suspects.

SPECTACLES

Of the various procedures adopted by surgeons and specialists to remedy physical defects traceable to the ocular apparatus, this volume is concerned in those only which required the purchase of special equipment or supplies for

their correction. Defective vision was the most important of these from a supply standpoint. The War Department directed the Medical Department, April 15, 1918, to furnish spectacles without charge to enlisted men who required them.¹⁷ Arrangements were made with various optical supply houses to furnish spectacles upon proper orders or requests from the medical supply officers. The country was districted and certain areas, with all the troops therein, were assigned to particular optical companies for supply. These companies had all agreed to furnish spectacles, frames, and cases at a definite fixed price according to the lenses required. The manner in which the enlisted man would obtain his spectacles was published to all concerned in the following letter:

WAR DEPARTMENT,
OFFICE OF THE SURGEON GENERAL,
Washington, July 11, 1918.

From: The Surgeon General.
Subject: Spectacles.

1. Paragraph VII, G. O. 35, W. D., C. S., provides as follows:

"During the present emergency lenses for the correction of visual defects, and suitable frames therefor, will, when prescribed by medical officers (or by civilian physicians employed under proper authority), be issued without charge by the Medical Department to all enlisted men who have been definitely accepted for the military service. They will not be issued to recruits who for any reason are about to be discharged from the service."

"The soldier's receipt for the lenses and frames will be taken by the issuing officer in each instance, and will be the medical officer's voucher for dropping them from his return of medical property."

"Should the lenses or frames be subsequently damaged, lost, or destroyed, while in the soldier's possession and without fault on his part, they will be repaired or replaced without charge by the Medical Department. Should they be damaged, lost, or destroyed through fault on the part of the soldier, they will be repaired or replaced by the Medical Department and the cost, repair, or replacement will be collected by stoppage against the soldier's pay."

2. Spectacles conforming to the following specifications will be purchased thereunder and issued to enlisted men at public expense:

(a) Lenses: Flat, white, round, 40 mm. in diameter.

(b) Frames: White metal, best stiff construction, 40 mm. round eye, special 0.055 inch full length, cable temple 6½-inch, split joint end piece 0.072 inch eye wire, known to the trade as No. 5468, American Optical Co.

(c) Case: All metal, unlined, Japanned, of suitable size to hold spectacle frames with 40 mm. round eye.

Prescriptions will not call for fractions smaller than one-fourth diopter.

3. While no other type of spectacles is authorized for issue at public expense, the soldier may if he prefers, be permitted to purchase at his own expense such other type of frame as he may desire. They may be purchased through the post exchange at cost plus 10 per cent. The requirement as to size of eye must be observed, because this is the only size lens being supplied overseas.

4. Prescriptions will be forwarded by the medical supply officer of the camp where their is such an officer, or by the commanding officer of the hospital, or surgeon of the post, camp, or station where the soldiers are being treated, to the optical company designated for its territory, daily or at such regular periods as may be to best interest to the service. Vouchers for spectacles furnished should be prepared monthly on War Department Form 330 or 330-a and sent through proper channels for payment. If itemized bills be rendered by the vendors on their own billheads, certified "correct and just, payment not received," and signed by proper representatives of the vendors, the same may be attached to the official vouchers. In which event the vendor's certificate on the voucher need not be signed. The purchasing officers should certify in general terms on the vouchers for the lump sums of the bills

attached thereto. Otherwise the bills must be itemized on the official forms and be certified thereon by both the vendors and the purchasing officers. The vouchers should be accompanied in each case by one copy of purchase invoice, Form 12.

5. A list of prices to be paid for the spectacles will be published by this office from time to time. The prices are gross, subject to discount of 6 per cent for payment within the month following the rendition of bill for spectacles furnished.

The vouchers should be certified at the list prices, summing up the total thereat, and deducting from such total the 6 per cent discount, thus producing the net total due; and to justify taking the discount must be forwarded within three days after the end of the month in which the spectacles were received.

6. The optical company designated to supply the spectacles will forward them by mail. Immediately upon their arrival in each case they should be examined to determine whether the prescription has been correctly filled; and if found correct, delivered to the soldier for whom they were prescribed, taking his formal receipt for the same, which will be filed with the issuing officer's property papers. The issues will be dropped monthly on an expenditure voucher, per form attached, to be supplied as form 18-a as soon as practicable, one copy of which will be forwarded with purchase vouchers to the Surgeon General, a duplicate being retained by the accountable officer. The receipts taken from the soldiers will be attached to the retained copy of form 18-a so that they may be checked by the inspectors from time to time.

7. Officers, nurses, and civilian employees are not furnished with spectacles at public expense, but may purchase them through the post exchange.

Price lists were furnished all camps and stations. These prices changed from time to time and new price lists were furnished for those which they superseded.¹⁸ The particular optical company was furnished a list of the camps and stations from which it might expect orders for spectacles.¹⁹ The several optical companies were informed of the type of spectacles to be furnished and the manner in which they would be ordered and paid for, as follows:

Your company has been selected to supply spectacles to all troops and military stations in Washington, Oregon, Idaho, and the western half of Montana.

The spectacles to be supplied must be in accordance with the following specifications:

(a) Lenses: Flat, white, round, 40 mm. in diameter.

(b) Frames: White metal, best stiff construction, 40 mm. round eye, special 9.055 inch full length, cable temple $6\frac{1}{2}$ inches, split joint end piece 0.072 inch eye wire, known to the trade as No. 5468 American Optical Co.

(c) Case: All metal, unlined, japanned, of suitable size to hold spectacle frames with 40 mm. round eye.

Prescriptions will not call for fractions smaller than one-fourth diopter.

The prices to be paid on single frames for prescription, 40 cents each; lenses and cases at regular wholesale rates, not to exceed those quoted on pages 46 and 47 of F. A. Hardy & Co. 1917 catalogue, copy herewith. These prices to be subject to 6 per cent discount if paid during the month following purchase. Any changes in regular wholesale price should be promptly communicated to this office for publication to the military service.

The prescriptions will be forwarded to you by the supply officer at the various camps and cantonments and by the surgeon at posts and other stations within the district to be supplied by you. The finished spectacles in cases, accompanied by individual invoices, are to be forwarded direct to the officer sending in the prescription. An itemized statement for all supplies furnished during the month must be forwarded on the last day thereof to each officer ordering them. In order to insure prompt payment, these itemized statements must bear the certificate "Correct and just, payment not received," over the signature of an officer of your company authorized to accomplish such instruments. Payment will be made from this office.

In order to insure that the lenses would remain in correct position, or if they became turned in the frame they could be correctly replaced by the

person making repairs or by the wearer himself, the optical company supplying the largest number of spectacles sent out to all medical supply officers the following form letter and caution notice:²⁰

In accordance with instructions received from the office of the Surgeon General in Washington, D. C., all cylindrical and spherocylindrical lenses as supplied in "Issue frame No. 5468," or in any frame in which round lenses are used, will in the future be marked with a small diamond scratch on the inside or side next the eye when glasses are being worn, at outer edge at temple joint, as shown in drawing printed on the back of this sheet, so as to indicate the proper position for lenses in frame on a straight line through lenses horizontally.

All lenses fitted in frames when received from us should be so exactly fitted as to preclude the possibility of the lens turning in the frame unless the screw holding the eye wire and temple is loosened or removed, and it is requested that any spectacles in which the lenses are not so snugly fitted be returned to us with complaint for our inspection and correction.

The object of marking lenses as shown and above noted is so that if in any way the lenses become turned in the frame, either through accident or because of necessity of loosening screws for repair purposes, they may be correctly replaced either by the person making repairs or the wearer himself.

In further compliance with instructions from the Office of the Surgeon General, we are sending to you in padded form slips as per the inclosed "Caution notice," one of which it is requested be handed to each wearer of "issue" glasses No. 5468 or any round-frame glasses containing cylindrical or spherocylindrical lenses marked as shown and above described, with explanation as to the necessity for the lenses being in the proper position so as to properly correct the vision.

Additional pads will be sent to you upon request, or we will honor your requisition for any number that you desire to have on hand to answer your individual requirements.

The wording and form of this communication and "Caution notice" has been approved by the Office of the Surgeon General and both are sent to you by instructions received therefrom.

CAUTION NOTICE

To properly correct your vision, lenses containing cylinders for the correction of astigmatism must be held in exact position in frame.

Lenses should be so snugly fitted that they can not turn in frame unless screw holding eye wire is loosened, and it should not be loosened except for necessary repair purposes.

So that lenses may be properly replaced, if either by accident or for repair purposes they may be turned or removed, each lens containing cylinder is scratched on the inside or side next the eye when glasses are being worn, as shown in drawing on reverse side hereon, and must be replaced so that the scratch is in identically the position as there shown, on a straight line through the center of lenses horizontally.

Department surgeons of all departments in the United States were furnished copies of letters of instruction on the subject July 13, 1918, for distribution by them to all stations in their respective departments.²¹ They were instructed to notify the various stations within their departments of the optical houses to which they should send their orders for spectacles.

REFERENCES

- (1) Annual Report of the Surgeon General, U. S. Army, 1916, 181-193.
- (2) Manual for the Medical Department, U. S. Army, 1916, par. 846.
- (3) Letter from the Surgeon General, U. S. Army, to the officer in charge, Medical Supply Depot, New York, N. Y., June 30, 1917. Subject: Laboratory supplies, and its inclosure. On file, Finance and Supply Division, S. G. O., 531-Misc.
36

- (4) Letter from the Surgeon General, U. S. Army, to the officer in charge, Medical Supply Depot, New York, N. Y., September 22, 1917. Subject: Laboratory supplies. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{36}$.
- (5) Letter from the Surgeon General, U. S. Army, to Parke, Davis & Co., Baltimore, Md., August 19, 1917. Subject: Smallpox vaccine to camps. On file, Finance and Supply Division, S. G. O., $\frac{531}{8}$.
- (6) Letter from the Surgeon General, U. S. Army, to the medical supply officer, Camp Lewis, American Lake, Wash., August 20, 1917. Subject: Smallpox vaccine. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{4}$.
- (7) Letter from the Surgeon General, U. S. Army, to the medical supply officer, National Guard Mobilization Camp, Camp McClellan, Anniston, Ala., August 20, 1917. Subject: Smallpox vaccine. On file, Finance and Supply Division, S. G. O., $\frac{534\text{-Misc.}}{3}$.
- (8) Letters from medical supply officers, National Army camps and National Guard camps, to the Surgeon General, during September and October, 1917. Subject: Smallpox vaccine. On file, Finance and Supply Division, S. G. O., $\frac{534}{4}$ and $\frac{534}{3}$.
- (9) Letter from the Surgeon General, U. S. Army, to the commandant, Army Medical School, July 30, 1917. Subject: Typhoid and paratyphoid vaccine for National Army cantonments. On file, Finance and Supply Division, S. G. O., 15,572-5.
- (10) Letters from the Surgeon General, U. S. Army, to medical supply officers, New York, N. Y.; St. Louis, Mo.; Chicago, Ill.; San Francisco, Calif.; Atlanta, Ga.; and San Antonio, Tex., August 2, 1917. Subject: Refrigerators. On file, Finance and Supply Division, S. G. O., 15,572-14.
- (11) Letters from the Surgeon General, U. S. Army, to camp surgeons, all National Army camps, August 2, 1917. Subject: Refrigerators. On file, Finance and Supply Division, S. G. O., 15,572-14.
- (12) Letter from the Surgeon General, U. S. Army, to the commandant, Army Medical School, Washington, D. C., July 30, 1917. Subject: Paratyphoid vaccine and combined typhoid and paratyphoid vaccine. On file, Finance and Supply Division, S. G. O., 15,572-21.
- (13) Letter from the Surgeon General, U. S. Army, to medical supply officers, all National Army camps, August 6, 1917. Subject: Purchase of ice. On file, Finance and Supply Division, S. G. O., 15,572-25.
- (14) Letters from the Surgeon General, U. S. Army, to all department surgeons in the United States, July 30, 1917. Subject: Smallpox, typhoid, and paratyphoid vaccine. On file, Finance and Supply Division, S. G. O., 15,572-5.
- (15) Letters from the Surgeon General, U. S. Army, to the various biological manufacturers, September 21, 1917. Subject: Biological products. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{34}$.
- (16) Letters from the Surgeon General, U. S. Army, to medical supply officers, all camps, November 2, 1917. Subject: Biological products. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{34}$.
- (17) G. O. No. 35, W. D., April 15, 1918.
- (18) Circular letter, Surgeon General's Office, September 9, 1918. Subject: Revised price list of spectacles. On file, Finance and Supply Division, S. G. O., $\frac{531\text{-Misc.}}{122}$.

- (19) Letter from the Surgeon General to Southwestern Optical Co. El Paso, Tex., June 25, 1918. Subject: Spectacles. On file, Finance and Supply Division, S. G. O., 531-Misc.
122
- (20) Letter from F. A. Hardy & Co., Chicago, Ill., to supply officer, Surgeon General's Office, October 24, 1918. Subject: Making of cylindrical lenses in spectacles. On file, Finance and Supply Division, S. G. O., 531-Misc.
122
- (21) Letters from the Surgeon General, to all department surgeons, July 13, 1917. Subject: Spectacles. On file, Finance and Supply Division, S. G. O., 531-Misc.
122

SECTION VI
HOSPITAL SUPPLIES AND EQUIPMENT
CHAPTER XXXII
HOSPITAL FURNITURE AND EQUIPMENT

For many years the congressional appropriations made for the Medical Department have been sufficiently expansive to provide for every requisite in the way of movable furniture required in Army hospitals, from office equipment to dining-room furniture and kitchen equipment. They have been broad enough to cover also every kind of technical apparatus used in any way in the treatment of the sick in connection with duties of officers, nurses, and enlisted men of the Medical Department. In addition to the various articles of furniture used during the World War, which are considered below, certain articles of equipment not otherwise covered are considered. The list of the initial equipment appears at the end of the chapter.

BEDSTEADS

For years prior to the World War, the Standard bed of the Medical Department has been a three-piece hospital bed of rigid construction, comprising head and foot ends and a fabric frame. (A T-frame also was provided at each end for supporting a mosquito bar.) The National fabric was used for the most part, and the springs were sufficiently heavy to keep the fabric taut at all times and yet allow them to give under the weight of a patient. The fabric frame consisted of side bars of heavy tubing, attached to the cross-pieces by malleable casting. The locking device which bound the fabric frame to the head and foot ends had three binding surfaces and the added weight and use served only to make the union more rigid. Since this particular type of lock was limited to one manufacturer, the early World War procurements, while continuing the three-piece idea, permitted the use of the particular type of locking device standard with the individual manufacturer. Other minor differences were also allowed, though the finish in white enamel and the standard height of the fabric from the floor were required. Because this bed was both bulky and heavy and was inconvenient for shipment, a type of bed with the same dimensions, but the angle-iron side rails and the head and foot pieces so arranged as to fold under the spring, was adopted by the Surgeon General, August 15, 1917.¹ Its lighter weight, greater compactness, and the attachment of end pieces to the body and withal its stability when set up made it very satisfactory for the purpose it was intended to serve. It both stored and shipped more easily than the three-piece bed and occupied much less space, which was a great consideration in shipments made overseas. The specifications follow:

SPECIFICATIONS OF FOLD-UNDER HOSPITAL BED

Ends.—Made of butt weld pipe, outside diameter 1.05 inch, bent to form continuous posts measuring $34\frac{3}{4}$ inches wide on outside. Head end to measure $42\frac{3}{4}$ inches high from floor. Foot end to measure $32\frac{1}{2}$ inches high from floor. Bottom of posts to be covered with steel cap. Head and foot ends to have one cross tube 0.084 inch diameter in each end just above fabric and one $\frac{7}{8}$ -inch steel cross rod in each end below fabric. Five filling rods in each end. Center filling rod to be $\frac{5}{8}$ -inch tubing with two $\frac{3}{8}$ -inch rods on each side.

Fabric frame.—Side and end angles to be of 2 by $1\frac{1}{2}$ inch by $\frac{1}{8}$ -inch, high-carbon steel. Side and end angles braced at each corner with $1\frac{1}{4}$ -inch by $1\frac{1}{4}$ -inch by $\frac{1}{8}$ -inch angles to prevent twisting. Frame joined to ends at each corner with two 1-inch by $\frac{1}{8}$ -inch flat steel braces. Ends fold under frame. Length of bottom, 6 feet, $4\frac{3}{4}$ inches. Top of side rail to measure $25\frac{1}{4}$ inches from floor. Frame to have lock at each corner to hold ends securely when open.

Fabric.—Simmons twisted double-link fabric, galvanized, 17 links long by 17 strands wide, Twin Link, or National fabric of equal strength may be accepted, but no single-wire fabric. Fabric connected to frame at each end by 17 number 12 helical springs, japanned, $2\frac{1}{2}$ inches long, and on each side by 4 number 14 helical springs, japanned $1\frac{5}{8}$ inches long.

Canopy.—Beds to be supplied with T canopy at each end. Upright and cross bars to be made of $\frac{7}{8}$ -inch rod connected with chill. End of upright squared. T canopy will enter hole drilled in top of top rod at center and will slide through $\frac{5}{8}$ -inch center upright into square hole in bottom rod, which will hold it rigidly in place.

Finish.—Primer and dull white finish as per sample.

Packing.—Ends and frame to be protected by excelsior pads.

Each bed to be plainly marked "U. S. A. M. D." in such manner that the marking can not be made illegible.

Adopted August 15, 1917.

This fold-under type was prescribed for the procurement of 150,000 bedsteads for which negotiations were then pending.¹ The finish of this lot was in white enamel. This finish, however, owing to the brittleness of the enamel and the readiness with which it chipped, did not prove as satisfactory on the fold-under type as it had on the standard three-piece type. It was found practicable at a later date to electro-galvanize these bedsteads instead of painting or enameling them, and 85,000 in this finish were purchased. The color of the finish blended well with that of the blankets. Furthermore, it was sanitary, did not chip or rust, or rub off, and presented a very pleasing appearance. It was adopted as the standard finish and remained so until the fall of 1918, when the use of aluminum paint was substituted for it by the War Industries Board, on the ground that not only would there be a saving of \$70,000 but also that the galvanized finish could be supplied by only one manufacturer and thus limited competition.²

MATTRESSES

HAIR MATTRESS

The standard mattress specifications of the Medical Department, for years prior to the World War, had called for a 3-piece, 25-pound, finished weight mattress filled with curled hair of the grade known as pure South American hair. This hair, mostly the mane hair cut from horses on the pampas of South America, by reason of its lightness, resiliency, and softness, had been found to be the most satisfactory material for hospital purposes. Its resiliency prevented packing and permitted ventilation. Its softness added greatly to the comfort

of the invalid. The three sections permitted frequent changes of the parts of the mattress which bore the greatest weight, and permitted the removal of a section, in the event one became soiled, and its replacement without the loss of the entire mattress. Great care was exercised in the purchase of these hair mattresses to avoid any admixture of hog hair or other adulterant, for it had been found that such mixtures served only to reduce the resiliency of the mattress and to cause it to pack, thus becoming hard and uncomfortable. Furthermore, the resultant renovations were less satisfactory and shorter lived.

COTTON FELT MATTRESS

Because of the improbability of securing considerable importations of hair from South America, the demand for the civilian trade, the resultant high cost of the hair, and the urgent need for prompt deliveries, considered in connection with the limited periods during which the majority of the mattresses would probably be used, the Surgeon General decided that some other less expensive material, yet comfortable withal, which could be procured in ample quantities must be substituted. Because of the growing favor of cotton felt in private use, its lower cost, and the apparently ample supply of materials, cotton felt was selected for the purpose. It was thought that there would be no difficulty in securing all the material that was necessary since the United States was the greatest cotton-producing country in the world.

The specifications for the mattress finally adopted³ contemplated a cotton felt mattress 2 feet 10 inches by 6 feet 4 inches, with a $4\frac{1}{2}$ -inch boxed edge between seams and of 30 pounds finished weight. The ticking adopted was a blue and white narrow, or wide, striped ticking of 74 by 44 comets, running 2.8 linear yards of 31-inch goods to the pound, and having a tensile strength of 90 pounds in the warp and 40 pounds in the filling or woof. The body of the mattress was to be built up of cotton felt in layers, each layer to be full size and to be made up one-half of strict upland middling cotton and one-half of good grade of felting linters. Neat and substantial workmanship was required, with the filling evenly distributed, except the center, which was to be slightly crowned. Thirty-three suitable white cotton tufts, top and bottom (diamond in biscuit pattern), were required. Two rows of stitching through the boxing ends and sides of at least 16 stitches each on the ends and 37 stitches each on the sides were required. Every mattress had to be plainly labeled with the name of the manufacturer and the year and month in which made. Owing to the absorption of practically the entire output of linters by the Ordnance Department, for the manufacture of smokeless powder, it proved necessary during 1918 to substitute a certain quantity of mill pickers for a part of the linters.

Of the original requirement of 82,000 mattresses of June 8, 1917, the allotment of 64,200 was placed as follows: Five-thousand for immediate delivery, half of the remainder by July 15, and the balance by August 15. Orders for the remaining 17,800 were placed shortly thereafter. The orders were distributed among 20 large manufacturers. These mattresses, as deliveries became available, were shipped on Government bill of lading direct from the factories to the hospitals at the camps or to the distributing depots, and arrived

in ample time to be placed in the wards of the hospitals when they were opened in advance of the arrival of the troops.

Before deliveries at the camps had been completed the flow of mattresses overseas had begun. The original equipment of the base hospitals sent overseas contemplated a bed capacity of only 500, but because of the increase of the strength of a division to approximately 27,000⁴ the allowance of four hospitals per division would be inadequate to provide sufficient lying-down accommodations unless the bed capacity was increased. Therefore, instructions were given by the Surgeon General to ship the complete equipment for 500 additional beds for every such base hospital sent over. This was accomplished by ordering a sufficient number of ward units to meet the requirements.

The original instructions for the procurement of 82,000 mattresses were increased on August 7, 1917, by 50,000 mattresses, 50,000 hair pillows, and 25,000 feather pillows.⁵ These later instructions were amended further on August 18, 1917, to increase the number to 150,000 and to procure the additional equipment needed to complete 3,000 ward units.⁶

The procurements for the 150,000 mattresses were placed without difficulty, and production proceeded fairly well but somewhat behind schedule. Since it was contemplated shipping all of them overseas when the instructions to procure were issued, and when it developed that the shipments could not be made as contemplated, the lagging of the deliveries, owing to the great bulk of product and the consequent extensive storage space required to take care of the output, did not prove to be wholly an unmixed evil. For a time the question of the space in which to store them became acute. However, the presence of a greater number of troops in camp during the winter of 1917-18 than was anticipated when the orders were placed, the presence of severe epidemic diseases in the camps during that period, and the resultant demands from every part of the United States for more and more beds, caused the store of mattresses to dwindle rapidly, and the anticipated shortage of storage space did not become so acute as was feared. In all the camps the bed capacity of the hospitals was doubled, in some trebled, and in one or two quadrupled over the equipment originally supplied. It was no uncommon thing during that winter to order out to camps complete equipment for 100 to 500 additional beds at a time. At no time during this trying period was there an actual shortage of lying-down accommodations in any of the camps.

PILLOWS

The Medical Department carried in stock two kinds of pillows, hair and feather, generally more of the former than of the latter. Usually, a hair pillow was provided for every bed and feather pillows in liberal number were available at every hospital, so that there were additional pillows for such patients as needed them.

HAIR PILLOW

For the same reasons it was the standard for mattresses, pure South American hair was used in the hair pillows. The admixture of substitutes was even less permissible in the pillow than in the mattress, and was continuously declined. The specifications for hair pillows during the procurements of

1917 called for a pillow 18 by 28 inches, containing 2 pounds of pure South American hair inclosed in a high-grade ticking of 80 by 64 or 84 by 60 threads per inch, running 7.5 ounces per linear yard of 32-inch material, in wide or narrow blue and white stripe, either herringbone or twill weave, with a tensile strength of not less than 100 pounds in the warp and 70 pounds in the woof; finished weight, $2\frac{1}{2}$ pounds. All work was to be done in a strictly first-class manner and every pillow was to have a label showing the name of the manufacturer and the year and month in which made.

For the procurements made during the summer and autumn of 1918 it was found necessary to substitute domestic products for the South American hair in the pillows. The manufacturers proposed a pillow containing 1 pound of curled cow-tail hair and a half pound of curled winter hog hair. It was claimed that the stock of cow-tail hair was not sufficient to provide more than this amount per pillow, considering the great number of pillows being purchased. The Surgeon General decided to eliminate the hog hair and to procure the pillows with only a pound of cow-tail hair in them if a greater amount could not be provided, and the orders were placed on that basis.

FEATHER PILLOW

The general appearance, specifications, and workmanship on the feather pillows were the same as for hair pillows, except as to contents. The feathers specified were prime live goose feathers, carefully renovated and free from odor. All feathers were to be new; no old or reworked feathers in whole or in part were permissible. Nor was the admixture of the feathers of other fowl acceptable. The weight of the finished pillow was $2\frac{1}{4}$ to $2\frac{1}{2}$ pounds. Owing to the scarcity and high initial cost of goose feathers, the mattress and pillow committee of the Council of National Defense, in their revised specifications, substituted a mixture of one-third good quality No. 1 gray or white goose feathers and two-thirds good quality No. 1 gray or white duck feathers, either domestic or foreign.⁷

The great number of pillows required soon exhausted the available stocks of this grade of feathers, so a reduction in the standard had to be made. Before the later contracts had been placed even duck feathers were at a premium, and a mixture of chicken feathers had to be used, and the quantity in the pillows reduced. Goose feathers had been found by years of experience to be the most satisfactory for hospital pillows. The fluffiness of the feathers, their softness to the touch, their lack of a tendency to mat together, and the comparative ease with which all animal and other odor could be removed, could not be duplicated in the feathers of any other species of domestic fowl. The feathers of the duck, while possessing many of the qualities of the goose, were difficult to free from the offensive local odor which permeated them. Chicken feathers are harsher, have a tendency to mat, and lose their "life" much earlier than goose feathers.

BLANKETS

The Medical Department had two standard blankets in its equipment tables when we entered the World War. One was a 4-pound, pure-wool, white blanket, the warp being of three-fourths blood bred wool and the filling of one-fourth blood bred wool. This blanket was 66 by 84 inches in size, had a

maroon stripe (the color of the Medical Department) 2 inches wide across the blanket near each end, and the letters "M. D." over "U. S. A." in maroon inclosed in a centrally located circle in the same color. The use of this blanket was limited to the wards and nurses' quarters of permanent hospitals.

The other blanket, intended for use in the field, was of approximately the same weight and size, but made of a lower grade of material and dyed different shades varying from blue to steel gray, but having the monogram in the center. The white color was not suitable for field use, hence the change to a dark color.

Because of the shortage of wool, as a result of the war, it became necessary to adopt a blanket made of mixed materials, and a gray blanket was purchased for hospital use. The question of securing a sufficient number of blankets was a matter of anxiety at practically all times and did not grow less as time passed. It was found necessary to provide four blankets for every bed in use in addition to the vast quantities required by the field service in the evacuation of the wounded.

Altogether upward of 2,798,780 blankets were purchased by the Medical Department, of which 1,976,937 had been delivered by March 1, 1918, leaving a balance of 821,843 blankets due. The contractors at the projected rate of deliveries would have been delinquent 148,300 blankets on April 30, 1919, had their contracts gone on to completion.

At the same time the Medical Department had due from the Quartermaster Department on interbureau requisition, 1,500,000 on which no deliveries had been made, except a few renovated blankets transferred at Hoboken.

MESS AND KITCHEN EQUIPMENT

In the construction of several of the hospitals at the cantonments built-in mess or dining tables and seats were provided. The material and labor for this purpose were supplied out of the appropriation, "Construction and repair of hospitals." The purposes covered by this appropriation were greatly extended in the urgent deficiency act of June 15, 1917, to include heating, lighting, plumbing, sewers, roads, and walks.⁸ Under this heading were included all the ranges and steam kettles in the kitchen and the steam tables in the dining rooms and diet kitchens. Chairs and dining tables and mess equipment (tableware, glassware, dishes, etc.) and many cooking utensils were supplied from the appropriation, "Medical and Hospital Department." Providing hospitals with the built-in equipment was handled by the construction branch of the Quartermaster General's Office; supplying the special equipment was done by the finance and supply division of the Surgeon General's Office.

A great many chairs, dining tables, and refrigerators, large size, were furnished for the mess halls and many kitchen and cooks' tables for the kitchen. The chairs were saddle seat, bow back, well rodded and bolted together to insure long life and utility.

FOOD TRUCKS AND CONTAINERS

It may safely be said that no problem connected with the feeding of patients in large hospitals has been more difficult of solution than the serving of the food sufficiently hot to be tempting and palatable to bed patients. In

the ward, even when a steam table is installed, the distance the food has to be carried to the individual patient is sufficient to permit it to cool to a very appreciable degree. It is not always practicable to install steam tables in wards, and it is practically impossible to prepare all the diets for the ward in the diet kitchen. The central kitchen is much more economical in personnel, fuel, and space. It seems necessary, therefore, to have the main articles of diet prepared in the central kitchen and transported in some sort of a conveyance to the ward, or preferably directly to the patient. From this it follows that the conveyance must be readily portable, preferably on wheels with rubber tires, and equipped with some means of keeping the food hot until it reaches the patient or the steam table in the ward. The multitude of patterns of food wagons and food carriers which appear in the catalogues of the various supply houses speaks eloquently of the difficulty experienced in accomplishing the desired result. Many of those carriages are very elaborate and complicated and entirely too expensive for general use in Army hospitals.

Prior to the opening of the large hospitals at the camps, very few hospitals in the Army were of a size to require special means for serving food. The patients were relatively few in number and the wards were sufficiently near the kitchen to permit direct service on trays. Though a few food conveyors had been procured, from time to time, for the larger military hospitals, most of them depending upon a hot-water chamber to keep the food hot while in transit, no standard had been adopted by the Medical Department, since all procurements had been on special requisitions and generally conformed to the idea of the requisitioning officer. Some type, therefore, had to be selected or devised to meet the needs of the large World War hospitals. To this end, the Surgeon General instructed the medical supply officer, New York, to investigate the matter and submit a report thereon.⁹ The report of the investigation was duly forwarded to the Surgeon General by the medical supply officer, and 200 trucks of the adopted pattern were purchased.

The first food carriage procured consisted essentially of an angle-iron frame mounted on wheels and carrying six food conveyor boxes. The frame was 26 inches wide, 44 inches long, and 36 inches high, and had 3 shelves, and was of aluminum finish. There were four swivel wheels, 6 inches in diameter, rubber tired and equipped with roller and thrust bearings. The conveyor boxes were 19 by 25 by $5\frac{1}{2}$ inches, made of galvanized iron, with a superimposed shelf $2\frac{1}{4}$ inches high, perforated with four holes $8\frac{1}{4}$ inches in diameter and 3 holes $5\frac{1}{4}$ inches in diameter. The conveyor boxes were equipped with aluminum food receptacles or pots with cover, four of 3-quart size and three of 1-quart size, all of which fitted snugly in the openings in the shelf of the conveyor box. These conveyor boxes were supposed to have hot water underneath the shelf. They had a capacity of 15 quarts of food each, or approximately 90 quarts to the truck.

Some very favorable reports of this type of truck were received, and also numerous complaints, as was anticipated. The few suggestions for improvement that were made to the Surgeon General were essentially that the

containers be made interchangeable with those of the steam tables in the diet kitchens.

The difficulty in keeping the food hot was not entirely overcome by this style of carriage. Accordingly, the subject was reopened May 13, 1918, and investigations looking to the development of a food truck which would overcome the objections were undertaken. A number of firms were interested and spent much time and expense in the experimentation. A new design of container was worked out and a large number purchased. Work on a suitable case for transporting these containers and for other purposes was in progress when purchases were discontinued.¹⁰

It was at first thought that four trucks per hospital would be sufficient, but this number soon proved inadequate and was increased to six. On October 16, 1917, instructions were issued the officer in charge of the medical supply depot at New York, to purchase 250 additional food trucks of the same pattern, to issue 6 to each of the cantonments, thus making 12 for each container, and to ship the remainder to the medical supply depot, American Expeditionary Forces.¹¹ After the issues had been made to every camp, further issues were made on requisitions in accordance with the demonstrated needs of the hospital for which requested.

To some hospitals, individual food containers, encased in insulated jackets similar to the ordinary fireless cooker but circular in shape, of a size to be interchangeable with the steam tables, were issued. These containers or pots were supposed to hold approximately enough for a ward of 30 patients. For the more bulky articles two could be used. They could be transported in any kind of a cart, and the heat loss from radiation was very small. They, in turn, did not meet with universal approval, and the investigations looking to a more satisfactory type, especially for overseas use, was in progress at the time of the signing of the armistice. One type was in use at Camp Lee where the individual food pots or containers were set into a cart body insulated as a fireless cooker, with aluminum receptacles for the pots and an aluminum-covered insulated top hinged at one side which let down upon the body of the cart and served very effectively to retain the heat. Since every vessel was in its own compartment, both hot and iced foods could be carried in the same cart.

SLIPPERS

The standard slipper of the Medical Department for patients in hospital at the beginning of the World War medical purchases consisted essentially of a medium two-ply leather sole, without heel, shaped to the foot, and an upper, covering only the anterior half of the sole; that is to say, extending back as far as the beginning of the instep. It resembled the Spanish chinela or the bathroom mule. Not having any upper around the posterior or heel part, it slipped on and off very easily. This pattern resulted from the observation that the counters of slippers of the common commercial patterns were soon broken down by the patients and converted, to all intents and purposes, into a "mule." The broken-down counter gave the slipper a very untidy appearance.

After the initial purchase of slippers in June, 1917, the shortage of suitable leather and the demand for it for other purposes made it impossible for the

Medical Department longer to furnish leather slippers for patients in hospital. The factories making rubber footwear offered to supply this need, making the slipper of a canvas upper, rubber sole, and a low-grade leather insole. Further, the prices for these "keds," as they were called, were less than had previously been paid for the leather slipper. Their durability seemed about equal to the leather slipper and they could be produced rapidly. To make these slippers more sanitary the leather inner sole was replaced with a composition material which permitted a thorough scrubbing with soap and water or even sterilization in a disinfectant, if the need arose, without material injury.

Initial equipment of 500-bed hospital as issued to all camps, 1917

MEDICINES, ANTISEPTICS, AND DISINFECTANTS

Acacia powder, 1 pound, in bottle.....bottles..	16	Chloralum hydratum, 1 ounce, in bottle.....bottles..	12
Acetanelidum, ¼ pound, in bottle.....do....	8	Chloroformum, ¼ pound, in tin.....tins..	120
Acidum aceticum, ½ pound, in bottle.....do....	6	Cocainæ hydrochloridum, ¼ ounce, in bottle.....bottles..	6
Acidum boricum, powder ½ pound, in bottle.....bottles..	60	Cocainæ hydrochloridum, 10-mgm. hypodermic tablets, 20-in tube.....tubes..	12
Acidum citricum, ½ pound, in bottle.....do....	2	Codeina sulphas, 1 ounce, in bottle.....bottles..	4
Acidum hydrochloricum, ½ pound, in bottle.....do....	12	Collodium, 1 ounce, in bottle.....do....	60
Acidum nitricum, ½ pound, in bottle.....do....	12	Copaiba, ½ pound, in bottle.....do....	6
Acidum oxalicum, for surgical use, ½ pound, in bottle.....bottles..	12	Creosotum, 1 ounce, in bottle.....do....	6
Acidum salicylicum, 3 ounces, in bottle.....do....	12	Cresol, 1 pound, in bottle.....do....	20
Acidum sulphuricum, ½ pound, in bottle.....do....	8	Creta preparata, ½ pound, in bottle.....do....	6
Acidum sulphuricum aromaticum, ½ pound in bottle.....bottles..	4	Cupri sulphas, 1 ounce, in bottle.....do....	5
Acidum tannicum, powder, 3 ounces, in bottle.....bottles..	6	Digitalinum, 1-mgm. hypodermic tablets, 20, in tube.....tubes..	12
Acidum tartaricum, ½ pound, in bottle.....do....	30	Emetinæ hydrochloridum, 22-mgm. hypodermic tablets, in tube.....tubes..	12
Adeps lanæ hydrosus, ¼ pound, in bottle.....do....	15	Emplastrum belladonnæ, 2 yards by 6 inches in tin.....tins..	12
Adrenalin chlorid, 1-mgm. tablets, 20, in tube.....tubes..	36	Emplastrum cantharidis, 1 yard by 6 inches, in tin.....tins..	2
Æther, ¼ pound, in tin.....tins..	100	Emplastrum sinapis, 4 yards by 6 inches, in tin.....tins..	3
Aethylis chloridum, 3 ounces, in metal tube.....tubes..	15	Eucalyptol, 1 ounce, in bottle.....bottles..	6
Alcohol, 5 gallons, in bottle.....bottles..	10	Extractum belladonnæ foliorum, 1 ounce, in bottle.....bottles..	3
Aloe, powder, 1 ounce, in bottle.....do....	4	Extractum glycyrrhizæ purum, ¼ pound, in jar.....jars..	40
Alumen, powder, ½ pound, in bottle.....do....	10	Extractum rhamni purshianæ, 130-mgm. tablets, 250, in bottle.....bottles..	20
Ammonii carbonas, lumps, ½ pound, in bottle.....bottles..	8	Ferri et quininae citras solubilis, 3 ounces, in bottle.....bottles..	12
Ammonii chloridum, ¼ pound, in bottle.....do....	20	Ferri phosphas solubilis, 1 pound, in bottle.....do....	2
Apomorphinæ hydrochloridum, 6-mgm. hypodermic tablets, 20, in tube.....tubes..	12	Ferri sulphas exsiccatus, ¼ pound, in bottle.....do....	2
Aqua ammoniæ, 10 per cent, 1 pound, in bottle.....bottles..	72	Fluidextractum ergotæ, ½ pound, in bottle.....do....	2
Aqua hydrogenii dioxidi, 1 pound, in bottle.....do....	72	Fluidextractum ipecaeuanae, ½ pound, in bottle.....bottles..	3
Argenti nitras, crystals, 1 ounce, in bottle.....do....	6	Fluidextractum pruni virginicae, 1 pound, in bottle.....bottles..	8
Argenti nitras fusus, 1 ounce, in bottle.....do....	6	Fluidextractum zingiberis, ¼ pound, in bottle.....bottles..	2
Argyrol, 1 ounce, in bottle (or equivalent).....do....	12	Foot powder (par. 902), ¼ pound, in tin.....tins..	100
Aspirin, 1 ounce, in bottle.....do....	120	Glycerinum, 1 pound, in bottle.....bottles..	100
Atropinæ sulphas:		Heroini hydrochloridum, 5.5-mgm. tablets, 500 in bottle.....bottles..	3
0.5-mgm. hypodermic tablets, 20, in tube.....tubes..	10	Hexamethylenamina (urotropin), 1 ounce, in bottle.....bottles..	48
0.13-mgm. ophthalmic disks, 50, in tube.....do....	1	Homatropinæ hydrobromidum, 15 grains, in bottle.....bottles..	1
Balsamum Peruvianum, ¼ pound, in bottle.....bottles..	12		
Balsamum toluatanum, ¼ pound, in bottle.....do....	12		
Bismuthi subnitras, ½ pound, in bottle.....do....	6		
Caffeina citrata, ½ ounce, in bottle.....do....	15		
Calc chlorinata, 1 pound, in zinc container.....pounds..	60		
Camphora, powder, ½ pound, in bottle.....bottles..	15		
Capsicum, powder, ½ ounce, in bottle.....do....	2		

* If in stock.

Hydrargyri chloridum corrosivum:		Potassii bicarbonas, 1 pound, in bottle.....bottles..	5
3 ounces, in bottle.....bottles..	4	Potassii bromidum, 1 pound, in bottle.....do.....	4
Commercial, 1 pound, in bottle.....do.....	10	Potassii chloras, powder, 1 pound, in bottle...do....	5
Tablets (antiseptic, par. 902), 250, in bottle.....bottles..	12	Potassii chloras, 324-mgm. tablets, 250, in bottle.....bottles..	15
Hydrargyri chloridum mite:		Potassii et sodii tartras, 3 pounds, in tin.....tins..	12
32-mgm. tablets, 250, in bottle.....do.....	30	Potassii hydroxidum, 1 ounce, in bottle...bottles..	10
6.5-mgm. tablets, 250, in bottle.....do.....	5	Potassii iodidum, ½ pound, in bottle.....do.....	20
2 ounces, in bottle.....do.....	60	Potassii permanganas, 1 pound, in bottle (or equivalent).....bottles..	120
Hydrargyri iodidum flavum, 10-mgm. tablets, 250, in bottle.....bottles..	15	Protargol, 1 ounce, in bottle.....do.....	120
Hydrargyri oxidum flavum, 1 ounce, in bottle.....bottles..	2	Pulvis glycyrrhizæ compositus, ¼ pound, in bottle.....bottles..	5
Hydrargyri salicylas, 1 ounce, in bottle.....do.....	10	Pulvis ipecacuanhæ et opii, ¼ pound, in bottle.....bottles..	6
Hyoscine hydrobromidum, 0.65-mgm. hypodermic tablets, 20, in tube.....tubes..	6	Quinia hydrochlorosulphas, 32-mgm. hypodermic tablets, 20, in tube.....tubes..	20
Ichthyolum, 3 ounces, in bottle (or equivalent).....bottles..	15	Quinia sulphas:	
Iodum, 1 ounce, in bottle.....do.....	72	Crystals, 1 ounce, in bottle.....bottles..	10
Ipecacuanha, powder, 3 ounces, in bottle.....do.....	1	200-mgm. tablets, 500, in bottle.....do.....	5
Liquor cresolis compositus, 1 quart, in bottle.do....	60	Resina podophylli, ½ ounce, in bottle.....do.....	2
Liquor formaldehydi (37½ per cent), 1 quart, in bottle.....bottles..	15	Rheum, powder, 2 ounces, in bottle.....do.....	6
Liquor potassii arsenitis, ½ pound, in bottle.do....	2	Saccharum lactis, powder, 3 ounces, in bottle.....bottles..	12
Lithii citras effervesceus, 324-mgm. tablets, 25, in bottle.....bottles..	10	Sapo mollis (green soap), 1 pound, in jar.....jars..	72
Magnesi carbonas, powder, 2 ounces, in bottle.....bottles..	20	Sodii bicarbonas, 1 pound, in bottle.....bottles..	40
Magnesi sulphas, 4 pounds, in tin.....tins..	100	Sodii bicarbonas et mentha piperita, tablets (par. 902), 400, in bottle.....bottles..	20
Menthol, 1 ounce, in bottle.....bottles..	5	Sodii boras, powder, 1 pound, in bottle.....do.....	12
Methylis salicylas (oil of wintergreen, synthetic), 1 ounce, in bottle.....bottles..	15	Sodii carbonas monohydratus, for surgical use, 1 pound, in bottle.....bottles..	21
Morphine sulphas:		Sodii fluoridum, 5 pounds, in package...packages..	3
Powder, ¼ ounce, in bottle.....do.....	1	Sodii phosphas exsiccatus, powder, 3 ounces, in bottle.....bottles..	80
8-mgm. hypodermic tablets, 20, in tube.....tubes..	30	Sodii salicylas, 6 ounces, in bottle.....do.....	20
Naphthalenum.....pounds..	30	Spiritus aetheris compositus, ½ pound, in bottle.....bottles..	12
Nitroglyceria, 0.65-mgm. hypodermic tablets, 20, in tube.....tubes..	10	Spiritus aetheris nitrosi, ½ pound, in bottle.do....	24
Normal saline solution, tablets (par. 902), 100, in bottle.....bottles..	12	Spiritus ammoniæ aromaticus, ½ pound, in bottle.....bottles..	30
Oleum caryophylli, 1 ounce, in bottle.....do.....	8	Spiritus frumenti, 1 quart, in bottle.....do.....	12
Oleum gossypii seminis, 1 quart, in bottle.....do.....	40	Spiritus glycerylis nitratis, 1 ounce, in bottle.....bottles..	4
Oleum menthæ piperitæ, 1 ounce, in bottle.....do.....	8	Strychninæ sulphas, 1-mgm. hypodermic tablets, 250, in bottle.....bottles..	15
Oleum morrhuæ, 1 pound, in bottle.....do.....	50	Sugar, white, 12 pounds, in can.....cans..	20
Oleum ricini, 1 quart, in bottle.....do.....	12	Sulphur, in roll.....pounds..	20
Oleum santali, 1 ounce, in bottle.....do.....	36	Sulphur lotum, ½ pound, in bottle.....bottles..	8
Oleum terebinthinæ rectificatum, 1 quart, in bottle.....bottles..	3	Syrupus ferri iodidi, ½ pound, in bottle.....do.....	8
Oleum theobromatis, ¼ pound, in bottle.....do.....	1	Syrupus hypophosphitum compositus, 1 pound, in bottle.....bottles..	10
Pepsinum, 3 ounces, in bottle.....do.....	30	Syrupus seillæ, 1 pound, in bottle.....do.....	2
Peptoizing tablets (par. 902), 125, in bottle.do....	30	Talcum, 2 pounds, in tin.....tins..	5
Petrolatum, 3 pounds, in tin.....tins..	30	Tinctura aconiti, 1 ounce, in bottle.....bottles..	6
Petrolatum liquidum, 1 pound, in bottle...bottles..	24	Tinctura cantharidis, ¼ pound, in bottle.....do....	4
Phenol, ½ pound, in bottle.....do.....	12	Tinctura capsici, ¼ pound, in bottle.....do.....	4
Phenylis salicylas (Salol), 3 ounces, in bottle.do....	1	Tinctura cinchonæ composita, 1 pound, in bottle.....bottles..	4
Physostigminæ sulphas, 0.0325-mgm., ophthalmic disks, 50, in tube.....tubes..	8	Tinctura digitalis, ½ pound, in bottle.....do.....	2
Pilocarpinæ hydrochloridum, 8-mgm. hypodermic tablets, 20, in tube.....tubes..	15	Tinctura ferri chloridi, 1 pound, in bottle.....do.....	6
Pilulæ aloini compositæ (or tablets), (par. 902), 250, in bottle.....bottles..	20	Tinctura gentianæ composita, 1 pound, in bottle.....bottles..	24
Pilulæ catharticæ compositæ (or tablets), 400, in bottle.....bottles..	16	Tinctura myrrha, ½ pound, in bottle.....do.....	1
Pilulæ copaibæ compositæ (or tablets), (par. 902), 250, in bottle.....bottles..	4	Tinctura nucis vomicæ, ½ pound, in bottle.....bottles..	12
Pilulæ ferri compositæ (or tablets), (par. 902), 80, in bottle.....bottles..	8	Tinctura opii, 1 pound, in bottle.....do.....	5
Plumbi acetas, 6 ounces, in bottle.....do.....	9	Tinctura opii camphorata, 1 pound, in bottle.....bottles..	24
Potassii acetas, 6 ounces, in bottle.....do.....		Tinctura strophanthi, 1 ounce, in bottle.....do....	1
		Trochisci ammonii chloridi, 125, in bottle...do....	12

Unguentum hydrargyri, ½ pound, in bottle.....	bottles.....	24
Unguentum hydrargyri chloridi mitis, 30 per cent, 2 pounds, in jar.....	jars.....	12
Veronal, 324-mgm. tablets, 250, in bottle.....	bottles.....	
Zinci oxidum, ¼ pound, in bottle.....	do.....	24
Zinci sulphas, ½ pound, in bottle.....	do.....	2

STATIONERY

Bands, elastic.....	dozen.....	100	Paper, blotting:		
Baskets:			For desks.....	quires.....	12
Letter.....	number.....	12	Small pieces for hand blotters.....	pieces.....	200
Waste paper.....	do.....	10	Paper, carbon:		
Binders, loose leaf, for medical history of post (see par. 412).....	number.....	1	Cap, 100 sheets, in box.....	boxes.....	2
Blotters, hand.....	do.....	12	Letter, 100 sheets, in box.....	do.....	4
Books, blank:			Paper fasteners.....	do.....	20
Crown (cap), 250 pages.....	do.....	40	Paper, manifold:		
8vo, 150 pages.....	do.....	40	Cap, 250 sheets, in package.....	packages.....	4
Books, prescriptions (see par. 240).....	do.....	4	Letter—		
Cups, sponge.....	do.....	10	500 sheets, in package.....	do.....	8
Envelope openers.....	do.....	5	Perforated, 500 sheets, in package.....	do.....	4
Envelopes, official:			Paper, typewriter:		
Large.....	do.....	300	Cap, 250 sheets, in package.....	do.....	2
Letter.....	do.....	1,000	Letter, 500 sheets, in package.....	do.....	8
Note.....	do.....	500	Paper weights.....	number.....	8
Erasers, rubber:			Paper, writing:		
Pencil.....	pieces.....	12	Letter.....	quires.....	50
Typewriter.....	number.....	24	Note.....	do.....	30
Steel.....	do.....	6	Note, 100 sheets, in pad.....	pads.....	150
Ink:			Paste, photographic and library.....	jars.....	12
Black (powder or tablets), sufficient in box for 1 quart of fluid.....	boxes.....	12	Pencils, lead.....	number.....	144
Red 2 ounces, in bottle.....	bottles.....	20	Penholders.....	do.....	36
Inkstands.....	number.....	24	Penracks.....	do.....	12
Labels:			Pens, steel.....	gross.....	4
For dispensing set.....	do.....	2	Punches, perforating.....	number.....	1
For vials.....	gross.....	48	Rulers.....	do.....	12
Poison, assorted.....	do.....	12	Stamps, penalty, rubber.....	do.....	2
Pads:			Tape, office, red.....	spools.....	2
Ink, for stamps.....	number.....	3			
Prescription.....	dozen.....	24			

MISCELLANEOUS SUPPLIES

Alcohol, denatured, 5 gallons, in bottle.....	bottles.....	20	Blankets, white.....	number.....	1,100
Apparatus:			Boilers:		
Compressed air (par. 903).....	number.....	1	Double, for cooking—		
Restraint (par. 904).....	do.....	1	11-quart.....	do.....	6
Applicators for throat, wood.....	gross.....	20	4-quart.....	do.....	6
Aprons, cooks'.....	number.....	50	Instrument.....	do.....	4
Atomizers, hand.....	do.....	20	For wards.....	do.....	12
Bags, rubber:			Tin, copper bottom.....	do.....	12
Hot water.....	do.....	12	Bottles, 4-quart, glass stoppers, for antiseptic solutions.....	number.....	16
Ice, for head.....	do.....	20	Bougies, flexible.....	do.....	6
Bandages:			Bowls:		
Gauze, roller, assorted, 6 dozen, in box.....	boxes.....	50	Chopping.....	do.....	2
Rubber, Martin.....	do.....	3	Soup, delft.....	do.....	600
Suspensory.....	dozen.....	12	Sugar, with lid.....	do.....	36
Bandage winders.....	number.....	1	Boxes:		
Bars, mosquito.....	do.....	548	Folding, for tablets.....	dozen.....	100
Basins for sponges, etc., white enamel.....	do.....	12	Fracture, folding.....	number.....	2
Basins:			Ointment, impervious.....	dozen.....	120
Hand, white enamel.....	do.....	12	Pill.....	do.....	120
White enamel, for operating room.....	do.....	10	Powder.....	do.....	120
Bath robes (gowns, convalescent).....	do.....	500	Brooms:		
Bed cradles.....	do.....	8	Corn.....	number.....	60
Bedpans, white enamel.....	do.....	50	Hair, long handle, for floors.....	do.....	12
Bedsteads, white enamel.....	do.....	548	Whisk.....	do.....	10
Bells, call.....	do.....	2			

Brushes:					
Hair, counter (brushes, hair, for floors)	number	12		Curettes	number
Hand, fiber	do	60		Cushions:	
Paint	do	6		Rubber—small	do
Scrubbing	do	60		Open Center	do
Shaving	do	4		Surgical, Kelly's	do
Stove blacking	do	5		Cuspidors	do
Buckets:				Desks, office	do
Covered, metal, 7-quart	do	10		Dippers, 1-quart	do
Fiber	do	10		Dishes:	
Galvanized iron	do	90		Meat, assorted	do
Cabinets, metal, for blanks and documents	do	2		Pickle	do
Cabinets for dressings and instruments:				Soap, with covers, for office	do
Large	do	2		Vegetable	do
Small	do	2		Dispensing sets (par. 942)	sets
Cabinets for medicines, ward	do	15		Egg beaters	number
Cao openers	do	12		Egg whips, large	do
Caps, for cooks	do	60		Eye shades:	
Capsules, gelatin, 100, in box, sizes:				double	do
00	boxes	25		single	do
0	do	50		First-aid packets for instruction (par. 945)	do
1	do	50		Forceps, needle	do
2	do	50		Forks:	
Cases:				Carving	do
Aspirating (par. 910)	number	1		Flesh	do
Ear, nose, and throat (par. 912)	do	1		Table, silver-plated	do
Emergency (par. 913)	do	3		Freezers, ice cream, 40-quart	do
Eye (par. 914)	do	1		Funnels, glass:	
Forceps, hemostatic (par. 915)	do	4		25-c. c.	do
General operating (par. 916)	do	3		250-c. c.	do
Genito urinary (par. 917)	do	1		500-c. c.	do
Pocket (par. 923)	do	2		1,000-c. c.	do
Post-mortem (par. 924)	do	1		Gauze, plain 7/12, 7½/24, 8/12	yards
Trial lenses (par. 926)	do	1		Gloves, rubber	pairs
Catheters, flexible	do	36		Glue, liquid, in small commercial tin	tins
Chairs:				Gowas, operating	number
Arm	do	112		Graduates, glass:	
Folding	do	250		10-c. c.	do
Invalid, rolling	do	20		100-c. c.	do
Office, revolving	do	8		250-c. c.	do
Rocking	do	84		500-c. c.	do
Chamois skins	do	12		1,000-c. c.	do
Chests, tool, No. 1 (par. 937)	do	1		Graters:	
Cleavers	do	3		Large	do
Clocks	do	20		Small	do
Clothesline, manila	yards	120		Gravy boats	do
Colanders:				Gridirons	do
Hotel size, large	number	2		Gridstones, kitchen, complete, 10-inch	do
Stock size	do	2		Hones	do
Cork extractors	do	2		Hose:	
Cork pressers	do	2		Rubber, ¾-inch, in 50-foot lengths	lengths
Corks, long taper, sizes:				Nozzles for	number
2	dozen	50		Reel carts for	do
3	do	100		Inflators, Politzer's	do
4	do	100		Inhalers:	
5	do	50		Chloroform, with drop bottles	do
10	do	20		Ether	do
Corkscrews	number	2		Irrigators:	
Cotton, absorbent, in roll	pounds	200		Stands for	do
Cotton bats	do	40		Valentine's	do
Criolin (steata), 6 yards, in piece	pieces	12		Jars:	
Cruets, vinegar and oil	number	26		Large, for dressings, etc.	do
Crutches	pairs	24		Small, covered, for sutures, etc.	do
Rubber tips for, size No. 18 (¾-inch)	number	48		Kettles:	
Cups	do	600		Croup	do
Drinking, paper	do	2,000		Tea	do
Feeding	do	72		Knives:	
Spit—white enamel	do	200		Chopping	do
Paper	do	10,000		Bread	do
Metal frames for	do	100		Butcher's	do
				Carviog	do
				Table, silver-plated	do

Ladders, step	number	2	Pillows:		
Ladles, assorted sizes	do	12	Feather	number	250
Lamps, spirit, glass	do	6	Hair	do	500
Lanterns:			Pill tiles, 5 by 10 inches	do	4
Complete	do	12	Pins:		
Extra globes for, white	do	12	Common, assorted	papers	60
Wicks for	do	72	Safety	dozen	200
Litters:			Pitchers:		
With slings	do	20	Delft—		
Canvas for	pieces	12	For office	number	2
Tacks for, 75, in package	packages	12	1-pint	do	32
Looking-glasses	number	20	4-quart	do	20
Lye, concentrated, 1 pound in can	cans	120	Sirup, glass	do	12
Mats, door:			White enamel	do	20
Manila	number	24	Plaster, adhesive, zinc oxide, 5 yards by 2½ inches	spools	252
Metal	do	6	Plaster of Paris, 4 pounds, in tin	tins	6
Mattress covers	do	800	Plates, dinner	number	520
Mattresses, hair, in three equal parts	do	548	Potato mashers, hotel size	do	4
Measures, metal, 1-pint, 1-quart, 2-quart, and 4-quart	sets	1	Pots:		
Meat cutters, hotel size	number	1	Mustard, with wooden spoons	do	24
Medicine droppers	dozen	24	Stock—		
Medicine glasses	number	120	36-quart with faucet and strainer	do	8
Mops:			36-quart without faucet and strainer	do	6
Handles for	do	36	Tea, enamel or tin	do	6
Heads for	do	72	Watering	do	2
Mortars and pestles:			Pus basins	do	24
Glass, 10-cm	do	3	Racks for urinals and bedpans	do	20
Wedgewood—			Razors	do	6
8-cm	do	4	Strops for	do	2
20-cm	do	2	Refrigerators:		
30-cm	do	1	Large	do	3
Muslin, unbleached	yards	60	Small	do	10
Needles:			Retorts, stands for	do	2
Common, assorted	papers	6	Rods, glass, assorted, 10 ounces, in package	packages	1
Surgical—			Rolling-pins	number	2
Assorted	dozen	6	Safes, iron	do	1
Hagedorn's, 20, in set	sets	4	Saucers	do	600
Oil cans with pumps, 5-gallon	number	1	Saws, hatcher's	do	3
Oilcloth, for table	yards	36	Scales and weights:		
Ophthalmoscopes	number	2	Apothecary's, metric system	do	2
Pails:			Balance in glass case, metric system	do	2
Commode (close stools)	do	45	Grocer's	do	1
White enamel	do	8	Platform	do	1
Pajamas:			Scissors, bandage	do	6
Coats	do	1,200	Scoops	do	6
Trousers	do	1,200	Screens, bed, folding, frames for, white enamel	number	12
Pans:			Settees, for porch or hall	do	12
Dish—			Shakers:		
Deep, retinned, 21-quart	do	6	Pepper, glass	do	20
Extra heavy, retinned or metal, 35-quart	do	12	Salt, glass	do	20
Dust	do	30	Shears	do	6
Frying—			For fixed bandages	do	2
Large	do	4	Sheeting, rubber	yards	36
Egg	do	12	Sheets, cotton	number	1,500
Milk	do	12	Shoes, wooden, for bedsteads	do	2,200
Muffin	do	24	Sieves, flour	do	2
Sauce, hotel size	do	12	Silk, oiled, 5 yards, in roll	rolls	8
Paper:			Skimmers, hotel size	number	12
Filtering, round, 10-inch	packages	20	Slippers	pairs	150
Oiled, 5 yards, in roll	rolls	10	Soap:		
Toilet, 2,000 sheets, in roll	do	500	Common	pounds	600
Wrapping—			Ivory	cakes	500
Blue	quires	12	Scouring	pounds	400
Brown	do	60	Spatulas:		
White	do	12	3-inch	number	3
Percolators, glass	number	2	6-inch	do	4
Pill machines	do	1	Spectula, rectal	do	1
Pillowcases, cotton	do	2,000			

Sphygmomanometers.....	number.....	1	Tape, cotton.....	pieces.....	20
Splints, Hodgen's.....	do.....	2	Tape measures, linen, 5-foot.....	number.....	10
Sponge holders.....	do.....	12	Thermo-cauteries, Paquelin's (par. 957).....	do.....	2
Spools, Halstead's glass.....	do.....	12	Thermometers:		
Spoons:			Bath.....	do.....	12
Basting, tinned-iron.....	do.....	12	Clinical.....	do.....	144
Table, silver-plated.....	do.....	480	Meteorological.....	do.....	20
Tea, silver-plated.....	do.....	600	Thread:		
Sprinklers, powder, hard rubber.....	do.....	2	Cotton, assorted.....	spools.....	12
Stamps, with outfits, for marking hospital clothing.....	number.....	1	Linen, unbleached, 200 yards, on spool.....	do.....	6
Steels.....	do.....	3	Tongue depressors:		
Sterilizers, for dressings.....	do.....	2	Metal.....	number.....	2
Stethoscopes, double.....	do.....	12	Wood.....	gross.....	24
Stools, revolving, white enamel.....	do.....	6	Tourniquets and bandages, rubber.....	number.....	6
Stoves, alcohol.....	do.....	12	Towels:		
Stove blacking.....	papers.....	12	Bath.....	dozen.....	100
Suppository molds.....	number.....	1	Dish.....	do.....	40
Sutures:			Hand.....	do.....	250
Catgut—			Paper—		
Plain, 1 suture, in tube, Nos. 0, 75; 1, 75; 2, 100; 3, 50.....	tubes.....	300	Fixtures for.....	number.....	6
Chromicised, 1 suture, in tube, Nos. 0, 25; 1, 50; 2, 100; 3, 25.....	tubes.....	200	In roll.....	rolls.....	24
Horsehair, 100 in coil.....	coils.....	6	Traps:		
Kangaroo tendon, sterilized, 1 suture, in tube.....	tubes.....	60	Mouse.....	number.....	1
Silk, 3 sizes, in package.....	packages.....	60	Rat.....	do.....	2
Silkworm gut, 100, in coil.....	coils.....	12	Trays:		
Silver wire, in yard lengths.....	yards.....	6	Bed, with legs.....	do.....	60
Syringes:			Butler's.....	do.....	30
Bulb, rubber.....	number.....	4	Instrument, white enamel.....	do.....	12
Ear and ulcer.....	do.....	4	Tubes:		
Extra needles for.....	do.....	72	Drainage, rubber, in yard lengths, 3 sizes.....	yards.....	24
Extra needles for Luer type.....	do.....	144	Rectal.....	number.....	4
Extra wires for.....	bundles.....	6	Stomach.....	do.....	3
Fountain—			Tubing:		
Metal, 2-quart, graduated (irrigators).....	number.....	10	Glass, assorted.....	pounds.....	3
Rubber,.....	do.....	12	Rubber, ¼-inch, 12; ⅜-inch, 6; ½-inch, 6.....	yards.....	24
Glass, Luer type—			Tubs:		
2-c. c. (for antityphoid vaccination).....	do.....	24	Bath, portable, on wheels.....	do.....	1
10-c. c.....	do.....	2	Foot.....	do.....	20
Hypodermic (par. 956).....	do.....	10	Wash.....	do.....	6
Penis, glass, in case.....	do.....	300	Tumblers, glass.....	do.....	600
Tables:			Twine, fine or coarse.....	pounds.....	20
Bedside, folding.....	do.....	300	Twine boxes.....	do.....	3
Dining, extension.....	do.....	6	Typewriters.....	do.....	5
Mess (plain lumber).....	do.....	24	Record ribbons for.....	do.....	10
Instrument.....	do.....	4	Urinals, glass, graduated.....	do.....	80
Operating.....	do.....	3	Vials.....	dozen.....	600
Typewriter.....	do.....	8	Vision test sets (par. 959).....	do.....	1
			Water coolers.....	do.....	20
LABORATORY SUPPLIES					
Acid, acetic, glacial, 1 pound in bottle.....	bottle.....	1	Bromin, 1 ounce, in bottle.....	bottles.....	2
Alcohol:			Brushes, test tube.....	number.....	6
Absolute, ethyl, 1 pound, in bottle.....	do.....	2	Burettes:		
Methyl, reagent, 1 pound, in bottle.....	do.....	2	Glass stopcock, 25-c. c., subdivision ⅓ c. c.....	number.....	2
Apparatus, distilling.....	number.....	1	Supports for, with double clamp and three rings.....	number.....	1
Balsam, Canada, 1 ounce, in bottle.....	bottle.....	1	Centrifuges, hand.....	do.....	1
Baskets, wire, for test tubes.....	number.....	4	Covers, glass.....	ounce.....	2
Baths, water:			Cylinders, graduated, with foot:		
Copper, for test tubes.....	do.....	1	10-c. c.....	number.....	2
Tripods for.....	do.....	1	25-c. c.....	do.....	2
Beakers, glass.....	do.....	6	Dishes:		
Bismarck brown, ½ ounce, in bottle.....	bottle.....	1	Evaporating, porcelain.....	do.....	6
Bottles, balsam.....	number.....	1	Stender, 30 mm. by 50 mm.....	do.....	2
Bottles, dropping:			Eosin, ½ ounce, in bottle.....	bottle.....	1
For oil of cedar (1 with microscope).....	do.....	1			
T. K., for stains, 2-ounce.....	do.....	6			

Flasks, Erlenmeyer's:		Paper—Continued.	
250-c. c. number ..	6	Litmus—Continued.	
500-c. c. do ..	6	Red, 100 strips, in vial ..	vials .. 6
1,000-c. c. do ..	4	Pencils, wax, red ..	number .. 6
2,000-c. c. do ..	8	Pipettes:	
Forceps:		1-c. c. do ..	4
Cover-glass, Stewart's ..	4	5-c. c. do ..	2
Straight, medium, fine ..	1	10-c. c. do ..	2
Fuchsin, 1/2 ounce, in bottle ..	1	25-c. c. do ..	2
Fuchsin, acid, 1/2 ounce, in bottle ..	1	Graduated, 5-c. c. do ..	4
Gentian violet, 1/2 ounce, in bottle ..	1	Slides, glass, 25 mm. by 75 mm ..	dozen .. 12
Hematoxylin, 1/2 ounce, in bottle ..	1	Stages, mechanical ..	1
Hemocytometers ..	number .. 2	Sterilizers, hot-air, 10 by 12 by 10 inches ..	number .. 1
Jars, staining, Coplin's ..	do .. 2	Test glasses, footed, urinary ..	do .. 24
Labels, microscopical, square, 500, in book ..	books .. 2	Test tubes ..	dozen .. 12
Methylene blue, 1/2 ounce, in bottle ..	bottles .. 1	Stands for ..	number .. 2
Microscopes, post (par. 951) with stage ..	number .. 1	Ureometers, Doremus-Hinds ..	do .. 2
Oil, immersion, 1 ounce, in bottle ..	bottles .. 1	Urinometers ..	do .. 2
Paper:		Wire, platinum, heavy ..	inches .. 4
Filtering, Laboratory ..	quire .. 1	Wire, platinum, medium ..	do .. 12
Litmus—		Wright's stain, powder, 0.2 gram, in ampoule ..	ampoules .. 3
Blue, 100 strips, in vial ..	vials .. 6	Xylo, 1/2 pound, in bottle ..	bottle .. 1

ADDITIONAL ARTICLES

Boilers, coffee, 40-gallon, aluminum or retinned copper, with faucet, strainer, wire ring inside for French drip, and metal tray to protect bottom of boiler ..	number .. 1	Tables—Continued.	
Slicer, bread and meat, sterling No. 70 ..	do .. 1	Kitchen—	
Tables:		4 by 10 feet, 2 feet 6 inches high, knock-down ..	number .. 2
Bakers, cooks, 3 by 8 feet, 2 feet 6 inches high, knock-down ..	number .. 1	3 by 6 feet, 2 feet 6 inches high, knock-down ..	number .. 2

ADDITIONAL EQUIPMENT FOR EAR, NOSE, AND THROAT SERVICE

Atomizers, Mueller ..	set .. 1	Knife, fistula, Koch, 6-inch ..	number .. 1
Air compressor, tankless ..	number .. 1	Knives, Mueller, best grade ..	do .. 12
Basin, solution:		Mallet, fiber ..	do .. 1
15-inch ..	do .. 3	Mirrors:	
9 1/2-inch ..	do .. 2	Laryngeal ..	do .. 2
6-inch ..	do .. 12	Post nasal ..	do .. 2
Bowl, immersion, stand for ..	do .. 2	Needle, aneurism, 6-inch ..	do .. 1
Bronchoscope, Jackson, battery for ..	do .. 1	Needle holder ..	do .. 1
Cabinet for instruments and dressings, large ..	do .. 2	Needles:	
Chairs:		Hagedorn, straight, No. 9 ..	do .. 48
Barany ..	do .. 1	Trocar point, Mayo, size 1 ..	do .. 12
Operating ..	do .. 4	Nippers, wire, 5-inch ..	do .. 1
Condensers, Coakley ..	do .. 2	Nitrous oxide, in cylinder, style E ..	cylinder .. 1
Dilator, tracheal, Koch 6-inch ..	do .. 1	Oxygen, in cylinders, style E ..	do .. 1
Director, grooved ..	do .. 1	Pitcher, white enamel, 4-quart ..	number .. 1
Dissector, blunt ..	do .. 1	Politzer bag, 8-ounce, with valve ..	do .. 1
Footstool, operating room ..	do .. 1	Probes, copper, 6-inch ..	do .. 3
Forceps:		Pus basins ..	do .. 6
Angular ..	do .. 2	Razor ..	do .. 1
Artery ..	do .. 12	Retractor, mastoid, Jansen ..	do .. 1
Artery, 6 1/2-inch ..	do .. 2	Retractors, solid blades, 2 in set ..	set .. 1
Laryngeal ..	do .. 1	Rheostat, lamp-socket type, Wappler ..	number .. 1
Tissue—		Rongeur, mastoid ..	do .. 1
10-inch ..	do .. 1	Scissors:	
4 1/2-inch, with 2 teeth ..	do .. 2	Bandage ..	pair .. 1
Volvillum ..	do .. 2	Heavy, 6-inch ..	do .. 2
Graduates, glass:		Specula, ear, 3 in set ..	sets .. 2
10-c. c.	do .. 1	Speculum:	
1,000-c. c.	do .. 1	Laryngeal, Jackson ..	number .. 1
Headlight, with 6 extra lamps ..	do .. 1	Nasal ..	do .. 2
Inhaler, gas-ether, Bennett or Clark-Herd ..	do .. 1	Sponge holders ..	do .. 2
Instrument rack, Mayo ..	do .. 1	Sterilizer for instruments, Mueller, 110-volt ..	do .. 3
Irrigator and washstand combined ..	do .. 1	Stool, revolving, for operating room ..	do .. 5
Jars, covered, for dressings ..	do .. 6	Suction apparatus, Coffin ..	do .. 1

Sutures, catgut:

Pyoktania, plain, size 00, 14-inch..... tubes..	24
Tanned or chromicised—	
Size 0, 14-inch.....do.....	24
Size 1, 14-inch.....do.....	24
Size 2, 14-inch.....do.....	24
Size 3, 14-inch.....do.....	36

Sutures:

Silk, braided—	
Size 8, 25-yard spools.....spool..	1
Size 12, 25-yard spools.....do.....	1
Silk worm, gut—	
Fine, B.....coils..	6
Medium, C.....do.....	6

Table:

Bedside, iron, white enamel.....number..	6
Instrument.....dn.....	2
Operating, Dean.....do.....	1
Tongue depressors:	
Wood.....gross..	10
Metal.....number..	1
Transilluminator, Jackson-Fres, 110-volt.....do.....	1
Trocar.....do.....	1
Antrum.....do.....	1
Tuning fork.....do.....	1
Added September 12, 1917.	

EQUIPMENT FOR MALINGERING TESTS AT CANTONMENTS

	Instrument or apparatus	Manufacturer	Catalogue No.	Quantity per camp
6	Batteries, extra for Jumbo handle electric ophthalmoscope and retinoscope.	Any electric company.....		3
12	Lamps, Tungsten, extra for ophthalmoscope and retinoscope.	Deozeng Standard Co., Camden, N. J.		3
1	Lense, condensing, 3-inch forms in case.....	F. A. Hardy & Co., Chicago.....	782	1
1	Loupes, Berger binocular.....do.....	do.....	795	1
3	Test charts, special, duplicate, one with letters reversed, one of each.	do.....	967E	2
1	Snelling malingering test.....do.....	do.....	75	1
1	Stereoscope, ordinary.....do.....	do.....	638	1
12	Stereoscopic pictures.....do.....			

Added August 31, 1917.

WARD LABORATORY EQUIPMENT

1. *General*.—Alcohol lamps; distilled water; disinfecting solutions; waste jar; filter paper in sheets.
2. *Microscopic Work—General*.—Microscope, complete (1); dark filed condenser (1) for genitourinary wards; special lamp for dark field (1) for genito urinary wards, Bausch & Lomb, 1782; cover glasses, thin, 1/2-ounce; stender jars for clean cover glasses (2); slides, regular in 1/2-gross boxes (2 boxes); stender jars for clean slides (2); bottle for immersion oil (1).
3. *Containers for reagents in blood and sputum work*.—Bottles for stains; T. K. type, 2-ounce (stains to be obtained from the main laboratory). For methylene blue, carbo-fuchsin, gentian violet, Gram's indine, Wright's stain, Bismarck brown. Staining jars, Coplin, for acid alcohol, alcohol (5), Gram's solutions (2), Wright's stain.
4. Hemocytometer (1), Hemoglobinometer, Talquist (1).
5. *Special apparatus for urine work*.—Centrifuge, hand (1); centrifuge tubes, plain, 15-c. e. (1 dozen); medicine dropper (4); bottles, 4-ounce, wide mouth, for collecting specimens (4 dozen); corks to fit last item (200); labels, Dennison in books of 50 (2 books); pencils, wax (4); funnels, 3-inch, short stem (2 dozen); uriaometers (2); test tubes, thin glass (regular chemical), 150 by 16 mm. (200); test tube holders, wire (2); test tube rack, wooden, to hold 12 tubes (4); nitric acid (1); Fehling's alkaline solution (1); Fehling's copper solution (1); Benedict's qualitative reagent (1).
6. *Supplies in original packages*.—Antiformin; litmus paper, neutral in tubes; filter paper, round, 1 1/2-cm. diameter, in packages of 100.

Added November 26, 1917.

Equipment for venereal infirmary

Catalogue No.	Item	Unit	Quantity
305	Applicators, wooden.....	Number	1,000
	Basins, wash hand, white enamel.....do.....	do	6
219	Bougies-a-boutte, sizes 16, 18, 20, 22, 24, 26.....do.....	do	6
	Catheters:		
210	Rubber, sizes 16, 18, 20, 22, 24, 26, 28, 30, 32.....do.....	Dozen	1
	Coude, sizes 16, 18, 20, 22, 24, 26, 28, 30, 32.....do.....	do	1
	Cots, finger, heavy rubber.....do.....	Number	48
A-801	Flasks.....do.....	do	2
130	Forceps, dressing.....do.....	do	1
253	Irrigators complete.....do.....	do	12
Kny-Scherer Cat. D-858	Knives, endourethral.....do.....	do	3
220	Mandrin, metal, with retaining spring handle, Conde beak.....do.....	do	1
230	Needle, silver utricule.....do.....	do	1
226	Rheostat, E. S. I. or Wappler lamp-socket type.....do.....	do	1
	Gloves, heavy rubber.....do.....	do	12
321	Salvarsan apparatus, complete.....do.....	do	2

Equipment for venereal infirmary—Continued

Catalogue No.	Item	Unit	Quantity
	Scissors:		
108	Curved	Number	1
109	Straight	do	1
218	Scissors, steel, sizes 16, 18, 20, 22, 24, 26, 30, 32	do	9
	Sterilizer, instrument	do	1
252	Syringes:		
Kay-Scherer	Large vesical, metal, Janet-Frank, 150-c. c.	do	2
Cat. D-1862	Utzmann-Keys, complete	do	4
	Tables, simple wooden	do	2
225	Urethroscope, Young's straight and curved beak tubes, 26 Fr., with light and cords	do	1
A-15	Albuminometer	do	1
A-193	Bottle for stains	do	6
A-245	Test tube brush	do	12
A-285	Alcohol lamp	do	1
	370 hand centrifuge	do	1
	Cover glasses (ounce)	do	1
A-700	Dish stender	do	1
A-705	do	do	2
A-803	Funnels	do	2
A-870	Funnel support	do	1
A-110	Labels	do	1
A-1155	Microscope	do	1
A-1175	D. G. illuminator	do	1
A-1180	Funnel stop	do	1
A-1205	Micro-lamp	do	1
A-1350	Filter paper	do	1
A-1395	Pencils, wax	do	1
A-1397	Pipettes	do	2
A-1590	Slides (gross)	do	1
A-1600	Slide box	do	2
A-1696	Syringe, 2-c. c.	do	2
A-1709	Needles	do	12
A-1741	Test tubes	do	100
A-1751	do	do	100
A-1770	Test tube support	do	2
A-1850	Urinometer	do	1

* Made by carpenter.

Added April 12, 1918.

REFERENCES

- (1) Letter from the Surgeon General to the medical supply officer, New York, August 17, 1917. Subject: Hospital beds. Copy on file, Finance and Supply Division, S. G. O., 713-539
1
- (2) Letter from T. J. Bailey, War Industries Board, Washington, to the Surgeon General, October 3, 1918, relative to hospital cots. On file, Finance and Supply Division, S. G. O., 533 N. D.
221
- (3) Letter from the chairman, mattress committee of the Council of National Defense, to the medical supply officer, New York, June 8, 1917, relative to orders for mattresses. On file, Finance and Supply Division, S. G. O., 713-539
1
- (4) Tables of Organization and Equipment, U. S. Army, Series A, Table I, August, 1917.
- (5) Letter from the Surgeon General to the medical supply officer, New York, August 7, 1917, relative to mattresses. Copy on file, Finance and Supply Division, S. G. O., 713-539
1
- (6) Letter from the Surgeon General to the medical supply officer, New York, August 18, 1917, relative to mattresses. Copy on file, Finance and Supply Division, S. G. O., 713-539
1-A
- (7) Specifications for feather pillows. M. and P. No. 11, June 11, 1917. On file, Finance and Supply Division, S. G. O., 713-539
1

- (8) Bulletin No. 43, W. D., July 22, 1917.
- (9) Letter from the Surgeon General to the medical supply officer, New York, August 18, 1917, relative to food trucks for hospitals. Copy on file, Finance and Supply Division, S. G. O., $\frac{713-539}{32}$.
- (10) Correspondence between the Surgeon General and the medical supply officer, New York, October 4 and 21, 1918, relative to food trucks for hospitals. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{1063}$.
- (11) Letter from the Surgeon General to the medical supply officer, New York, October 16, 1917, relative to food trucks for hospitals. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{32}$.

CHAPTER XXXIII

OVERSEAS BASE HOSPITALS

Because of lack of funds and the resultant inability of the Medical Department to procure, in time of peace, materials and equipment for base hospitals, and to have them stored in reserve, it had no units of equipment of this type available when the first troops of the American Expeditionary Forces were sent to France. Hospitalization for these troops was provided by base-hospital units organized and equipped under the auspices of the American Red Cross and inducted into the Federal service. Fifty such units had been organized. A majority of them provided all their initial equipment. Some units provided part and the Medical Department supplied the rest. These Red Cross units served to meet the requirements of the Army until the procurement schedule of the Medical Department was able to provide them. The equipment of these units as a rule followed the list of articles prescribed in the standard supply table for base hospitals. Standard beds and bedding were provided in place of the field equipment. Additional articles of kitchen equipment, mess equipment, sterilizing outfits, and even portable laundry equipment and ice machines, were added by some of these units. Additional equipment to bring the capacity of these hospitals up to 1,000 beds was supplied later by the Medical Department. When subsequent hospitals were sent overseas the list of equipment developed for base hospitals at training camps, with a few modifications, was used as the standard table of equipment. Some articles of heavy furniture and miscellaneous supplies were omitted at the request of the commanding general. A few articles were added to meet the conditions existing in France and the quantities of many items were increased. Changes were made in the equipment from time to time as experience indicated. The equipment as provided was as follows:

List of medical supplies for the initial equipment of a 1,000-bed base hospital (overseas)

(Revised, Surgeon General's Office, May 18, 1918, as recommended by chief surgeon, A. E. F., April 2, 1918)

MEDICINES, ANTISEPTICS, AND DISINFECTANTS

Acacia, powder, 1 pound, in bottle.....	bottles..	36	Aqua ammoniæ, 10 per cent, 1 pound, in glass stop-		
Acidum aceticum, ½ pound, in bottle.....	do.....	12	per bottle.....	bottles..	144
Acidum acetyl salicylicum, 1 pound, in carton	.....	18	Argent nitras, crystals, 1 ounce, in bottle....	do....	12
.....	cartons		Argyrol, 1 ounce, in bottle, or equivalent.....	do....	48
Acidum boriceum, powder, ½ pound, in bottle	.....	144	Arsenal trioxidum, 1-mgm. tablets, 500 in bottle....	do....	4
.....	bottles..		Atropinæ sulphas:		
Acidum salicylicum, 3 ounces, in bottle.....	do.....	24	0.65-mgm. hypodermic tablets, 20 in tube	.....	24
Acidum tannicum, powder, 3 ounces, in bottle	.....	12	.....	tubes..	6
.....	bottles..		0.13-mgm. ophthalmic disks, 50 in tube....	do....	24
Acidum tartaricum, ½ pound, in bottle.....	do....	48	Balsamum Peruvianum, ¼ pound, in wide-mouth	.....	24
Aethylis chloridum, 3 ounces, in metal tube.....	tubes..	36	bottle.....	bottles..	
Alumina, powder, ½ pound, in bottle.....	bottles..	24	Bismuthi subcarbonas, U. S. P., 1 pound, in carton	.....	12
Ammonii carbonas, lumps, ½ pound, in bottle....	do....	12	.....	cartons..	
Ammonii chloridum, ¼ pound, in bottle.....	do....	36	Caffeina citrata, ½ ounce, in bottle.....	bottles..	24
Apomorphinæ hydrochloridum, 7-mgm. hypodermic	.....	24	Camphora, powder, ½ pound, in wide-mouth bottle	.....	36
tablets, 20 in tube.....	tubes..		.....	bottles..	

Chloralum hydratum, 1 ounce, in glass-stopper bottle.....	24	Oleum theobromatis, $\frac{1}{4}$ pound, in bottle.....	6
Chloroformum, $\frac{1}{4}$ pound, in tin.....	300	Petrolatum, 3 pounds in tin.....	60
Cocainæ hydrochloridum, $\frac{1}{4}$ ounce, in wide-mouth bottle.....	18	Petrolatum liquidum, 1 pound, in bottle (etc.) heavy and light.....	60
Cocainæ hydrochloridum, 10-mgm. hypodermic tablets, 20 in tube.....	24	Phenol, $\frac{1}{2}$ pound, in bottle.....	48
Codinae sulphas, 1 ounce, in bottle.....	4	Phenylis salicylas, $\frac{1}{2}$ pound in bottle.....	9
Collodium, 1 ounce, in bottle.....	200	Phystigminæ sulphas, 0.0325-mgm. ophthalmic disks, 50 in tube.....	2
Creosotum, 1 ounce, in glass-stopper bottle.....	12	Pillulæ aloini compositæ (or tablets) (par. 902), 250 in bottle.....	24
Cresol, 1 pound, in bottle.....	48	Pillulæ eatharticiæ compositæ (or tablets), 400 in bottle.....	48
Cupri, sulphas, 1 ounce, in bottle.....	12	Pillulæ ferri carbonatis, 324-mgm., gelatin coated, 1,000 in bottle.....	8
Emetinæ hydrochloridum, 22-mgm. hypodermic tablets, in tube.....	24	Plumbi acetas, 6 ounces in bottle.....	12
Emplastrum sinapis, 4 yards by 6 inches, in tin.....	12	Potassii hydroxidum, 1 ounce in bottle.....	24
Epinephrine hydrochloride, 1-mgm. tablets, made soluble by the addition of boric acid, 25 in tube.....	72	Potassii iodidum $\frac{1}{2}$ pound, in bottle.....	48
Extractum belladonnæ florum, 1 ounce, in bottle.....	6	Protargol, 1 ounce or equivalent in bottle.....	240
Extractum casearæ sagradæ, 133-mgm. tablets, 500 in bottle.....	20	Pulvis ipeacuanhæ et opii, $\frac{1}{4}$ pound in bottle.....	12
Extractum glycyrrhizæ purum, $\frac{1}{4}$ pound, in jar.....	72	Quinina dihydrochloridum, 32-mgm. hypodermic tablets, 20 in tube.....	36
Ferri phosphas solubilis, 1 pound, in bottle.....	4	Quinina sulphas:	
Fluidextractum ipeacuanhæ, $\frac{1}{2}$ pound, in bottle.....	6	Crystals, 1 ounce, in wide-mouth bottle.....	24
Foot powder (par. 902), $\frac{1}{4}$ pound, in tin, with perforated cover.....	300	200-mgm. tablets, 500 in bottle.....	12
Glycerinum, 1 pound, in bottle.....	200	Saccharum lactis, powder, 3 ounces in bottle.....	24
Hexamethylenamina, U. S. P., 1 pound, in bottle.....	6	Sapo mollis (green soap) 1 pound in jar.....	144
Homatropinæ hydrobromidum, 15 grains, in bottle.....	2	Scopolaminæ hydrobromidum, 0.650-mgm. hypodermic tablets, 20 in tube.....	12
Hydrargyri chloridum corrosivum:		Sodii acetas, U. S. P., 1 pound in bottle.....	12
3 ounces, in bottle.....	8	Sodii bicarbonas, U. S. P., 1 pound, in carton.....	72
1 pound, in bottle.....	24	Sodii bicarbonas et mentha piperita tablets (par. 902), 400 in bottle.....	48
Tablets (antisept) (par. 902), 250 in bottle.....	24	Sodii boras, powder, 1 pound, in bottle.....	24
Hydrargyri chloridum mite:		Sodii carbonas monohydratus, for surgical use, 1 pound, in bottle.....	48
32-mgm. tablets, 250 in bottle.....	48	Sodii fluoridum, 5 pounds in package.....	6
6.5-mgm. tablets, 250 in bottle.....	120	Sodii phosphas exsiccatus, powder, 3 ounces in wide-mouth bottle.....	144
2 ounces, in bottle.....	120	Sodii salicylas, 6 ounces, in bottle.....	48
Hydrargyri salicylas, 1 ounce, in bottle.....	24	Spiritus ammoniæ aromaticus, $\frac{1}{2}$ pound in glass-stopper bottle.....	60
Icthyololum, 3 ounces, or equivalent, in bottle.....	36	Spiritus frumenti, 1 quart, in bottle.....	24
Iodum, 1 ounce, in bottle.....	144	Spiritus glycyrrylis oitratis, 1 ounce in glass-stopper bottle.....	8
Ipeacuanha, powder, 3 ounces, in wide-mouth bottle.....	4	Strophanthinum 0.5-mgm. hypodermic tablets, 20 in tube.....	24
Liquor cresolis compositus, 1 quart, in bottle.....	96	Strychninæ sulphas, 1-mgm. hypodermic tablets, 250 in bottle.....	36
Liquor ferri chloridi, U. S. P., 1 pound, in bottle.....	12	Sugar, white, 12 pounds in can.....	36
Liquor formaldehydi, U. S. P., 1 gallon in jug.....	9	Sulphur, in roll.....	48
Liquor hydrogenii dioxidi, U. S. P., 1 pound, in amber-colored bottle, stopper wired.....	144	Sulphur lotum, $\frac{1}{2}$ pound in bottle.....	12
Magnesi sulphas, 4 pounds, in tin.....	200	Taleum, 2 pounds in tin.....	12
Menthol, 1 ounce, in bottle.....	12	Tinctura digitalis, $\frac{1}{2}$ pound, in bottle.....	4
Methylis salicylas (oil of wintergreen, synthetic), 1 ounce in bottle.....	36	Tinctura nucis vomicæ, $\frac{1}{2}$ pound, in bottle.....	24
Morphinæ sulphas:		Tinctura opii, 1 pound in bottle.....	12
Powder, $\frac{1}{4}$ ounce, in bottle.....	2	Tinctura opii camphorata, 1 pound in bottle.....	48
8-mgm. hypodermic tablets, 20 in tube.....	60	Trochisci ammonii chloridi, 125, in bottle.....	24
Naphthalenum.....	60	Unguentum hydrargyri, $\frac{1}{2}$ pound, 10 per cent, with petrolatum base.....	48
Nitroglycerin, 0.65-mgm. hypodermic tablets, 20 in tube.....	20	Unguentum hydrargyri oxidi flavi, 2 per cent (petrolatum base), $\frac{1}{4}$ ounce in tube.....	4
Normal saline solution, tablets (par. 902), 100 in bottle.....	48	Unguentum hydrargyri chloridi mitis, 30 per cent, 2 pounds in jar.....	24
Oleum caryophylli, 1 ounce in glass-stopper bottle.....	12	Zinci oxidum, $\frac{1}{4}$ pound, in wide-mouth bottle.....	48
Oleum gossypii seminis, 1 quart, in bottle.....	72	Zinci sulphas, $\frac{1}{2}$ pound, in wide-mouth bottle.....	4
Oleum menthæ piperitæ, 1 ounce, in glass-stopper bottle.....	12		
Oleum ricini, 1 quart, in bottle.....	60		

The following medicines are supplied from the base overseas:

Acidum hydrochloricum, ½ pound, in bottle.....bottles.....	24	Æther, ¼ pound, in tin.....tins..	200
Acidum nitricum, ½ pound, in bottle.....do....	24	Alcohol, 5 gallons, in bottle.....bottles..	20
Acidum sulphuricum, ½ pound, in bottle.....do....	12	Oleum terebinthinæ rectificatum, 1 quart, in bottle.....bottles..	72

NOTE.—The size of container will vary from time to time due to market conditions.

STATIONERY

Bands, elastic.....dozen..	200	Paper:	
Binders, loose-leaf, for medical history of post (see par. 412).....number..	1	Blotting—	
Blotters, hand.....do....	24	For desks.....quires..	24
Books:		Small pieces for hand blotters.....pieces..	400
Blank—		Carbon—	
Crown (cap), 250 pages.....do....	72	Cap, 100 sheets, in box.....boxes..	4
8vo, 150 pages.....do....	72	Letter, 100 sheets, in box.....do....	8
Prescription (see par. 210).....do....	6	Fasteners.....do....	24
Envelopes, official:		Manifolding—	
Large.....do....	600	Cap, 250 sheets, in package.....packages..	8
Letter.....do....	2,000	Letter, 500 sheets, in package.....do....	16
Erasers, rubber:		Typewriter—	
Pencil.....pieces..	24	Cap, 250 sheets, in package.....do....	4
Typewriter.....number..	24	Letter, 500 sheets, in package.....do....	16
Ink:		Weights.....number..	8
Black (powder or tablets) sufficient in box for 1 quart of fluid.....boxes..	18	Writing—	
Red, 2 ounces, in bottle.....bottles..	24	Letter.....quires..	50
Note, 100 sheets, in pad.....pads..	300	Note, 100 sheets, in pad.....pads..	300
Labels:		Paste, photo and library.....jars..	12
For dispensing set.....number..	2	Pencils, lead.....number..	288
For vials.....gross..	72	Penholders.....do....	72
Poison, assorted.....do....	12	Pens, steel.....gross..	8
Pads:		Punches, perforating.....number..	1
Ink, for stamps.....number..	6	Rulers.....do....	12
Prescription.....dozen..	36	Stamps, penalty, rubber.....do....	2
		Tape, office, red.....spools..	2

MISCELLANEOUS SUPPLIES

Apparatus:		Beds, white enamel, standard.....number..	1,000
Compressed air (par. 903).....number..	1	Bells, call.....do....	36
Electric.....do....	1	Blankets:	
Applicators, for throat:		Gray.....do....	4,000
Metal.....do....	12	Rubber.....do....	70
Wood.....gross..	10	Boilers:	
Apron:		Coffee, 1½-quart tin or enamel.....do....	24
Cook's.....number..	180	Double for cooking—	
Rubber.....do....	12	1½-quart.....do....	33
Atomizers, hand.....do....	144	4-quart.....do....	84
Bags:		Instrument.....do....	24
Laundry.....do....	60	Tio, copper-bottom.....do....	12
Rubber—		Books, medical library, base-hospital sets.....do....	1
Hot water.....do....	144	Bottles, 4-quart, for antiseptic solutions.....do....	20
Ice, for bead.....do....	50	Bougies, flexible, Nos. 11, 13, 15, 17, 20, 22, French scale.....number..	48
Bandages:		Bowls, soup, enamel ware or aluminum.....do....	1,500
Flannel, 3-inch roller.....gross..	6	Boxes:	
Gauze, roller, assorted, in boxes of six dozen boxes.....	120	Folding for tablets.....dozen..	720
Plaster of Paris, 3-inch, in individual packages dozen.....	36	Ointment, impervious.....do....	720
Rubber, Martin.....number..	48	Powder.....do....	720
Suspensory.....dozen..	16	Brooms:	
Winder.....number..	3	Corn.....number..	120
Bars, mosquito.....do....	200	Hair, long handle.....do....	40
Spreaders for frames.....do....	200	Brushes:	
Frames for.....pairs..	200	Hand, fiber.....do....	150
Basins:		Paint.....do....	24
For sponges, etc., white enamel.....number..	60	Scrubbing.....do....	144
Hand, white enamel.....do....	150	Shaving.....do....	12
White enamel for operating room.....do....	72	Buckets:	
Bed pans, enamel or agate ware.....do....	140	Covered metal, 7-quart.....do....	50
		Galvanized iron.....do....	200

Pillows, feather.....	number..	2, 100
Pins:		
Common, assorted.....	papers..	150
Safety, 3 sizes.....	gross..	20
Pitehers, white enamel:		
Small, 1-pint.....	number..	200
Large, 4-quart.....	do.....	50
Plaster, adhesive, zinc oxide, 5 yards by 2½ inches, in spool.....	spools..	250
Plaster of Paris, 4-pound tins.....	tins..	30
Plates, dinner, enamel ware.....	number..	2, 000
Potato masher, hotel size.....	do.....	6
Pots:		
Stock—		
24-quart, with spigot.....	do.....	6
36-quart, with faucet and strainer.....	do.....	8
36-quart, without faucet and strainer.....	do.....	6
Tea, enamel ware.....	do.....	36
Pus basins.....	do.....	100
Pyrene fire extinguishers.....	do.....	100
Fillers for.....	do.....	100
Racks for urinals and bed pans.....	do.....	20
Razors.....	do.....	12
Razor strops.....	do.....	6
Retort stands.....	do.....	6
Rods, glass, assorted, in 10-ounce packages.....	packages..	2
Rolling pins, hotel size.....	number..	3
Safe, iron, small.....	do.....	1
Saucers, white enamel.....	do.....	2, 000
Saws, butcher's, large.....	do.....	6
Scales and weights:		
Apothecaries', metric system, sensitive to 6.5 mgm.....	number..	1
Grocers'.....	do.....	1
Balance, in glass case.....	do.....	1
Screens, bedside, folding, wooden.....	do.....	48
Shears.....	pairs..	12
Sheeting, rubber.....	yards..	150
Sheets, cotton.....	do.....	4, 250
Shirts, cotton.....	number..	2, 250
Sickles.....	do.....	6
Sieves, flour, pan type.....	do.....	6
Skimmers.....	do.....	12
Slippers.....	pairs..	800
Soap:		
Common.....	pounds..	600
Ivory.....	do.....	500
Scouring.....	do.....	300
Scalpels:		
5¼-inch.....	number..	48
6¼-inch.....	do.....	48
Spatula:		
3-inch.....	do.....	6
6-inch.....	do.....	6
Spools, glass, Halstead.....	do.....	24
Spoons:		
Basting, iron, large, tinned.....	do.....	12
Table.....	do.....	1, 500
Tea, silver plated.....	do.....	2, 250
Sprinklers, powder, hard rubber.....	do.....	6
Steels.....	do.....	6
Sterilizers, nickled, 6 by 14 inches.....	do.....	24
Stools, revolving, white enamel.....	do.....	6

Stoves:		
Coal oil, blue flame, 1-burner.....	number..	40
Extra wicks for, blue flame.....	do.....	80
Stove blacking.....	papers..	48
Sutures:		
Catgut—		
Chromicized, 3 sizes in package.....	packages..	500
Plain, 3 sizes in package.....	do.....	1, 000
Horsehair, 100 in coil.....	coils..	50
Silk, 3 sizes in package.....	packages..	300
Silkworm gut, 100 in coil.....	coils..	50
Silver wire, in yard length.....	yards..	24
Suits, convalescent.....	number..	2, 250
Syringes:		
Ear and ulcer.....	do.....	36
Fountain—		
White enamel, 2-quart, graduated.....	do.....	48
Rubber.....	do.....	60
Hypodermic (par. 956).....	do.....	60
Extra needles for.....	do.....	300
Extra wires for, bundles.....	do.....	60
Penis, glass in cases.....	do.....	144
Tables:		
Bedside, wood, folding.....	do.....	1, 000
Instrument, metal.....	do.....	12
Dressing, rolling.....	do.....	12
Operating—		
Field, folding.....	do.....	33
Post, standard.....	do.....	3
Mess, folding.....	do.....	50
Typewriter.....	do.....	12
Tanks, acetylene, filled.....	do.....	6
Tape measure, 60 inches.....	do.....	24
Thermo-cautery (par. 957).....	do.....	2
Thermometers:		
Clinical.....	do.....	500
Maximum and minimum, meteorological.....	number..	1
Ward.....	do.....	25
Thread:		
Cotton, assorted.....	spools..	100
Linen, unbleached 200 yards in spool.....	do.....	48
Tongue depressors, wood.....	gross..	6
Towels:		
Bath.....	dozen..	170
Dish.....	do.....	12
Hand.....	do.....	1, 000
Trays:		
Bed with legs.....	number..	240
Butlers'.....	do.....	120
Instrument, white enamel.....	do.....	36
Tubing, Carrel:		
¼-inch, red rubber.....	yards..	100
½-inch, red rubber.....	do.....	25
¾-inch, red rubber.....	do.....	10
¾-inch, red rubber.....	do.....	5
Tubes, stomach.....	number..	18
Tubing, glass, assorted.....	pounds..	25
Tumblers, glass.....	number..	105
Twine, coarse.....	pounds..	25
Typewriters.....	number..	12
Record ribbons for.....	do.....	24
Urinals, enamel ware.....	do.....	120
Veneral prophylaxis unit (par. 958).....	do.....	1
Vials, 1, 2, 4 ounce, of each.....	dozen..	200
Vision test sets.....	number..	4
Wire cutters.....	do.....	4

SURGICAL INSTRUMENTS AS PER LIST OF STAPLE, MEDICAL, AND SURGICAL SUPPLIES. REVISION OF DECEMBER, 1917

Dissecting scissors (Mayo):		Towel forceps (Baekhaus), 6-inch, screw lock (134)	
Curved, 5½-inch, screw lock (108).....number..	6	.....number..	24
Straight, 5½-inch, screw lock (109).....do....	6	Bullet forceps (Senn), 8-inch, screw lock (135)	
Straight scissors:		.....number..	6
One point sharp, 5½-inch, screw lock (111)		Esmarch's tourniquet, rubber 36 by ½-inch; chain,	
.....number.....	24	9 inches (140.1).....number.....	24
Double sharp, 5½-inch, screw lock (112).....do....	24	Probes, straight, with eye, 8-inch, silver or plated	
Bandage scissors, 7½-inch, screw lock (115).....do....	40	(156.1).....number.....	12
Hæmostatic forceps (Koehler), straight, 5½-inch,		Director, grooved, plated, 5½-inch (158).....do....	24
screw lock (120).....number.....	50	Bone-cutting forceps (Liston), curved, screw lock,	
Intestinal forceps (Doyen):		7½-inch (173).....number.....	12
Straight, 9-inch, screw lock (124).....do....	6	Rongeur bone forceps (Horsley), screw lock 8½-inch	
Curved, 9-inch, screw lock (125).....do....	6	(175).....number.....	6
Sponge holder, oval blades, 8½-inch, screw lock		Sequestrum forceps, screw lock (177).....do....	3
(126).....number.....	36	Bone curette (Whiting), sizes 2, 4, and 6 (188).....sets..	4
Tissue forceps (Allis), 6-inch, 4 by 5 teeth, screw		Rectal speculum (Sims), bivalve, wrought metal	
lock (127).....number.....	24	.....number.....	3
Dressing forceps:		Syringe, Luer standard, all glass, with chain attach-	
Straight, 10-inch, with catch, screw lock (128)		ment, four sizes, 2-c. c., 5-c. e., 10-c. e., 20-c. e., of	
.....number.....	24	each (300).....number.....	12
Spring, 5½-inch (139).....do....	50	Needles, hypodermic, various sizes, to fit standard	
Tissue forceps, spring, mouse-toothed, 1 by 2, 5½-inch		Luer syringe (301).....number.....	40
(131).....number.....	24	Tongue depressor (Farlow) (313).....do....	22
Needle holder:		Faughner aneroid sphygmomanometer (430).....do....	2
Richter, 7-inch screw lock (132).....do....	8	Yankauer mask, metal (455).....do....	12
Hegar, 7½-inch, screw lock (133).....do....	8	Politzer bag (530).....do....	6

GENERAL

Apparatus (Carrel-Dakin) (Revised).....number..	100	Clippers, hair.....number..	2
EXTRA ARTICLES FOR CARREL-DAKIN APPARATUS		Cots, finger.....gross..	5
Apparatus, chloroform control.....number..	2	Disinfectors, portable, steam type, Kinyoun-	
Beakers, 1,000, e. c., 2,000 c. c., of each.....do....	12	Francis.....number.....	1
Bottles, 10 liters; 20 liters, of each.....do....	8	Forceps, straight, mosquito (Halstead).....do....	12
Burettes, 50 c. c. graduated in ½ c. c.....do....	8	Flasks (Erlenmeyer) 500-c. e.....do....	18
Creline (or equivalent).....pounds..	8	Gag, mouth (Denhart).....do....	4
Clamp fasteners.....number.....	12	Gas, oxygen, anesthesia apparatus.....do....	1
Clamp cocks, Mohr.....do....	100	Headlamps (Murphy) complete.....do....	1
Pipettes:		Needles, infusion.....do....	12
Bulb, 10-c. c., calibrated.....do....	12	Razors, skin grafting.....do....	2
10-c. c., graduated in ½ c. c.....do....	12	Scalpels, ½-inch blade.....do....	10
Ring stand, 20-inch, medium.....do....	2	Scissors:	
Screw clamps.....do....	10	Curved, dissecting.....do....	6
Silk, India.....yards..	10	Straight, dissecting.....do....	3
Spatula, porcelain, 7-inch.....number..	2	Sounds, uterine (Simpson).....do....	1
Stoppers, rubber, 2 hole, Nos. 7, 8.....do....	12	Sterilizers, national, hospital size, gasoline burners	
Thread, linen, Nos. 25, 30, of each.....spools..	12	.....do....	2
Toweling, bath.....yards..	15	Sterilizing outfit, combination with steam boiler and	
Tubing:		1 additional dressing sterilizer.....do....	1
Glass, 8-10 mm. bore.....feet.....	48	Stretchers, wheel.....do....	6
Rubber, 8-10 mm. bore.....do....	48	Tables, instrument, adjustable.....do....	3
Wash bottles, 250-c. e.....number..	4	Tubes, drainage;	
CHEMICALS FOR CARREL-DAKIN APPARATUS		Large (Paul's).....do....	2
Acid, acetic, glacial, 1 pound in bottle.....bottles..	8	Medium (Paul's).....do....	2
Lime, chlorinated.....pounds..	200	Ward dressing sets.....do....	15
Phenolphthalein (powder).....ounces..	2	Water pump, slip attachments.....do....	1
Potassium iodide.....do....	8	Wax, standlind.....bottles..	12
Sodium bicarbonate.....pounds..	60	BRAIN, PLASTIC, AND ORAL	
Sodium carbonate, dry.....do....	100	Apparatus, anaesthesia, intratracheal.....number..	1
Sodium thiosulphate (reagent quality).....do....	10	Bellows, foot.....do....	1
SURGICAL INSTRUMENTS AND APPLIANCES		Brain spatula, three sizes (Cushing).....set.....	1
Abdominal suction tubes.....number..	2	Brace and drill (Hudson).....do....	1
Apparatus for administration of serum (3-way stop-		Canula (catheter introducer) (Cotton-Boothby)	
cock with tubing).....number.....	2	.....number.....	1
Atomizers with extra bulb (Sherman).....do....	2	Case, brain, plastic and oral.....do....	1
Clamps, hemorrhoidal.....do....	1	Catheters, cylindrical, 18 Fr. (Poerge's).....do....	12

Forceps:

Bone, Rongeur (DeVilbiss).....	number..	2
Artery—		
Halstead, straight.....	No.	} sets.. 5
Mosquit.....	No.	
Kelly, large size.....	No.	
Army.....	No.	
Lead plate, No. 19, gauge 12 by 12 inches.....	number..	1
Saws (Gigli), 20 inches.....	do.....	12
Screws, oral.....	do.....	4
Trephines (Hudson), set of 3.....	set.....	1
Wax, bone (3 tubes to container).....	containers..	12

GENITOURINARY

Catheters:

Urethral—		
Plain—		
No. 5.....	number..	1
No. 6.....	do.....	4
X-ray No. 6.....	do.....	4
Conical end No. 6.....	do.....	4
Urethral, Nos. 14, 16, 18, and 20 (2 each).....	do.....	8
Nelaton, rubber, Nos. 14, 16, 18, 22, and 26 (2 each).....	number..	10
Coupler or adapter.....	do.....	1
Cystoscope (Brown-Buerger).....	do.....	1
Urethroscope (Young).....	do.....	1
Rheostat (E. S. I. or Wappler lamp-socket type).....	number..	1
Syringes, urethral, glass, ½-ounce.....	do.....	10
Phenolsulphonephthalein, ampoules.....	dozen..	3

EYE

Apparatus, suction.....	number..	1
Balls, glass, lead free (18, 20, 22 mm.), 12 each.....	do.....	36
Bottles, solution.....	do.....	2
Case:		
Eye, auxiliary.....	do.....	1
Treatment.....	do.....	1
Coroeal, loupes (Berger).....	do.....	1
Flashlights, pocket, with extra batteries.....	do.....	2
Irrigators (New York eye and ear pattern).....	do.....	3
Lamps, projection, 110 volts direct current.....	do.....	1
Lenses, condensing, 110 volts direct current.....	do.....	2
Magnets (Lancaster model), 110 volts direct current.....	number..	2
Ophthalmoscope and retinoscope, electric, with box (DeZeng).....	number..	1
Perimeter, hand (Schweigger), with 12 charts.....	do.....	1
Racks, instrument.....	do.....	1
Syringes, ear, soft rubber.....	do.....	12
Tonometer.....	do.....	1
Undines.....	do.....	12
Worsted, colored (Holgrem's stick).....	do.....	1

EAR, NOSE, AND THROAT

Antrum trocar.....	number..	1
Aneurism needle.....	do.....	1
Atomizers, Mueller.....	set.....	1
Bronchoscopic battery, Jackson.....	number..	1
Catgut:		
Pyoktannin, plain, No. 00, 14-inch.....	tubes..	21
Tanned or chromicized—		
No. 0, 14-inch.....	do.....	24
No. 1, 14-inch.....	do.....	24
No. 2, 14-inch.....	do.....	24
No. 3, 14-inch.....	do.....	36
Chairs, operating room.....	number..	4
Coffin suction apparatus, Mueller, 110 volts direct current.....	number..	1
Condensers, Coakley, 110 volts direct current.....	number..	2

DeZeng's outfit, consisting of:

Jumbo handle battery.....	number..	1
Laryngoscope and transilluminator, electric, 2 lamps, 2 interchangeable mirrors.....	number..	1
Lamps, extra.....	do.....	4
Otoscope, electric, 3 specula, head, compression bulb, 2 lamps.....	number..	1
Speculum, nasal.....	do.....	1
Tongue depressors, electric, 2 lamps.....	do.....	1
Dissector, blunt.....	do.....	1
Forceps:		
Angular.....	do.....	2
Artery.....	do.....	12
6½ inches.....	do.....	2
Laryngeal.....	do.....	1
Tissue—		
10-inch.....	do.....	1
2 teeth, 4½-inch.....	do.....	2
Tongue, 5½-inch.....	do.....	1
Vulsellum.....	do.....	2
Grooved director, 5½-inch.....	do.....	1
Gut, silk-worm:		
Fine B.....	bundles..	6
Fine C.....	do.....	5
Headlight (6 extra lamps), 110 volts, direct current.....	number..	1
Instrument sterilizers, Mueller, 110 volts, direct current.....	number..	1
Knife, fistula, Koch, 6-inch.....	do.....	1
Knives, Mueller.....	do.....	12
Mallet.....	do.....	1
Mastoid Rongeur.....	do.....	1
Mirrors:		
Laryngeal.....	do.....	2
Postnasal.....	do.....	2
Needle holder.....	do.....	1
Needles:		
Hagedorn, straight, No. 9.....	dozen..	4
Trocar point, Mayo.....	do.....	1
Nippers, wire, 5-inch.....	number..	1
Nitrous oxide, cylinder "E".....	do.....	1
Oxygeo, cylinder "E".....	do.....	1
Politzer bag, 8-ounce, with valve.....	do.....	1
Probes, copper.....	do.....	3
Rack, instrument, Mayo.....	do.....	1
Retractors:		
Mastoid, Jansen.....	do.....	1
Solid blade, 2-inch set.....	set.....	1
Scissors, heavy, 6-inch.....	number..	2
Silk, braided:		
No. 2, 25 yards.....	spool..	1
No. 12, 25 yards.....	do.....	1
Specula:		
Aural, 3-inch set.....	set.....	2
Nasal.....	number..	2
Speculum, laryngeal, Jackson.....	do.....	1
Sponge holders.....	do.....	2
Inhaler, gas-ether.....	do.....	1
Tankless air compressor and suction apparatus, Mueller, 110 volts, direct current.....	number..	1
Tracheal dilator, Koch.....	do.....	1
Transilluminator, Jackson-Freer, 110 volts, direct current.....	number..	1
Trocar.....	do.....	1
Tuning fork.....	do.....	1

ORTHOPEDIC

Bone extension apparatus (Steinmann).....	number..	4
Bone set (Albee).....	do.....	1

Clamps for bone plating:		
Large (Lowman).....	number.....	1
Small (Lowman).....	do.....	1
Felt, elastic, ½ inch thick.....	yards.....	10
Forceps, screw-holding (Lane).....	number.....	1
Knives, plaster.....	do.....	6
Plates, bone (Sherman) Nos. 1, 3, 4, 6, 7, 9 (2 each)	.....
.....	number.....	12
.....	dozen.....	3
Screws, bone, assorted (Sherman).....	dozen.....	3
Screw driver:		
Lane.....	do.....	1
Sherman-Pierce.....	do.....	1

SPLINTS

Arm:		
Abduction.....	number.....	10
Extension.....	do.....	25
Bradford frame.....	do.....	10
Bradford abduction frame.....	do.....	1
Balkan frame, standard, knockdown.....	do.....	25
Combined ankle and lower leg.....	do.....	50
Elbow.....	do.....	30
Foot, rectangular.....	do.....	50
Hand, hyperextension.....	do.....	50

X-RAY APPARATUS FOR BASE HOSPITAL—500 TO 1,000 BEDS

Apparatus, X-ray, interrupterless type, to operate on type of current stated in contract.....	number.....	1
Apron:		
Lead, protracting, with leather straps.....	do.....	2
Waterproof, 50 inches long.....	do.....	1
Box:		
For localizing apparatus.....	do.....	1
To contain the following:		
Parallel wire device for Strohl's method.....	number.....	1
Blaine's parallax localizer.....	do.....	1
Localizing scale for cross-thread method.....	number.....	1
Profoundometer localizer.....	do.....	1
Hirtz compass.....	do.....	1
Fluoroscopic adapter for Hirtz compass.....	number.....	1
Sutton localizing set.....	do.....	1
Lined with ¼-inch sheet lead, water-tight, to be connected with sewer; inside measurements, 42 inches long, 22 inches wide, 19 inches deep. This box to hold tanks for developing, etc. (to be constructed locally).....	number.....	1
Lined with ½-inch sheet lead on all sides; 10 inches wide, 20 inches long, 18 inches deep, made of ¾-inch lumber, with hinged lid; for protection of X-ray plates (to be constructed locally).....	number.....	1
Wooden, 12 inches long, 12 inches wide, 3 inches deep (to be constructed locally).....	number.....	3
Bonnet, fluoroscopic (to be purchased in France).....	number.....	2
Brush, camel's hair, 3 inches.....	do.....	1
Carriers, plate, Core:		
10 by 12 inch size, monel metal.....	dozen.....	1
14 by 17 inch size, monel metal.....	do.....	1 ½
Carriers, film (ease) Eastman:		
For development, 10 by 12 inches.....	do.....	1
For development, 8 by 10 inches.....	do.....	1
For development, 14 by 17 inches.....	do.....	½
Charts, eye localizing, Kelley-Koett.....	number.....	200
Chemicals:		
Barium sulphate, for X-ray diagnosis.....	pounds.....	50
Chrome alum.....	do.....	5

Hodgen's new pattern (25 each).....	number.....	50
Humerus, extension.....	do.....	40
Knee, Thomas, with toe drop and spanner attachments (25 each).....	do.....	50
Simple straight 25 each.....	do.....	100
Wire gauze, 15 by 36 inches.....	dozen.....	4
Wood.....	rolls.....	12
Wood, yucca.....	dozen.....	4
MISCELLANEOUS		
Back rests.....	number.....	40
Boiler, coffee, 40-gallon, aluminum or retinned copper, with faucet, strainer, wire ring inside for French drip, and metal tray to protect bottom of boiler.....	number.....	2
Slicer, bread and meat, sterling, No. 70.....	do.....	1
Tables:		
Baker's and cook's, 3 by 8 feet by 2 feet 6 inches high, knockdown.....	number.....	1
Kitchen—		
4 by 10 feet by 2 feet 6 inches high, knockdown.....	number.....	2
3 by 6 feet by 2 feet 6 inches high, knockdown.....	number.....	2

Chemicals—Continued.		
Formaldehyde.....	pounds.....	5
Hydroquinone.....	do.....	5
Metol, or equivalent.....	do.....	½
Potassium bromide.....	do.....	1
Sodium carbonate, dry.....	do.....	5
Sodium hyposulphite.....	do.....	100
Sodium sulphite, dry.....	do.....	15
Crocks, earthenware, 5-gallon.....	do.....	2
Films:		
Dental—		
Holders for development, Eastman.....	do.....	10
1½ by 2½ inches (No. 1A).....	gross.....	1
1¼ by 1¾ inches (No. 1).....	do.....	1
X-ray—		
11 by 17 inches.....	dozen.....	5
10 by 12 inches.....	do.....	10
8 by 10 inches.....	do.....	10
Film holders (ease type), Eastman, 10 by 12 inches to accommodate 10 by 12 and 8 by 10 films between 2 screens.....	dozen.....	2
Funnels, enamel ware, 6-inch.....	number.....	2
Glass cutter.....	do.....	1
Glass, lead, ⅞ inch thick, 8 by 10 inches.....	pieces.....	1
Gloves, opaque, protective, gauntlet.....	pairs.....	2
Goggles, automobile type, fitted with red and green superimposed clear polished celluloid, Arlington Pyralin, colors 24 and 181, 0.01 inch thick, finish H. H.....	pairs.....	2
Insulators, 4-arm, for high-tension wires.....	number.....	2
Insulators, wall, for carrying high-tension wires through partitions.....	number.....	3
Lead foil, medium thickness.....	pound.....	10
Light, incandescent, blue, with pull switches.....	number.....	2
Lead, in sheets, 4 pounds to square foot.....	square foot.....	100
Localizer, eye, Kelley-Koett.....	number.....	1
Marker, skin (to be purchased in France).....	do.....	1
Pitchers, enamel ware, 2-quart.....	do.....	2
Preservers, negative:		
For 14 by 17 plates.....	do.....	100
For 10 by 12 plates.....	do.....	200
For 8 by 10 plates.....	do.....	400
For 5 by 7 plates.....	do.....	100

Paper, tracing:		
14 by 17 inches.....	.....sheets.....	500
10 by 12 inches.....	.....do.....	500
Plate rack, folding, for 12 plates.....	.....number.....	2
Pencils, grease, Blaisdell, red and blue, of each.....	.....number.....	6
Plate changer, stereoscopic, for 14 by 17 plates, Kelley-Koett.....	.....number.....	1
Plates, X-ray:		
14 by 17 inches.....	.....dozen.....	6
10 by 12 inches.....	.....do.....	6
8 by 10 inches.....	.....do.....	10
5 by 7 inches.....	.....do.....	6
Rack, tube, 5-inch, holes, wooden (to be made by carpenter).....	.....number.....	1
Ruler, wood (15 inches) with metric system, having 2 metal buttons, 3 mm. in diameter, the centers of which are exactly 10 cm. apart.....	.....number.....	1
Reels, trolley:		
Plain.....	.....number.....	4
Double Coolidge.....	.....do.....	2
Roentgenoscope, vertical, arranged for Coolidge tube; box protected by sheet lead $\frac{1}{8}$ inch thick on front and sides, furnished with good grade fluoroscopic screen, 11 by 14 inches, mounted in screen holder with protected handles and covered with lead glass at least $\frac{1}{8}$ inch thick.....	.....number.....	1
Rotary converter, 7½ kilowatt capacity, complete with starting box and switches, capable of continuous operation at 7½ kilowatts and of sustaining an overload of 150 per cent for 10 seconds, and to deliver a satisfactory alternating current to the X-ray machine from a direct current source (to be furnished only where direct current is the sole source of supply).....	.....number.....	1
Safe light, dark room, Wratten.....	.....do.....	1
Sandbags, 3 by 4 by 8 inches, empty.....	.....do.....	6
Screens, intensifying, mounted in cassettes, detachable:		
Size 14 by 17 inches.....	.....number.....	2
Size 10 by 12 inches.....	.....do.....	2
Size 8 by 10 inches.....	.....do.....	2
Screens, intensifying, without cassettes, furnished in cardboard folder:		
Size 14 by 17 inches.....	.....do.....	2
Size 10 by 12 inches.....	.....do.....	4

Screens, intensifying, without cassettes, furnished in cardboard folder—Continued.		
Size 8 by 10 inches.....	.....number.....	4
Size 5 by 7 inches.....	.....do.....	4
Stand:		
Tube, Kelley-Koett type, with two cones 5 and 7 inches.....	.....number.....	1
Insulating, for Coolidge tube transformer.....	.....number.....	1
Stereoscope, Wheatstone, furnished with four 100-watt nitrogen lamps permitting of gradual regulation.....	.....number.....	1
Switch:		
Foot, so devised that the room may be in total darkness without either X ray or electric light, or with X ray on and no electric light, or with lights on and no X ray (Kelley-Koett).....	.....number.....	1
High tension —		
Double throw, Coolidge equipped.....	.....do.....	1
Single throw, Coolidge equipped table, base hospital type.....	.....number.....	1
Tank, porcelain:		
4½ by 14¾ by 20 inches.....	.....do.....	1
14¾ by 14¾ by 20 inches.....	.....do.....	2
Thermometer, bath.....	.....do.....	2
Time switch, Wappler or equivalent.....	.....do.....	1
Trays; enamel ware:		
For 14 by 17 plates.....	.....do.....	2
For 10 by 12 plates.....	.....do.....	2
Tools, set, consisting of hammer, saw, ease opener, large and small screw driver, and heavy cutting pliers.....	.....sets.....	1
Transformer, Coolidge tube, insulated against breakdown test of 50,000 volts.....	.....number.....	1
Tubes:		
Coolidge—		
Medium focus.....	.....do.....	3
Special radiator type.....	.....do.....	2
Tungsten, target, 7-inch.....	.....do.....	2
Tunnel, plate changing, aluminum, 17 by 17 inches with one plate draw.....	.....number.....	1
Turnbuckles.....	.....do.....	12
Wedge, wooden, 12 by 3 inches, angle 23°.....	.....do.....	1
Wire, copper, spool of 12 yards in length, No. 16 spools.....	.....number.....	1
Wires, bronze, for trolley system No. 10.....	.....feet.....	150

INITIAL ALLOWANCE FOR A BASE HOSPITAL (OVERSEAS) LABORATORY SUPPLIES

Item No.		
1.	Acetylene, cylinder.....	.....number..... 1
	Accessories for above acetylene cylinder:	
2.	Band.....	.....do..... 1
3.	Double control valve.....	.....do..... 1
4.	Union.....	.....do..... 2
5.	Rubber tubing.....	.....feet..... 31
15.	Aluminometer, Esbach.....	.....number..... 3
20.	Animal cages.....	.....do..... 4
21.	Iron supports.....	.....do..... 1
25.	Aprons, laboratory.....	.....do..... 6
30.	Asbestos boards.....	.....do..... 16
35.	Asbestos mats.....	.....do..... 6
40.	Autoclave, for oil heating.....	.....do..... 1
	Balance:	
55.	Laboratory.....	.....set..... 1
60.	Weights.....	.....do..... 1
65.	Harvard trip.....	.....do..... 1
70.	Weights.....	.....do..... 1
	Solution scale.....	.....do..... 1
100.	Baskets.....	.....number..... 24

Item No.		
	Beakers, spout:	
105.	100-c. e.....	.....number..... 6
106.	250-c. e.....	.....do..... 6
107.	400-c. e.....	.....do..... 6
108.	600-c. e.....	.....do..... 6
109.	800-c. e.....	.....do..... 2
110.	1,000-c. e.....	.....do..... 2
120.	Bell glass.....	.....do..... 4
	Blocks, of red fiber:	
125.	½ by ½ by ¾ inches.....	.....do..... 12
126.	1 by 1 by ¾ inches.....	.....do..... 12
145.	Bone saw.....	.....do..... 1
150.	Bottle, balsam.....	.....do..... 2
	Bottles:	
155.	For specimens.....	.....do..... 100
160.	Do.....	.....do..... 50
165.	Green glass.....	.....do..... 5
180.	1,000-c. e. capacity.....	.....do..... 6
190.	30-c. e. capacity.....	.....do..... 24
195.	8-ounce capacity.....	.....do..... 12

Item No.		Item No.	
	Bottles—Continued.		Corks—Continued.
225.	Reagent..... set	1	595. No. 20, 1 $\frac{1}{8}$ inches diameter at small end..... gross
230.	Wolff..... number	2	600. Borers..... set
235.	Brush, camel's-hair, flat..... do	1	615. Counting apparatus..... number
	Brushes:		618. Counting chamber..... do
240.	Camel's-hair pencil..... do	12	620. Cover glasses..... boxes
245.	Test tubes..... do	24	625. Crucibles, coors U. S. A..... number
250.	Flask..... do	6	
255.	Burette..... do	6	Cylinders:
260.	Burettes..... do	2	650. 25 c. c. capacity..... do
	Burners:		651. 100 c. c. capacity..... do
275.	Acetylene..... do	3	652. 250 c. c. capacity..... do
280.	Acetylene (stove)..... do	1	653. 500 c. c. capacity..... do
	Alcohol—		654. 1,000 c. c. capacity..... do
285.	Lamp..... do	4	660. Mixing bottle..... do
290.	Stove..... do	2	665. Desiccators..... do
330.	Gasoline..... do	2	670. Desiccator plates..... do
335.	Kerosene..... do	4	
350.	Calcium chloride tubes..... do	4	Dishes:
360.	Carborundum stone..... do	1	680. 70 mm. diameter..... do
365.	Casseroles..... do	4	681. 100 mm. diameter..... do
	Centrifuge:		682. 215 mm..... do
370.	Hand..... do	1	690. Petri, 100 by 15 mm..... gross
380.	Water..... do	1	695. Culture, 150 by 15 mm..... number
	Tubes—		700. Stender, 30 mm. high by 50 mm. diameter..... number
475.	Ungraduated..... do	144	705. Stender, 90 mm. high by 60 mm. diameter..... number
480.	Graduated..... do	6	710. Distilling apparatus..... do
	Clamps:		715. Emery paper..... sheets
500.	Bunsen..... do	6	
505.	Universal..... do	6	Files:
510.	Clamp holders..... do	6	736. Triangular, 8 inches long..... number
515.	Adjustable..... do	6	740. Round, 6 inches long..... do
	Clamps:		750. Filter apparatus..... do
520.	Adjustable..... do	6	756. Filter, bougie, 5 inches long by 1 inch diameter..... number
525.	For test tubes..... do	2	761. Glass cylinder, 5 $\frac{3}{4}$ by 2 $\frac{1}{2}$ inches..... do
530.	Hoffman..... do	4	765. Filter pump..... do
535.	Mohr's pinchock..... do	12	770. Filter pump coupling..... do
545.	Colorimeter, Duozing..... do	1	
	Condensers:		Flasks, Erlenmeyer:
555.	Liebig..... do	2	780. 50 c. c. capacity..... do
560.	Allihn..... do	2	781. 150 c. c. capacity..... do
	Corks:		782. 250 c. c. capacity..... do
565.	No. 2, $\frac{3}{8}$ inch diameter at small end..... gross	1	783. 500 c. c. capacity..... do
566.	No. 3, $\frac{3}{8}$ inch diameter at small end..... do	1	784. 1,000 c. c. capacity..... do
567.	No. 4, $\frac{1}{4}$ inch diameter at small end..... do	1	785. 2,000 c. c. capacity..... do
568.	No. 5, $\frac{1}{2}$ inch diameter at small end..... do	2	
569.	No. 6, $\frac{1}{8}$ inch diameter at small end..... do	2	Flasks, filtering:
570.	No. 7, $\frac{5}{8}$ inch diameter at small end..... do	1	795. 500 c. c. capacity..... do
571.	No. 8, $\frac{3}{4}$ inch diameter at small end..... do	2	796. 1,000 c. c. capacity..... do
572.	No. 10, $\frac{3}{4}$ inch diameter at small end..... do	2	
573.	No. 11, $\frac{1}{2}$ inch diameter at small end..... do	1	Flasks:
574.	No. 12, $\frac{7}{8}$ inch diameter at small end..... do	1	800. 300 c. c. capacity..... do
575.	No. 13, $\frac{1}{2}$ inch diameter at small end..... do	1	801. 1,000 c. c. capacity..... do
576.	No. 14, 1 inch diameter at small end..... do	1	
577.	No. 15, 1 $\frac{1}{8}$ inches diameter at small end..... gross	1	Volumetric—
578.	No. 16, 1 $\frac{1}{5}$ inches diameter at small end..... gross	1	815. 10 c. c. capacity..... do
579.	No. 17, 1 $\frac{1}{16}$ inches diameter at small end..... gross	1	816. 25 c. c. capacity..... do
580.	No. 18, 1 $\frac{1}{4}$ inches diameter at small end..... gross	1	817. 100 c. c. capacity..... do
581.	No. 20, 1 $\frac{3}{8}$ inches diameter at small end..... gross	1	818. 250 c. c. capacity..... do
590.	No. 16, 1 $\frac{1}{5}$ inches diameter at small end..... gross	1	819. 500 c. c. capacity..... do
			820. 1,000 c. c. capacity..... do
			Distillation—
			830. 500 c. c. capacity..... do
			831. 1,000 c. c. capacity..... do
			Forceps:
			850. Cover glass..... do
			855. Heavy..... do
			860. Medium fine..... do
			861. Fine dissecting..... do

Item No.		Item No.			
Funels:		Paper—Continued.			
865.	50 mm. diameter..... number..	2	1380. 125 mm. diameter..... box.....		
866.	65 mm. diameter..... do.....	3	1385. Lens, Japanese..... package..		
867.	90 mm. diameter..... do.....	4	Pencils, wax:		
870.	Funnel support..... do.....	1	1395. Red..... number.....	12	
Funnel, separatory:		1396.	Blue..... do.....	12	
880.	Cylindrical..... do.....	4	Pipettes:		
885.	Squibb..... do.....	4	1405.	1 c. c. in one-hundredths..... do.....	100
890.	Gas generator..... do.....	1	1406.	10 c. c. in one-tenths..... do.....	20
895.	Rubber rings..... do.....	2	1410.	2 c. c. capacity..... do.....	10
900.	Glass beads..... pound..	1	1412.	5 c. c. capacity..... do.....	10
Glass rods:		1413.	10 c. c. capacity..... do.....	10	
905.	4 mm. diameter..... pounds..	2	1414.	20 c. c. capacity..... do.....	10
906.	6 mm. diameter..... do.....	2	1415.	25 c. c. capacity..... do.....	2
907.	8 mm. diameter..... do.....	5	1416.	50 c. c. capacity..... do.....	2
Glass tubing:		1417.	100 c. c. capacity..... do.....	2	
1000.	6 mm. diameter..... do.....	20	1420.	0.5 c. c. capacity..... do.....	50
1001.	10 mm. diameter..... do.....	10	1421.	1 c. c. capacity..... do.....	100
1020.	Goggles..... number.....	1	1425.	Pipette box..... do.....	2
1025.	Hemoglobinometers..... do.....	3	1433.	Pliers..... do.....	1
1035.	Hemacytometer..... do.....	2	1445.	Pyrene fire extinguisher..... do.....	2
Extra white corpuscle pipettes and cover slips, of each..... number.....		6	Rings:		
1061.	No. 48360 incubator thermometer..... do.....	2	1450.	2 ⁷ / ₈ inches outside diameter..... do.....	6
Jars:		1451.	3 ³ / ₄ inches outside diameter..... do.....	6	
1070.	Lightning..... do.....	144	1452.	4 ⁷ / ₈ inches outside diameter..... do.....	6
1075.	Caplin staining..... do.....	12	Rubber bulbs:		
1105.	Knife, brain..... do.....	1	1465.	3 c. c. capacity..... do.....	24
Labels:		1466.	5 c. c. capacity..... do.....	24	
1110.	Micro..... book.....	1	1470.	1 ¹ / ₂ inches diameter by 3 ³ / ₄ inches long..... number.....	12
1115.	Dennison..... do.....	1	1471.	1 ⁷ / ₈ inches diameter by 4 inches long..... number.....	6
1120.	Do..... boxes.....	6	1475.	Rubber gloves..... do.....	12
1125.	Lead shot..... pounds.....	1	Rubber stoppers:		
1130.	Magnifier..... number.....	3	Solid—		
1155.	Microscopes, Bausch & Lomb..... do.....	4	1480.	No. 00, 10 mm. diameter..... do.....	12
1165.	Mechanical stages, Bausch & Lomb..... do.....	4	1481.	No. 0, 12 mm. diameter..... do.....	12
1175.	Dark ground illuminator..... do.....	1	1482.	No. 1, 15 mm. diameter..... do.....	12
1180.	Funnel stop..... do.....	1	1483.	No. 2, 15 mm. diameter..... do.....	12
1215.	Microtome..... do.....	1	1484.	No. 4, 20 mm. diameter..... do.....	24
1216.	Microtome knife..... do.....	1	1485.	No. 5, 23 mm. diameter..... do.....	12
1217.	Microtome knife handle..... do.....	1	1486.	No. 6, 25 mm. diameter..... do.....	24
1235.	Microtome, clinical..... do.....	1	1487.	No. 7, 30 mm. diameter..... do.....	12
1236.	Microtome knife..... do.....	1	1488.	No. 8, 33 mm. diameter..... do.....	12
1237.	Microtome freezing attachment..... do.....	1	1489.	No. 9, 36 mm. diameter..... do.....	12
1244.	Cylinder containing 25 pounds of CO ₂ under high pressure..... number.....	1	1490.	No. 10, 42 mm. diameter..... do.....	12
1245.	Microtome knife hone..... do.....	1	One-hole—		
1246.	Block stop..... do.....	1	1500.	No. 0, 12 mm. diameter..... do.....	6
1247.	Fine..... do.....	1	1501.	No. 1, 15 mm. diameter..... do.....	6
1248.	Dressing for above stopps..... box.....	1	1502.	No. 2, 15 mm. diameter..... do.....	6
1300.	Mortar, iron..... number.....	1	1503.	No. 4, 20 mm. diameter..... do.....	6
Mortars, porcelain:		1504.	No. 5, 23 mm. diameter..... do.....	6	
1335.	65 mm. diameter..... do.....	6	1505.	No. 6, 26 mm. diameter..... do.....	12
1306.	110 mm. diameter..... do.....	2	1506.	No. 7, 30 mm. diameter..... do.....	6
1307.	175 mm. diameter..... do.....	2	1507.	No. 8, 33 mm. diameter..... do.....	6
1310.	Mortar, Wedgewood..... do.....	1	1508.	No. 9, 36 mm. diameter..... do.....	12
1320.	Needle holder..... do.....	6	Two-hole—		
1325.	Oil stone..... do.....	1	1520.	No. 5, 23 mm. diameter..... do.....	6
1330.	Oven, copper..... do.....	1	1521.	No. 6, 26 mm. diameter..... do.....	6
Paper:		1522.	No. 7, 30 mm. diameter..... do.....	6	
1345.	Filter, "Alpha" brand..... sheets.....	100	1529.	Rubber tubing annex..... feet.....	6
1350.	100 mm. diameter..... package.....	1	Rubber tubing:		
1351.	125 mm. diameter..... do.....	1	1530.	1/4-inch bore by 1/8-inch wall..... do.....	24
1352.	180 mm. diameter..... do.....	1	1535.	5-mm. bore by 1 3/4-mm. wall..... do.....	24
1353.	200 mm. diameter..... do.....	1	1540.	1/4-inch bore by 1/8-inch wall..... do.....	24
1354.	250 mm. diameter..... do.....	1	1545.	1/8-inch bore by 1/8-inch wall..... do.....	12
1360.	480 by 480 mm..... sheets.....	50	1555.	Inside diameter 1 1/8 inches with outside diameter 1 1/2 inches..... feet.....	12
1365.	Filter, Whatmen No. 42..... package.....	1			

Item No.		Item No.	
1560.	Rule, steel.....number..	1	Test tubes—Continued.
1565.	Saccharometer.....do....	1	Thin wall—Continued.
	Scalpels:		
1570.	25 mm. length of blade.....do....	3	1741. 150 by 16 mm.....number..
1571.	45 mm.....do....	3	Heavy wall—
1573.	Scissors.....do....	2	1746. 150 by 16 mm.....do....
1575.	Screw driver.....set....	1	217. 210 by 27 mm.....do....
1576.	Section lifter.....number..	1	Medium thick wall—
1585.	Sbeurs, laboratory.....do....	1	1750. 75 by 10 mm.....do....
1590.	Slides, micro, 3 by 1 inches.....gross..	25	1751. 100 by 12 mm.....do....
1595.	Do.....number..	30	1770. Test tube support.....do....
1600.	Slide boxes.....do....	12	1785. Wassermann rack.....do....
	Specific gravity bottle, Gay-Lussac:		Thermometers, chemical:
1615.	10 c. e. capacity.....do....	1	1790. 0° to 100° C. in 1°.....do....
1616.	25 c. e. capacity.....do....	1	1791. 0° to 200° C. in 1°.....do....
	Sterilizer:		1792. 0° to 360° C. in 1°.....do....
1637.	For kerosene.....do....	1	1795. Thermometers, incubator.....do....
1650.	Arnold steam.....do....	1	1810. Tongs.....do....
	Stopcocks:		1816. Triangles, 2½-inches length of each side.....do....
1675.	Brass.....do....	3	Trypod:
	Glass—		1820. Outside diameter of ring, 5 inches; 9 inches high.....number..
1680.	1 mm. bore.....do....	3	1825. Outside diameter of ring, 8 inches; 9 inches high.....number..
1681.	3 mm. bore.....do....	3	1845. Ureometer, Doremus-Hieds.....do....
1690.	Supports for burettes.....do....	6	1850. Ureometer, Squibb.....do....
1691.	Do.....do....	6	1855. Vials.....gross..
	Syringes:		1865. Wash bottle.....number..
1695.	1 c. e. in one-hundredths.....do....	4	1870. Wassermann bath.....do....
1695.	2 c. e. in one-teenths.....do....	12	Watch glasses:
1697.	10 c. e. in one-fifths.....do....	12	1875. 39 mm. diameter.....do....
1698.	20 c. e. in 1 c. e.....do....	3	1876. 65 mm. diameter.....do....
	Syringe needles:		1877. 100 mm. diameter.....do....
1705.	¾ inch long, 25 gauge.....do....	12	1885. Water bath.....do....
1706.	1 inch long, 22 gauge.....do....	12	1900. Water bath, of copper.....do....
1707.	1½ inches long, 20 gauge.....do....	12	1910. Weighing bottles.....do....
1708.	2 inches long, 20 gauge.....do....	12	Wire:
1709.	2 inches long, 18 gauge.....do....	24	Copper—
1710.	2½ inches long, 18 gauge.....do....	12	1920. 16-gauge.....do....
1711.	3 inches long, 18 gauge.....do....	12	1921. 18-gauge.....do....
1712.	3 inches long, 16 gauge.....do....	12	1922. 20-gauge.....do....
1725.	Tape measure.....do....	1	1923. 22-gauge.....do....
1730.	Tenaculum.....do....	1	Nichrome—
1735.	Test glasses.....do....	24	1925. 24-gauge.....feet..
	Test tubes:		1926. 26-gauge.....do....
	Thin wall—		
1740.	75 by 11 mm.....do....	300	

REAGENTS, MICROSCOPIC STAINS, CULTURE AND EMBEDDING MEDIA

Acetone, Merck blue label, in 1-pound cork stopper bottle.....number..	2	Acid—Continued.
Acid:		Pyrogallic (pyrogallol), Merck blue label, in 1-ounce cork stopper bottle.....number..
Acetic, Merck blue label, 99.5 per cent, in 1-pound glass stopper bottle.....number..	1	Sulphuric, Baker analyzed, chemically pure, specific gravity 1.84, in 1 and 9 pound glass stopper bottle.....number..
Butyric, Merck white label, technical, absolute, in 1-ounce glass stopper bottle.....number..	1	Tannic, Merck blue label, in 1-ounce cork stopper bottle.....number..
Citric, Merck blue label, in ¼-pound cork stopper bottle.....number..	1	Uric, special purity for standard, in 1-gm. vials.....number..
Hydrochloric, Baker analyzed, chemically pure, specific gravity 1.19, in 1-pound and 6-pound glass stopper bottle.....number..	2	Agar-agar, prime white in shreds for culture media, in 1-pound cartons.....number..
Lactic, Merck white label, U. S. P., specific gravity 1.21 at 15° C., in 1-ounce cork stopper bottle.....number..	1	Albumin, from blood, in 1 pound cartons.....pound..
Nitric, Baker analyzed, chemically pure, specific gravity 1.42, in 1 and 7 pound glass stopper bottle.....number..	2	Alcohol:
Oxalic, Merck blue label, in ¼-pound cork stopper bottle.....number..	1	Ethyl, 99 per cent absolute, in 1-pound cork stopper bottle.....number..
Pieric, Merck white label (20 per cent water), moist, in 4-ounce cork stopper bottle.....number..	1	Methyl, acetone free, Merck white label, in 1-pound cork stopper bottle.....number..
		Alizarine sodium monosulphamate, in 1-ounce cork stopper bottle.....number..
		Ammonium aluminum sulphate (alum) Baker analyzed, chemically pure, in 1-pound cork stopper bottle.....number..

Ammonium carbonate, Merck blue label, $\frac{1}{4}$ -pound glass stopper bottle.....number.. 1

Ammonium chloride, Merck blue label, in $\frac{1}{4}$ -pound cork stopper bottle.....number.. 1

Ammonium hydroxide, Baker analyzed, chemically pure, specific gravity 0.90, in 1 and 4 pound glass stopper bottle.....number.. 1

Ammonium molybdate, Merck blue label, in 1-ounce cork stopper bottle.....number.. 1

Ammonium Oxalate, Merck blue label, in $\frac{1}{4}$ -pound cork stopper bottle.....number.. 1

Ammonium sulphate, Merck blue label, in 1-pound cork stopper bottle.....number.. 1

Aniline oil, water-white, for microscopic use in 1-ounce amber cork stopper bottle.....number.. 3

Antiformin, in 1-pound cork stopper bottle.....do.... 6

Arsenic trioxide, Merck blue label, in $\frac{1}{4}$ -pound cork stopper bottle.....number.. 1

Asbestos, long fiber, washed in acid, for use in Gooch crucibles, in 1-pound cartons.....number.. 1

Bacto bile, Difco, in 1-pound cork stopper bottle.....number.. 6

Balsam, Canada, in Zylol, must be made from hard balsam, in 1-ounce cork stopper bottle.....number.. 2

Barium chloride, Merck blue label, in 1-pound cork stopper bottle.....number.. 1

Barium hydroxide, Merck blue label, crystalline, in $\frac{1}{4}$ -pound cork stopper bottle.....number.. 1

Beef extract, Liebig's, in $\frac{1}{4}$ -pound jars.....do.... 4

Benzidine, for blood test, in 1-ounce cork stopper bottle.....number.. 1

Bismarek brown, in 10-gm. screw-cap vials.....do.... 4

Brilliant green, in 10-gm. screw-cap vials.....do.... 1

Bromine, U. S. P. in 1-ounce glass stopper bottle in tin container.....number.. 2

Calcium chloride, granular, for drying, in 1-pound cork stopper container.....number.. 1

Calcium hypochloride, Baker analyzed, chemically pure (oxychloride), in 1-pound tins.....number.. 1

Cedar oil, for immersion objectives, in 1-ounce cork stopper bottle.....number.. 4

Cholesterolin, Merck blue label, in $\frac{1}{4}$ -ounce cork stopper bottle.....number.. 1

Congo red, in 10-gm. screw-cap vials.....do.... 1

Copper oxide (black), Baker analyzed, chemically pure, special (for haematoxylin solutions), in 1-ounce cork stopper bottle.....number.. 1

Coppersulphate (cupric sulphate), Merck blue label, crystals, in 1-pound cork stopper bottle.....number.. 2

Crystal violet, in 10-gm. screw-capped vials.....do.... 1

Dextrin, white, in $\frac{1}{4}$ -pound cork stopper bottle.....number.. 1

Dextrose, Difco, anhydrous, in $\frac{1}{4}$ -pound cork stopper bottle.....number.. 4

Dimethylaminoazobenzol, Merck white label, in 10-gm. cork stopper bottle.....number.. 1

Diphenylamine, Merck blue label, in 1-ounce cork stopper bottle.....number.. 1

Emery flour, for grinding stopcocks, etc.....pound.. 1₂

Eosin, water soluble, in 10-gm. screw-cap vials.....number.. 4

Fuchsin, basic, in 10-gm. screw-cap vials.....do.... 4

Fuchsin, acid, must be soluble in sodium hydrate for andrade indicator, in 10-gm. screw-cap vials.....number.. 4

Gelatin, Difco, for culture media, in $\frac{1}{4}$ -pound cartons.....number.. 3

Gentian violet, in 10-gm. screw-cap vials.....do.... 4

Gold chloride, Merck white label, in 15-grain ampoules.....number.. 1

Guaiac resin, in $\frac{1}{4}$ -pound cork stopper bottle.....do.... 1

Haematoxylin, in 10-gm. screw-cap vials.....do.... 1

Iaullin, Mulford, in 10-gm. cork stopper bottle.....do.... 1

Lactose, Difco, powdered, free from dextrose, in 1-pound cork stopper bottle.....number.. 2

Litmus, powdered, Merck blue label, in $\frac{1}{4}$ -pound cork stopper bottle.....number.. 2

Litmus paper, Squibb's, in glass vials of 100 strips each (red and blue), of each.....number.. 10

Maltose, in $\frac{1}{4}$ -pound cork stopper bottle.....do.... 1

Maonife, Merck white label in 1-pound cartons.....number.. 1

Methylene blue, in 10-gm. screw-cap vials.....do.... 6

Neutral red, in 10-gm. screw-cap vials.....do.... 1

Paraffin, hard, M. P. 52, in 1-pound cakes wrapped in paper.....pounds.. 10

Peptone, Armour, in $\frac{1}{2}$ -pound cork stopper bottle.....number.. 20

Phenolphthalein, Merck blue label, in 1-ounce cork stopper bottle.....number.. 1

Phenolsulphonephthalein, Hynson, Wescott & Dunning, dry, in 5-gm. vial.....number.. 1

Phenolsulphonephthalein, for collimeter tests, ampoules of 1.5 mg., 12 in box.....box.. 1

Potassium dichromate, Merck blue label, in 1-pound cork stopper bottle.....number.. 2

Potassium ferrocyanide, Merck blue label, in $\frac{1}{4}$ -pound cork stopper bottle.....number.. 1

Potassium ferricyanide, Merck blue label $\frac{1}{4}$ -pound cork stopper bottle.....number.. 1

Potassium iodide, Merck blue label, in $\frac{1}{4}$ -pound cork stopper bottle.....number.. 1

Potassium permanganate, Merck blue label, in $\frac{1}{4}$ -pound cork stopper bottle.....number.. 1

Potassium sulphocyanate, Merck blue label, in $\frac{1}{2}$ -pound cork stopper bottle.....number.. 1

Pumice stone, lumps.....pound.. 1₂

Saccharose, Merck white label, highest purity, in 1-pound cork stopper bottles.....number.. 1

Safranin, in 10-gm. screw-cap vials.....do.... 2

Scharlach R., in 10-gm. screw-cap vials.....do.... 1

Sealing wax, in sticks.....do.... 2

Soap, castile.....pound.. 1₂

Sodium carbonate, commercial crystals, 1-pound cork stopper bottle.....number.. 10

Sodium chloride, Merck blue label, in 1-pound cork stopper bottle.....number.. 5

Sodium citrate, Merck highest purity, crystals, in 1-pound cork stopper bottle.....number.. 1

Sodium dichromate, commercial, for cleaning mixture, in 1-pound cork stopper bottle.....number.. 5

Sodium hydroxide, Merck blue label, purified, sticks, in $\frac{1}{2}$ -pound cork stopper bottle.....number.. 8

Sodium nitrate, Merck blue label, in $\frac{1}{4}$ -pound cork stopper bottle.....number.. 1

Sodium nitroprusside, Powers-Weightman-Rosengarten, in 1-ounce cork stopper bottle.....number.. 1

Sodium potassium tartrate, crystals, Merck blue label in 1-pound cork stopper bottle.....number.. 2

Sodium sulphite, crystals, Merck blue label, in 1-pound cork stopper bottle.....number.. 2

Sudan III, in 10-gm. screw-cap vials.....do.... 1

Thionin, in 10-gm. screw-cap vials.....do.... 1

Toluidin blue, in 10-gm. screw-cap vials.....do.... 1

Toluene, Merck white label, in $\frac{1}{4}$ -pound cork stopper bottle.....number.. 2

Tumeric paper, Mallinckrodt's, 100 strips in screw-cap vial.....	number.....	1
Urease, tablets, Squibb, 100 1/10-grain tablets in vial.....	number.....	1
Wright's stain, powdered, in 2-gm. ampoules.....	do.....	12
Zinc metallic, Mosey, for gas generator, in 1-pound cartons.....	number.....	1
Xyloï, water-white, crystallizable, in 1-pound cork stopper bottle.....	number.....	4

Item No.	number..	100
1713 Tags.....	do.....	1
1721. Tanks.....	do.....	1
1963. Catheters, Naie, German silver.....	do.....	1
1993. Needles.....	dozen.....	1
1997. Racheotomy saw.....	number.....	1
2016. Sponges, large, bath.....	pounds.....	1
2020. Thread.....	spool.....	1

M. M. D. 912.

Case, Ear, Nose, and Throat. (e) Model of 1917

(In canvas roll, with metal case for delicate instruments. Outline of instruments stamped on roll and name of contained instruments stamped in case)

	Catalogue No.	Quantity		Catalogue No.	Quantity
Adenotome, LaForce.....	543	1	Koife: Paracatosis, small, light, flexible shank..... Submucous, Freer's— Flat, rounded blade..... Half round straight..... Swivel, Ballenger's, small size..... Knives, turbinated, Ballenger's (1 each, right and left)..... Mirrors, laryngeal, boilable, 1 and 3 (1 each)..... Otoscope, Seigel's, pneumatic, metal, with 3 specula..... Scissors, nasal, Knight's screw lock..... Separator, tonsil, special model..... Snare, tonsil, Brown's, 1 plain and 1 ring tip..... Specula, ear, Brown's, metal (set of 3)..... Speculum, nasal: Bivalve (Bosworth's), tempered steel..... Septal (Goldstein's), tempered steel..... Syringe: Ear, with metal shield, Pomroy's, 2-ounce..... Tonsil, with extension, metal, with 3 finger rings and 2 needles, gold points, 1 curved and 1 straight..... Tongue depressor, Bosworth's, steel plate..... Trachea tubes, regular, Chevalier-Jackson, Full curve, German silver, silver plated, sizes, 2, 3, 4, 5, and 6 (1 each)..... Tube, diagnostic, Toyobee's (White and Black tips)..... Wire, for snares, sizes, 3, 5, and 7 (2 each).....	533	1
Applicators, nasal: Special.....	513	4		503	1
Bosworth's.....	514	3		504	1
Catheters, Eustachian, silver, 1, 2, and 3 (of each, 1).....	536	3		510	1
Chisels, mastoid, Schwartz's 1 and 2 (1 of each).....	507	2		509	2
Chisel, nasal, Freer's, submucous.....	505	1		537	2
Curlette: Adenoid, Barnhill's, 1, 3, and 4. (1 of each).....	515	3		532	1
Mastoid, Buck's, 1 and 3 (1 each).....	506	2		527	1
Drill, antrum, Pope's (not in catalogue).....		1		516	1
Elevator: Dull-edged, Freer's, submucous.....	501	1		520	1
Sharp-edged, Freer's, submucous.....	502	1		329	1
Forceps: Ear, angular, Wilde's.....	535	1		512	1
Nasal, angular, Knight's, screw lock.....	526	1		511	1
Esophageal, spiral.....	522	1			
Septum— Compression Asch's.....	525	1			
Jansen-Middleton, modified.....	523	1			
Tonsil-sizing.....	517	1			
Gag, mouth (Denhart's).....	311	1			
Gauge, mastoid, Schwartz's, 1 and 2, (1 of each).....	508	2			
Headband, metal folding.....	539	1			
Head mirror, 3 1/2-inch, with 1/2-inch opening.....	538	1			

NOTE.—Catalogue numbers taken from "List of Staple Surgical and Medical Supplies, Council of National Defense."

M. M. D. 913.

Case, emergency

(In aluminum, brass, or leather case, with detachable sling)

Tablets, in 1/2-ounce h. r. bottles:	
Acetphenetidinum (phenacetin).....	mgms.. 324
Aspirin.....	do..... 324
Bismuthi subnitras.....	do..... 324
Caffeina citrata.....	do..... 65
Heroini hydrochloridum.....	do..... 5.5
Hydrargyri chlor. corros. (par. 902).....	do..... 32
Hydrargyri chlor. mite.....	mgms.. 32
Mistura glycyrrh. comp. (par. 902).....	do..... 8
Morphina sulphas.....	mgms.. 8
Pilula aloini comp. (par. 902).....	do..... 324
Pilula camphora et opii (par. 902).....	do..... 324
Pilula cathart. comp.....	do..... 324
Potassii bromidum.....	mgms.. 324
Pulvis ipeca. et opii.....	do..... 324
Quininae sulphas.....	do..... 200
Sodii bicarbonas.....	do..... 324
Sodii bicarb. et menth. pip. (par. 902).....	do..... 324
Sodii salicylas.....	mgms.. 324
Tinctura digitalis.....	c. c. 0.3
Veronal.....	mgms.. 324

Tablets, hypodermic, extra (one tube of each):	
Digitalinum.....	mgms.. 1
Quininae hydrochlorosulphas.....	do..... 32
Instruments, etc.:	
Bistouries, curved and straight, of each, number.....	1
Case, linen, for instruments.....	do..... 1
Forceps, dissecting.....	do..... 1
Forceps, hemostatic.....	do..... 1
Needles, surgical, assorted.....	do..... 12
Plaster, isinglass, 5 by 18 inches.....	rolls.. 1
Scalpel.....	number.. 1
Scissors, straight.....	do..... 1
Sutures, silk, sterilized, 3 sizes in package.....	packages.. 2
Suture, silver wire, sterilized, 1 yard.....	do..... 1
Syringe, hypodermic (par. 956).....	number.. 1
Thermometer, clinical.....	do..... 1

NOTE.—For tropical use the contents of the emergency case, as listed above, are packed in a canvas roll, each roll containing in addition, a brass box for sutures and hypodermic tubes.

M. M. D. 914.

Case, Eye. (a) Model of 1917
(In mahogany case)

	Catalogue No.	Quantity		Catalogue No.	Quantity
Curette, chalazion, Meyhoefer, medium	561	1	Lid plate, hard rubber, Jaeger's	596	1
Cystotome, Graef's	562	1	Needle holding forceps, Stevens'	580	2
Canaliculus, knife, Bowman, flexible shank	569	2	Lens, spoon, wire loupe	572	1
Forceps:			Needles:	570	1
Advancement (Reese)	581	1	Paracentesis,		
Cilia, plain	583	1	Full curved, plain eye, cutting edge	600	12
Chalazion, Lambert's	582	1	Half curved, plain eye, cutting edge,		
Entropium Desmarres'	584	1	assorted	601	12
Fixation, with catch	585	2	Ophthalmoscope (Loring's)	597	1
Iris, angular, mouse toothed	586	2	Probes, lachrymal, Theobald's, double-	590	1
Trachoma, Moyes, 1 up and 1 down	587	2	ended (set)		
Trachoma, Prince	588	1	Retinoscope	599	1
Gouge, sharp pointed, V-shaped	563	1	Retractors, 2 sizes	592	2
Iris hook, sharp Tyrell's	564	1	Scissors:		
Iris scissors, full curved	577	2	Probe pointed, angular (Iris)	578	1
Knives, cataract, Graefe's, assorted sizes	567	3	Enucleation, full curved, light	576	1
Irrigator, anterior chamber	603	1	Strabismus, straight	579	1
Knives:			Tenotomy, Stevens'	580	2
Scalpel type, medium size	568	3	Spatula and probe, 1 handle, Knapp's	593	1
Needle, Knapp's medium size	566	3	Spatula, double-ended, Fisher's	591	1
Keratome, angular, Jaeger's, medium size	565	3	Speculum, Ziegler's	594	1
Lens:			Sutures, assorted silk and catgut		1
Spoon, metal--			Syringe, all metal, 3 needles (lachrymal)	598	6
Graefe's	573	1	Repositor, iris, metal	571	1
David	574	1	Tenotomy hook, medium	575	2
Condensing, 2 inches broad, hard-rubber ring	595	1	Testing drum, hard rubber	602	1

NOTE.—Catalogue numbers from "List of Staple Medical and Surgical Supplies, Council of National Defense."

CASE, EYE, AUXILIARY

Cautery handle	number	1	Knife—Continued.		
Cautery tips (corneal set)	set	1	Scalpel type	number	3
Dilator, lachrymal (canaliculus)	number	1	Needle, Hays-Ziegler	do	1
Forceps:			Needle holder	do	2
Fixation, without catch, silver, nonmagnetic	number	1	Needles, eye, curved	dozen	1
Iris—			Scissors:		
Curved	do	2	Straight sharp point	number	1
Straight	do	1	Straight dull point	do	1
Capsule	do	1	Half curved	do	1
Trachoma, Knapp	do	1	Speculum, eye (Weeks), silver, nonmagnetic	do	1
Advancement, Prince	do	1	Spud, eye, protecting handle	do	1
Entropion (right and left angular), each	do	1	Tenotomy hook:		
Lid elevator	do	1	Smith	do	1
Keratomes, straight	do	1	Graefe	do	1
Knife:			Trepbine, Elliot	do	1
Cataract, Graefe	do	3			
Beers	do	1			

M. M. D. 915.

Case, forceps, hemostatic. (a) Model of 1917

(In canvas roll)

	Catalogue No.	Quantity
Forceps:		
Straight—		
5½ inches long, Kocher's, screw lock	120	2
Flat shank, Kelly-Hopkins, screw lock	118	2
Jones's straight, 5-inch, screw lock	116	4
Halstead's army, 5½-inch, screw lock	117	4

NOTE.—Catalogue numbers taken from "List of Staple Medical and Surgical Supplies, Council of National Defense."

M. M. D. 916.

Case, general operating. (a) Model of 1917

(In canvas roll with two metal boxes as containers. Outline of instruments stamped on canvas and names written in metal box)

	Catalogue No.	Quantity		Catalogue No.	Quantity
Buttons, Murphy intestinal anastomosis, 1, 2, 3	303	3	Needles:		
Catheter, brass, nickeled, Van Buren curve, 16F	215	1	Surgeons, regular plain eye, sizes 14, 10, 2, 6 (2 each)	142	8
Curette, bone, Whitling, 4	188	1	Abdominal—		
Director, grooved, 6-inch	158	1	Taper point half circle, sizes 4 and 6 (3 each)	141	6
Drill, bone, 1 detachable metal handle with square socket, 3 points	190	3	Straight, sizes, 5 and 7 (4 each)	143	8
Earhook and spoon, (Gross's (not catalogued)	1	1	Intestinal—		
Elevator, peristæum (Sayer) double-ended	186	1	Taper point straight, size 4	147	3
Eye spud, Dix (not catalogued)	1	1	Half circle	148	6
Forceps:			Case for, not catalogued	1	1
Bone cutting, flat blade, curved, Liston's, screw lock, 7½-inch	173	1	Osteotome, square handle, size 12 mm., of each	185	1
Bone holding, Farabeuf's, French lock	181	1	Periosteotome, blunt dissector (Koeher)	187	1
Bullet, Senn's, 8-inch, screw lock	135	1	Pins, Wyoth's, 12-inch	155	2
Intestinal, Doyen straight, 9-inch, screw lock	124	2	Probes, single, with eye, plated:		
Dressing—			5 inches long	156	1
Bosman, 10-inch, screw lock, straight, with catch	128	1	8 inches long	156	1
12-inch spring	129	1	Razor, metal-handled, medium size	309	1
5½-inch spring	130	1	Retractor, Army type, 2 sizes, 9 and 10 inches (1 each)	150	2
Hemostatic—			Retractors, flexible copper, silver plated, 13 inches long:		
Jones's straight, 5-inch, with screw lock	116	6	1½ inches wide	150.1	1
Halstead (Army pattern) straight, 5½-inch, screw lock	117	3	2 inches wide	150.1	1
Koeher, straight, 5½ inches long, screw lock	120	3	Saw:		
Pean, straight, 8½-inch, screw lock	122	2	Amputating, Satterlee's	136	1
Mouse tooth, 5½-inch, tissue	122	2	High's, 12, 20, and 30 inches (2 each)	138	6
Rongeur bone—			Handle for	139	2
Curved, screw lock (Bane's)	176	1	Scissors:		
Horseley's, screw lock, Baltimore pattern	175	1	Bandage, angular, 7¼-inch, screw lock	115	1
Sequestrum, screw lock	177	1	Mayo, dissecting, curved, screw lock, 5½-inch	108	1
Tissue spring, mouse tooth, 5½-inch	131	2	Heavy blunt, 6½-inch	110	1
Gag, mouth (Denhart)	311	1	Straight		
Gouge, bone, square-handled, 10-mm.	184	1	Double blunt, 5½-inch, screw lock	110	1
Knife, amputating, Catlin, 6½-inch blade	106	1	One point, sharp, 5½-inch, screw lock	141	1
Mallet, hardwood, with metal rings; diameter of head, 1½ inches	179	1	Sutures:		
Knife:			Horselair, 100 strands in coil..... coils		1
Minor operating—			Silk, assorted, 3 sizes in package		1
1½-inch blade	102	4	..... packages		1
2-inch blade	103	2	Syringes, aspirating (Dienlaffoy) (not catalogued)		1
Plaster wooden handle, riveted	107	1	Tongue depressor, wire, folding (not catalogued)		1
Needle, aneurism (not catalogued)	154	1	Trepigne, Galt, ¾-inch, crown of tool steel	170	1
DesChamps right blunt point	154	1	Trocar, disk and plate canula, ¾-inch	157.1	1
Needle holder, Hegar, 7½-inch, screw lock	133	1	Tube, trachea, German silver, silver plated, Jackson, full curved, size 5	540	1

NOTE.—Catalogue numbers taken from "List of Staple Medical and Surgical Supplies, Council of National Defense." Articles not showing catalogue number are same pattern furnished in past in general operating case.

M. M. D. 917

Case genitourinary. (a) Model of 1917

	Catalogue No.	Quantity
Bistoury, straight, probe pointed	101	1
Bongies, åbottle, brass nickled, 1 each, Nos. 8, 10, 12 14, 16, 18, 20, 22, 24, and 26 F	219	10
Catheter:		
Double-current, silver, male	215.1	1
Grooved and tunneled, with stylet, Gouley's, size 14 F	214	1
Posterior, urethral, silver, to fit standard Luer syringe	229	1
Dilator, LaFort's taper point with filiform guide, Nos. 11, 13, 15, 18, 23, 26 F, of each, 1	216	6
Director, silver (Arnott's)	158.1	1
Filiform gum lino, standard screw fitting for LaFort sounds or Missouneuve urethrotome and catheter	221	6
Filiform whalebone, straight, thin, delicate, No. 6	222	12
Forceps:		
Straight, urethral (Pitha)	237.1	1
Lithotomy, curved, screw lock, Lewkowitz	240	1

Case genitourinary. (a) Model of 1917—Continued

	Catalogue No.	Quantity
Gorget, lithotomy (Teale).....	235	1
Nozzle, for urethral irrigator.....	249	1
Sound, steel, nicked, Otis's short beaked, Nos. 18, 20, 22, 24, 26, 28, 30 F, of each, 1.....	218	7
Sound, tunneled (Gouley's), Nos. 8, 14 F, of each, 1.....	217	2
Syringe (Luer), standard, all glass, 10 c. c.....	300	1
Urethrotome (Maissoneuve), No. 8 F, 2 blades, anterior cutting edge with fittings for standard filiform, extra tunneled tip for whalebone filiform.....	228	1
Utricle needle to fit standard Luer syringe.....	230	1

NOTE.—Catalogue numbers taken from "List of Medical and Surgical Supplies, Council of National Defense."

M. M. D. 923.

Case, pocket

(In canvas roll, with metal holder for knives, etc.)

Bistoury:		Needle, aneurism.....	number.....	1
Curved, sharp pointed.....	number.....	Needles, surgical, assorted.....	do.....	12
Straight.....	do.....	Probe, double, with silver tips.....	do.....	1
Catheter, plated, male and female tips.....	do.....	Scalpels.....	do.....	2
Caustic holder and exploring needle combined.....	do.....	Scissors, straight.....	do.....	1
Director, grooved, with myrtle leaf.....	do.....	Sutures, silk, braided, sterilized, 3 sizes in package.....	do.....	1
Forceps:		.....	packages.....	1
Dissecting, mouse-tooth.....	do.....			
Hemostatic—				
And needle.....	do.....			
F.....	do.....			
Short.....	do.....			

NOTE.—In the older cases of this type, the instruments are contained in a leather case, with buckskin cover.

M. M. D. 924.

Case, post-mortem

(In canvas case, with metal box for knives, etc. Outline of instruments stamped on the canvas and names of contained instruments in metal box)

Blowpipe.....	number.....	1	Knife—Continued.	
Chain and hooks.....	do.....	1	Amputating—Continued	
Costotome chisel.....	do.....	1	Cartilage.....	number.....
Enterotome.....	do.....	1	Needles.....	do.....
Forceps, dissecting.....	do.....	1	Saw.....	do.....
Hammer, steel.....	do.....	1	Scalpels, assorted.....	do.....
Knife:			Scissors, straight.....	do.....
Amputating—			Tenaculum.....	do.....
Large.....	do.....	1		
Small.....	do.....	1		

NOTE.—In the older cases the above articles are contained in a wooden case.

M. M. D. 926.

Case, trial lenses

(In mahogany or oak case)

Disks.....	number.....	11	Lenses—Continued.	
1 plain metal.....			Spherical—	
2 metal with stenopæic aperture.....			Concave.....	pairs.....
2 metal with stenopæic slit.....			Convex.....	do.....
1 with Maddox rod.....			Mirror, plain, retinoscopic, 1½-inch.....	number.....
1 with half-frosted disk.....			Prisms.....	do.....
2 blue glass, dark and light.....			1 pair each of 1, 2, 3, 4.....	
1 red glass.....			½ pair each of 5, 6, 8, 10, 12, 15, 20.....	
3 smoked glasses, different shades.....			Tape measure, small, spring, 1 meter.....	do.....
1 plain glass.....			Trial frame, graduated:	
Geneva lens measure.....	do.....	1	Double cell.....	do.....
Lenses:			Triple cell, outer cell rotating, adjustable frame and hooks.....	number.....
Cylindrical—				
Concave.....	pairs.....	21		
Convex.....	do.....	21		

NOTE.—The spherical and cylindrical lenses are marked in both English and dioptric systems on the case and in the dioptric systems on the lenses.

M. M. D. 937.

Chest, tool, No. 1

(To wooden chest with handles and lock, weight 120 pounds)

Awl, scratch.....	number..	1	Mallet, carpenter's, round.....	number..	1
Awls, brad, assorted.....	do.....	3	Nail puller, large.....	do.....	1
Bit:			Nail set, square, 4-inch.....	do.....	1
Expansive, 1 $\frac{1}{2}$ to 1 $\frac{1}{2}$ inch.....	do.....	1	Oiler, zinc.....	do.....	1
Screwdriver.....	do.....	1	Oilstone.....	do.....	1
Bits, drill, assorted.....	do.....	3	Pincers, carpenter's, steel jaw, 8-inch.....	do.....	1
Brace, ratchet.....	do.....	1	Plane:		
Brads and tacks, assorted, in tin box.....	boxes ..	1	Fore, iron frame, 18-inch.....	do.....	1
Chalk line, with reel and awl, complete.....	number..	1	Hollow, wooden frame.....	do.....	1
Chisel:			Jack, iron frame, 14-inch.....	do.....	1
Cold, 1 $\frac{1}{2}$ -inch.....	do.....	1	Rabbet, iron frame, 8-inch.....	do.....	1
Socket firmer—			Rounding, wooden frame.....	do.....	1
3 $\frac{1}{2}$ -inch, with handle.....	do.....	1	Smoothing, iron frame, 9-inch.....	do.....	1
1 $\frac{1}{2}$ -inch, with handle.....	do.....	1	Pliers, combination, 6-inch.....	do.....	1
1-inch, with handle.....	do.....	1	Rasp, wood, half-round, 10-inch, with handle.....	do.....	1
1 $\frac{1}{2}$ -inch, with handle.....	do.....	1	Rule, boxwood, brass-bound, 2-foot.....	do.....	1
Countersink.....	do.....	1	Saw:		
Dividers, 8-inch.....	do.....	1	Hand, 20-inch.....	do.....	1
Drawing knife, carpenter's, oval blade, 10-inch.....	number..	1	Keyhole, 10-inch.....	do.....	1
File:			Panel, 16-inch.....	do.....	1
Flat bastard, 10-inch, with handle.....	do.....	1	Rip, 22-inch.....	do.....	1
Round bastard (rat-tail), 10-inch, with handle.....	number..	1	Saw set.....	do.....	1
Saw, taper—			Screw, bench, iron, 1-inch diameter.....	do.....	1
3 $\frac{1}{2}$ -inch, with handle.....	do.....	1	Screwdriver:		
4-inch, with handle.....	do.....	1	Ratchet, 6-inch.....	do.....	1
4 $\frac{1}{2}$ -inch, with handle.....	do.....	1	Regular, 4-inch.....	do.....	1
Gauge, marking.....	do.....	1	Screw, hand, 10-inch.....	do.....	1
Gimlets, wooden handles, assorted.....	do.....	3	Spokeshave, 3-inch.....	do.....	1
Hammer, nail, adz-eye.....	do.....	1	Tape measure, 50-foot.....	do.....	1
Hatchet, shingling.....	do.....	1	T-bevel, 8-inch.....	do.....	1
Level, spirit, pocket, iron top plate, japanned.....	number..	1	Try square, rosewood, 9-inch.....	do.....	1
			Wrench, monkey, 10-inch.....	do.....	1

Brain, plastic and oral surgery, in canvas case

Scalpel, medium, M. O., 1 $\frac{1}{2}$ -inch blade.....	number ..	2	Retractors—Continued.		
Tenotomy, small, M. O., 3 $\frac{1}{4}$ -inch blade.....	do.....	1	Flexible copper, 1 $\frac{1}{2}$ by 13 by 1 $\frac{1}{8}$ inch.....	pair..	2
Scissors:			Laminectomy (Frazier).....	do.....	2
Mayo dissecting—			Halstead vein.....	do.....	2
Straight, 5 $\frac{1}{2}$ -inch.....	pair ..	2	Trepphine, 3 $\frac{1}{4}$ -inch.....	number..	1
Curved, 5 $\frac{1}{2}$ -inch.....	do.....	2	Forceps:		
Straight, screw lock, blunt, 5 $\frac{1}{2}$ -inch.....	do.....	2	Rongeur—		
2 points sharp, 5 $\frac{1}{2}$ -inch.....	do.....	2	DeVilbiss.....	do.....	1
Bandage, 7 $\frac{1}{4}$ -inch.....	do.....	2	Horsley.....	do.....	1
Dressing forceps:			Screw lock, length 5-3 $\frac{1}{4}$ inches, Luer, United States Army.....	number..	1
Plain, 5 $\frac{1}{2}$ -inch.....	number ..	4	Bone holding, Farabeuf's.....	do.....	1
Mouse-tooth, 5 $\frac{1}{2}$ -inch.....	do.....	4	Bone cutting, Liston's, 10-inch, screw lock.....	do.....	1
Needle holder:			Liston bone, screw lock, 8 $\frac{1}{2}$ -inch, angled.....	do.....	1
Richter, 7-inch.....	do.....	1	Andrews tonsil.....	do.....	1
Hegar.....	do.....	1	Cranial operating set.....	do.....	1
Saw, Heys.....	do.....	2	Bone drill, Stille-Sherman, 6 extra drills.....	do.....	1
Saw metacarpal.....	do.....	1	Elevator:		
Saw, Gigli, square, wire, 20-inch.....	do.....	24	Sayre.....	do.....	1
Saw guide for Gigli, Blair's.....	do.....	1	Periosteal, plain.....	do.....	1
Saw handle, Gigli.....	do.....	2	Dura, angular.....	do.....	1
Towel, clamp, Backhaus:			Probes:		
3-inch.....	do.....	6	Pliable copper, 8-inch, $\frac{3}{16}$ -inch diameter, not plated.....	number..	2
5-inch.....	do.....	6	Silver—		
Retractors:			8-inch.....	do.....	1
Parker's, double-ended.....	pair ..	1	Lachrymal (salivary duct).....	do.....	1
Volkman's, 4-prong.....	do.....	2			
Sharp, single hook (Langenbeck).....	do.....	1			
Decompression.....	do.....	2			

Spatula, brain:			Tracheal retractors, 3-prong	number	2
7 by $\frac{5}{8}$ by $\frac{3}{4}$ inches	number	1	Tracheal hook, sharp	do	1
$8\frac{1}{2}$ by $\frac{7}{8}$ by $\frac{3}{4}$ inches	do	1	Infusion cannula, Webster's	do	2
Periosteotome:			Infusion needles, Webster's	do	2
Broad	do	1	Mallet, hardwood	do	1
Narrow	do	1	Curette, mastoid, Bucks:		
Hook Dura, medium, curve	do	2	No. 1	do	1
Osteotome:			No. 3	do	1
6-mm. wide	do	1	Dilator, jaw, Blair's	do	1
12-mm. wide	do	1	Spinal puncture needle with stylette	do	1
Gauge:			Silver wire, No. 20 gauge	ounces	2
6-mm	do	1	Razor, metal handle, for skin grafting	number	1
10-mm	do	1	Razor strop, United States Army standard	do	1
Clipper, hair	do	1	Forceps:		
Mouth gag:			Tongue holding, Matthieu, 7 $\frac{1}{4}$ -inch, screw lock		
Denhart	do	1		number	1
Murdock	do	1	Pean's hysterectomy	do	4
Tracheal tube, Jackson, size No. 6	do	3			

Base hospital and evacuation hospital dental equipment

Articles	Quantity		Articles	Quantity	
	A	B		A	B
	For base hospital	For evacuation hospital		For base hospital	For evacuation hospital
(a) MEDICINES			(d) INSTRUMENTS AND APPLIANCES—contd.		
Acidum trichloroaceticum, 1 ounce, in glass-stoppered bottle	2	1	Cases, office:		
Eugenol, 1 ounce, in bottle	2	1	Oak, preparation, 18 $\frac{1}{2}$ -ounce glass-stopper bottles	2	1
Mercury, redistilled, 4 ounces, in bottle	6	3	Preparation, extra $\frac{1}{2}$ -ounce glass-stopper bottles for	12	6
Novocain, 50-mgm. hypodermic tablets (or equivalent)	20	10	Chisels, L. H., Nos. 3, 33, 34, 41, 42, 48, of each	2	1
Paraform, $\frac{1}{16}$ grain compressed tablets, Formacid type (or equivalent), 100 in bottle	4	2	Clamps, rubber dam, Ivory's, Nos. 19, 20, 21, 22A, 23A, 56, and Bi-nap	2	1
Phenol, camphorated, 4 ounces, in bottle	2	1	Cleansers root-canal, Donaldson's or S. S. W., No. 5, all fine, 6 in package	24	12
Sodium and potassium, in sealed tube	12	6	Corkscrews, folding	2	1
(b) STATIONERY			Elevators, Knott's type, right and left, metal handle, of each	2	1
Erasers, steel	2	1	Elevators, No. 3, metal handle	2	1
Examination blanks No. 2, 50, in pad, pads	12	6	Engines, dental:		
Files, Shannon	8	4	All-cord, with K3 attachment for No. 7 H. P	2	1
Rulers	2	1	Cables "A" for	2	1
(c) BOOKS			Cables "A" sheaths for	12	6
Dental Materia Medica and Therapeutics (Prinz)	1	1	Cords for, extra	12	6
Dental Pathology, Therapeutics and Pharmacology (Burchard-Inglis)	1	1	Duplex springs for	do	do
Dentistry, First-Aid (Ryan)	1	1	Duplex springs, sheaths for part 10X	2	1
Dentistry, Operative (Johnson)	1	1	Hand pieces of "M," contra-angle, for slip joints No. 2	2	1
Handbook for Sanitary Troops (Mason)	1	1	Handpiece for, No. 7 straight, for slip joints No. 2	2	1
Oral Surgery (Brown)	1	1	Lubricating oil for	6	3
(d) INSTRUMENTS AND APPLIANCES			Slip-joint connections for part C2	2	1
Alloy balances	2	1	Slip-joint connections for part F2 do	2	1
Amalgam carriers, double-end, No. 5 do	2	1	Engine, instruments for hand piece "H" contra-angle:		
Bands, fracture, Angle's, 4 bicuspid and 2 molar	4	2	Burs—		
Blowers, chip, and hot-air syringes, No. 38	2	1	Dentate, 557, 558, 559, 560, 568 each	24	12
Blowers, chip, extra bulbs for	4	2	Fissure, 700, 701, 702, 703 do	12	6
Boilers, instrument, small, approximately 12 by 6 by 4 inches	2	1	Inverted cone 33 $\frac{1}{2}$, 34, 35 37, 39, 41	24	12
Bottles, office, preparation No. 6	24	12	each	do	do
Broach reamers, extra fine and fine, 6 in package	6	3	Plug-finishing 200, 202, 221 do	4	2
Burnishers, L. H., Nos. 29, 32, 34s, 36 of each	4	2	Round $\frac{1}{2}$, 2, 1, 4, 6, 8, 9 do	24	12
			Drills, 100, 103 do	12	6
			Mandrels:		
			Nos. 302 and 303 do	4	2
			Morgan-Maxfield number		
			Points, carborundum medium grit, mounted, 183, 186, 187, 189, 211, 219, 226, 227, 231, 241	4	2
				4	2

Base hospital and evacuation hospital dental equipment—Continued

Articles	Quantity		Articles	Quantity	
	A For base hospital	B For evacuation hospital		A For base hospital	B For evacuation hospital
(d) INSTRUMENTS AND APPLIANCES—contd.			(d) INSTRUMENTS AND APPLIANCES—contd.		
Engine instruments for hand piece No. 7:			Scissors, gum, curved on flat, No. 22		
Burs—			number.....	2	1
Dentate, 557, 558, 559, 560, 568	24	12	Separators, adjustable, Ivory's, or equivalent.....	2	1
each.....			number.....		
Fissure, 700, 701, 702, 703.....do.	12	6	Shears, No. 32.....do.	2	1
Inverted cone, 33 ² , 34, 35, 37, 39, 41			Slabs, mixing, glass No. 6.....do.	2	1
each.....	24	12	Spatulas Nos. 22, 24.....each	2	1
Plug-finishing, 200, 202, 221.....do.	4	2	Strips, celluloid, thin, in box of 100 boxes.....	8	4
Round, 1/2, 1, 2, 4, 6, 8, 9.....do.	24	12	Syringes:		
Drills, 100, 103.....do.	12	6	Hypodermic—		
Mandrels, Nos. 302 and 303.....do.	12	6	Dental, all metal, No. 172A		
Mandrels, Morgan-Maxfield.....number	6	3	All metal, extra needles for straight and curved.....	2	1
Points, carborundum, medium grit, mounted 183, 186, 187, 189, 211, 219, 226, 227, 234, 241.....each	4	2	Extra needles for conductive anesthesia (Fischer's type).....number	12	6
Excavators, Black's cutting instruments, Nos. 1, 17, 19, 21, 23, 34, 37, 39, 49, 50, 58, 63, 64, 67, 57, 68, 75, 74, 81, 83.....each	4	2	Extra hubs for, long and short.....each	4	2
Explorers, L. H., 5, 6, 11, 12, 18.....do.	4	2	Water, self-filling, all metal.....number	2	1
Forceps, rubber-dam:			Self-filling, extra pipes for, curved.....number	4	2
Clap, Brewer's type.....number	2	1	Tool, universal.....do.	1	1
Punch, perfected.....do.	2	1	Wire, ligature, Angle's, No. 187.....boxes	2	1
Tooth-extracting 10, 15, 18R, 18L, 65, 150, 222, 151.....each	1	1	(e) FURNITURE		
Holders:			Chairs, dental, portable, metal frame in chests.....number	2	1
For cotton, Methot's type.....number	2	1	Chests:		
For mercury, ebony, No. 2.....do.	2	1	Empty, for dental engines.....do.	2	1
For nerve branch, No. 2.....do.	6	3	Supply, empty.....do.	2	1
Rubber-dam, Anatomik.....do.	2	1	Instrument, operating, empty.....do.	2	1
Hones, oil, Arkansas stone, in wooden boxes.....number	2	1	Cuspids, nickel-plated, No. 6.....do.	2	1
Lamps, alcohol:			Desks, field, dental, empty.....do.	2	1
No. 26, with flame shields.....do.	2	1	Stands, portable, complete, less tables, for field use, Clark's type.....number	2	1
Extra wicks for.....do.	12	6	Tables, pressed steel, white, No. 90, Harvard type, table bases to fit Clark's type stands.....number	2	1
Lanets:			(f) MISCELLANEOUS		
Abscess, metal handles, octagon, No. 5.....number	2	1	Alloy:		
Gum, metal handles, octagon No. 2.....number	2	1	Copper, 1 ounce in box.....boxes	4	2
Mallets, metal cases, No. 15.....do.	2	1	To comply with Black's physical standards, 1 ounce in box.....boxes	24	12
Matrix retainers, Ivory's:			Boxes, soap, metal, small.....number	2	1
No. 1.....do.	2	1	Cement:		
Extra bands for, bicuspid and molar.....each	24	12	Copper oxyphosphate, black.....boxes	12	6
Matrix strips, copper, soft, 1/2 inch wide, 36 gauge, 5-inch box, 6 inches long.....boxes	2	1	Oxyphosphate, colors, yellow, white, light gray, pearl gray, dark brown.....each	12	6
Mechanical dams, Automaton.....number	2	1	Cotton, absorbent, rolls, 6 inches long, 3/8, 1/2, 3/4 inch, in diameter, 100 in box, of each.....boxes	4	2
Mirrors, mouth:			Cois, finger, rubber.....dozen	2	1
Aluminum handles, No. 4.....do.	4	2	Covers, paper, aseptic, 12 by 12 inches, for bracket table.....number	2	1
Extra glasses for, size No. 4, magnifying and plain.....each	6	3	Cups:		
Mortars and pestles, glass, No. 2.....number	2	1	Polishing, soft rubber, small.....do.	144	72
Pliers:			Tin, 2 in nest.....nests	2	1
Dressing:			Disks:		
No. 2.....do.	4	2	Bristle 9, 11, and cup shape.....each	36	18
No. 17.....do.	4	2	Carborundum, knife-edge, 1/2, 3/4, 3/8		
Office, smooth beak, No. 122.....do.	2	1	Sandpaper, 1/2, 3/8, 3/4, grit, 00, 100 in box.....each	18	9
Pluggers:			Garnet paper, 1/2, 3/8, 3/4, grit, 1/2.....do.	2	1
Amalgam, Woodson's 1, 2, 3.....each	2	1	Emery paper, 1/2, 3/8, 3/4, grit, 0.....do.	2	1
Plastic, L. H., 3, 28, 37, 39, 40, 40a.....do.	2	1	Cuttle-fish paper, 1/2, 3/8, 3/4, grit, fine.....number	2	1
Root-canal, Donaldson's, 2, 4, 6.....do.	2	1	Fiber, devitalizing, arsenical, in jars.....jars	2	1
Pots, medicine, glass, Dappen's green and white.....each	2	1	Floss, silk, waxed.....spools	48	24
Probes, silver.....number	2	1	Gowns, operating.....number	12	6
Saws, dental:			Gutta-percha stopping:		
Complete, Gordon White.....do.	2	1	High-heat sticks.....ounces	8	4
Gordon White, extra blades for.....do.	12	6	Temporary, pink sticks.....do.	8	4
Ribbon, 3/4-inch, thin.....do.	6	3			
Scalers:					
L. H. 3, 6, 30, 33, 34, 40, 41, 51, 59, 68.....each	4	2			
Pyrroha.....do.	2	1			
Screw portes, Morrison improved, No. 2.....number	2	1			

Base hospital and evacuation hospital dental equipment—Continued

Articles	Quantity		Articles	Quantity	
	A For base hospital	B For evacuation hospital		A For base hospital	B For evacuation hospital
(f) MISCELLANEOUS—continued			(h) LABORATORY EQUIPMENT—continued		
Modeling composition, Perfection (Detroit).....pounds.....	4	2	Lamps, alcohol, large, Purdy's.....number.....	1	1
Napkins, dental, aseptic, 500 in box.....boxes.....	4	2	Metal, Melotte's.....ingots.....	6	6
Paper:			Maldine compound.....pounds.....	1	1
Articulating, thin in books.....books.....	2	1	Pliers:		
Bibulous, Japanese, 100 sheets in package.....packages.....	4	2	Contouring—		
Points, absorbent.....boxes.....	12	6	No. 115, Crescent.....number.....	1	1
Plaster of Paris, French, Impression.....tins.....	2	1	No. 114, Johnson.....do.....	1	1
Points:			Round nose, No. 107.....do.....	1	1
Root-canal, gutta-percha, 8, 10, 12, boxes.....each.....	4	2	Rubber, red.....pounds.....	1	1
Soft-rubber, corrugated G. L.....do.....	48	24	Sandpaper, 00 to 1, of each.....sheets.....	24	24
Pumice stone, powdered.....tins.....	2	1	Saws, frame, mechanical.....number.....	1	1
Rubber dam, plain, medium, 18 feet by 6 inches, in sealed tin.....tins.....	4	2	Extra blades for.....do.....	24	24
Sandarac, gum.....cartons.....	2	1	Shears, Nos. 8, 10, 11, of each.....do.....	1	1
Stoves, oil, blue-flame.....number.....	2	1	Soldering and heating outfits, gasoline generator No. 45, complete, less blowpipe stand.....number.....	1	1
Strips, polishing, assorted grits, in boxes.....boxes.....	6	3	Soldering appliances, Melotte's improved, with blowpipe, pads, and clamps, complete.....number.....	1	1
Wheels, carborundum, square edge, Nos. 301, 302, 304, 305.....each.....	4	2	Spatulas:		
Wood, orange, sticks, large.....bundles.....	4	2	Plaster, 4-inch.....do.....	1	1
			Rubber, 4-inch.....do.....	1	1
			Tongs, soldering, 7-inch.....do.....	1	1
			Trays:		
			Lower impression, 1, 3, 5, 15, 17, 22 each.....	1	1
			Upper impression, 1, 3, 5, 12, 14, 18 each.....	1	1
			Tubing, rubber, ½-inch, heavy wall, white.....feet.....	16	16
			Tweezers, B, C, D, E.....each.....	1	1
			Vises, bench, jeweler's, 2-inch.....number.....	1	1
			Wax:		
			Carvers for, Roach's.....do.....	1	1
			Enlay.....boxes.....	1	1
			Base-plate, pink, ½-pound boxes.....do.....	1	1
			Wheels:		
			Brush, 3, 5, 6, 16, 24, 26.....each.....	1	1
			Carborundum, lathe, square edge, 1 and 2 inches in diameter, ¾-inch width, grit, C and B.....each.....	1	1
			Felt, square edge No. 3, round edge No. 4, knife edge No. 2 of each.....number.....	1	1
			Whetstones, carborundum, 5-inch.....do.....	1	1
			Wire binding, 32-gauge.....spools.....	2	1
(g) OFFICE FURNITURE AND EQUIPMENT			(i) ADDITIONAL ARTICLES		
Anvils, cast base.....number.....	1	1	Burnishers, tantalum, double-end, No. 1.....number.....	2	1
Aprons, rubber.....do.....	1	1	Spatulas, agate or bone.....do.....	2	1
Forceps, crown-slitting.....do.....	1	1	Synthetic porcelain:		
Mirrors, hand, bevel, 5-inch.....do.....	1	1	Caulk's 10-shade, full portion, in box.....boxes.....	1	1
Port polishers, contra-angle.....do.....	1	1	Caulk's shade guides for.....number.....	1	1
Wood points, for, assorted, in box.....boxes.....	1	1	Anchor flasks.....do.....	2	2
Post pullers, Little Giant.....number.....	1	1	Bolts for.....sets.....	2	2
Root reamers, Peeso's 2, 3, for H. P. No. 7.....each.....	2	2	Cusp die plates No. 5.....number.....	1	1
Root facers, safe-side, for H. P. 7, 8, 9.....each.....	2	2	Flask:		
Shade bars.....number.....	1	1	"Box".....do.....	1	1
Syringes, water, 21A.....do.....	1	1	Presses.....do.....	1	1
Extra bulbs for.....do.....	2	2	Ladles with handles (melting), Nos. 5 and 6, of each.....number.....	1	1
Typewriters.....do.....	1	1	Lead.....ingots.....	12	12
Record ribbons for.....do.....	4	4	Molding rings, for metal dies, Bailey type, large and small.....each.....	1	1
Water coolers, 6-gallon.....do.....	1	1	Molding sand.....tins.....	1	1
			Plate, German silver, Brown & Sharpe gauge, No. 30, size 6 by 6 inches.....pieces.....	6	6
			Rubber, red vulcanite.....pounds.....	2	2
			Soldier, silver.....ounces.....	1	1

Base hospital and evacuation hospital dental equipment—Continued

Articles	Quantity		Articles	Quantity	
	A For base hospital	B For evacuation hospital		A For base hospital	B For evacuation hospital
(i) ADDITIONAL ARTICLES—continued			(i) ADDITIONAL ARTICLES—continued		
Swagers (metal).....number..	1	1	Head gear, Aiguiers.....number..	6	6
Swaging mallets, horn.....do....	1	1	Lathes, the Unique, complete, (670 Lee S. Smith catalogue) (fifth edition).....number..	1	1
Trays, wooden, for molding sand.....do....	1	1	Rubber ligatures, assorted sizes in box (S. S. W.).....boxes	1	1
Vulcanite files, round and half round.....each..	1	1	Rubber, pink, ½ pound in box.....do....	4	4
Vulcanite scrapers and finishers, 3, 7, 8, 26, 27.....each..	1	1	Saliva ejector, hand, S. S. W.....number..	2	1
Vulcanizers, 3 flasks, gas or kerosene.....number..	1	1	Seamless copper bands, 100 in box, assorted (Ransom & Randolph Co.).....boxes	1	1
Wire, German silver, gauge 12, 16, 18, 4-foot lengths.....each..	1	1	Solder, soft, in wire form, ¼ pound packages.....	1	1
Zinc, ½ pound, ingots.....ingots..	20	20	Soldering flux, zinc chloride, 1 ounce in bottle.....bottles..	1	1
Articulator, Guilford's.....number..	1	1	Soldering iron, 2 pounds.....pounds..	1	1
Surgery and Diseases of the Mouth and Jaw (Blair's).....number..	1	1	Splints, emergency, Gunning type, aluminum, 6 in box.....boxes	2	2
Clamp bands, Usona type, Meier Dental Manufacturing Co., as follows:			Tap and die set (Guilford, screw plate and 2 taps).....number..	1	1
K large, open pattern, 6 in envelope envelopes.....	1	1	Teeth, vulcanite, assortment No. 1 Assistants.....	1	1
K medium, open pattern, 6 in envelope envelopes.....	1	1	Tubing for use with expansion arches, 16-gauge, 3-inch lengths.....lengths..	4	4
K small, open pattern, 6 in envelope envelopes.....	1	1	Usona type expansion arch C, 16-gauge (Meier dental).....number..	12	12
M bicuspid, open pattern, 6 in envelope envelopes.....	1	1	Wax, yellow, impression, ½-pound boxes.....boxes	2	2
Clasp wire, gold, half-round.....inches..	6	6	Wire, galvanized iron:		
Crown, assortment No. 10.....number..	1	1	No. 8 gauge, 2-foot lengths.....lengths..	12	12
Calxine.....boxes..	3	3	No. 10 gauge, 2-foot lengths.....do....	12	12
**Cups, drinking, enamel ware, white.....number..	12	12	Wrench, L, square end, for Usona clamp bands.....number..	2	2
Dilators, jaw, ordinary wooden clothespins.....number..	25	25	Wire, aluminum bronze, 13-inch lengths, in box opening at end, ½-pound box, assorted as follows: 24 gauge, 40 per cent; 26 gauge, 40 per cent; 28 gauge, 20 per cent.....boxes..	1	1
Face bow, Snow's.....do....	1	1			
Flask, anchor, wrench for.....do....	1	1			
Fracture bar, Usona type, threaded, 4 nuts, 6 in envelope.....envelopes..	1	1			
Gold, solder, 18-carat.....pennyweights..	10	10			
Gold plate, 30-gauge, 22-carat.....do....	10	10			

N. B.—Articles on the regular dental supply table (see Manual for the Medical Department) marked with an asterisk are articles of medical supply. The necessary supply of these articles for use of the dental personnel should be obtained in the same manner as other strictly medical supplies. The allowance for a base hospital is computed on the basis of two portable outfit equipments and one laboratory equipment; that for an evacuation hospital, on the basis of one portable outfit equipment and one laboratory equipment.

Additional equipment for an Orthopedic hospital (overseas)

INSTRUMENTS			
102. Operating knife.....number..	48	126. Sponge holder, oval blade.....number..	24
103. do.....do....	48	127. Tissue forceps (Allis).....do....	16
104. Tenotome.....do....	16	Dressing forceps:	
105. Amputating knife.....do....	8	Straight.....do....	8
106. do.....do....	8	Spring.....do....	8
107. Plaster of Paris knife.....do....	8	130. do.....do....	24
108. Dissecting scissors.....do....	8	131. Tissue forceps, spring, mouse-toothed.....do....	32
109. do.....do....	8	Needle holder:	
110. Straight scissors.....do....	24	132. Richter.....do....	8
111. do.....do....	24	133. Hegar.....do....	8
113. Plaster of Paris shears.....do....	4	134. Towel forceps (Backhaus).....do....	48
114. Uterine scissors, curved.....do....	8	135. Bullet forceps (Senn).....do....	8
115. Bandage scissors.....do....	16	136. Amputating saw (Saterlee).....do....	8
Hemostatic forceps:		137. Coping saw frame and blades with adjustment for Gigli saw.....number..	16
116. Jones, straight.....do....	72	138. Gigli saws.....do....	96
117. Halstead-Army, straight.....do....	48	139. Handles for Gigli saw.....pair..	8
118. Kelly-Hopkins, straight.....do....	48	140. Tourniquet, Army pattern.....number..	32
119. Kelly-Pean, curved, flat shank.....do....	24	141. Abdominal needles, taper point, half circle, Nos. 8, 10, 11, 12, of each.....number..	48

142. Surgeon's needles, regular plain eye, full curved, Nos. 6, 8, 12, 16, of each.....number..	48	184. Bone gouge, square handle, 3 sizes, of each size.....number..	8
143. Abdominal needles, straight, of each.....do....	48	185. Osteotome, square handle, 3 sizes, of each size.....number..	8
Cervix needles:			
145. Trocar point, full curved, Nos. 1, 2, 3, 4, 5, of each.....number..	48	186. Periosteum elevator (Sayre) double-ended.....number..	8
146. Taper point, full curved plain eye, Nos. 2, 3, 4, of each.....number..	48	187. Periosteotome, blunt dissector (Kocher).....number..	16
147. Intestinal needles, taper point, straight, Nos. 3, 4, 5, of each.....number..	48	188. Bone eurette (Whiting), sizes 2, 4, 6, of each.....number..	8
149. Double-ended retractor, combination of Richardson & Eastman, two sizes, nested; blades.....number..	8	Bone drill:	
150. Retractor, Army type, two sizes, nested.....number..	8	189. Stille-Sherman, with 3 points.....do....	4
151. Four-prong sharp retractor, steel.....do....	16	190. Detachable metal handle with square socket.....number..	8
154. Aneurism needle (Dechamps), blunt point.....number..	8	191. Bone operating set, electric (Albee).....do....	2
156. Probe, silver, straight, with eye, 2 sizes.do....	8	192. Bone plates (Sherman) vanadium steel...set..	1
157. Trocar and cannula, small, medium and large sizes, of each.....number..	8	193. Screw driver (Sherman).....number..	1
157-1. Trocar disk and plain cannula, 2 sizes, of each size.....number..	8	194. Bone serews (Sherman) of each size.....do....	12
158. Grooved director, plated.....do....	8	195. Clamp for bone plating (Lownian).....do....	1
169. Cranial operating set; brace, with burr, 1 cm., and drill, 1 cm.....number..	4	210. Urethral catheter, gum linen, conde, boilable, of each size.....number..	8
170. Trephine (Galt).....do....	2	212. Urethral catheter (Nelaton), of each size.....number..	8
171. Rongeur bone forceps, cranial (DeVilbiss).....number..	2	252. Vesical syringe (Janet-Frank), metal.....do....	8
172. Brain spatula, medium size.....do....	2	300. Syringe, Luer standard, all glass, with chain attachment 4 sizes with needles, of each.....number..	8
Bone-cutting forceps (Liston):			
173. Curved.....do....	8	302. Lumbar puncture needles, steel, to fit standard Luer syringe.....set..	4
174. Straight.....do....	8	304. Finger cots, thin rubber.....dozen..	8
Rongeur bone forceps:			
175. Horsley.....do....	8	305. Applicators, wooden, in boxes.....dozen..	8
176. Banes.....do....	8	306. Cautery.....number..	2
177. Sequestrum forceps.....do....	8	309. Razor, brass or German silver handle.....do....	8
179. Mallet, hardwood, with seamless metal rings.....number..	16	311. Mouth gag (Denhart).....do....	8
180. Bone extension apparatus (Steinmann).....set..	1	312. Head light.....do....	2
181. Bone-holding forceps (Farabonfi).....number..	8	313. Tongue depressor (Farlow).....do....	4
183. Bone chisel, square handle, 3 sizes, of each size.....number..	8	320. Infusion apparatus.....do....	24
		400. Stomach tube.....do....	8
		401. Stethoscope.....do....	8
		542. Tongue depressor, wooden, in boxes.....do....	1,000
		DRUGS (NOT IN STANDARD LIST)	
		Resin.....do.....	6

SPECIAL EQUIPMENT FOR PLASTER OF PARIS WORK

Plaster of Paris for bandages, "regular dental" plaster.....barrels..	30	Portable splea support, Goddy pattern.....number..	1
Plaster of Paris for casts, Higginson's casting plaster.....barrels..	25	Table, fracture, Hawley, complete.....do....	1
Crinoline, Vigiland brand, 32 inches wide, 24 yards in bolt.....yards..	50,000	GENERAL SUPPLIES	
Cotton sheet wadding, 1 yard wide by 7 yards long.....bales..	290	Bandages; flannelette, 4-inch roller, cut on bias.....cases..	5
Felt:			
Thin white.....do....	5	Splint material:	
Soft gray, 1 inch thick.....do....	15	Zinc, perforated, with $\frac{1}{8}$ -inch perforation.....sheets..	100
Hard gray, $\frac{1}{4}$ inch thick.....do....	10	Wire gauze, $5\frac{1}{4}$ inches by 1 yard, in rolls.....number..	100
Basin, hand, agaware or white enamel.....number..	8	Splint wood, 3 or 4 inches wide, $\frac{1}{8}$ -inch stiek, soft wood, assorted lengths.....feet..	200
Bucket, agaware or white enamel.....do....	8	Sutures:	
Boxes, tin, ordinary bread boxes.....do....	8	Silk, twisted, 3 sizes, 18 inches long, in packages.....packages..	500
Knives, bandage, handle with 12 detachable blades.....number..	2	Kangaroo tendon, in tube.....tubes..	200
Hone for sharpening knives.....do....	4	Plaster, adhesive, zinc oxide, 12-inch, 5-yard rolls.....rolls..	144
Emery paper.....sheets..	12	Rubber dam, plain, thin, in sealed tin.....tins..	50
Shears:			
Bandage.....number..	8	Rubber tubing for drainage, assorted sizes, 1-yard lengths, $\frac{1}{8}$ to $\frac{1}{2}$ inch by $\frac{1}{8}$ inch.....yards..	500
Tailor, large.....do....	2	Muslin, oiled.....do....	24
Spoons, basting, tinned iron.....do....	8	Benzine.....gallons..	10
Frame, portable, for applying plaster of Paris jackets.....number..	1	Alcohol.....do....	10

SPECIAL ORTHOPEDIC SUPPLIES				
Buckles for splints and appliances, 1 inch and 1½ inches, of each.....	gross..	25	Droppers, medicine.....	number.. 72
Cord, braided cotton, ⅜ inch in diameter (for extensions).....	bolts..	50	Hooks, cup, brass, small and large, of each.....	dozen.. 12
Covers, canvas, duck, being in 2 sections (for the Bradford frames).....	number..	25	Pulleys, awning, single.....	number.. 200
			Screw eyes, heavy brass, stem ⅝ inch by 1 inch.....	number.. 100
			Tape measures, linen, 5-foot.....	do.. 24
			Webbing, 1 inch, 2 inches, 4 inches, and 6 inches wide, of each.....	yards.. 100

Base hospital library unit

BOOKS				
		Copies		Copies
Anatomy. Gray.....		1	Report on Disorders of the Heart in Soldiers. (British) Medical Research Committee Special Report Series No. 8, National Health Insurance, England.....	4
Chemical and Microscopical Diagnosis. Wood.....		1	Malingering. Jones and Llewellyn.....	1
Chemistry. Simon.....		1	Physical Diagnosis. Cabot.....	1
Pathological Technique. Mallory and Wright.....		1	United States Pharmacopœia.....	1
Bacteriology. Hiss and Zinsser.....		1	Physiology. Howell.....	1
Pathology. MacCallum.....		1	War Nursing. Goodwin.....	2
Bacteriology. Stitt.....		1	Materia Medica and Therapeutics. Potter.....	1
General Surgery. Da Costa.....		1	Preventive Medicine. Roseman.....	2
Orthopedic Surgery. Whitman.....		1	Military Hygiene. Havard.....	2
Operative Surgery. Binnie.....		1	Dispensatory.....	1
Gunshot Wounds. La Garde.....		1		
Treatment of Infections. Carrell.....		4	MEDICAL JOURNALS	
Fractures. Scudder.....		1	Journal American Medical Association.....	1
Diseases of the Nervous System. White and Jelliffe.....		1	Archives of Internal Medicine.....	1
Occupation Therapy. Duntun.....		1	American Journal of Roentgenology.....	1
Diseases of the Eye. de Schweinitz.....		1	Annals of Surgery.....	1
Surgery and Diseases of the Mouth and Jaws.....		1	American Journal of Medical Sciences.....	1
Ear, Nose, and Throat. Ballenger.....		1	British Medical Journal.....	1
Urology. Chetwood.....		1	Journal of Infectious Diseases.....	1
Diseases of Skin. Stellwagen.....		1	Laryngoscope.....	1
Genito-Urinary Surgery. Martin.....		1	Annals of Ophthalmology.....	1
Radiography, X-ray Therapeutics and Radium Therapy. Knox.....		1	Journal of Mental and Nervous Diseases.....	1
Principles and Practice of Medicine. Osler.....		4	Dental Cosmos.....	1
Disease of the Heart. Mackenzie.....		1	Journal of Cutaneous Diseases.....	1
Diseases of Lungs. Lord.....		1	Urological and Cutaneous Review.....	1
Trench Nephritis. (British) Medical Research Committee Special Report Series No. 8, National Health Insurance, England.....		4	Journal of Laboratory and Chemical Medicine.....	1
			American Journal of Orthopedics.....	1
			The Military Surgeon.....	1

JULY 15, 1918.

INSTRUMENTS AND EQUIPMENT REQUIRED FOR USE IN HOSPITALS HAVING SEPARATE ORTHOPEDIC SERVICE

The articles on this list will be furnished on requisition therefor.

NOTE—Such surgical instruments and appliances as are necessary for orthopedic uses, if not available in the general surgical equipment provided at the base hospital, may be requisitioned from the List of Staple Medical and Surgical Supplies, Part I.

Brace wrenches.....	number..	2	Extension splint, humerus, universal, Jones, No. 711.....	number..	40
Frame, portable for applying plaster of Paris jackets.....	number..	1	Frame:		
Heaters, Burdick, type L, No. 2.....	do..	2	Bradford, No. 701.....	do..	10
Knives, plaster.....	do..	6	Abduction, Bradford, No. 702.....	do..	1
Sacral Rest, Meyerling's (not furnished when Hawley table is furnished).....	number..	1	Overhead bed, Balkan, No. 719.....	do..	12
Table, Hawley.....	do..	1	Foot and ankle splint, combined, Jones, No. 707.....	number..	50
			Foot splint, rectangular, universal, Jones, No. 708.....	number..	50
SPLINTS			Hand splint:		
Abduction splint, arm:			Skeleton, dorsiflex, Jones, No. 714.....	do..	10
Universal, Jones, No. 709.....	number..	20	Long, Jones, No. 715.....	do..	10
Straight, Jones, No. 710.....	do..	20	Long, with thumb piece, Jones, No. 716.....	do..	10
Bed rest for knee splint, Thomas, No. 705.....	do..	25	Short, cock-up, Jones, No. 713.....	do..	50
Elbow splint, Jones, No. 712.....	do..	30			

Knee splint, Thomas; 2 sizes of rings, 25 and 28 inches inside diameter; bar length, 52, inches, No. 703 number.....	100
Straight splint, simple, Jones; set of 4 sizes—20, 16, 12, and 8 inches, No. 700..... number.....	100
Suspension splint, universal, Hodgden's, with 17 feet of rope and galvanized pulley, No. 717..... number.....	50
Toe-drop brace for knee splint, Thomas, No. 704..... number.....	25
Wood for splints, 4 inches wide by $\frac{3}{4}$ inches thick; 6-foot lengths..... number.....	50
Stretcher bar, for suspension of lower extremities in transport, No. 718.	

TOOL CHEST, ORTHOPEDIC

The following supplies are furnished when requisition is made for "Tool chest, orthopedic." (In reinforced wooden chest with drawers, handles, and lock.)

Brushes, paint, 1 $\frac{1}{2}$ -inch, flat..... number.....	3
Chisels, cold: $\frac{1}{2}$ -inch..... do.....	2
1-inch..... do.....	2
Clamp, splicing, lineman's; holes, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, 1 $\frac{1}{2}$, 2; 10 $\frac{1}{2}$ inches long; weight, 16 ounces..... number.....	1
Clamps, malleable iron, 4-inch..... do.....	2
Countersinks, $\frac{3}{8}$ -inch, to use in breast drill..... do.....	2
Drill: Breast, with 3-jawed chuck..... do.....	1
Morse, for same, $\frac{3}{8}$ and $\frac{1}{2}$ inch, dozen of each..... number.....	2
Files: Flat— Bastard, 10-inch, with handles..... do.....	3
Second cut, 10-inch, with handles..... do.....	2
Round, bastard— 10-inch, with handles..... do.....	2
6-inch, with handles..... do.....	2
Flat, second cut, 6-inch, with handles..... do.....	1
Saw (three-cornered), 6-inch, with handles, medium cut..... number.....	1
Glue, liquid..... quart.....	1
Hammer, machinist's: 1-pound, cross pein..... number.....	1
5-ounce, ball pein..... do.....	1
Lead, block, 2 by 3 by 4 inches..... do.....	1
Pliers: Side cutting, flat nose, 8-inch..... do.....	1
Button pattern, 10-inch..... do.....	1
Heavy, for cutting wire, 12-inch..... do.....	1
Punch, belt, universal, 6 size..... do.....	1
Punches: Center, 4-inch..... do.....	3
Rivet; 1 rivet set for use with $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$ rivets, 1 each..... number.....	3
Rasp, wood, 10-inch, half round..... do.....	1
Reamer, 6-inch, one-quarter at large end for breast drill..... number.....	2
Roller, bandage, double clamp, standard..... do.....	1
Rule: Boxwood, 24-inch, folding..... do.....	1
Caliper, 6-inch, 1-fold..... do.....	1
Saw: Fine miter, 12-inch back saw..... do.....	1
Hack, extension, with 12 blades, 18 teeth to inch number.....	1
Shears, tin snips, Lyon pattern, 14-inch..... do.....	1
Solder, in pounds, half and half..... pounds.....	2
Soldering iron, 3 pounds, with handle..... number.....	1
Soldering salts, in pounds..... pound.....	$\frac{1}{2}$

Stone: Oil, hard, Arkansas, 5 by 2, in box..... number.....	1
Fine carborundum, 5 by 2, in box..... do.....	1
Toogs, blacksmith's, 22-inch, or equivalent..... do.....	1
Vise: Bench, 3 $\frac{1}{2}$ -inch jaw, swivel base..... do.....	1
Hand, 1 $\frac{1}{2}$ -inch jaw..... do.....	1
Wrench: Monkey, 10-inch..... do.....	1
Pipe, 12-inch..... do.....	1
Yankee, plalo, screw driver: No. 90, size 4-inch..... do.....	1
No. 90, size 10-inch..... do.....	1

ADDITIONAL ARTICLES FOR USE WITH TOOL CHEST

Additional articles are furnished together with orthopedic tool chest on requisition for "orthopedic tool chest with additional supplies."

Anvil, 75-pound..... number.....	1
Forge, small portable with hood..... do.....	1
Iron: Black, soft, $\frac{1}{2}$ inch wide, $\frac{1}{4}$ inch thick, 10-foot lengths..... pieces.....	10
Sheet, black, open-hearth, 20 gauge, half sheets, 48 inches by 24 inches..... number.....	8
Leather, first-grade strap: 4-ounce..... side.....	$\frac{1}{2}$
8-ounce..... do.....	$\frac{1}{2}$
Rod, round, soft iron: 8/32 diameter, straight, 12-foot lengths..... pounds.....	40
10/32 diameter, straight, 12-foot lengths..... do.....	20

SPECIAL MATERIALS AND SUPPLIES
(Supplied on requisition)

Adhesive plaster, zinc oxide, 12 inches by 5 yards rolls.....	23
Bolts, iron, stove: $\frac{3}{8}$ by $\frac{1}{2}$ inch..... gross.....	3
$\frac{1}{4}$ by $\frac{3}{4}$ inch..... do.....	3
Buckles, iron, sliding-bar type: 1-inch..... do.....	1 $\frac{1}{2}$
1 $\frac{1}{2}$ inch..... do.....	$\frac{1}{2}$
3..... dozen.....	3
D rriags, 1-inch, iron.....	
Duck, cotton, khaki-colored, 10 ounces, 29 inches wide..... yards.....	25-30
Esetutheon pins, iron, No. 12, $\frac{3}{8}$ inch long ;No. 14 $\frac{1}{2}$ inch long; No. 16, $\frac{1}{8}$ inch long; of each pound.....	1
Leather, calfskin..... number.....	1
Rivets: Soft iron; diameters, $\frac{1}{4}$ inch, $\frac{3}{16}$ inch, $\frac{1}{8}$ inch; lengths, $\frac{1}{2}$ inch, 1 inch; of each..... pound.....	1
Copper; diameters, $\frac{1}{8}$ inch, $\frac{3}{16}$ inch, $\frac{1}{4}$ inch; lengths, $\frac{1}{2}$ inch, $\frac{3}{4}$ inch, 1 inch; of each pound.....	1
Shellac, dry, white..... do.....	1
Snap hooks..... dozen.....	3
Tie, sheet, 24-gauge, 20 by 28 inches..... pieces.....	4
Wire, copper, annealed, No. 14, 1 pound..... spool.....	1
Bandages, cotton, elastic, without rubber..... number.....	12
Crioline, Vigilant brand, 24-20 threads to the inch; 36 inches wide; 55-50 yards long; strictly starch size..... bolt.....	1
Felt: Soft gray asbestos, $\frac{1}{2}$ inch thick; width, 36 inches, in bundles containing approximately 10 yards. number.....	1
Firm gray saddle, $\frac{1}{2}$ inch thick; width 36 inches, in bundles containing approximately 10 yards. number.....	1

Paper, emery, for sharpening cast knives (assorted sheets).....	number..	12
Plaster of Paris, in barrels, or equivalent quantity in waterproof containers.....	barrels..	2
Scissors, large tailoring, for cutting heavy felt, 14 inches long.....	pair..	1
Sheet wadding, cotton, 1 yard wide, 7 yards long, in 100-yard hales; No. 407, Union brand, or equivalent.....	bale..	1
Wire gauze, for splints; ¼ inch mesh, 5 inches wide, 1 yard long, in rolls.....	number..	12
Webbing:		
1 inch wide, in roll (for use in making splints).....	yards..	72
1¾ inches wide (for use in making splints) do.....	do....	36

INSTRUMENTS FOR TREATMENT OF FOOT DISABILITIES

Excavator and packer, No. 1568 (not over 4½ inches).	
Corn kolfe, No. 1528.	
Forceps, No. 1647 (not over 4½ inches).	
Callous rasp No. 1656.	
Scissors No. 1601, both points sharp (as described in par. 3).	
Nail clippers, No. 1677.	
Or substitute list.	
NOTE: Catalogue Nos. are Serenson Manufacturing Co., New York.	

APPARATUS AND SUPPLIES FOR THERAPEUTIC ALTERATIONS OF SHOES

Narrow sewing awl and handle for repairing uppers.....	number..	1
Extra awl blades for above.....	do....	3
Peg awl and handle for hand driven nails.....	do....	1
Extra awl blades for above.....	do....	3
Bristles for upper stitches.....	ounce..	1
Silk-finish thread for stitching, spool of 600 yards, 20/4.....	number..	1
Soft cotton-finish thread for stitching, spool of 600 yards, 20/4.....	number..	1
Wax for above thread.....	ounces..	4
Rasps, 8-inch double-faced, for smoothing edge of soles and heels; Crispin, or equivalent.....	number..	2
Cutting nippers, 6-inch size, for cutting off heel slugs, No. 125, Bernard, or equivalent.....	pair..	1
Heel removing tool.....	number..	1
Heel pinchers for removing top heel lifts, 8-inch.....	pair..	1
Shoe knives for trimming edges (I. P. Hyde) Nos. 1, 2, 3.....	number..	6

Emery cloth:	
No. 1.....	sheets.. 12
No. 00.....	do.... 12
Iron cobbling jack of lap design.....	number.. 1
Cobbler's hammer, size No. 3 (St. Crispin, or equivalent).....	number.. 1
Gauge heel nails 6-8, No. 13.....	pounds.. 25
Sole leather, blocks 8½ by 12½ inches.....	number.. 25
Top heel lifts, large size.....	pairs.. 50
Cement.....	pint.. 1
Sole thread:	
8-cord linen.....	pound.. 1
7-cord linen.....	do.... 1
Liquid wax, Goodyear.....	gallon.. 1
Hold-fast nails:	
4-8.....	pounds.. 5
4½-8.....	do.... 5
5-8.....	do.... 5
Heelstaver, No. 30 E. D.....	number.. 1
Eyelets, 3/16-inch opening, for Army shoes.....	do.... 1,000
Hand tool for applying eyelets.....	do.... 1

WAR DEPARTMENT,
 ADJUTANT GENERAL'S OFFICE,
 Washington, June 3, 1918.

From: The Adjutant General of the Army.

To: Commanding generals of all National Army, National Guard, and Regular Army divisions, all department commanders, and chiefs of all supply bureaus.

Subject: Allowance of quartermaster supplies for base and evacuation hospitals for overseas duty.

The authorized equipment for base and evacuation hospitals for overseas duty is as follows:

Axes, with helvcs.....	10	Pickaxes, with helvcs.....	3
Bags, water sterilizing.....	8	Pot, marking.....	1
Brush, marking.....	1	Rakes, steel.....	8
Bugles, with slings.....	2	Range, No. 5.....	5
Flag:		Spades.....	6
Distinguishing, Red Cross.....	1	Stick, size, show.....	1
Halyards for.....	2	Stretcher, shoe.....	1
National storm.....	1	Shovels, short handle.....	3
Lampblack, pounds.....	2		

By order of the Secretary of War:

F. W. SENN, *Adjutant General.*

WAR DEPARTMENT,
THE ADJUTANT GENERAL'S OFFICE,
Washington, June 3, 1918.

From: The Adjutant General of the Army.

To: Commanding generals of all National Army, National Guard, and Regular Army divisions, all department commanders, and chiefs of all supply bureaus.

Subject: Authorization of cooking utensils, etc., for use with No. 5 Army range for base and evacuation hospitals for overseas duty.

The following articles are authorized for issue with No. 5 Army range:

2 boilers, round, one 6 and one 8 gallon.	2 knives, butcher, 10-inch.
3 boilers, square, one 10-gallon, one 15-gallon, 1 twenty-gallon.	2 pans, bake, 1 Army range, No. 5, large, and 1 No. 578, large.
2 buckets, galvanized iron, 12-quart.	2 pans, frying, one 12-inch and one 18-inch.
2 cake turners.	1 pan, dish, 21-quart.
3 cans, garbage.	1 saw, meat, 22-inch blade.
2 can openers.	1 sieve, flour.
1 cleaver, 8-inch.	2 skinners, large.
3 dippers, 2-quart.	3 spoons, large.
3 forks, meat, large.	1 steel, butcher, 12-inch.
1 grinder, meat.	

The bake pans listed above are in addition to the two bake pans which are issued with and form part of the No. 5 Army ranges.

By order of the Secretary of War:

F. W. SENN, *Adjutant General.*

The complete equipment of one of these 1,000-bed hospitals was bulky and heavy. It occupied approximately 30,000 cubic feet of space and weighed 120 short tons. Considerable difficulty was experienced in assembling it. A part of the equipment required packing, especially surgical instruments and other small articles. The quantities of many articles on the standard list were less than commercial case lots. This part of the assembly was carried on efficiently at the New York medical supply depot. The more bulky articles could not be carried in stock for lack of space and had to be ordered in from the manufacturers as needed.

In July 1918, there began to be need of a number of these units. Base hospital organizations were under orders for overseas service. The plan of supply contemplated that complete equipment would be delivered to each unit upon its arrival at the port of embarkation. In order that this plan might be effective and the equipment available, it was decided to have a number assembled at the port of embarkation, Hoboken, N. J., and held in readiness for immediate issue. The personnel of nearly all hospital units were then being routed through that port.

Instructions were issued to the medical supply officer, port of embarkation, Hoboken, N. J., July 31, 1918, to assemble the equipment for 10 base hospitals of 1,000 beds.¹⁰ Each hospital was to be given a letter of the alphabet, beginning with the letter A. Each package in the equipment was to bear that letter as an identifying mark. For each unit, separate invoices and receipts were to be prepared bearing the lettered markings. When the unit was issued, the name of the organization was to be entered thereon and a certificate attached that

the equipment had been issued in original packages. As base hospital units were placed on the priority list for overseas, a requisition for the equipment was forwarded to the medical supply officer of the port. The equipment was then to be marked and shipped to leave with or before the organization.

The unit equipments covered by the original instructions to assemble included the letters A to J. Instructions of August 8, 1918, directed the assembly of 10 more equipments, lettered, K to T, inclusive.¹⁰ These instructions were followed September 10 for the assembly of 20 more such units to be lettered U, V, W, X, Y, Z, AA, AB, AC, AD, AE, AF, AG, AH, AI, AJ, AK, AL, AM, AN.¹¹ On October 11 20 more units, lettered AO to BG, inclusive, were ordered to be assembled.¹² On November 4, 1918, 10 more units, lettered BI to BR, inclusive, made a total of 70 such units to be assembled.¹³ Because of the difficulty experienced in assembling and shipping these units it was decided to ship, thereafter, the supplies in bulk to the medical supply depot in France for assembly and issue as required.¹⁴

At the same time that instructions were given the port medical supply officer to assemble the equipment, lists of the component parts thereof to be furnished by the medical supply depots at New York and Washington, respectively, were furnished those depots. The depots were directed to pack the equipment separately for each unit and to send it, accompanied by a packer's list, to Port Newark terminal.¹⁵

The depots were instructed to prepare separate invoices for each unit bearing lettered markings and to send them to the medical supply officer of the port. Requests for the appropriate quartermaster equipment were sent to the Quartermaster General for the required number of units at the same time the instructions were sent to the depots for the medical equipment.¹⁶ These requests to the Quartermaster General asked that the units be packed separately, with the contents marked on the box, and sent with the least practicable delay to the medical supply officer at Port Newark terminal.

The number of base hospitals equipped under the auspices of the Red Cross was limited to 50. Under the estimated requirements of four such hospitals per division, that number would not go far toward providing for the forces contemplated for duty overseas. Measures were taken at an early date to provide adequate hospital equipment. On August 18, 1917, the medical supply officer at New York was instructed to purchase 3,000 ward units (150,000 beds complete with mattresses, blankets, ward linen, pajamas, and other articles for ward use) for ultimate shipment to France.¹

On September 1, 1917, instructions were issued for the purchase of sufficient supplies for 50 base hospital unit equipments (500-bed hospital) less ward units authorized as above noted.² It was intended to ship four such units with each division ordered overseas. At that time it was thought that divisions would be transported at the rate of four per month. For various reasons they were not sent at that rate until the following spring. The instructions contemplated that sufficient equipment would be maintained at New York for 32 base-hospital units. Lack of storage space, however, prevented this, and the number was reduced to 16. In October, 1917, the

medical supply officer at New York reported that 36 such units were being purchased.³

As articles on the contracts placed at the end of August for 3,000 ward units came into production and deliveries began to be made, storage space was very short in New York City and vicinity. Although the immediate number of troops then in France did not call for that number of beds, cargo space was available, and it was thought wise to forward them against future need while cargo space for them could be had. The question of their shipment at that time was referred to the commander in chief, A. E. F., by whom the plan was disapproved.⁴

The component articles for these ward units were shipped to the several distributing depots in accordance with their available storage space. The great hospitalization needs of the various training camps which developed during the following months called for a rapid distribution of these articles to the base hospitals in the United States.

The equipment provided base hospitals by the Medical Department was lacking in certain essential articles such as ranges for cooking and the kitchen utensils ordinarily supplied with them—flags, rakes, picks, shovels, filing equipment, etc. These articles were commonly provided by the Quartermaster Corp, out of its proper appropriations. The question of ranges came up early in 1917 in accumulating equipment for hospitals organized under the auspices of the American Red Cross. The directors of the units were advised to secure their own ranges and cooking equipment.⁵ The Quartermaster General, on September 11, 1917, was furnished an itemized list of the articles of his department needed to equip the Medical Department units of a division, including base hospitals, with the request that arrangements be made to have them available overseas in sufficient quantities to equip these units upon arrival.⁶ Arrangements were made, a month or two later, by the Quartermaster General to ship 50 Army ranges No. 5 as initial equipment for every 25,000 men sent over and to supply one-third of that amount monthly as upkeep. It was thought that base hospitals could be supplied from this stock after their arrival in France.⁷

The question of quartermaster supplies for base hospitals came up again in May, 1918, when additional hospitals were being equipped for service overseas. The depot quartermaster at Philadelphia, Pa., was designated to supply all the articles on the list except water-sterilizing bags, which were to be supplied from New York, and Army ranges No. 5, which were to be supplied on arrival abroad.⁸ This method of supply not proving satisfactory, ranges were included in the equipment to be supplied in the United States. The quartermaster articles to be furnished each base hospital were prescribed in instructions from The Adjutant General, June 3, 1918.⁹

The instructions for the assembly of the earlier units directed the shipment of the supplies to Pier 45, North River, but the space at that pier was inadequate for the proper assembly of these units. Port Newark terminal, Newark, N. J., by the late summer of 1918 had reached such a state of completion that space was available to receive supplies.¹⁷ This terminal was intended primarily for the shipment of supplies overseas, and some difficulty was at first experienced in obtaining authority to route the equipment of these units into the terminal

for assembling. These difficulties were overcome, and 40,000 square feet of floor space was assigned to the Medical Department for the accumulating, marking, etc., of the small items. More space was promised as necessary.¹⁷ Other storage space was to be used for the storage of beds, mattresses, pillows, and blankets. It was estimated on September 23, 1918, that the space assigned would be sufficient to keep on hand the equipment of 20 base hospitals and leave working space for the assembling of that many more. At that time supplies were arriving at the terminal in sufficient quantities to justify the forecast of 10 base hospitals that could be forwarded during the month of October.¹⁷

Many of the supplies required for the equipment of base hospitals were at that time being obtained on interbureau requisitions^a and being shipped in bulk on contracts placed by the general purchasing office of the Medical Department. Supplies received from other depots came properly packed and accompanied by packers' lists and invoices. The supplies received from other sources, coming in bulk, had to be assembled for each unit. To accomplish this a packing force was necessary. Some delay was experienced in developing a suitable packing room and a force to operate it. This difficulty was overcome by the assignment of a nucleus of trained personnel in the New York medical supply depot and by the utilization of personnel from the labor battalion assigned to duty at the terminal. Material delays were experienced in assembling base hospital unit equipments because of failure to receive the needed articles from the contractors. It became necessary for the Surgeon General to issue instructions for the shipment of the equipment incomplete, in order that as much of it as possible might be made available in France for the use of hospital personnel which had already gone over.

While the equipment furnished the base hospitals forwarded overseas conformed to the list already mentioned, certain units designated for the treatment of special classes of patients were provided with additional equipment. All hospitals had some orthopedic equipment; those intended for special hospitals for the treatment of orthopedic cases were provided with more extensive and elaborate equipment for that purpose. The same is true of hospitals intended for the treatment of neuropsychiatric cases. The equipment for special treatment for these units consisted essentially of hydrotherapeutic apparatus.

COST OF INITIAL EQUIPMENT OF A 1,000-BED BASE HOSPITAL (OVERSEAS)

Medicines, antiseptics, disinfectants.....	\$2, 258. 79
Stationery	152. 91
Furniture, bedding, and clothing.....	84, 139. 99
Medical books.....	194. 13
Surgical instruments (general), dressings, and appliances.....	10, 114. 14
Surgical instruments:	
Brain, plastic, and oral.....	253. 51
Ear, nose, and throat.....	935. 80
Eye.....	636. 00
Orthopedic	1, 634. 73

^a For details concerning interbureau requisitions, consult Chap. XI.

Miscellaneous	\$6, 757. 06
X-ray apparatus	3, 813. 28
Laboratory equipment, and supplies	3, 242. 59
	<hr/>
Steam disinfecter, portable, Medical Department	114, 133. 93
Ranges, cooking utensils, flags, rakes, shovels, and other equipment supplied by the Quartermaster Corps	2, 672. 50
	<hr/>
	959. 15
	<hr/>
	117, 765. 58

REFERENCES

- (1) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, August 18, 1917. Subject: Purchase of beds. On file, Finance and Supply Division, S. G. O., $\frac{25}{9}$.
- (2) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, September 1, 1917. Subject: Supplies for a 50-bed hospital unit. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{97}$.
- (3) Letter from the medical supply officer, New York, to the Surgeon General, October 3, 1917. Subject: Requisition for instruments partially duplicating orders already given. On file, Finance and Supply Division, S. G. O., $\frac{250}{43}$.
- (4) Cablegram from The Adjutant General to the commanding general, American Expeditionary Forces, France, November 7, 1917, relative to shipment of 150,000 beds and bedding, and par. 19, Cable No. 279, H. A. E. F., to The Adjutant General, Washington, November 10, 1917, in reply thereto. On file, Finance and Supply Division, S. G. O., $\frac{250 \text{ France}}{99 \text{ and } 111}$.
- (5) Correspondence between the director of Red Cross Base Hospital No. 23, Buffalo, and the Surgeon General, June 15, 1917, relative to ranges for that hospital. On file, Finance and Supply Division, S. G. O., 14843 N.
- (6) Letter from the Surgeon General to the Quartermaster General, September 11, 1917. Subject: Equipment and supplies required by the Medical Department. On file, Finance and Supply Division, S. G. O., $\frac{750-594}{12}$.
- (7) Second indorsement, Quartermaster General, to The Adjutant General of the Army, November 8, 1917, relative to equipment of hospitals sent overseas. On file, Finance and Supply Division, S. G. O., $\frac{750-594}{12}$.
- (8) Correspondence between the Surgeon General and the Quartermaster General, May 3 to 9, 1918. Subject: Supplies for base hospitals ordered abroad. On file, Finance and Supply Division, S. G. O., $\frac{750-594}{144}$.
- (9) Letters from The Adjutant General to the commanding generals of all National Army, National Guard, and Regular Army divisions, department commanders, and chiefs of supply bureaus June 3, 1918. Subject: Allowance of quartermaster supplies for base and evacuation hospitals for overseas duty. On file, Finance and Supply Division, S. G. O., $\frac{750-594}{144}$.
- (10) Letter from the Surgeon General to the port medical supply officer, Pier 45, North River, New York, July 31, 1918. Subject: Supplies. On file, Finance and Supply Division, S. G. O., $\frac{55 \text{ Misc. B. H.}}{13}$.

- (11) Letter from the Surgeon General to the port medical supply officer, Pier 45, North River, September 10, 1918. Subject: Receipt and issue of base hospital equipment. On file, Finance and Supply Division, S. G. O., 55 B. H. Misc.
10
- (12) Letter from the Acting Surgeon General to the port medical supply officer, Pier 45, North River, October 11, 1918. Subject: Receipt and issue of base hospital equipment. On file, Finance and Supply Division, S. G. O., Req. 55 B. H. Misc.
15
- (13) Letter from the Surgeon General to the port medical supply officer, Pier 45, North River, New York, New York, November 4, 1918. Subject: Receipt of and issue of the base hospital equipment. On file, Finance and Supply Division, S. G. O., Req. 55 B. H. Misc.
33
- (14) First indorsement from the Surgeon General to the port medical supply officer, Pier 45, North River, New York, October 23, 1918, relative to shipment of supplies for base hospitals. On file, Finance and Supply Division, S. G. O., 55 Misc.
32
- (15) Letters from the Surgeon General to the officers in charge, Medical Supply Depots, New York and Washington, D. C., September 10, 1918. Subject: Shipment of base hospital equipment. On file, Finance and Supply Division, S. G. O., Req. 55 B. H. Misc.
10
- (16) Letter from the Surgeon General to the Quartermaster General, September 13, 1918. Subject: Equipment of base hospitals. On file, Finance and Supply Division, S. G. O., 750-549 QMC.
219
- (17) First indorsement, port medical supply officer, Pier 45, North River, New York, to the Surgeon General, September 23, 1918, relative to essential articles for the operation of the base hospitals, and storage space at the Port Newark terminal. On file Finance and Supply Division, S. G. O., Req. 55 B. H. Misc.
13

CHAPTER XXXIV

SURGICAL INSTRUMENTS

In 1914, the year in which the Great War began, practically 80 per cent of the steel instruments used in the United States came from abroad. During that year reports of retail dealers to the United States Tariff Commission indicated that 50 to 75 per cent of all instruments sold during that year were of foreign manufacture. The bulk of the importations came from Germany. France supplied a few delicate cutting instruments, such as eye scissors, and England furnished the majority of the suture needles used by American surgeons. This placed the foreign manufacturer in a predominant position.¹

Because of the position of the foreign manufacturer, the American manufacturer was unable to turn out surgical instruments of comparable quality at competitive prices. The disparity in prices was due largely to two factors: The difference in cost of labor and methods of manufacture. There was also a prevailing impression among retailers and surgeons that instruments of foreign manufacture were better plated, more uniform in temper, correct in pattern, smoother in finish, and had better points, joints, and serrations than the domestic. Many of them were not made at all in the United States, or if made were made to order and at a much higher price.¹

While most of the instruments used by the American profession were made in Germany, very few of the patterns originated there. They were practically all designed in America. American surgeons have shown the same inventive genius and originality which have made American machinists and designers famous. Surgical instruments are rarely patented; they may be made by any manufacturer. When an American manufacturer had perfected a design and made a few instruments, and it became evident that the type would be saleable, some retailer or importer would secure a sample and send it to Germany where it would be copied, dies would be made, quantity production started, the profession circularized, and the instrument sold at less than the American cost.¹

In September, 1914, the Imperial German Government declared an embargo on the exportation of all surgical supplies, including surgical instruments, and in spite of the many protests from manufacturers of surgical instruments, refused to lift the embargo except in so far as it granted special licenses. Supplies of German instruments continued to trickle into the United States during the remainder of 1914 and to some extent during 1915, but by the middle of 1916, on account of the embargo and the very efficient blockade, they had ceased entirely. England and France likewise required practically the entire output of their own factories for their own use. Surgical needles became increasingly more difficult to secure, until in the spring of 1917 the maximum

amount Great Britain would permit to be exported to the United States was 6,000 gross for the year, and this for military as well as civilian needs. A new source of supply of surgical instruments had been discovered in Japan, but it attracted very little attention until the latter months of 1916.¹

The shortage of instruments became noticeable in 1915, and the drain on the retailer's stocks became severe. Domestic manufacturers found themselves called upon to supply not only the domestic needs but to meet the pressing needs of the military forces in England and other allied countries.¹

In the midsummer of 1916, when the Mexican border mobilization occurred, the state of the surgical instrument trade in the United States was at its lowest ebb. The stocks of previous importation had been practically exhausted, and the domestic manufacturers had but begun to expand to meet the increased demands for surgical instruments which was soon to reach such gigantic proportions. While they were in a much better position to meet the demands of the Army and Navy in 1917 than they would have been in 1914, they were overburdened with orders from retail dealers and from European countries.¹

This condition was soon to prove the saving feature of an exceedingly grave situation. The regular instrument makers had increased their productive facilities and had been able to acquire enough skilled labor to supply the demand during the three years when the Atlantic was closed to importations into the United States from Germany. When the United States entered the World War, these increased facilities on the part of the domestic manufacturer provided an appreciable nucleus of an instrument-making industry which made it possible to meet the emergency which arose during the war.² With this situation in mind, it became evident, even before war was declared by the United States, that if the instrument makers of this country were to be able to meet its military requirements it would be absolutely necessary to reduce the number of patterns of instruments in order that quantity production might be had and that the time and effort of all manufacturers might be devoted to these particular patterns. To this end the Secretary of War, as chairman of the Council of National Defense, called a conference, in the early part of 1917, of medical officers of the Army, Navy, and Public Health Service, and civilian practitioners of the highest type, representing all specialties, to work in conjunction with committees of manufacturers.¹ The duty devolved upon this committee was the determination of what instruments were necessary, what were available, and what could be produced in quantities within a reasonable time. Superfluous types of instruments were eliminated and the number of designs reduced to the minimum. The list, as finally tabulated, contained, 800 different items selected from 7,000 as catalogued by manufacturers and dealers. This standardization assured uniformity of equipment, but it did more than that. The reduction in the number of items guaranteed a demand of each article in quantities sufficient to justify the introduction of new and expensive machinery and the reorganization of methods of production.

The manufacturers of surgical instruments and appliances were not idle while the committee on standardization struggled with the problem of selection, elimination, and reduction of types. Representatives of the largest instrument makers met in Washington April 11, 1917, to form an organization

representative of that industry.³ At that meeting a committee on surgical instruments and hospital equipments was formed at the suggestion of the medical section of the Council of National Defense. To the committee was assigned the task of devising the best and quickest methods of supplying surgical instruments to the Army, Navy, and Public Health Service.

A call was sent to all the principal instrument makers for a conference with the committee in Washington, April 15, 1917, to arrange plans for the immediate production of the surgical instruments required by the Government. At this meeting the prospective requirements of the Army and Navy were presented and explained by representatives of the medical departments of those services. The investigations of the committee indicated that the facilities available at that time in the United States would not produce over 10 per cent of the steel surgical instruments required. It was agreed that every known source of production must be improved and perfect coordination and complete cooperation had among the actual manufacturers if the requirements were to be met. To some the situation appeared almost hopeless.⁴ There were financial, raw material, and labor problems to be met. Of this the labor problem appeared to be the most difficult of all. It required months and often years to acquire the necessary skill and technique to make surgical instruments, and there was no time for training unskilled workmen. Then, too, there was the prospective loss through enlistments and by the draft of a number of trained workmen. However discouraging the situation appeared, the problem remained to be met with firmness and determination. Through the efforts of the committee the entire industry was mobilized. Plants were reorganized and new methods introduced.

The great task confronting the surgical instrument manufacturers was solved by (1) making the most economical use of existing plants, (2) the establishment of a few new firms, and (3) utilizing to some extent facilities afforded by establishments in allied branches of the metal working industries. Manufacturing resources were systematically mobilized. Resources were pooled by large and small manufacturers to fill Government contracts as rapidly as possible. Contracts were divided, each firm selecting the articles it could handle to advantage. Teamwork or cooperation in production made possible the most economical use of plants and labor forces specializing on a scale never before attempted. The contracts, calling for hundreds of a given item where only dozens had been produced before, enabled the manufacturers to purchase or design new machinery, dies, and processes, and to introduce, in fact, quantity production.¹

The reorganization and introduction of new methods and expansion of existing facilities were not equal to the production of the vast and ever-increasing quantities of instruments being required. Other measures became necessary, new sources of supply had to be found, and new facilities developed. Certain types of surgical instruments had their analogy in the products of allied industries, such as hand tools, table and pocket cutlery, and the like. These industries later were to be classified by the War Industries Board as nonessential industries. It was thought that they might be interested in the manufacture of surgical instruments. Early in 1918, in cooperation with the War

Industries Board and other governmental agencies, a survey was made covering:⁵ (a) The best class of workmen who were formerly engaged in industries, then nonessential, and whose training would lend itself to the manufacture of surgical instruments; (b) workmen who had had experience in the manufacture of articles of the soft metal group, nickel-silver, copper, brass, silver, etc.; (c) lines of industry which had stocks of these metals on hand; (d) contractors who were not already furnishing supplies for war purposes; (e) industries which in peace time manufactured cutting tools, saws, pliers, etc.

Following this survey, the associated jewelry, silversmiths, and table and pocket cutlery industries were requested to attend a special meeting with a view to undertaking the manufacture of surgical instruments.⁶ At this meeting a set of samples accompanying every article on the war supply table was demonstrated. An official who was acquainted with the materials used and in the manufacturing procedures presided at the meeting. Attending manufacturers were provided by an official with all necessary information. The samples were tagged with the proper name and number and also with the price bid for the article to the regular manufacturers by the Medical Department. The manufacturers at the conclusion of the meeting expressed a willingness to help in making surgical instruments, and many of them were quite enthusiastic over being called in to help in war procurement from which they had thus far been excluded. After the meeting proposals were sent out from Washington for all the items on the supply table. In this instance they were sent to between 200 and 300 prospective bidders as against 40 or 50 in former instances. Bids were received from approximately 200 bidders. Awards on these bids were given to approximately 35 regular and 56 converted factories. Investigations were at once undertaken to determine whether the successful bidders were equipped to make and deliver the articles on which they had bid. Wherever uncertainty existed the award was made only tentatively until the converted plant had been inspected by a special official. If the plant on this inspection was found satisfactory, the award was definite. If unsatisfactory, the bidder was partly or entirely eliminated as a factor.⁶

It was possible to select many single articles from among manufacturers of outside products. For example, in the case of bone mallets, made of boxwood and extensively used. A former manufacturer of roller skates was found who had a large quantity of Turkish boxwood on hand. He was interested in the manufacture of bone mallets and furnished them with surprising promptness and at a fraction of the price which previously had prevailed.⁵ The manufacturers of household scissors easily adapted themselves to the making of surgical scissors and provided a satisfactory supply. Surgical drills and trephines were of much importance. Manufacturers of carpenters' drills were interested and produced perfect instruments. Hardware and tool makers furnished saws, chisels, gouges, and other items related to their peace-time product.⁶

The converted industry had a problem difficult to solve at the beginning. They had to be taught to make articles about which they knew very little. They were instructed and supervised periodically by surgical instrument inspectors from the New York medical supply depot. All processes, from the

forging to the finished article, were more or less constantly under supervision. Although very few deliveries were made by them before the armistice came, they demonstrated that, had the war gone on, production was in a fair way to meet requirements.²

The first problem in acquiring surgical equipment appeared in the first call for the assembled cases to be delivered complete by each bidder. The complication arose from the fact that no single bidder could produce in his own plant all the articles in the complete case. A number of manufacturers to whom proposals for bids were sent failed to bid, feeling that they would be unable to obtain from competing manufacturers the articles they were unable themselves to produce. This difficulty was overcome by conferences between the manufacturers wherein satisfactory arrangements were made for the interchange of articles. This interchange between the manufacturers proceeded with almost no friction and the assembled, complete cases were delivered within reasonable time. All the assembled cases were made by the regular surgical instrument manufacturers. The instruments requisitioned individually were made by the regular manufacturers at the beginning of hostilities and until other sources of supply became available.⁶

Practically all the surgical instruments required by the Medical Department were so nearly standard that machine methods already existed so far as machines could be used in their construction. No articles were required in quantities large enough to justify the construction of special machines for their manufacture. Special small tools for shapings in machining were always necessary. Such tools were made by trained toolmakers. Very few of the surgical instrument manufacturers had toolmakers enough to cover the demand. They were obliged to have their tools made in special tool-making shops, and those they found overloaded with tool making for other essential industries. This caused much delay in actual delivery from the regular surgical instrument manufacturers, who rarely found it possible to supplement their own toolmakers.⁷

No trouble was experienced in obtaining all the surgical knives needed. Most of them were obtained from drop forgings by the regular surgical knife makers who had their own dies and drop hammers for making the forgings. When the makers were unable to furnish the quantities needed, no material difficulty was found in supplementing their output by the products of pocket-knife and butcher and household knife makers. Most of them had their own die makers and drop hammers and also the grinders and polishers to finish the forgings. The steel used in making knives has a rather high carbon content, varying from 0.90 to 1.20. No great difficulty was experienced in obtaining a sufficient quantity of this steel. The difficulty was in getting special sizes of steel which were not the standard stock sizes. The manufacture of surgical knives was not affected by this because they were usually made from standard-size steel. If the exact sizes wanted were not quickly obtainable in an emergency, a somewhat different size could be utilized with a slight excess of labor in their manufacture.⁷

Surgical scissors were all made from drop forgings except the one style which went into enlisted men's belt cases. Many of these were made of cast iron for lack of time required to get the forgings. They were better than none and were quite inexpensive; furthermore, they were the only kind available and had to be used, although they were not reliable.⁷ All the bone-cutting forceps were made from drop forgings both by the surgical manufacturers and the converted plants.⁷

The great problem encountered was to obtain sufficient drop forgings from the existing dies. These dies produce only limited quantities before they wash out and have to be repaired or replaced. The vast quantities of instruments required for war purposes called for additional drop-forging dies. The specially high-trained labor for that industry was woefully short and was overloaded far beyond capacity. The instrument makers usually had their dies and forgings made outside. The few plants which made their own dies and forgings were equipped only for a normal demand.

The finishing and the proper assembling of steel forceps is the most time-consuming part of the labor in constructing them. The polishing is absolutely hand labor. Even after pickling to remove the scale, the outer surface must be ground away with emery. A skilled grinder or polisher can remove an excess of 0.005 inch without spoiling the surface and in the shortest possible time. A less skilled workman can not do the work with so small a margin of excess without spoiling the forging. He requires much more time to finish his work than the skilled man. Several grinding and polishing operations with different grades and sizes of abrasives are necessary before the part is ready for nickel plating. This particular part of the manufacture of steel instruments can be done only by the very highest skilled labor.⁵

The converted plants were confronted not only with the problem of training polishers for steel forceps but also with that of assembling and adjusting the forceps after they had been polished. Hemostatic forceps required details of construction differing somewhat from those of any other commodity. The serrations in the jaw, which must mesh properly, and the spring tension required in some of the jaws and in all of the shanks, especially when the jaws were curved, seemed to be an almost insurmountable obstacle to them even after proper instructions. The men did not acquire the skill readily, and long delay was experienced before any appreciable production materialized.⁷

In giving the converted plants samples of the articles they were to produce inquiries were always made concerning their ability to acquire the dies for making the drop forgings. Their reply to this inquiry as a rule, was, that their engineers were accustomed to laying out dies for steel or for soft metals and that further instructions on that head were hardly necessary. One of the firms produced forgings almost twice as thick as they should have been, and to remove the excess was practically impossible. If correct drop forgings could have been furnished these plants, material production might have been made. Many of the converted plants which accepted contracts for steel forceps held firmly to the theory that soft-metal polishers could be easily trained into steel

polishers. This theory, however, did not prove true. The soft-metal polishers did not adapt themselves easily, and it was many months before they produced anything worth while.⁷

The smoothing and polishing of the inside of the rings on the forceps has always been done by what is called strapping. Several of the new firms constructed special machines for doing this by a new process, but their effort was wasted. The machines did not do the job faster than the simple strapping method.⁷

These converted industries had very little trouble in making articles of soft metal. They made those articles with very little instruction or special help.⁶

In the later months of the war new plans were put into effect for overcoming the shortage of forgings. The plan contemplated and partially completed was based upon the forgings being furnished by the Government. Contracts were to be made with reliable drop-forging establishments for the production of the blanks. These plants had their own drop hammers and trained die makers; this assured correct shapes and proper steel. The forgings were to be delivered to special finishers who were qualified to do the work. This work was to be done under the supervision of competent inspectors. The Medical Department was thereby assured of a more uniform product and delivery in ample quantities. All parts were standardized, even the screws used in forceps, scissors, etc. These standard parts were to be supplied with the forgings and also to be used in the repair of instruments. Arrangements were completed so that parts could be properly tempered or heat treated at New York, Philadelphia, and Chicago. The regular instrument makers were asked and willingly agreed to assist Government inspectors in their respective localities.⁵

The smaller shops were unacquainted with the procedure for making bids to the Government and the details for delivery. They were not familiar with the financial aspects of billing and collecting the actual money with which to meet their pay rolls. These small makers did not have sufficient capital to carry their accounts until they received reimbursement from the Government. Farming out material for partial finishing and plating was resorted to only in isolated instances.⁷

The surgical instrument committee was interested in the quality of the instruments to be furnished on Government contracts. It feared that unless measures were taken to prevent it, inferior instruments might be supplied. In order to protect the reputable manufacturer and to prevent the introduction of spurious instruments, orders were issued by the War Department which required that all metal instruments furnished the Medical Department of the Army should be impressed with the trade-mark of the actual manufacturer. If the manufacturer did not have a trade-mark, his initial or other identifying mark was to be stamped on the instrument. Instruments which were not a product of the contractor's plant, but which had been obtained from other sources by the contractor, were required to bear only the trade-mark or the initial or other identifying marks of the person in whose manufacturing establishment they were made. This requirement did not preclude the use of imported

instruments, but it did serve a useful purpose in identifying any which were later found defective.⁸

Besides the difficulty arising from a shortage of skilled labor, the surgical instrument makers, during the months of January to March, 1918, were confronted with a shortage of fuel.⁹ Early in January the Fuel Administration had been established to coordinate the distribution of fuel and to conserve the supply. Under the restrictions proposed by the Fuel Administration, some difficulty was at first experienced in securing a proper amount of coal. All manufacturers who were devoting the major part of their production for Government contracts were favored in the matter of fuel and measurements effected whereby their minimum requirements in the matter of coal were made until the fuel situation eased with the coming of the spring weather.

The surgical instruments standardization board, which compiled the list of instruments to be standardized, also revised the various instrument cases on the standard supply table of the Medical Department.¹⁰ Such changes were made in the cases as were necessary to adapt them to the instruments in the standard list. In preparing the new list of contents to these cases a particular catalogue number of each instrument was given where the instrument had been standardized. In the few cases where the instrument had not been standardized, the instrument required had been furnished for many years, and a sufficient number of dies were available to insure an adequate quantity. New instrument cases were added from time to time as the needs of the hospitals required. The number of new cases, however, was small. The principal among them were the auxiliary eye cases, the ward dressing set, and the brain, oral, and plastic surgery outfits.

PURCHASE

The instructions for the early purchase of surgical instruments were contained in the general instructions to purchase medical and hospital supplies issued to the depots at New York and Washington on May 25, 1917.¹¹ The instructions for the purchase of veterinary instruments were issued to the medical supply officer at St. Louis on May 21, 1917.¹² In making these purchases, proposals for instruments were forwarded to bidders through the committee on surgical instruments and hospital equipment. The committee apportioned the instruments to be supplied among the various manufacturers according to their abilities and notified the purchasing officers of the number and kinds of instruments each manufacturer was to furnish.¹³

While the quantities of instruments required on the original schedule of supplies for an army of 1,000,000 men were large, it was realized that the future requirements of an ever-increasing army would be still greater. To provide for these increasing requirements, the officers in charge of the medical supply depots at New York, Washington, and St. Louis were instructed on September 18, 1917, to duplicate the existing contracts for surgical instruments as to both quantity and price. These contracts were to be prepared and submitted to the manufacturers for signature. If they were unwilling to accept the contracts or the prices, the Surgeon General was to be notified.¹⁴ The makers accepted the contracts without comment and the work proceeded.

In January, 1918, the schedules of procurement sent to the three purchasing depots included a large number of instruments. In June, 1918, another schedule was sent them. The quantities of instruments given on the automatic supply table received from the commanding general of the American Expeditionary Forces in France were larger than had been anticipated and called for a material increase in the procurement and productive schedules of surgical instruments.

A grave emergency having arisen in France in August, 1918, from an acute shortage of surgical instruments,¹⁵ effective measures to meet the need became urgent. Accordingly, instructions were given to the officer in charge of the medical supply depot in New York and to the officer handling the purchase of surgical instruments in the general purchasing office, in Washington, to purchase, from stock in the hands of dealers wherever it could be found, instruments on the standard supply list, or others very nearly like them. Purchases were made, accordingly, in New York City, Philadelphia, Cleveland, Chicago, St. Louis, Cincinnati, and Pittsburgh. These instruments went forward on a fast transport and arrived speedily at their destination. They proved sufficient to meet the emergency which had arisen.

During the earlier months, after the establishment of the large hospitals at the various training camps throughout the United States, it was not possible to furnish as many instruments as the local surgeons thought desirable. While manufacture was proceeding as rapidly as possible under the facilities then available, the output of all the factories was not sufficient to provide the instruments required. Complaints were received from some camps, for example, Camp Lewis, concerning the shortage of instruments and that the surgeons were being required to use their own instruments.¹⁶ Many of the surgeons had brought with them to the camp the instruments used by them in their private practice. To overcome the shortage of instruments thus reported and to relieve the surgeons from the need of using their own instruments, instructions were issued for the purchase of all privately owned instruments in use at the hospitals which were considered necessary for their proper operation.¹⁶ These instructions resulted, however, in the purchase of comparatively few instruments. Many of the surgeons having instruments and using them at the hospitals refused to sell them. In a few instances the surgeons, with the approval of the camp commander, went to near-by cities and purchased instruments from local stock. The instruments so purchased were later vouchered and paid for out of Medical Department funds.

INSPECTION

The inspection of surgical instruments is always a difficult procedure. No specifications and no simple tests had been worked out for the information and guidance of inexperienced personnel in making inspections. To formulate specifications would have taken so much time that the Medical Department would have had very little equipment before the end of the war. It was practicable for a few inspectors actually trained in the manufacture of surgical instruments to visit the factories from time to time, to watch the process of manufacture, to suggest changes and improvements, and to inspect the instruments in their various stages from inception to finish. A few such experienced instrument men

were secured, and these were supplemented by examiners from the appraiser's division of the customhouse at New York. The inspections which were made were deemed adequate, because each of the inspectors knew the character and the reputation for reliability of the various manufacturers, importers, and dealers in the industry. On deliveries from dependable sources, inspections of a few articles passed the lot.² Less dependable sources received more attention. The regular sources of supply of surgical instruments were generally satisfactory and gave but little concern as to usability of the material. The finish often fell below the normal requirements, but consideration had to be given to the insistent demand for rush deliveries, to the lack of time, which forced underfinish, and which had to be overlooked if the material was found to be effective for its purpose.

Certain instruments were imported from Japan. The earlier imports were not dependable. Thorough inspection was required and often resulted in the rejection of the greater part of the delivery. During the later months of the war, however, the instruments imported from Japan rapidly improved in quality, and many of them were found satisfactory.

For many years prior to 1914, practically all surgical needles used in the United States were imported from England. The greater part of these needles were made by two firms, located at Redditch, England,¹⁷ which specialized in the manufacture of needles and were able to supply the demand both of Great Britain and the United States without difficulty.

With the outbreak of hostilities in 1914, the export of surgical needles from England was greatly curtailed. As the demand for man power at the front increased, the number of skilled workmen at home diminished and the output fell off. The British Government was thereby confronted with the necessity of reducing the output of surgical needles and of conserving the available stock for the use of its own forces. This need arose partly from the shortage of steel and partly from the reduction in manufacturing personnel. The few surgical needles manufactured during the years 1914-1916, inclusive, contributed but little toward supplying the needs of the country. Imports into the United States rapidly diminished.

The stocks on hand in the United States at the outbreak of hostilities in 1914 and the dwindling supply which continued to find its way from England had sufficed for the civilian needs until the entry of the Medical Departments of the Army and Navy into the market for needles for military purposes. A large number of cases of instruments had been ordered by the Medical Department of the Army in the late summer of 1916. Each one of these cases contained a dozen needles. In July, 1917, the contractors reported that they were still awaiting the major part of the needles required to fill these cases.¹⁸ The number of needles required for the instrument cases needed for the Army of 1,000,000 men caused an acute shortage. Under the British export restrictions they could not be obtained from England. After the United States had decided to join the Allies it was thought that these restrictions might be sufficiently relaxed to provide for its military needs. Accordingly, a letter was addressed to the Secretary of State on April 17, 1917, by the Secretary of War, setting forth the difficulties experienced by the Medical Department in procuring

surgical needles in sufficient quantities for Army purposes as a result of those restrictions; the assistance of the State Department was solicited in securing their relaxation.¹⁹ The request was promptly transmitted by cable to the American ambassador at London, that the British markets be opened to purchases of surgical needles for the United States forces.²⁰ On May 7, the Secretary of State was advised that the Medical Department of the Army had endeavored to purchase 14,300 dozen needles during the previous year, of which only a part had been delivered. The needs of the Army for surgical needles during the ensuing year were placed at 68,000 dozen, or approximately 6,700 gross.²¹ The military needs of the United States for surgical needles was placed before the British Foreign Office by the American ambassador, but apparently without material results. In the meantime, correspondence between the contractors in the United States and the manufacturers at Redditch had been going on. The makers reported that an export license was necessary to enable them to supply the needles which had been ordered by the contractors.²² A request was made that the American Embassy secure authorization for the purchase of these needles, and a letter to that effect was addressed to the Secretary of State on July 18, 1917.²³ The matter was again taken up by cable and the Secretary of State was advised, August 13, as follows:²⁴

The British Government is willing to allow the exportation to the United States of not more than 5,000 gross surgical needles during the next 12 months on condition that the distribution will be made under United States Government control. This represents the maximum which in all probability can be spared from the limited production in this country. It is extremely desirable that in ordering needles from the United Kingdom the assortment be limited to as few models as possible. We understand that these needles if distributed under United States Government control can be obtained at the same price which the British Government has fixed to the manufacturers of these needles. Needles ordered by Haslam, 500 gross; Charles Lentz & Sons, Philadelphia, 100 gross; Powers & Anderson, Richmond, 35 gross; Porter Bros., New York, 70 gross, can be released for shipment as soon as ready, if they are consigned to the United States Government, or its nominees. These lots will be part of the 5,000 gross set apart for the United States. Telegraph to whom these needles should be consigned. Suggest cooperation with Council of National Defense.

In the meantime in the process of negotiations between the American ambassador and the British Foreign Office, the following information was received July 25, 1917:²⁵

With reference to the note No. 4235 which your excellency was good enough to address to me on July 3 regarding the exportation of surgical needles from Great Britain to the United States of America, I have the honor to state that while the most favourable consideration possible is being given to application for licences to export these goods to America, the supply is for the moment insufficient to meet the requirements of the War Office in this country.

Efforts to secure an increase in the number of surgical needles allotted to the United States continued, and on August 30, 1917, the following cable was sent by the Department of Commerce to the commercial attaché in London:²⁶

Consign needles commanding officer, Army Medical Supply Depot, six twenty-eight Greenwich Street, New York, who will control distribution. Five thousand gross wholly inadequate for country's requirements. Request more.

Although the British Government found it impracticable to increase the apportionment of surgical needles to the United States, deliveries of the quantities authorized were made with commendable promptness. The shipments were consigned to the officer in charge of the medical supply depot at New York, who made distribution to the firms for whom they were intended. These firms used the larger part of the needles on their orders in completing the contracts with the Government.

When it became evident that a sufficient number of surgical needles could not be imported from Great Britain to take care of the military requirements, a survey was made of the possible facilities within the United States which might be converted or developed for the manufacture of needles. It was believed that if sewing-machine needles could be produced satisfactorily, surgical needles might also be produced by a slight modification of the plant and by the training of the necessary personnel. A survey was made of the factory and facilities of the one manufacturer in the United States who was producing surgical needles. This survey, made on September 13, 1917, disclosed the fact that the company occupied two floors of a substantial manufacturing building. The firm had acquired, a year and a half previously, the needle-making machine already referred to. They had not experimented in the manufacture of needles and had had a great many trials and tribulations. They were at that time actually turning out needles in smaller quantities of satisfactory quality. It was probably from the experience that the company had had that they were at least six months ahead of anyone else who might enter the field. They were filling orders from surgical supply houses in a small way. It was suggested that the Government take over the entire output of needles and cancel all orders that the company had, and that the Government give them such assistance financially and otherwise as might be necessary to increase their output within as short time as possible to a specified quantity of needles per day.²⁷

At a conference between representatives of the Council of National Defense and the Surgeon General it was agreed that efforts be made to obtain an offer of a contract from Randall, Faichney & Co., the owner of the equipment just mentioned, on 22,000 gross of surgical needles representing 6 different sizes as listed in the catalogue of surgical instruments.²⁸ The Singer Sewing Machine Co., which had been approached and had expressed a willingness to undertake the manufacture of surgical needles, was to be requested to submit an offer on 22,000 needles at the present time.²⁸ The Osthby & Barton Co., were requested a few days later to submit samples and to quote prices on 12,000 gross of needles.²⁹ In the event that the sample needles prepared by these three firms proved satisfactory, contracts for the quantities mentioned were to be given each of them. The War Industries Board recommended, October 5, 1917, that Randall, Faichney & Co., be given a contract for 19,000 gross surgical needles of various types and sizes.²⁹ On November 9, 1917, the Singer Sewing Machine Co., reported that the necessary machinery was rapidly being installed, that dies were nearly complete, and that it hoped within a very short time to be actually making needles. As soon as manufacture had reached that point a price would be submitted. One thousand needles of size 4 had already been

manufactured and were ready for delivery.³⁰ On November 15, 1917, the Singer Sewing Machine Co., reported the work progressing and requested dates of delivery considered necessary.³¹

Samples were submitted, and thereafter the work proceeded satisfactorily and needles were turned out in quantities. The other manufacturers mentioned were also proceeding with the making of surgical needles, and the United States had no longer need to depend upon importation for its surgical needles. These firms continued to manufacture surgical needles until the end of the war, and all of them developed efficient organizations for that purpose. While the needles furnished by them had not measured up in all respects to those which had previously been imported, they were nevertheless satisfactory for the purpose for which they were intended, and no difficulties in their use were experienced.

At the time of signing the armistice large stocks of surgical needles in all the standard sizes were on hand in the various medical supply depots, and existing contracts were terminated on terms favorable to the Government and to the satisfaction of the contractor.

Upon the cessation of hostilities and the termination of the contracts, the organizations of the Singer Sewing Machine Co. and the Ostby & Barton Co. built up with such care for the manufacture of surgical needles, were disbanded and the production of needles discontinued.

REFERENCES

- (1) United States Tariff Commission. Tariff information, Series VII. The surgical instrument industry in the United States. Government Printing Office, 1918.
- (2) Letter from Lieut. Col. Alfred Littauer, O. R. C., 337-341 Fourth Ave., New York City, N. Y., to Col. Edwin P. Wolfe, M. C., June 11, 1927. Subject: Surgical instruments during World War. On file, Finance and Supply Division, S. G. O., file 713-539 N. Y.
1245.
- (3) Letter from Charles J. Pilling, chairman, committee on surgical instruments and hospital equipment, to Dr. F. F. Simpson, medical section, Council of National Defense, April 11, 1917. Subject: Committee on surgical instruments. On file, Finance and Supply Division, S. G. O., file $\frac{572}{a}$ C. J. P.
- (4) Letter from Charles J. Pilling, Philadelphia, Pa., to W. C. Gorgas, Surgeon General, U. S. Army, January 24, 1918, relative to the surgical instrument situation regarding the Army. On file, Finance and Supply Division, S. G. O., $\frac{572}{36}$ C. J. P.
- (5) Letter from Lieut. Col. George W. Wallerich, O. R. C., Chicago, Ill., to Col. Edwin P. Wolfe, M. C., January 29, 1917, relative to surgical instruments during the World War. On file, Finance and Supply Division, S. G. O., $\frac{713-539 N. Y.}{1258}$.
- (6) Letter from Lieut. Col. Alfred Littauer, O. R. C., to Col. Edwin P. Wolfe, M. C., July 2, 1927, relative to surgical instruments during the World War. On file, Finance and Supply Division, S. G. O., $\frac{713-539 N. Y.}{1245}$.
- (7) Letter from Lieut. Col. Alfred Littauer, O. R. C., to Col. Edwin P. Wolfe, M. C., July 8, 1927, relative to surgical instruments during the World War. On file, Finance and Supply Division, S. G. O., $\frac{713-539 N. Y.}{1245}$.

- (8) Letter from the Surgeon General to the officer in charge, Medical Supply Depots, New York, Washington, and St. Louis, November 15, 1917. Subject: Revised instructions as to markings of surgical instruments. On file, Finance and Supply Division, S. G. O., $\frac{715 \text{ Surg. Inst.}}{1}$.
- (9) Letter from Charles J. Pilling, Philadelphia, Pa., to the Surgeon General, January 31, 1918, relative to fuel. On file, Finance and Supply Division, S. G. O., $\frac{574 \text{ C. J. P.}}{3}$.
- (10) Proceedings of the board of officers convened at the Field Medical Supply Depot, Washington, D. C., for the purpose of making recommendations for the revision of the instrument cases of the Medical Department of the Army, May 25, 1917. On file, Finance and Supply Division, S. G. O., Document File.
- (11) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, May 25, 1917. Supplies for a million men. On file, Finance and Supply Division, S. G. O., 14039-20-14.
- (12) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, May 21, 1917. Subject: Veterinary supplies. On file, Finance and Supply Division, S. G. O., 14066-14.
- (13) Letter from Charles J. Pilling, chairman, committee on surgical instruments and hospital equipment, to the Surgeon General, August 25, 1917, relative to allotments on veterinary instruments. On file, Finance and Supply Division, S. G. O., $\frac{572 \text{ C. J. P.}}{V}$.
- (14) Letter from the Surgeon General to officers in charge, Medical Supply Depots, New York, Washington, and St. Louis, September 18, 1917. Subject: Surgical instruments. On file, Finance and Supply Division, S. G. O., $\frac{713-5-39}{136}$.
- (15) Par. 1b, Cable 1606, Headquarters, A. E. F., to The Adjutant General, August 17, 1918, relative to shortage of surgical instruments.
- (16) Correspondence between the Commanding Officer, Base Hospital, Camp Lewis, Washington, and the Surgeon General, January to March, 1918, inclusive, relative to the shortage of surgical instruments and to purchase of privately owned instruments in the possession of medical officers. On file, S. G. O., Finance and Supply Division, $\frac{531-127}{136}$.
- (17) Letter from the Acting Secretary of War to the Secretary of State, May 7, 1917, relative to the importation of surgical needles. On file, Finance and Supply Division, S. G. O., 14039-31.
- (18) Telegram from Alfred Littauer, O. R. C., secretary, committee on surgical instruments and hospital equipment, New York, to the Secretary of War, July 13, 1917, relative to surgical needles, Finance and Supply Division, S. G. O., 14636-76.
- (19) Letter from the Secretary of War to the Secretary of State, April 17, 1917, relative to shortage of surgical needles. On file, Finance and Supply Division, S. G. O., 14039-31.
- (20) Letter from the Secretary of State to the Secretary of War, April 20, 1917, advising that cable had been sent ambassador at London requesting British markets be opened to the purchasers of surgical needles for American Army needs. On file, Finance and Supply Division, S. G. O., 14029-31.
- (21) Letter from the Acting Secretary of War to the Secretary of State, May 7, 1917, relative to surgical needles. On file, Finance and Supply Division, S. G. O., 14029-31.
- (22) Letter from the Kny-Scheerer Corporation to the War Department, Office of the Surgeon General, September 17, 1917, including correspondence with the surgical needle manufacturers. On file, Finance and Supply Division, S. G. O., $\frac{418}{6}$.
- (23) Letter from the Secretary of War to the Secretary of State, July 27, 1917, requesting authority for the ambassador, Great Britain, to assist in effecting shipment of surgical needles. On file, Finance and Supply Division, S. G. O., 14636-76.

- (24) Letter from the Secretary of State to the Secretary of War, August 16, 1917, inclosing copy of cablegram of August 13, 1917, from the American ambassador, London, England, relative to surgical needles. On file, Finance and Supply Division, S. G. O., 14636-76.
- (25) Note No. 145 232 X from the foreign office, S. W. I. London, to His Excellency, the Honorable W. H. Page, July 25, 1917. On file, Finance and Supply Division, S. G. O., $\frac{418}{2}$.
- (26) Letter from Fred. B. Peterson, Exports Administrative Board, Washington, D. C., to Lieut. Col. Carl R. Darnall, Medical Supply Officer, Medical Supply Depot, U. S. A., Washington, D. C., August 30, 1917, relative to cable to the commercial attaché, London, relative to surgical needles. On file, Finance and Supply Division, S. G. O., $\frac{533-498}{3}$.
- (27) Memorandum of the visit made by G. E. Chatillon to the factory of Randall, Faichney & Co., Boston, Mass. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N. D.}}{269}$.
- (28) Memorandum for Col. Darnall, Surgeon General's Office, by Everett L. Crawford, Council of National Defense, September 15, 1917, relative to a survey of the factory of Randall, Faichney & Co., Boston, Mass. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N. D.}}{269}$.
- (29) Letter from George E. Chatillon, Council of National Defense, to Col. Darnall; S. G. G., October 5, 1917. Subject: Surgical needles. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N. D.}}{269}$.
- (30) Letter from the Singer Manufacturing Co. to George E. Chatillon, War Industries Board, Council of National Defense, Washington, D. C., November 9, 1917, reporting progress in manufacture of surgical needles. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N. D.}}{269}$.
- (31) Letter from the Singer Manufacturing Co. to George E. Chatillon, War Industries Board, Council of National Defense, November 15, 1917. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N. D.}}{269}$.

CHAPTER XXXV

SURGICAL DRESSINGS AND SUTURES

TYPES OF DRESSINGS FURNISHED

The standard supply table provided the following list of surgical dressings:¹ Bandages, gauze, compressed, 2½-inch, 3-inch, 3½-inch, 6-yard rolls, 1 gross in packet; bandages, gauze, roller, 2½-inch, 3-inch, 3½-inch by 10 yards, 6 dozen in a box; cotton, absorbent, 1 pound in rolls, for general hospital use; cotton, absorbent, sterilized, 1 ounce in package for field use; first-aid packets, metal covered; first-aid packets, shell wound; individual dressing packets; gauze, plain, 25 yards, in roll or 100 yards in bolt; gauze, plain, in 5-yard rolls; gauze, plain, sterilized, two ½-yard lengths in package; gauze, sublimated, two ½-yard lengths in package. To these were added during the war: Front-line packet No. 1, red label; front-line packet No 2, white label; front-line packet No. 3, blue label.

A full description of the standard prepared surgical dressings and the specifications for absorbent gauze will be found in Chapter XIX. Specifications for gray gauze and for gauze roller are quoted below:

SPECIFICATIONS FOR GRAY GAUZE

Material.—Gray goods to be made of 1⅙-inch staple white cotton, not lower in grade than United States Government type middling, and free from blue benders or tinged cotton.

The material used in the sizing of the yarns for this cloth shall be free from inorganic sizing or loading material, insoluble soaps, paraffin, glue, unsaponifiable oils, waxes, water-insoluble gums, or turpentine.

Construction.—The gray gauze shall be not less than 36 inches wide, and the thread count and weight per square yard shall be in accordance with the following table:

Warp	Weft	Approximate weight per square yard
<i>Grams</i>		
20 or 19	16 or 15	19
22 or 21	18 or 17	22
28 or 27	24 or 23	28
41 or 43	40 or 39	48

TESTS

Water extract.—One-half yard of gauze extracted with distilled hot water in a Soxhlet extractor for five hours shall yield an extract weighing not more than 3.5 per cent.

Alcohol extract.—One-half yard of gauze extracted with 95 per cent ethyl alcohol in a Soxhlet extractor for five hours shall yield a solid extract when dried at 100° C. of not more than 1.65 per cent by weight.

Ether extract.—One-half yard of gauze extracted with ethyl ether in a Soxhlet extractor for five hours shall yield a solid extract when dried at 100° C. of not more than 1 per cent by weight.

Incineration.—One-half yard of gauze incinerated in a platinum crucible shall yield not more than 90 per cent by weight of ash, containing potassium, sodium, magnesium, calcium, iron, and aluminum which were originally in combination with hydrochloric, sulphuric, and phosphoric acids.

Put-up.—Rolls of 1,000 yards or over if possible, otherwise bales of usual size. Rolls or bales to be fully protected with strong kraft paper, or paper of similar strength, and covered with new or clean burlap, equal to 40-inch, 7½ ounces per yard.

Length of cuts.—Goods to be woven in pieces as long as possible, no pieces under 60 yards to be accepted, and with no appreciable quantity of pieces less than 120 yards in length. The pieces furnished on rolls to be sewed in such manner that cloth at the sewing will be full width and filling yards run horizontally across fabric.

Approved.

SURGEON GENERAL'S OFFICE, UNITED STATES ARMY,

October 16, 1918.

SPECIFICATIONS FOR PLAIN BANDAGES, ASSORTED

Six dozen in a box (24 each 2½ inches, 3 inches, and 3½ inches by 10 yards).

Material.—All gauze to be in accordance with United States Government Standard Specifications for Absorbent Gauze, in weight, mesh, and chemical analysis. Bandages to be made from gauze having 44 threads to the inch in the warp and 40 threads to the inch in the filling.

Size and wrapping.—Each bandage to be one continuous 10-yard length of material specified above, and to be of the full width specified, to be smoothed out and tightly and evenly rolled. Each bandage to be securely wrapped and sealed, the wrapper to be of good quality white paper, equal to the standard sample on which shall be printed the size of the bandage, in figures, with name and address of the contractor.

Packing.—Bandages to be packed in plain strawboard boxes each containing 24 bandages of each of the three sizes designated, each box to bear a label showing contents, contractor's name and address, and date of contract. These paper boxes to be packed in strong wooden cases of not less than ¾-inch, finished size, spruce or white pine lumber; 20 paper boxes to each case. Cases to be stenciled on one end with the number of dozen bandages contained therein and the name of the contractor and the date of the contract.

PURCHASES IN 1917

The surgical dressings manufacturers met in Washington in April, 1917, and organized a committee of surgical dressings manufacturers which cooperated with the Council of National Defense.² The executive committee of this association at that time received the requirements of the Army, the Navy, and the American Red Cross, and apportioned them among the various manufacturers in accordance with their ability to produce. A representative of this committee negotiated with the manufacturers of gray goods in behalf of all the surgical dressings manufacturers for the quantities of gauze needed to produce the surgical dressings required. The surgical dressings required by the Army at that time called for approximately the following quantities of gauze:³

	Yards
38½-inch, 44 by 40, 8.2 yards per pound.....	35, 000, 000
36-inch, 32 by 28, 13 yards per pound.....	10, 000, 000
36-inch, 28 by 24, 15 yards per pound.....	45, 000, 000
36-inch, 22 by 18, 19 yards per pound.....	8, 000, 000
Total	98, 000, 000

The cost-plus percentage type of contract was then favorably regarded. The surgical dressings manufacturers requested that the contracts for surgical dressings be made on that basis. Accordingly a special type of contract was

prepared for surgical dressings on the basis of the cost of cotton gray goods and the necessary fixed overhead, to which was added a profit of 10 per cent. For the form of contract see page 122.

The cost of the gray goods used in these contracts was on the following basis:⁴

	Cents per yard
38-inch, 44 by 40; weight, 8.2 yards per pound.....	5 $\frac{7}{8}$
36-inch, 22 by 28; weight, 13 yards per pound.....	3 $\frac{7}{8}$
36-inch, 28 by 24; weight, 15 yards per pound.....	3 $\frac{1}{2}$
36-inch, 24 by 20; weight, 17 yards per pound.....	3
36-inch, 22 by 18; weight, 19 yards per pound.....	2 $\frac{3}{4}$

While the cloth is commonly sold on the basis of the price per yard, in the trade it is quite as often quoted on the basis of the price per pound. It will be seen from the prices per yard already quoted that the price per pound would vary between 48 $\frac{1}{4}$ cents and 52 $\frac{1}{2}$ cents, or an average of about 50 cents. The manufacturers of surgical dressings had no difficulty in placing their orders for the required amount of gauze. The deliveries called for were for short periods. The demand for dressings was immediate and urgent. Delays, however, were experienced by the manufacturers of finished dressings in the receipt of needed machinery and in perfecting their organizations. Contracts were not ready for signature until nearly the end of August, 1917, although production began in June and July.⁵ The work had proceeded in advance of the receipt of contracts upon the understanding between the representative of the Medical Department and the manufacturer that contracts would be forthcoming as soon as the forms had been perfected. The mills manufacturing gauze experienced difficulty in securing shipments of cotton from the South.⁶ Embargoes were frequent and special arrangements had to be made for securing cars for the shipment of raw material. Supplies to fill Government contracts, and definitely known by the railroads to be such, were given preference in shipment. Manufacturers of gray goods were furnished the contract numbers of the surgical dressings manufacturers and instructed to have those numbers placed on bills of lading for the shipment of the cotton needed for the production of the gray goods to fill their orders. In the event that these measures did not suffice, the manufacturers were instructed to apply to the Surgeon General's Office or to the Council of National Defense for assistance in securing transportation. Priority certificates were issued to the surgical dressings manufacturers and subsidiary priority certificates to the manufacturers of gray goods.⁷ In spite of this, deliveries on gray goods to the surgical dressings manufacturers continued to lag. Some manufacturers experienced greater difficulties than others. The producers were urged to speed up production. By the end of the year deliveries had been made in sufficient quantities to meet requirements.

In November, 1917, it became evident that further orders must be placed at an early date for surgical dressings to meet the increasing and expected requirements of the following year. Although the committee of surgical dressings manufacturers, as a part of the Council of National Defense, had been dissolved, a war service committee of the same manufacturers had been organized.⁸ Negotiations continued to be made through the representatives of that committee. On November 28, 1917, a member of the committee was informed that

the Medical Department desired to place contracts for bandages and surgical dressings for delivery during the first three months of 1918, and that approximately 35,000,000 yards of bandage cloth and surgical gauze would be required.⁹ The committee was requested to purchase the cloth from the mills and was authorized to represent the interests of the Medical Department in the purchase. It was stipulated that the purchase be made at as reasonable a margin above actual cost of production as possible. Priority in the delivery of the cloth from the cotton mills participating was required.⁹ The Medical Department undertook to assume responsibility for the cloth in the event of difficulty on the part of the manufacturer of surgical dressings in securing it.⁹ Following this request, a representative of the surgical dressings manufacturers selected by the Surgeon General to negotiate the purchase of the gauze, accompanied by a representative of the Council of National Defense and a representative from the Quartermaster General, visited the mills in the Fall River district of Massachusetts to negotiate for the purchase of this material. In these negotiations it was found much more difficult to secure a fair price for the materials than in the purchase made earlier in the year.¹⁰ This was due in part to increased difficulties in the matter of finance and raw materials, but probably, to a considerable extent, to the belief on the part of the cotton mills that the surgical dressings manufacturers, in previous contracts, had secured unusually favorable prices.¹¹ The contracts were finally placed at a price of approximately 65½ to 68⅞ cents per pound, with full promise that deliveries would be completed within the first three months of the following year. While representatives of the Government negotiated the contract and arranged the price, the actual contracts were made by the surgical dressings manufacturers, who were to deliver the finished articles to the Medical Department.¹² The dressings made from this gauze were 160,000 boxes of bandages, assorted, 2½-inch, 3-inch, and 3½-inch, by 10 yards in boxes of 6 dozen; 200,000 bolts of absorbent gauze, 100 yards to the bolt; and 400,000 rolls of absorbent gauze, 25 yards to the roll. The total yardage required for this purpose was 39,600,000.¹³

PURCHASES IN 1918

The increasing tendency of centralization of procurement led to the conduct of the negotiations for the purchases early in 1918 of surgical gauze by the Government direct rather than through the surgical dressings manufacturers. At the suggestion of the Quartermaster General, negotiations were handled through the cotton goods section of his department. By this time the requirements of the Army, the Navy, and the Red Cross were fairly well known. In the conduct of the negotiations for gray goods the requirements of these three branches of the service were considered as one. On February 9, 1918, the chief of the cotton goods section, Quartermaster General's Office, was advised that approximately 160,000,000 yards of surgical gauze would be required between that time and the end of September, 1918.¹⁴ The gauze required would be 44 by 40, 32 by 28, 28 by 24, and 22 by 18. It was intended out of this gauze to produce the following surgical dressings:

First-aid packets, metal-covered.....	2, 400, 000
First-aid packets, shell-wound.....	800, 000
Individual dressing packets.....	3, 000, 000
Bandages:	
Compressed, 6 yards, 1 gross in box..... gross..	125, 000
Roller, 10 yards, 72 to the box..... do.....	125, 000
Gauze:	
Plain—	
5 yards in carton..... cartons..	240, 000
In 1-yard packets..... packets..	450, 000
18 by 22 mesh, 100-yard bolts..... yards..	20, 000, 000
Sublimated, in 1-yard packets..... packets..	12, 000, 000

The proportions in which the gray goods were required were 67,000,000 yards 44 by 40, 15,000,000 yards 32 by 28, 32,000,000 yards 28 by 24, and 46,000,000 yards 22 by 18.¹⁵ The negotiations for the purchase of this gauze were promptly undertaken. The chief of the cotton goods section of the Quartermaster General's Office, a representative of the War Industries Board, and a representative of the surgical dressings manufacturers met with the mill producers of the Fall River district on February 13, 1918.¹⁶ It was found that an artificial market had been created, due largely to the fact that the amount of the prospective Government contract had become known to the mills in that district. As a result the price had gone up 10 cents a pound and material difficulty was had in arriving at a fair price. The representative of the War Industries Board proposed that the price paid on the last purchase of gray goods, plus the extra cost of cotton, labor, and supplies, should form the basis of the price paid for the materials under negotiation. The mills declined to accept the offer, upon which all mills in the Fall River district were notified not to sell any of the contracts under negotiation, or cloth, or the products of the looms, until permitted to do so by the War Industries Board. It was contemplated that the War Industries Board would be requested to fix a price for the material which would yield a fair profit to the manufacturer. The result of this decision led to a material reduction in prices. The market quotation of the week previous to the conference between the mills and the representatives of the Government was approximately 70 cents per pound. The price asked at the conference was 90 cents per pound. The price finally paid was 72½ to 75½ cents per pound.¹⁷

After negotiations were completed covering the price, allotments were made to the various mills for the production of the gray goods. The orders were distributed among three groups of mills, the Fall river group, a northeastern group, and a southern group. Negotiations were conducted throughout by the representatives of the cotton goods section of the Quartermaster General's Office. When the apportionment of the gray goods to the mills had been completed, the contracts with the mills were made by the Medical Department. A representative of that department was stationed at Fall River to supervise the inspection, acceptance, and shipment of the gauze produced by the mills in that district. When the different mills had shipments ready they notified this representative, and he arranged for the inspection of the gauze and its

shipment on Government bills of lading to the surgical dressings manufacturers, who had contracted to convert them into finished dressings. A similar representative was stationed at Greenville, S. C., and performed like services. The proportion of the gauze on the respective contracts to be sent to each surgical dressings manufacturer was determined in the Surgeon General's Office and a distribution list furnished its representatives in the Fall River and Greenville districts. Inspection of the gray goods in both areas was made by representatives of the customs service of the Treasury Department, acting on behalf of the War Department.

The quantity of gauze purchased and the proportions of the several constructions are shown in the following table:¹⁸

Mills	38½-inch, 44 by 40, 8.20 yards per pound	36-inch, 32 by 28, 13 yards per pound	36-inch, 28 by 24, 15 yards per pound	36-inch, 22 by 18, 19 yards per pound	36-inch, 20 by 16, 21 yards per pound	Total
	Yards	Yards	Yards	Yards	Yards	Yards
Fall River group.....	5,000,000	6,199,950	2,450,055	61,599,957	6,876,705	82,426,667
Northeastern group.....	520,000	7,845,000	6,500,000	1,180,000	-----	16,045,000
Southern group.....	53,949,000	-----	-----	1,355,000	500,000	55,804,000
Total.....	59,469,000	14,344,950	8,950,055	64,134,957	7,376,705	154,275,667

The facilities of the manufacturers of surgical dressings were strained to the utmost in the production of the bandages and field dressings, and it became necessary to find other agencies for bleaching and finishing the plain gauze for ordinary hospital use. Since there were many bleacheries in the United States engaged in bleaching sheeting and print cloth, no reason could be seen why their facilities should not be made applicable to the bleaching of surgical gauze. After some negotiations bleacheries were found willing and able to take over the bleaching and finishing of this material. The earlier outputs of these bleacheries were lacking in absorbency and finish, due to their lack of familiarity with the processes required. The same degree of absorbency is not required in ordinary bleached muslins or print cloths that is required in surgical gauze. The earlier processes at these bleacheries followed their accustomed practice and were not carried sufficiently far to produce the degree of absorbency required. This difficulty was overcome in time, and the output of the bleacheries passed the standard requirements.

The raw materials division of the War Industries Board became quite concerned in the middle of March, 1918, over the quantities of gauze being purchased for the Army. These purchases were thought to excite the market because of the size of the orders—more than 200,000,000 yards. Under such conditions the cotton-mill men would immediately go out to cover any obligations they might incur and the result would be a prompt rise in prices all along the line.¹⁹ This led to an inquiry from the surveyor general of purchases to the Surgeon General, concerning the negotiation then in progress for gauze.²⁰ In reply, the Surgeon General advised that these negotiations were being conducted by the supply section of the Quartermaster General's Office.²¹ While the quantity of gauze (230,000,000 yards) might seem large, it covered only a six months' supply in so far as the Army was concerned, the estimate requirement

of the Army being about 320,000,000 yards for the next year. This estimate was based on the quantity of surgical dressings asked for by General Pershing.²¹

The 160,000,000 yards considered in the negotiations already described were expected to cover the period ending with September, 1918. As the military program proceeded and the number of troops in France increased, it became evident that in the period following October 1, 1918, additional surgical dressings would be required. Accordingly, in July consideration was given to the placing of further orders for surgical dressings material in the gray.

On July 30, 1918, instructions were issued for the placing of an interbureau procurement requisition with the Quartermaster Department for the following materials:²²

Gauze:	Yards
36-inch, 22 by 18, 19 yards to the pound.....	22, 202, 000
36-inch, 28 by 24, 15 yards to the pound.....	10, 795, 000
36-inch, 32 by 28, 13 yards to the pound.....	3, 300, 000
38½-inch, 44 by 40, 8.20 yards to the pound.....	68, 738, 000
Sheeting, 36-inch, 64 by 60, 5.35 yards to the pound.....	4, 110, 000

Interbureau procurement requisition M-21 was accordingly placed with the Quartermaster General on August 2. Receipt of the requisition was acknowledged August 9. The first contract under the requisition was made August 26, and the last contract October 31, 1918. A previous requisition, M-12, placed early in July, called for 5,000,000 yards of gauze. The contracts actually placed, including overages, amounted to 115,535,000 yards.

Full shipping instructions were furnished showing the distribution to the finishers of the gauze on this requisition. These shipping instructions indicated the quantities of the different meshes to be shipped to the different finishers and surgical dressing manufacturers and the rate at which they were to be supplied. Inasmuch as experience with the last contracts placed by the Medical Department had brought to light the use by the mills of a sizing compound, which was practically insoluble and had rendered it very difficult to effect a satisfactory bleach, the procuring bureau was advised of this tendency and requested to have its inspectors constantly guard against it.

Difficulty was experienced in determining the quantities of gauze furnished on these contracts. A careful compilation of all available data made at the end of May, 1919, indicated the following as of that date:²³

Count	Required	Shipped	Balance
	Yards	Yards	Yards
22 by 18.....	22, 702, 000	9, 019, 719	13, 682, 281
28 by 24.....	12, 715, 000	4, 780, 110	8, 014, 890
32 by 28.....	6, 300, 000	3, 653, 332	2, 646, 668
44 by 40.....	73, 738, 000	28, 924, 528	44, 813, 472
Total.....	115, 535, 000	46, 377, 689	69, 157, 311
Percentage.....	100	42	68

During the months in which the war had gone on in Europe there had come into general use, among the Allies, a type of dressing known as front-line packets. Prior to the entry of the United States into the war these packets had been made in large numbers by the American National Red Cross and

supplied for the use of the allied troops. They were considered more convenient for the dressing of wounds than the standard first-aid packet. This was largely due to the fact that the first-aid packet, as furnished by the Medical Department, was intended primarily for the treatment of the wounds ordinarily produced by the high-velocity small-arms bullet. A great many of the wounds incurred during the war were produced by shrapnel and fragments of high-explosive shells. They were accordingly much larger than those produced by the small arms and required a larger dressing. To meet these needs the front-line packets were developed. These packets are described in detail elsewhere (p. 320). As the time drew near for the entry of the United States forces in large numbers into the zone of combat, the representatives of the Medical Department in France reported that a large number of front-line packets and other special dressings would be needed in the treatment of the wounded.²⁴ The Surgeon General was advised by cablegram on March 1, 1918, of the relative quantities of the different kinds of dressings required.²⁵ The quantities of these special dressings requested are given below.²⁶

Number of dressings estimated as needed per month, March 1, to September 1, 1918

	Quantity	Bandages—Continued.	Quantity
Packet No. 1, red label.....	600,000	Muslin, cut on the bias—	
Packet No. 2, white label.....	500,000	4 inches by 5 yards.....	500,000
Packet No. 3, blue label.....	400,000	5 inches by 5 yards.....	500,000
Gauze rolls, (30 inches by 5 yards), unsterile.....	8,000	6 inches by 5 yards.....	500,000
Sponges:		Crinoline, 5 inches by 5 yards.....	800,000
Small size.....	400,000	Supporting slings:	
Large size.....	350,000	Size No. 1.....	5,000
Sterile dressing pads.....	300,000	Size No. 2.....	5,000
Unsterile dressing pads:		Size No. 3.....	5,000
Type 1—		Rubber cloth supporting slings:	
Size 1.....	200,000	5½ by 60 inches.....	5,000
Size 2.....	150,000	8 by 24 inches.....	5,000
Type 2—		Slings, 50 by 36 inches.....	10,000
Size 1.....	75,000	The scultetus bandage.....	5,000
Size 2.....	50,000	The many-tailed bandage.....	5,000
Oakum pads:		The anklet.....	8,000
Size 1.....	5,000	The elbow traction band.....	15,000
Size 2.....	5,000	The canvas hammock.....	2,000
Sphagnum moss dressing pads:		Canvas swatches for use in connec- tion with Bradford frames.....	7,000
Size 1.....	6,000	Pneumonia jackets.....	5,000
Size 2.....	6,000	Heel rings.....	5,000
Sheet wadding or cotton batting.....	800,000	Bags to contain shot-bag weights..	2,000
Bandages:		Gauze rolls, 30 inches by 3 yards, sterilized.....	10,000
Gauze 3 inches by 5 yards.....	500,000		

The Red Cross in the United States stated that the 5-yard gauze roll could not be sterilized completely except by very high pressure. The opinion was held that the 5-yard gauze rolls, if sent unsterilized should be so marked. It was thought that a proportion of these rolls could be sterilized here and the additional needs be met by substituting the 3-yard roll, which would be sent sterilized.

The commanding general, A. E. F., urged a closer liaison and cooperation between the Medical Department and the American Red Cross in supplies of this sort provided for the American Expeditionary Forces. In the conference which followed between the representatives of the Surgeon General and those of the Red Cross in Washington, a working plan was adopted March 5, 1918, as follows:²⁷

The Surgeon General of the Army to advise the Red Cross the number and assortment of dressings required each month.

The dressings will be delivered to the Medical Department, f. o. b., New York, Boston, Washington, Philadelphia, Atlanta, New Orleans, Cleveland, Chicago, Minneapolis, Denver, San Francisco, Seattle, and St. Louis, packed and marked for shipment in accordance with instructions furnished by the Medical Department.

At the end of each month the Red Cross will advise the Medical Department of the quantity of materials used in dressings delivered during the month, and the Medical Department will turn over to the Red Cross a like quantity of materials in exchange therefor.

Frequent conferences were held between the representatives of these two services until the details of the plan had been perfected. Under this plan the Medical Department placed with the Red Cross a request for the finished dressings desired, and the Red Cross placed with the Medical Department requisitions for materials required to prepare these dressings. The following requisition for dressings was placed by the Medical Department with the Red Cross March 8, 1918.²⁸

It is requested that the following supplies be prepared for early delivery:

	Quantity		Quantity
Packet No. 1, red label	600, 000	Sterile dressing pads	300, 000
Packet No. 2, white label	500, 000	Unsterile dressing pads:	
Packet No. 3, blue label	400, 000	Type 1—	
Gauze, roll:		Size 1	200, 000
5-yard	8, 000	Size 2	150, 000
3-yard	10, 000	Type 2—	
Sponges:		Size 1	75, 000
Small	400, 000	Size 2	50, 000
Large	350, 000		

Attention is invited to the following:

Packing.—Must be carefully done and must be suitable for overseas shipment.

Marking.—Each shipping package must be marked with a red cross 4 inches high and with the words, "Medical Department, U. S. Army," in letters at least 1 inch high.

In addition to this marking each package must be marked as directed in the instructions sent with the bill of lading.

Delivery.—No shipment to be made except on Government bill of lading furnished by this office.

When shipments are ready this office should be notified and the following information given:

- (a) Exact location of supplies.
- (b) Number of packages.
- (c) Weight of each package.
- (d) Cubic feet of space required by each package.
- (e) Address to which bill of lading should be sent.

It is requested that a statement of the quantity of material used in making these supplies be furnished this office, in order that replacement of the same may be accomplished in accordance with the arrangement heretofore made.

The American Red Cross, in turn, placed with the Medical Department a requisition for 4,000,000 yards of gauze to be delivered to 11 regional representatives in the various cities throughout the United States. The quantities to be delivered to each special representative varied from 150,000 yards at New Orleans and Denver to 800,000 yards at New York.²⁹ Shipment of this gauze was ordered by the Surgeon General on March 8.³⁰

The American Red Cross was requested to place an order with the Surgeon General for the materials other than gauze required to make up a sufficient number of the several kinds of dressings described, in the required proportions of each kind, to exhaust the 4,000,000 yards of gauze furnished. The Red Cross advised the Surgeon General on March 18, 1918, that the following articles enumerated in the order already quoted, were available for immediate issue.³¹ The other articles would necessarily have to be made up.

Gauze rolls, 5-yard-----	8, 000	Unsterile dressing pads:	
Sponges:		Type 1—Size 1-----	200, 000
Large-----	350, 000	Size 2-----	150, 000
Small-----	400, 000	Type 2—Size 1-----	75, 000
Sterile dressing pads-----	300, 000	Size 2-----	50, 000

The quantities of materials required to supplement the 4,000,000 yards of gauze in proportion of these dressings were estimated to be:

Absorbent cotton-----	pounds--	184, 508
Nonabsorbent cotton-----	do-----	93, 805
Muslin-----	yards--	657, 000

It was desired that these front-line packets be properly identified. It was considered appropriate that the Medical Department receive credit in the minds of the users for its share in the preparation of the dressings. To insure facility in warehousing and distribution it was necessary that the packing cases be properly marked. To accomplish this end, request was made to the American Red Cross to cause the following instructions to be issued:³²

Packing cases should be marked on one side with a red cross 4 inches high and the words "Medical Department, U. S. Army—From A. R. C.," in letters at least 1 inch high.

On each end of the box the contents should be plainly stenciled. Thus, "115 dressing pads, type 1, size 2."

When shipping instructions are received from this office the other markings required, as specified herein, also should be stenciled on the box.

No other marks whatsoever should appear on the cases.

Packages of dressings or other supplies contained in a packing case or other container should bear labels or be stamped with the words "Material provided by the Medical Department, U. S. Army—prepared by American Red Cross." The name of the chapter may also be given if deemed advisable.

Kind or type of dressing or other articles. Thus, "25 sponges, large, 4 in. by 4 in."

The front-line packets and other dressings on this order could not be properly sterilized by the various chapters of the Red Cross at which they were made. It became necessary to secure facilities for sterilizing them before shipment to France. After an extensive survey of the situation it was decided to have these packets sterilized in New York City, or its immediate vicinity. The Medical Department was fortunate at this time in finding an idle plant formerly devoted to the manufacture of ligatures. It was found that this plant

was equipped adequately with sterilizers to effect the sterilizing of the packets. Accordingly, arrangements were made to ship all the first-line packets to this plant, where they were sterilized and packed for ocean shipment.³³ A method of packing was devised in a very short time whereby the package could be placed in bales under moderate pressure and covered with burlap, instead of being packed in boxes.³⁴ By means of this change a material saving was made in the cubic space of shipment. At first some difficulty was experienced in securing a steady flow of these front-line packets from the various chapters to the plant where they were to be sterilized.³⁵ After the system had been in operation for a few weeks this difficulty was overcome, and a steady flow of these packets to France was assured. The medical supply officer in New York was authorized to furnish to the plant sterilizing the packets such quantities of waterproof paper, burlap, and other materials as might be necessary from time to time in the sterilizing of the packets and in their preparation for shipment abroad.³⁶

A further request, omitted from the original orders, was placed with the American Red Cross, May 3, 1918, for the following items in the quantities mentioned, per month for the ensuing six months:³⁷

Oakum pads:		Elbow traction bands.....	15,000
Size 1.....	5,000	Many tailed bandages.....	5,000
Size 2.....	5,000	Pneumonia jackets.....	5,000
Sphagnum-moss pads:		Scultetus bandages.....	5,000
Size 1.....	6,000	Supporting slings:	
Size 2.....	6,000	Size 1.....	5,000
Bags for shot-bag weights.....	2,000	Size 2.....	5,000
Heel rings.....	5,000	Size 3.....	5,000

Before shipment of the sphagnum-moss dressings to France began they were tested out in Army general hospitals.³⁸ Information concerning them was sought from surgeons who had used them in civilian hospitals. These reports varied as to the suitability of this substance for dressings. The principal objection was the manner in which small particles like leaves shook out of the containers, scattered over the remainder of the dressings and gave an untidy appearance. To obviate this, layers of absorbent cotton were used in conjunction with the moss.³⁹ Other hospitals did not consider the objections material and used the moss for surgical dressings with varying degrees of satisfaction. Having been requested by the medical staff of the American Expeditionary Forces, these dressings were supplied in the quantities requested.⁴⁰ The material was cheap and its use relieved the cotton situation by that much. The moss was found in large quantities in some of the Northwestern States and in Canada.

In the list of contents of the front-line packets, as originally furnished from France, there were 18,000,000 bandages cut on the bias. These bandages varied in width from 4 inches, in front-line packet No. 1, to 6 inches in width, in the front line packets No. 3. Two bandages in these packets seemed unnecessary. Accordingly, instructions were given on April 27, 1918, to reduce the number of bandages in each front-line parcel to one. Not only did the two seem unnecessary, but it was becoming increasingly difficult to secure a sufficient

quantity of material for making the bandages. It was found necessary practically to commandeer the looms of certain mills in the United States to get the muslin necessary to make up the bandages authorized. It was believed that if a greater number of muslin bandages was required at the front than one in each front-line packet, they could be furnished separately. Five hundred thousand of each size were sent monthly in addition to those in the packets.⁴¹ To provide the necessary muslin for these front-line packets, muslin bandages, and other special dressings, 2,098,000 yards of muslin were purchased in March⁴² and an order for 5,000,000 yards more placed with the cotton goods section of the Quartermaster General's Office on April 8, 1918.⁴³

The introduction of the muslin bandage involved the finding or the development of new facilities for their production. The various surgical dressings manufacturers making gauze bandages were working at top speed to produce them. Very few of them had either space or facilities for taking on muslin bandages in addition to their other work. It became necessary, therefore, to find facilities elsewhere. Fortunately, about this time certain industries had either passed into the classification of nonessentials or their business had fallen off to such an extent that they were desirous of undertaking war work. A large embroidery manufacturer in New Jersey expressed a desire to undertake the manufacture of bandages and quoted prices which proved satisfactory. Upon investigation this plant was found adequate for the purpose.⁴⁴

By the end of October, 1918, practically the entire requirements for the American Expeditionary Forces in the special types of dressings, already enumerated, had been met. No difficulty was anticipated for future requirements.

The quantities of these special dressings actually shipped to the American Expeditionary Forces, France, were:⁴⁵

Quantities of special dressings shipped to France March to August inclusive, 1918

Packet No. 1, red label.....	1, 268, 500	Sphagnum-moss dressing pads:	
Packet No. 2, white label.....	570, 618	Size 1.....	4, 000
Packet No. 3, blue label.....	535, 688	Size 2.....	4, 000
Gauze roll:		Rubber cloth supporting slings:	
Unsterile, 5-yard.....	56, 905	5½ by 60 inches.....	30, 000
3-yard rolls.....	17, 672	8 by 24 inches.....	30, 000
Sponges:		Scultetus bandages.....	31, 200
Small size, 2 by 2 inches.....	2, 405, 625	Many-tailed bandages.....	40, 500
Large size, 4 by 4 inches.....	2, 106, 175	Anklets, canvas.....	50, 000
Sterile dressing pads.....	2, 174, 310	Canvas hammocks, 20 by 48	
Unsterile dressing pads:		inches.....	12, 000
Type 1—		Canvas swathes for Bradford	
Size 1.....	696, 111	frames.....	42, 000
Size 2.....	551, 865	Pneumonia jackets.....	14, 483
Type 2—			
Size 1.....	217, 781		
Size 2.....	160, 370		

SUBSTITUTE MATERIALS FOR SURGICAL DRESSINGS

During the early months of 1918 considerable doubt was entertained that the quantity of cotton available would be sufficient to meet the requirements for textiles of all sorts and for surgical dressings. Investigations were instituted by various agencies looking toward the development of a substitute material

for surgical dressings. Among the substitutes offered for cotton was a preparation of wood fiber rendered absorbent and produced under the title "cellucotton."⁴⁶ In order to determine its merits a considerable quantity of this material was purchased and distributed to the various general and base hospitals throughout the United States, with instructions to give it a thorough trial and report to the Surgeon General on its merits. Reports received on this substance were for the most part favorable. Its absorbency was better than the absorbent cotton furnished. For dressings intended primarily to absorb fluid it was fairly satisfactory. However, since it was apt to become hard and uncomfortable when saturated, for general use in the hospital it proved advisable to limit its use; then it proved entirely satisfactory.⁴⁷ As a result of these reports the material was purchased in large quantities and distributed to hospitals for use as a substitute for absorbent cotton in all those conditions for which it was found suitable.

The difficulty in providing an adequate quantity of absorbent gauze led to the development of a type of gauze known as "re-use knitted gauze." This material came in much the same form as knitted cotton underwear. It was formed into a number of shapes which could be readily washed and sterilized for re-use. Forms for drying and forming of units after washing had been devised. Tests of the material were made at several of the general hospitals and found satisfactory. Accordingly, in April, 1918, 100 pounds of re-use knitted gauze were sent to 20 large hospitals. With this gauze was furnished an electric washing machine and a three-form aluminum steam drying and forming unit complete. The results obtained at these hospitals were satisfactory and the use of the material was extended to 41 other hospitals, making a total of 61 in all. Enlisted personnel at these hospitals were trained in the use of the washing machine and the drying and forming outfit, and the work was carried on satisfactorily.⁴⁸ In some of the hospitals conservation of gauze was effected by washing the gauze in the washing machine furnished for the re-use knitted gauze and drying it on the steam drying and forming unit, after which it was re-sterilized and used again in the same manner as it was ordinarily used. This materially reduced the quantity of surgical gauze used at these hospitals and a great saving was effected.

SUTURES

The materials from which the sutures used by the Medical Department are manufactured are catgut, horsehair, kangaroo tendon, linen, silk, silkworm gut, and silver wire. The sutures made from these materials are manufactured according to standard commercial practices. They all come in a number of different sizes. The variation in the size of horsehair is the least of all ligatures. Inasmuch as the form in which horsehair is used for sutures is that in which it is produced by nature, varieties in size can be obtained only by sorting the hair as it is cut from the tail of the horse. All the other forms of sutures can be made in any size required.

The sutures listed in the standard medical supply table of 1916, and used as the basis for purchase during the years 1917, 1918, are as follows:⁴⁹

Sutures for field use:

Catgut—

Chromicized, sterilized, 18 inches each, 3 sizes in package.

Plain, sterilized, 18 inches each, 3 sizes in package.

Silk, braided, sterilized, 18 inches each, 3 sizes in package.

Silkworm gut, 100 strands in coil.

Silver wire, in yard lengths.

Sutures for hospital use:

Catgut, plain or chromicized, sterilized, 18 inches in tube, assorted sizes.

Horsehair, 100 in coil.

Kangaroo tendon, sterile, 1 suture in each tube.

Silk, braided, sterilized, 18 inches each, 3 sizes in package.

Silkworm gut, 100 in coil.

Silver wire, in yard lengths.

Sutures for veterinary use:

Linen, sterilized, 18 inches each, 2 sizes (Nos. 16 and 20) in package.

Silk braided, sizes 4, 8, 12, 16, 20, on spools.

Tape, sterilized, 18 inches each, 2 pieces in package.

CATGUT

Catgut sutures ordinarily come in six sizes, fine to coarse—Nos. 00, 0, 1, 2, 3, and 4. They are made from either domestic or imported catgut. The domestic gut is considered superior quality and preferable in color. The material is obtained from the packing houses, cut into strips of such width as will give the proper size, rolled or twisted, and dried. Catgut in commerce usually comes in coils of 100 feet.⁵⁰ In preparing it for sutures all fatty material is removed by digesting the coils in ether or other fat solvent. After the fat has been removed the coils are cut into the desired lengths, placed in glass tubes of appropriate size and length, sterilized, the appropriate preserving fluid added, and a slip of paper indicating the size and whether plain or chromicized inserted in the tube. The tube is then sealed and again sterilized by fractional sterilization until complete sterility is assured. The methods of preparing and sterilizing the gut and the preserving fluid vary with each manufacturer. Exact specifications covering the mode of procedure could not well be prepared owing to its variations of methods. The specification for plain catgut ligatures adopted in May, 1918, after prolonged study and investigation, are given below:⁵¹

SPECIFICATIONS FOR PLAIN STERILE CATGUT

Material.—To be best quality catgut ligatures prepared from the small intestines of sheep, evenly split, freed from all but submucous connective tissue, bleached, uniformly twisted, dried, and perfectly smooth. Each strand of catgut to be sterile, and each is to be tubed with a sufficient amount of an acceptable storing fluid to cover the coil when the tube is held vertical.

Length.—Each strand of sterile catgut shall measure not less than 18 inches in length.

Gauge.—The gauge of strands shall be in accordance with measurements indicated for the following sizes:

Size No.—

00 to equal Brown & Sharpe gauge 27.

0 to equal Brown & Sharpe gauge 26.

1 to equal Brown & Sharpe gauge 25.

2 to equal Brown & Sharpe gauge 24.

3 to equal Brown & Sharpe gauge 23.

4 to equal Brown & Sharpe gauge 22.

The diameter to be taken in three places, at each end and in the middle. At least two of these diameters must agree, the diameters in agreement giving the strand its gauge.

Tensile strength.—The tensile strength for the different sizes of sterile catgut shall not be less than the number of pounds designated for sizes below:

Size No.—	Pounds	Size No.—	Pounds
00-----	3	2-----	12
0-----	5	3-----	16
1-----	9	4-----	20

All tensile-strength tests will be straight pull to rupture at least a 4-inch length of catgut without bend or knot. The average of 6 tests will indicate the strength of the material.

Pliability, plasticity, boilability, tubes, labels, coils.—The pliability of sterile catgut ligatures when removed from the tube shall be such as to allow its use as a suture without previous moistening. The ligature must show a normal amount of elasticity or tendon. Tubes shall be made from clear, clean glass tubing selected for quality and uniformity of wall diameter; tubes when sealed to measure about $2\frac{1}{4}$ inches in length and $\frac{5}{16}$ inch outside diameter. Each tube to have engraved at or near its center a straight fracture mark of uniform depth and width and to measure in length not less than one-third the circumference of tube; the tube shall break evenly at the fracture mark without splintering. Each strand of catgut shall be evenly coiled and, without twist, introduced into the glass tube in a manner to allow the top loop of the coil to be even with the fracture mark. One free end of the ligature shall pass beyond the coil and fracture mark; this to facilitate removal of the ligature from tube. Each tube to contain one strand of sterile catgut in tubing fluid as specified and printed label showing the kind and size of the contents and the name of the manufacturer. Entire contents to be sterile and final sterilization to be done after both ends of tube have been sealed by fusion. The tubes to be boilable for one-half hour without harm to the tubes or contents.

Packing.—Tubes to be furnished in strong, flat paper boxes containing 10 tubes packed in a single row; each box to be properly lined with corrugated paper or furnished with other acceptable device to prevent breaking; each box to be plainly labeled with the kind and size and number of contents and the name of the manufacturer and bear the words "Medical Department, U.S.A." One hundred such boxes to be inclosed in an outer heavy paper box bearing a similar label. Package to be marked with kind and number of contents and name of manufacturer. All paper packages to be packed in strong wooden boxes suitable for distant shipments, each plainly stenciled on one end with the name and number of contents and the name of the contractor.

The specification for chromicized catgut were practically identical with those for the plain sterile catgut, with the following addition and modification; under the heading "Material" the following sentence was added:⁵¹

The catgut to be chromicized by a method of treating the potassium or sodium dichromate which will yield finished ligatures free from undesirable products of chromium. The absorbability of the chromic ligatures must approximate the time indicated on the label.

The heading "Length" was changed as follows:

Length.—Each strand of sterile chromicized catgut shall measure not less than 18 inches in length.

During the year 1917 no material difficulty was experienced in procuring a quantity of catgut sutures adequate to meet the requirements. In conformity with the procedure then in vogue a meeting of the manufacturers of sutures was held in New York, May 4, 1917, at which 10 manufacturers were present.⁵² At this conference prices were discussed and the requirements of the Army and Navy presented. The various types of sutures were apportioned to the manufacturers present at this conference.⁵² The prices agreed upon at this conference

seemed rather high. The price paid for catgut, chromic, 3 sizes in a package, in the purchase in March, was $9\frac{1}{4}$ cents per package. For catgut, plain, the price was $8\frac{1}{2}$ cents a package. The conference price was 12 cents a package. The price paid in November, 1917, for the same materials was $7\frac{1}{2}$ cents per package. It was found that catgut in tubes, of good quality, could be had in the market in 60-inch lengths, at 9 cents per tube, and the officer in charge of the medical supply depot at New York refused to pay more than 9 cents per tube. This refusal caused some friction with one of the manufacturers, who contended that the material could not be furnished at that price, stating that the raw gut cost $8\frac{1}{8}$ cents per tube and that the cost of preparation exceeded the cost of the raw gut.⁵⁰ Prices following this first purchase, which was made in June, 1917, eased up materially.

By the middle of 1918, however, the quantity of catgut sutures required had reached such magnitude that it was difficult to meet requirements. Every manufacturer was called upon to furnish practically his maximum output. A thorough canvass was made during the summer and fall of 1918 of the methods of preparing and sterilizing catgut sutures. As a result of these investigations some doubt was had by the inspectors concerning the sterility of the product.⁵³ Arrangements were made by the surgical board in the Surgeon General's Office to have tests for sterility conducted under its supervision at Chicago, New York, and Boston, and a definite plan to this end was worked out near the end of October, 1918.⁵⁴ Before it could be placed into effect, however, the armistice had been signed and the urgency of the need for sutures passed.

HORSEHAIR

Horsehair sutures are not much used in Army surgical practice and no large quantities were purchased. They are selected, undyed, black horsehair, cut from the tail of the horse. The early purchases in 1917 called for 13,500 coils,⁵⁵ 100 hairs in coil.

KANGAROO TENDON

Kangaroo tendon is much less used in military surgery than catgut and was accordingly procured in smaller quantities. In order that a standard suture, both as to size and quality, might be purchased, and for the benefit of the personnel called upon to make inspection, the following specifications were adopted in May, 1918:⁵¹

SPECIFICATION FOR KANGAROO TENDON SUTURES

Material.—To be tendons from the tail of a kangaroo, free from other tissue, blood, etc., and very soft so a knot can be tightly tied. Each strand of kangaroo tendon to be sterile and each to be tubed with chloroform or other acceptable fluid in sufficient amount to cover the coil when the tube is held vertical.

Length.—Each strand of sterile kangaroo tendon upon removal from the tube shall measure not less than 12 inches in length.

Gauge.—The size in diameter of the strand shall be uniform and approximately of the measure indicated for the following sizes:

- Fine, to equal Brown & Sharpe gauge 26.
- Medium, to equal Brown & Sharpe gauge 24.
- Coarse, to equal Brown & Sharpe gauge 22.
- Extra coarse, to equal Brown & Sharpe gauge 20.

The diameter to be taken in three places, at each end and in the middle. At least two of these diameters must agree, the diameters in agreement giving the strand its gauge.

Tubes, labels, coils.—Tubes shall be made of clear, clean glass tubing selected for quality and uniformity of wall diameter, tubes when sealed to measure about $2\frac{1}{4}$ inches in length and $\frac{5}{16}$ inch outside diameter. Each tube to have engraved at or near its center a straight fracture mark of uniform depth and width, and to measure in length not less than one-third the circumference of the tube; the tube shall break exactly at the fracture mark without splitting. Each strand of kangaroo tendon shall be evenly coiled and, without twist, introduced into the glass tube in a manner to allow the top loop of the coil to be even with the fracture mark. One free end of the ligature shall pass beyond the coil and fracture mark, this to facilitate removal of ligature from tube. Each tube to contain one strand of sterile kangaroo tendon in tubing fluid, as specified, and a printed label showing the kind and size of the contents and the name of the manufacturer. Entire contents to be sterile and final sterilization to be done after both ends of tubes have been sealed by fusion. The tubes to be boilable in water for one-half hour without harm to the tube or its contents.

Packing.—Tubes to be furnished in a single row in strong flat paper boxes containing 10 tubes each, each box to be properly lined with corrugated paper or furnished with other acceptable device to prevent breaking; each box to be plainly labeled with kind and size and number of contents, and the name of the manufacturer, and bear the words "Medical Department, U. S. A." One hundred such boxes to be inclosed in an outer heavy paper box bearing a similar label. Packages to be marked with kind and number of contents and name of manufacturer. All paper packages to be packed in strong wooden boxes suitable for distant shipment, each plainly stenciled on one end with the name and number of contents and the name of the contractor.

SILK

Silk sutures in the trade come in a large number of sizes. There are two types of silk sutures, the twisted and the braided. The smaller sizes of the silk sutures are almost always the twisted variety. The medium sizes are both twisted and braided. The larger sizes are almost entirely of the braided variety. The Medical Department uses the braided variety in three sizes—small, medium, and large. Still larger sizes are issued for veterinary use. The sutures for human use are put up three sizes on a card inclosed in an impervious wrapping and placed in an envelope. They are also furnished a single size on an individual card, inclosed in an individual wrapping, and the three of these, one of each size, inclosed in an envelope. Silk sutures for veterinary use are furnished unsterilized on spools.

SILKWORM GUT SUTURES

These sutures are used both in the field and in fixed hospitals. As purchased, they ordinarily come assorted sizes in the package. During the war they were purchased, fine, medium, and coarse, and only one size in a package. During the early purchases considerable difficulty was experienced in obtaining the Army requirements. This was due largely to the fact that the majority of silk worm gut is made in Spain and transportation was not available. After the transportation service had become better organized in 1918, less difficulty was experienced in securing the quantities required. At the request of the chief surgeon, A. E. F., on August 5, 1918,⁵⁶ an order was placed for the delivery from Spain, direct to the American Expeditionary Forces, of 100,000 coils of silkworm gut sutures. These sutures were purchased for delivery in Paris.

Sutures purchased during 1917-18

Sutures	Unit	Unit prices			Quantity		Gross cost
		High	Low	Average	Ordered	Delivered	
Catgut, chromicized:							
60-inch length in tube	Tube	\$0.135	\$0.09	\$0.1017	2,287,147	1,359,808	\$138,341.72
18-inch length in tube	do	.06	.035	.0494	7,490,000	3,391,204	167,668.26
Catgut, plain, sterilized:							
60-inch length in tube	do	.095	.09	.0904	1,529,500	881,802	79,733.78
18-inch length in tube	do	.06	.0325	.0434	11,735,000	5,189,054	225,561.00
Silk braided, sterilized, 3 sizes in package	Package	.12	.0433	.06403	3,140,000	2,508,370	160,619.31
Catgut, plain, sterilized, 18 inch, 3 sizes in package	do	.135	.0725	.1121	870,000	870,000	97,575.00
Silkworm gut, 100 strands in coil	Coil	1.00	.28	.655	820,474	815,474	534,313.28
Silver wire, in yard lengths	Yards	.15	.0475	.0856	250,600	250,600	21,308.38
Kangaroo tendon, sterilized, 1 suture in tube	Tube	.105	.05 $\frac{1}{2}$	.0735	1,013,000	702,920	51,718.87
Linon, sterilized, 18 inch, 2 sizes, Nos. 16 and 20, in package	Package	.05	.05	.05	48,100	48,100	2,405.00
Silk braided, sizes 4, 8, 12, 16, 20:							
Ounce on spool	Spool	2.00	2.00	2.00	2,000	2,000	4,000.00
$\frac{1}{2}$ ounce on spool	do	1.30	.80	.970	8,000	8,000	7,800.00
25 yards on spool	do	.75	.25	.3978	41,151	41,151	28,312.00
Tape, sterilized, 18-inch, 2 pieces in package	Package	.05	.045	.047	30,000	30,000	1,410.00
							1,520,766.60

REFERENCES

- (1) Manual for the Medical Department, U. S. Army, 1916. Supply Tables.
- (2) Report of Committee on Industrial Preparedness, American Drug Manufacturers' Association, Annual Convention, New York, N. Y., January 29-30, 1918. Copy on file, Finance and Supply Division, S. G. O.
- (3) Computed from records on file in Medical Section, New York General Intermediate Depot.
- (4) Contract dated June 23, 1917, between Col. C. R. Darnall, M. C., and Johnson & Johnson, New Brunswick, N. J., for surgical dressings. Copy on file in Field Medical Supply Depot records stored in Medical Section, New York General Depot.
- (5) Letter from Henry P. Kendall, Norwood, Mass., to Lieut. Col. H. C. Fisher, Surgeon General's Office, August 11, 1917, relative to progress in production of surgical dressings. On file, Finance and Supply Division, S. G. O., $\frac{395}{1}$.
- (6) Letter from Narragansett Mills, Fall River, Mass., to Col. C. R. Darnall, Washington, D. C., September 24, 1917. On file, Finance and Supply Division, S. G. O., $\frac{51}{21}$.
- (7) Letter from Henry P. Kendall, Norwood, Mass., to Col. C. R. Darnall, Surgeon General's Office, October 22, 1917, relative to priority certificates. On file, Finance and Supply Division, S. G. O., $\frac{395 \text{ H. P. K.}}{1}$.
- (8) Letter from Dr. H. C. Loris, formerly Chairman of Manufacturers of Surgical Dressings, New York, N. Y., to Col. C. R. Darnall, S. G. O., November 27, 1917, relative to disbanding of Association of Manufacturers of Surgical Dressings, organized under Council of National Defense. On file, Finance and Supply Division, S. G. O., $\frac{445 \text{ H. C. L.}}{1}$.
- (9) Letter from Col. C. R. Darnall, S. G. O., to Mr. Henry P. Kendall, Lewis Manufacturing Co., Walpole, Mass., November 28, 1917, relative to purchase of gauze. On file, Finance and Supply Division, S. G. O., $\frac{437 \text{ L. M. C.}}{7}$.
- (10) Letter from Henry P. Kendall, Norwood, Mass., to Col. C. R. Darnall, S. G. O., November 30, 1917, relative to negotiations for gauze. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N. D.}}{268}$.

- (11) Letter from Henry P. Kendall, New York City, to Col. C. R. Darnall, S. G. O., November 27, 1917, relative to prospective negotiations for gauze. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N. D.}}{268}$.
- (12) Letter from Mr. Albert L. Scott, Committee on Supplies, Cotton Goods Section, War Industries Board to Col. C. R. Darnall, S. G. O., December 6, 1917, relative to purchase of gauze. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ N. D.}}{268}$.
- (13) Letter from Mr. H. P. Kendall, Lewis Manufacturing Co., Walpole, Mass., to Col. C. R. Darnall, S. G. O., December 15, 1917, relative to apportionment of surgical dressings to manufacturers. On file, Finance and Supply Division, S. G. O., $\frac{437 \text{ L. M. Co.}}{8}$.
- (14) Letter from Col. Darnall, S. G. O., to Messrs. Holbrook, McCormick, and Kendall (no address), February 9, 1918, relative to gauze requirements. On file, Finance and Supply Division, S. G. O., $\frac{386 \text{ J \& J.}}{7}$.
- (15) Letter from the Surgeon General to the section on cotton goods, Quartermaster General's Office, attention Mr. Holbrook, February 16, 1918. Subject: Orders for gray goods for surgical dressings. On file, Finance and Supply Division, S. G. O., $\frac{750-594 \text{ Q. M. G.}}{94}$.
- (16) Letter from Mr. H. P. Kendall, Norwood, Mass., to Col. C. R. Darnall, S. G. O., relative to purchase of gauze. On file, Finance and Supply Division, S. G. O., $\frac{395 \text{ H. P. K.}}{7}$.
- (17) Letter from Mr. J. E. Osborn, Chairman, Merchants' Manufacturing Co., Fall River, Mass., to Col. C. R. Darnall, April 9, 1918, relative to contracts and prices for gauze. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ M. M. C.}}{7}$.
- (18) Purchases of gauze, General Purchasing Officer, Medical Department, U. S. Army. Revised April 27, 1918.
- (19) Letter from Alex Legge, Raw Materials Division, War Industries Board, to Mr. E. R. Stettinius, Surveyor General of Purchases, March 15, 1918, relative to requisitions for gauze being placed by the Government. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ Misc.}}{66}$.
- (20) Memo from Edw. R. Stettinius, Surveyor General of Supplies, for Col. Darnall, Medical Department, March 16, 1918, forwarding letter from Mr. Legge. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ Misc.}}{66}$.
- (21) First indorsement, Surgeon General, to Mr. E. R. Stettinius, Surveyor General of Purchases, War Department, March 19, 1918, relative to purchases of gauze. On file, Finance and Supply Division, S. G. O., $\frac{533 \text{ Misc.}}{66}$.
- (22) Letter from the Surgeon General to the officer in charge, General Purchasing Office, Washington, July 30, 1918. Subject: Interbureau requisitions for dressing material. On file, Finance and Supply Division, S. G. O., $\frac{750-714 \text{ S. G.}}{381}$.
- (23) Report compiled by Maj. F. W. Lennox, San. Corps, U. S. Army, May 29, 1919. On file, Finance and Supply Division, S. G. O., $\frac{750-714 \text{ S. G.}}{381}$.
- (24) Letter from the Chief Surgeon, A. E. F., to the Surgeon General, January 26, 1918. Subject: Surgical Dressings. On file, Finance and Supply Division, S. G. O., $\frac{250 \text{ F 2.}}{236}$.
- (25) Par. 3, Cable No. 660, H. A. E. F. to The Adjutant General, February 28, 1918, received March 1, 1918.

- (26) Letter from the chief surgeon, A. E. F., to the Surgeon General, February 28, 1918. Subject: Standard Surgical dressings. On file, Finance and Supply Division, S. G. O., $\frac{250 \text{ FR.}}{236}$.
- (27) Letter from the Surgeon General to Mr. Harvey D. Gibson, General Manager, A. R. C., March 8, 1918, relative to surgical dressings. On file, Finance and Supply Division, S. G. O., $\frac{602 \text{ A. R. C.}}{73}$.
- (28) Order No. 1 from the Surgeon General to the American Red Cross, March 8, 1918, for surgical dressings. On file, Finance and Supply Division, S. G. O., $\frac{602 \text{ A. R. C.}}{78}$.
- (29) Order No. W-1055, American Red Cross, March 2, 1918, to the Surgeon General's Office, for 4,000,000 yards gauze. On file, Finance and Supply Division, S. G. O., $\frac{602 \text{ A. R. C.}}{78}$.
- (30) Letter from Col. Darnall to Mr. Harvey D. Gibson, A. R. C., March 8, 1918, relative to supplies for surgical dressings. On file, Finance and Supply Division, S. G. O., $\frac{602 \text{ A. R. C.}}{78}$.
- (31) Letter from the American Red Cross, to the Surgeon General, March 18, 1918, relative to surgical dressings. On file, Finance and Supply Division, S. G. O., $\frac{602 \text{ A. R. C.}}{82}$.
- (32) Letter from the Surgeon General to the General Manager, American Red Cross, March 22, 1918. Subject: Marking of supplies made for the Medical Department by the American Red Cross. On file, Finance and Supply Division, S. G. O., $\frac{602 \text{ A. R. C.}}{78}$.
- (33) Letter from Col. C. R. Darnall, S. G. O., to Messrs. Johnson & Johnson, New Brunswick, N. J., April 1, 1918, relative to sterilization of front-line packets. On file, Finance and Supply Division, S. G. O., $\frac{386 \text{ J \& J.}}{10}$.
- (34) Telegram from John A. Hartwell, A. R. C., New York, N. Y. to Col. C. R. Darnall, S. G. O. April 17, 1918, relative to baling front-line packets. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{596}$.
- (35) Letter from Associate director, Bureau of Stores, American Red Cross, Washington, D. C., to Messrs. Van Horn and Sawtelle, 511 East One-hundred and sixty-fourth Street, New York City, June 25, 1918, relative to front-line parcels. Copy on file, Finance and Supply Division, S. G. O., $\frac{602 \text{ R. C.}}{136}$.
- (36) First indorsement, Surgeon General's office to the officer in charge, Medical Supply Depot, New York, September 10, 1918, relative to packing material for front-line packets. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y. D.}}{596}$.
- (37) Letter from the Surgeon General to the American Red Cross, National Headquarters, Washington, D. C., May 3, 1918, relative to surgical dressings. On file Finance and Supply Division, S. G. O., $\frac{602 \text{ R. C.}}{117}$.
- (38) Letter from Col. C. R. Darnall, M. C., S. G. O., to Major John A. Hartwell, M. C., 44 East Twenty-third Street, New York, April 6, 1918, relative to sphagnum-moss dressings, On file, Finance and Supply Division, S. G. O., $\frac{602 \text{ R. C.}}{89}$.
- (39) Letter from chief of surgical service, U. S. A. General Hospital No. 1, New York City, to the commanding officer, May 14, 1918. Subject: Report substitutes for absorbent cotton for surgical dressings. On file, Finance and Supply Division, S. G. O., $\frac{602 \text{ R. C.}}{107}$.

- (40) Letter from Maj. John A. Hartwell, M. C., 44 East Twenty-third Street, New York, City, to Col. C. R. Darnall, M. C., S. G. O., May 23, 1918, relative to use of sphagnum-moss dressings. On file, Finance and Supply Division, S. G. O., 602 A. R. C.
107
- (41) Letter from Col. C. R. Darnall, M. C., S. G. O., to Maj. John A. Hartwell, M. C., 44 East Twenty-third Street, New York, April 27, 1918, relative to bandages in front line packets. On file, Finance and Supply Division, S. G. O., 602 R. C.
112
- (42) Letter from the Surgeon General to the Supply and equipment division, cotton goods branch, Quartermaster General's Office, March 20, 1918. Subject: Sheetings. On file, Finance and Supply Division, S. G. O., 750-594 A. G.
105
- (43) Letter from the Surgeon General to the Acting Quartermaster General, supply and equipment division, cotton goods section, April 8, 1918. Subject: Unbleached muslin. On file, Finance and Supply Division, S. G. O., 51 B & B.
15
- (44) Correspondence between the Surgeon General's Office and the Camden Curtain & Embroidery Co., Camden N. J., during March, 1918, relative to the manufacture of bias muslin bandages. On file, Finance and Supply Division, S. G. O., 122 C. C. & E. Co.
1
- (45) Reply to Courier Cable S-102, par. 3, S. O. S., A. E. F., relative to quantities of special surgical dressings. On file, Finance and Supply Division, S. G. O., 250 France.
523
- (46) Correspondence between the Surgical Division, S. G. O., and the Finance and Supply Division, S. G. O., during February, 1918, relative to substitutes for cotton. On file, Finance and Supply Division, S. G. O., 750-714 S. G.
181
- (47) Correspondence between the Surgeon General's Office and various base hospitals at training camps, February to April, 1918, inclusive. Subject: Cellucotton. On file, Finance and Supply Division, S. G. O., 531 Misc.
100
- (48) Correspondence between the Surgical Division, S. G. O., and Finance and Supply Division, S. G. O., during April and May, 1918, relative to re-use knitted gauze and reclamation of surgical dressings. On file, Finance and Supply Division, S. G. O., 531 Misc.
10
- (49) Manual for the Medical Department, U. S. Army, 1916, corrected to June 15, 1918, pp. 285, 254, 33.
- (50) Letter from Davis & Geek (Inc.), Brooklyn N. Y., to Lieut. Col. Hartsock, Medical Supply Depot, New York, August 10, 1917, relative to award of sutures. On file, Finance and Supply Division, S. G. O., 174 D. & G. Inc.
1
- (51) Letter from the Surgeon General to officer in charge, Medical Supply Depot, New York, June 15, 1918. Subject: Specifications for sterile chromicized catgut. On file, Finance and Supply Division, S. G. O., 713-539 N. Y.
759
- (52) Minutes of Meeting of Subcommittee on Ligatures held at 100 William St., New York, N. Y., May 4, 1917, at 4:15 p. m. On file, Finance and Supply Division, S. G. O., 174 D. & G. Inc.
1

- (53) Letter from officer in charge, Medical Supply Depot, N. Y., to the Surgeon General, October 22, 1918. Subject: Unsterile catgut. On file, Finance and Supply Division, S. G. O., 713-759 N. Y.
1067
- (54) Letter from the Acting Surgeon General to the officer in charge, Medical Supply Depot, New York, October 26, 1918. Subject: Catgut. On file, Finance and Supply Division, S. G. O., 713-759 N. Y.
1067
- (55) Letter from E. F. Sawtelle, 15-17 East 40th Street, New York, Chairman Subcommittee, Class 2, Surgical Dressings, to Davis & Geek, Inc., Brooklyn, N. Y., calling a meeting of manufacturers of sutures. On file, Finance and Supply Division, S. G. O., 174 D. & G. Inc.
1
- (56) Par. 7, Cable No. 1557, August 4, 1918, H. A. E. F. On file, Finance and Supply Division, S. G. O., Cables Received Book.

CHAPTER XXXVI
STERILIZING APPARATUS

STANDARD SURGICAL DRESSINGS STERILIZER

The selection of a suitable type of sterilizer for surgical dressings that would be needed in our many military hospitals presented a matter of considerable importance to the supply division of the Surgeon General's Office upon our entrance into the World War. A few electrically heated sterilizing outfits had been purchased for Army hospitals during the years 1910-1916. Due to lack of attention on the part of the operatives, these outfits were a source of annoyance to the supply division. In consequence of this experience and of reports from civilian hospitals, it was decided to limit the sterilizing apparatus for the large fixed hospitals during the World War to those using high-pressure steam. With each set of sterilizing apparatus, as a part of it, there was furnished a steam boiler of suitable size and of the vertical submerged-tube type. The apparatus furnished at first were equipped with a 6-horsepower boiler of this type. It soon became evident that a large-sized boiler was required, and subsequent outfits were provided with 10 or 12 horsepower boilers. It was desirable to install large sterilizing chambers, or disinfectors, for the disinfection of mattresses and bed linen. While the 6-horsepower boiler could provide steam for either the sterilizing set or the disinfectant when operating alone, it was inadequate when both were operating simultaneously. The large-sized boiler, while using but little more fuel, satisfactorily met these requirements.

In compiling the list of apparatus for sterilizing outfits for the camp hospitals, it was decided to limit it to the following pieces and sizes, all sterilizers to be suitably mounted on separate stands or in groups on one or two stands:¹ One 16 by 36 inch dressing sterilizer, or one of approximately equal capacity; 1 pair of 25-gallon water sterilizers complete with filter; one 20 by 20 by 24 inch utensil sterilizer; one 7 by 12 by 22 inch instrument sterilizer; One 6-horsepower steam boiler; one set of piping.

The sizes selected were standard commercial sizes, and no difficulty in their manufacture was anticipated. Such delays as might arise would be those incident to securing raw materials and semifinished parts and the time required for the manufacture of the apparatus. No maker of sterilizer apparatus was equipped to draw the shells of the water sterilizers. These shells are of brass and to draw them requires special skill and apparatus. They were obtained from one or two firms equipped to draw them.

In April, 1917, five or six firms in the United States were making sterilizer outfits. Each of these firms had a design of its own. While all were of the same general type, they differed in minor details of manufacture. On April 15, 1917, these manufacturers met in Washington and appointed a committee

on sterilizing apparatus to develop standard specifications and plans for production.¹ Specifications, prepared by a subcommittee appointed for the purpose, were considered and adopted on the following day. These specifications were sufficiently general to cover the apparatus commonly made by the several manufacturers. They were as follows:¹

SPECIFICATION FOR STERILIZERS

(United States Army medical supply depot)

* * * * *

Each sterilizing outfit to consist of the following:

- One 16 by 36 dressing sterilizer.
- One pair 25-gallon, capacity each, water sterilizers complete with filter.
- One 20 by 20 by 24 utensil sterilizer.
- One 7 by 12 by 22 instrument sterilizer.
- One 6-horsepower steam boiler
- One set of piping.

The following detailed specifications are to be observed:

The dressing sterilizer to be of the steam-jacketed type, with a separate generator in which the steam for sterilizing will be generated.

The inner, or sterilizing chamber to be formed from a seamless, cold-drawn, brass shell, tinned inside, and the outer or pressure chamber to be of brazed or riveted copper construction. The door and door frame to be made from high-grade cast bronze, and the door to be locked by radial locking bar, controlled by a handwheel.

The steam generator to be constructed from brass or copper, to have sufficient water capacity to carry through two sterilizations of material without refilling. One end of the generator to be easily removable for cleansing of sediment from the interior.

The construction of the sterilizer to be such as to permit sterilization of its contents by subjection to steam at 15 pounds pressure for 30 minutes, after which dry sterile dressings are to be available within 3 minutes.

The steam jacket and generator to be subjected to a hydrostatic pressure of at least double the working pressure; the equipment to include all the necessary operating valves, a safety valve, two steam gauges, a gauge glass, and a steam heating coil for the generator.

The water sterilizers to consist of two tanks, each to be of full 25 gallons capacity. Each tank to be made from a tin-lined seamless, cold-drawn, brass or copper shell. The bottoms are to be made from brass castings, constructed for easy removal for cleaning the interior.

The filter to be provided, having valved connections to each tank, and valved connections to the raw water supply and waste lines. Filter casing to be made from copper or brass, and to be constructed so that the filter stone may be easily removed for cleaning.

Equipment to include for each tank all necessary operating valves, gauge glass, safety valve, vacuum-breaking valve, thermometer, and a copper heating coil. One tank to be equipped with a water-cooling coil. By the use of suitable valves, the heating coil may be used for this purpose. Each water tank and the filter are to be subjected to a hydrostatic test of not less than double the working pressure.

The instrument and utensil sterilizers are to be constructed from copper. Instrument sterilizer of not less than 20 Stubs gauge; the utensil sterilizer of not less than 18 Stubs gauge. The edges of this receptacle to be well reinforced.

A tray of perforated sheet copper or brass is to be provided for each sterilizer; the tray to have strong side handles for lifting. The covers to be made from copper, preferably dome-shaped, and smooth on top.

A foot lift for raising and closing the covers only is to be provided. Each sterilizer to be equipped with a copper steam heating coil, and inside corner pieces or their equivalent to be provided which will separate the tray slightly above the heating coil. Each utensil

sterilizer to have steam, return, water, and waste valved connections to the supply lines. Each instrument sterilizer to have only valved steam, return, and waste connections to the supply lines.

The steam boiler to be a 6-horsepower, submerged-tube type, 100 pounds pressure, standard boiler, equipped with suitable injector and 10 feet of stack with a damper in stack.

The sterilizers are to be mounted each on a separate stand of suitable tubular steel construction. The arrangement to be such that, facing sterilizers, they will be placed in the following order from left to right: Water, utensil, instrument, and dressing sterilizers. They are to be placed as close together as conveniently possible, and piping is to be provided to connect all common valves, bringing the supply lines close together near the center of the outfit in the rear. The water and waste lines are to end with unions at the wall, situated approximately 12 inches back of the sterilizers. The steam and return pipes to be carried directly to the boiler (without a trap), which will be located approximately 10 feet in the rear of the sterilizers.

All valves to be Jenkins's diamond pattern or equivalent, rough bodies. All water and waste pipes and fittings to be galvanized iron and steam and return pipes and fittings to be black iron.

Exterior surfaces of all sterilizers to be finished in brush or satin nickel. The interior of all sterilizers to be tinned. Stands to be finished in aluminum bronze and a varnish finishing coat.

Each manufacturer shall furnish detailed installation plans and operating directions with each outfit.

The estimate for sterilizing apparatus, prepared in the Surgeon General's Office and presented to the manufacturers at their meeting in Washington, D. C., April 11, 1917, called for 100 combination sterilizing outfits, delivery to be within approximately four months. Because of manufacturing requirements, the committee on sterilizers considered it essential that definite information concerning the quantity to be ordered be furnished at the earliest practicable date. Securing the needed materials was a slow process. The manufacturer of the seamless drawn shells required 60 to 90 days for delivery. The manufacturer of boilers required 120 days from date of order. The metal market was uncertain and, to be assured of deliveries, it was necessary that orders for sheets, castings, valves, and other parts be placed promptly.¹ Because of lack of funds, purchases could not be made at that time and the placing of orders was delayed. The purchase of 30 sets of standard combination sterilizers for the base hospitals at the training camps was authorized May 25, 1917.² The contracts were actually placed June 26. The number was equally distributed among five manufacturers, six outfits being purchased from each.

It soon became apparent that 30 outfits would be insufficient and more should be purchased. Instructions were issued August 3 for the purchase of 60 additional outfits.³ Contracts for them were placed August 9. The total number was distributed among the manufacturers according to their ability to produce them. The third authorization for the purchase of these outfits was issued November 16, 1917.⁴ It called for 75 outfits. They were distributed equally among the manufacturers. Subsequent instructions to purchase were issued from time to time thereafter as prospective needs indicated. The last instructions for purchase were dated August 13, 1918, for 100 outfits.⁵ The total number of standard outfits delivered during the war period was 338.⁶ The prices paid for the outfits were uniform for all manufacturers and rose steadily

throughout the period due to advances in the cost of boilers, boiler plate, and labor.

The outfit originally authorized had but one dressing sterilizer, 16 by 36 inches in size. At the time this number and size were decided upon the contemplated capacity of the hospitals was 500 beds. It is doubtful that it would have been adequate for that number of beds. When the capacity of the hospital was increased to 1,000 beds, a single sterilizer of that size proved to be wholly inadequate for the needs of the hospital.⁷ The question then arose whether an additional sterilizer, 16 by 36 inches, should be furnished, making two of that size, or whether a larger size, 16 by 60 inches, should be substituted. The latter

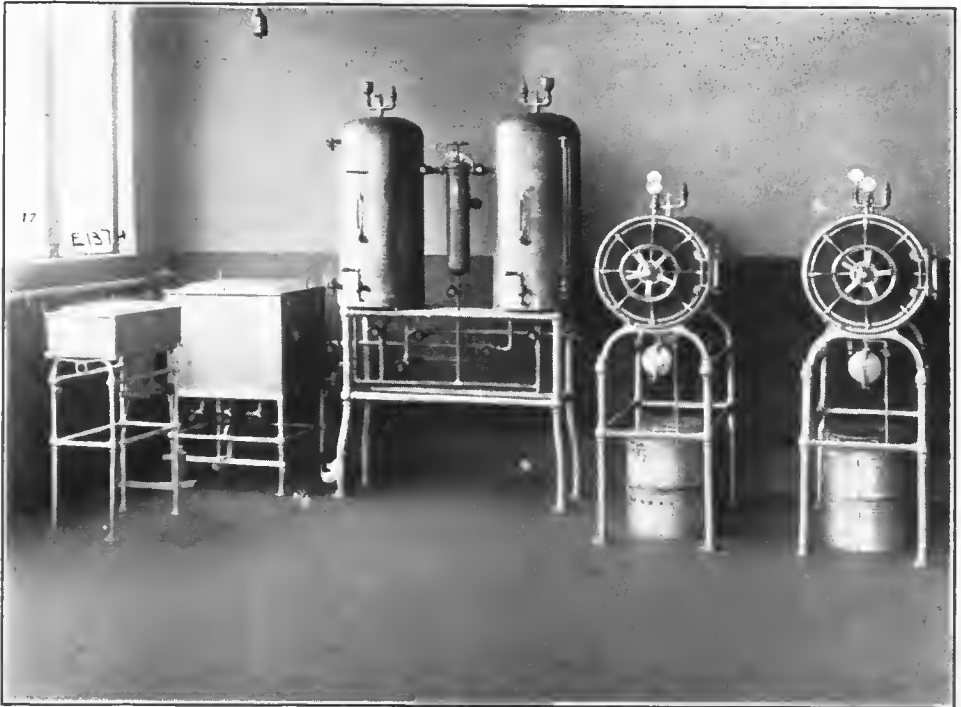


FIG. 35. —Standard sterilizing outfit, with two sterilizers

size required a track to carry the drums containing the dressings, and the shell was difficult to secure. The 16 by 36 inch shells were easy to obtain, and while two of them cost more than one of the larger size, they had greater capacity, did not require a track for the drums, and were more easily operated. Accordingly, it was decided to furnish two 16 by 36 inch dressing sterilizers for all 1,000-bed hospitals.⁸ An additional sterilizer was issued to all base hospitals in the United States. Two dressing sterilizers were included in the outfit provided for all base hospitals sent overseas. The appearance of the standard outfit with the two sterilizers is shown in Figure 35. The addition to the outfit of the second dressing sterilizer and certain other sterilizing equipment made

necessary a larger steam boiler. A 12-horsepower boiler was purchased with all the later outfits.⁹

Every base hospital established within the United States or sent overseas was equipped with a standard sterilizing outfit for surgical dressings. Sterilizing outfits for the training camps were delivered and installed by the time they were needed. The outfits required for the hospitals sent overseas were shipped usually with the other hospital equipment. The temporary general hospitals as they were opened were likewise equipped with standard outfits. The purchase of such outfits was based on known requirements, and deliveries were made in accordance therewith. For the most part the outfits were inspected at the factory and shipped direct to the designated hospital or port of embarkation. Only a few were carried in stock at any time.

NONSTANDARD OUTFITS

A number of hospitals which came into being during the World War, as well as some already existing, had obsolete equipment that was expanded to larger capacity. The standard equipment was too large for them.¹⁰ A suitable outfit consisting of the same number of pieces as the original standard outfits, but of smaller size, was selected and purchased for them. Wherever there was space for a small boiler, steam-heated outfits were supplied. When space could not be provided for the boiler, and electric current was available, electrically heated outfits were supplied.¹¹ If neither space for a boiler nor electric current was available, outfits of suitable size heated by blue-flame kerosene burners were furnished.

The need arose in the eye clinics and in the ear, nose, and throat clinics for a small water sterilizer and a small instrument sterilizer. A small unit mounted on a stand, consisting of a 3-gallon water sterilizer and a small instrument boiler, both electrically heated, was provided for this purpose. The issue of this unit was limited to hospitals where suitable electric current was available. The total number of the special outfits and electrically heated outfits supplied during the war period was 135. The aggregate number of sterilizing outfits delivered during the same period was 473.⁶

PORTABLE DISINFECTORS

The Medical Department had become interested in portable disinfectors during the year preceding our entrance into the World War. In connection with the Mexican border mobilization in 1916, the need arose for these apparatus for disinfecting clothing and bedding. One manufacturer, in conjunction with an officer at the New York medical supply depot, developed such an apparatus. Eight of them were purchased and tried out on the border, where their merit was demonstrated. This disinfecter consisted essentially of a disinfecting chamber 30 inches wide, 42 inches high, and 80 inches long, inside measurements, furnished with a basket type of car, extension tracks and supports, mounted on steel running gear and provided with a steam boiler of suitable size.¹² The specifications for this apparatus appear below.¹³ The general appearance of the disinfecter is shown in Figure 36.

SPECIFICATIONS COVERING "AMERICAN" KINYOUN-FRANCIS PORTABLE STEAM DISINFECTOR
(RECTANGULAR TYPE)

To consist of an "American" Kinyoun-Francis jacketed disinfector, 30 inches wide by 42 inches high by 80 inches long, clear inside dimensions; a 6-horsepower submerged-tube vertical boiler, a water-storage tank, a complete set of firing tools and wrenches, and running gear.

DISINFECTOR

Type.—Disinfector to be of the rectangular steam-jacketed construction, with 2-inch steam space between inner and outer shells.

Material.—Pressure shells to be of Otis, Carnegie, Cleveland Steel Co., or equal, 60,000 pounds tensile strength, open-hearth homogeneous flange steel plates $\frac{1}{4}$ inch thick. Victor



FIG. 36.—Portable disinfector

rivets or equal. Castings for the end frames, saddies, etc., to be of semisteel or close-grained iron, as may be best suited for the purpose intended, to be free from blowholes, and all carefully machined where necessary to secure proper fitting of parts.

Riveting and stay bolting.—Longitudinal seam of inner shell to be single lap, riveted with $\frac{1}{8}$ -inch rivets, $2\frac{1}{4}$ -inch pitch. Longitudinal seam of outer shell to be double lap, riveted with $\frac{1}{8}$ -inch rivets, $2\frac{7}{8}$ -inch pitch. Girth seams to be single lap, riveted with $\frac{1}{8}$ -inch rivets, $2\frac{1}{4}$ -inch pitch. Rivet holes to be punched or drilled, and all unfair holes to be brought into line by the use of reamer; no drift pins to be used. Shells to be stayed with $\frac{7}{8}$ -inch stay bolts of selected, double-refined iron, spaced approximately 6 inches between centers, thereby making jacket surrounding chamber amply strong for full 100 pounds working pressure. All seams to be carefully caulked and made perfectly tight.

Bottom plate at front to be reinforced and to form a unit with front truck by means of a fifth wheel and king pin. On each side at rear shall be a heavy cast-steel or malleable

bracket bolted into a riveted reinforcing steel plate saddle, supporting boiler and forming riding supports for the disinfector-boiler combined units.

Door.—To be of $\frac{7}{16}$ -inch flange steel, properly dished, fitted to one end of disinfector, and closing against a $\frac{3}{4}$ -inch Ebonite, or equal, gasket loaded in groove turned in face of east end frame and a steam and vacuum-tight joint made by a series of not less than 16 radial crucible spring steel, taper-turned, arms or levers engaging the rim of said end ring at outer ends and being connected to a central disk by a ball-and-socket joint and forced outward by the rotation of handwheel carrying said disk. The door to swing on a heavy forged-steel davit, carefully fitted to the end frame and provided with means for accurate adjustment. To minimize friction and facilitate operation, improved ball or roller bearings to be used in the construction of door and davit.

Rear head.—To be jacketed, consisting of two flanged steel heads, $\frac{1}{4}$ inch thick, with 2 inch steam space between. To be braced with $\frac{7}{8}$ inch stay bolts about 6 inches center to center.

Flanges.—All to be of best quality steel, carefully riveted and calked to insure perfect tightness under both steam and vacuum.

Test.—The jacket to be tested and made perfectly tight under a hydrostatic pressure of 150 pounds per square inch, and again tested at 100 pounds steam pressure in the jacket and at not less than 30 pounds steam pressure in the chamber for a working pressure of 12 to 15 pounds per square inch.

Piping.—To provide for:

1. Entrance of high-pressure steam to jacket.
2. Entrance of low-pressure steam through pressure-reducing valve to chamber directly on top near each end.
3. The escape of air from chamber and the circulation of steam within chamber to facilitate the process of disinfection.
4. High-pressure steam connection to improved type of ejector of sufficient capacity to create and maintain a vacuum of not less than 20 inches with 80 pounds of steam at apparatus.
5. The condensation from inner chamber to run free from bottom at front end, controlled with a valve.
6. The condensation from jacket from center of bottom to be connected to improved pipe expansion trap and discharged into feed-water tank for use in boiler. To be controlled also with a valve.

Fittings.—To include, in addition to piping specified, all necessary valves for the proper control of steam to both jacket and chamber, compound pressure and vacuum gauge for chamber, pressure gauge for jacket, low-pressure safety valve set at from 12 to 15 pounds for chamber, high-pressure safety valve for the jacket set at from 60 to 100 pounds as preferred, one pressure-reducing valve, one air ejector, one steam trap, and all necessary connections. All to be guaranteed to be satisfactory for the purpose intended.

Castings.—All piping and fittings, except that on bottom of disinfector for condensation tank, and formaldehyde-ammonia generators, to be located on top and covered in a sheet-steel casing, hinged and provided with a suitable lock.

Formaldehyde-ammonia generators.—Disinfector shall be provided and fitted with the "American" improved type vacuum formaldehyde-ammonia generators, consisting of two containers and one gas generating chamber, all complete, properly valved and connected to disinfecting chamber.

Car.—To be of wrought-steel construction, basket type, mounted on roller wheels and furnished with track and truck supports necessary for operation in approved manner, unless otherwise ordered.

Finish.—Interior of chamber, also car frame and wheels, to be painted three coats of aluminum bronze; exterior to be painted three coats of gloss black, unless otherwise specified in order. A substantial, removable, sheet copper hood to be furnished and fitted inside at top of chamber and properly supported.

BOILER

Boiler to be of the vertical submerged-tube type, 30 inches in diameter by 5 feet 8 inches high. Shell to be $\frac{1}{4}$ inch thick, open-hearth steel; the heads of $\frac{3}{8}$ inch flange steel. To be fitted with 50 tubes, 2 inch diameter and built to carry a working pressure of 100 pounds per square inch. Smoke pipe of 13 inch diameter, to be hinged for lowering when not in use.

Boiler to be fitted with ash pan formed by extension of shell, with bottom of No. 8 steel, and to be complete with all fixtures, including safety valve, injector, steam and water gauges and cocks, blow-off cock, together with all piping to connect with disinfector.

Boiler to be secured to and made self-contained with disinfector by heavy cast-steel or malleable plates bolted to reinforcing saddles to support boiler at proper location. Firing tools, consisting of hoe, slice bar, and scoop to be provided.

RUNNING GEAR AND SUPPORTS

These shall be constructed to support the imposed weight at three points, one in front and two in the rear. The forward truck to be provided with steel roller-bearing wheels not less than 2 inches in diameter and $\frac{3}{4}$ by 6 inch face. The framework to support a steel fifth wheel forming a unit with the bottom of the disinfector. Heavy steel leaf elliptical springs to be underslung to not less than 2 inch square axle. To be provided with removable tongue, two steel strap eyes for attaching tractor, double trees, and chains. The rear wheels to be steel roller-bearing, 48 inch diameter and not less than $\frac{3}{4}$ by 6 inch face on not less than a $2\frac{1}{2}$ inch square steel axle.

The heavy cast-steel or malleable plates supporting the overhanging boiler to the disinfector are also to form the riding supports; at points of contact heavy steel helical springs to be provided. A single driver's seat shall be placed on top of disinfector.

The wheels, axles, and woodwork to be finished in Indian red paint, varnished. The disinfector and boiler in black machinery enamel.

AMERICAN STERILIZER Co.,
Erie, Pa.

In considering the needs of base hospitals in the American Expeditionary Forces, it was foreseen that there would be times, during and just after active military operations, for example, when the surgical sterilizing apparatus would be inadequate. It was thought that portable disinfectors might be used in such emergencies. Furthermore, since evacuation hospitals were not supplied with surgical dressings sterilizers, the portable disinfector might be very useful to them on such occasions as those referred to above. In order to determine their efficiency for that purpose and before making recommendations for their use under such conditions, tests were made early in March, 1918, by an officer detailed from the laboratory of the Army Medical School. The results of those tests are quoted here in full:¹⁴

REPORT ON A TEST MADE ON THE PORTABLE DISINFECTOR "HARTSOCK MODEL," MANUFACTURED BY THE AMERICAN STERILIZER CO., ERIE, PA.

The test was made to determine whether all infectious organisms in bedding, clothing, or surgical dressings would be killed; in other words, to determine the reliability of this type of disinfector as a sterilizer.

The organisms used were *Staphylococcus aureus* and *B. subtilis*. The latter is not pathogenic, but is quite as difficult to kill as anthrax or tetanus and could be carried more easily. The material used in the test was prepared as follows: Forty-eight hour broth cultures were prepared. Stained smears indicated that the culture of *B. subtilis* contained many spores. Small pledgets of gauze were then prepared and soaked in these cultures. The gauze pledgets were about an inch in length, by one-fourth of an inch wide, and consisted of several layers of gauze sewed together. After they had been thoroughly saturated

in the culture, they were removed to a sterile Petri dish and dried at room temperature, and wrapped in sterile containers for use.

The method of experiment was as follows: Several of these infected pledgets of gauze were buried in different packages of gauze dressings. These packages of dressings were then placed in different parts of the disinfecter in the middle of folds of blankets or under mattresses, etc., and the disinfecter was filled entirely with old blankets, clothes, packages of surgical dressings, and cotton waste, so as to simulate service conditions as closely as possible. Self-registering thermometers and Diack controls were also buried in the same gauze packages with the cultures so that the temperature reached could be accurately recorded. At the end of the period of exposure the packages were opened, and the infected pledgets of gauze were dropped by sterilized forceps into tubes of sterile broth. Controls were made by planting a number of pledgets of infected gauze that had not been passed through the disinfecter, in tubes of bouillon. All of these control tubes showed growth on the following morning, proving that the cultures of staphylococcus and *B. subtilis* were both alive and viable. The results of the tests made are as follows:

FIRST TEST

Steam was up and the apparatus already warmed; 65 pounds pressure in the jacket. A vacuum of 16 inches was obtained in four minutes. Steam was then introduced into the cylinder, and the contents were given a 20-minute exposure at 15 pounds pressure.

Package of gauze was buried at the bottom in a mattress, and contained pledgets infected with Staphylococcus and *B. subtilis*, and also a Diack control. After the exposure, a vacuum of 8 inches was produced and the chamber opened. When removed after the test, the Diack control was melted, indicating a temperature of at least 250° F. and the infected pledgets were cultured. All were sterile.

A second package of gauze was placed in the middle of the disinfecter, buried in a closely packed package of blankets. A self-registering thermometer was also in the package. At the end of the exposure the pledgets of infected gauze were placed in bouillon tubes, and no growth occurred in any tube. The thermometer registered 255° F.

SECOND TEST

With 65 pounds pressure in the jacket, a vacuum of 18 inches was obtained in four minutes, steam was introduced into the chamber, and the bedding and clothing exposed for 30 minutes at 15 pounds pressure. At the end of the exposure a vacuum of 9 inches was produced, and the chamber was opened five minutes after the exposure.

A package of gauze with infected pledgets and thermometer was buried in a mattress at the bottom. At the end of the test the thermometer registered 231° F. The pledgets were cultured, and all remained sterile. No growth occurred in any tube either of staphylococcus or *B. subtilis*.

A package of gauze was buried in blankets in the middle as before. The thermometer in this package registered 250°, a Diack control similarly placed was not melted, but cultures of the infected pledgets all remained sterile.

THIRD TEST

With 65 pounds in the jacket, 18 inches of vacuum were obtained in four minutes. Steam was introduced into the cylinder and an exposure of 40 minutes was given at 15 pounds pressure. At the end of the experiment, 9 inches of vacuum were produced and the chamber was opened in five minutes from the termination of the exposure.

One package of gauze was buried in the middle of the cylinder as before, with infected pledgets, three thermometers, and a Diack control. When the package was removed after the exposure, the Diack control was melted, but all three thermometers registered 247° F. It is thus seen that the Diack control, which is supposed to melt at 250° F. is not an accurate method of measuring temperature, for in one case one failed to melt although the

thermometer registered 250, while in another case the control melted although three thermometers agreed on a reading of 247° F. All pledgets were cultured and no growth occurred in any tube.

One package was buried in the bottom as before, with pledgets of gauze. These were cultured at the conclusion of the exposure, and all tubes remained sterile.

FOURTH TEST

A test was made of the sterilizing power of the formaldehyde apparatus. As it is notoriously difficult to secure penetration with formaldehyde, and as the cylinder was closely packed as in all other tests, it was believed that this test would afford a demonstration as to the penetrating power of formaldehyde when used in this disinfecter with a vacuum. At the same time it must be stated that as heat was used through the steam in the jacket, and as the bedding necessarily contained some moisture as the result of its passage through the previous tests, these circumstances alone may have been sufficient to cause sterilization.

With 65 pounds of steam in the cylinder, a vacuum of 20 inches was produced in six minutes. Seventeen ounces of formaldehyde solution (100 parts 40 per cent formaldehyde, 10 parts glycerine, and 20 parts calcium chloride) were introduced in vapor into the cylinder in four minutes. After the formaldehyde was vaporized there was still 15 inches of vacuum in the chamber. An exposure of one hour was given, at the end of which time the gauge showed that there was still 4 inches of vacuum. This was increased to 10 inches, and 8 ounces of ammonia were introduced to neutralize the formaldehyde, and the disinfecter was opened. No fumes of formaldehyde were noticeable.

Three packages of gauze were used in this test:

The first package, with infected pledgets was placed on top of the bedding where the gauze would have free access to it. Two thermometers that were hung near this package registered 295° and 300° F., respectively. This was the temperature in the open, and it is not to be supposed that the temperature in the mass of bedding was as high as this. At the end of the exposure, the infected pledgets were cultured and all remained sterile.

A package of gauze was buried in blankets in the middle of the mass of clothing as before. The infected pledgets removed from this package after exposure were cultured and all cultures remained sterile.

A package was also buried in the mattress at the bottom as before. The infected pledgets removed from this package after exposure were cultured and all remained sterile.

From the above tests, the conclusion is drawn that when properly operated, this disinfecter is an efficient sterilizer even when the cylinder is closely packed with clothes or dressings. Every culture placed in the disinfecter was killed whether the exposure was 20, 30, or 40 minutes. It is believed, therefore, that a 20-minute exposure can be recommended, and as it takes approximately five minutes at the beginning to introduce the steam and another five minutes at the end to create the vacuum and remove the steam so that the clothes may be dry when removed, this 20-minute exposure will actually require 30 minutes. It will thus be seen that two loads may be sterilized in an hour. In other words, it could be relied on to sterilize the clothes of about two companies an hour.

The formaldehyde sterilization, using a temperature of about 90° F., which will not injure leather, can certainly be relied upon to sterilize leather articles and such articles of equipment as may be destroyed by steam, and where great penetration is not required. This is probably all that will be required of the formaldehyde process. At the same time, it may be stated that this process may be capable of penetration because of the effective vacuum that can be created by the apparatus, and in the test described above there were indications, in change of color and appearance of certain articles, that the formaldehyde had actually penetrated to the interior of the mass used in the experiment.

While unfortunately no lice or bedbugs were available for test, it is certain that any process that will kill the spores of *B. subtilis* will kill these insects, which are sensitive to heat, and the apparatus is therefore to be recommended as an efficient apparatus for the delousing of a command.

Mr. J. E. Hall, the president of the American Sterilizer Co., states that in 30 days' time they can turn out this portable disinfector at the rate of one a day.

EDWARD B. VEDDER,
Lieutenant Colonel, M. C.

Because of the reported prevalence of vermin among the troops in France, the question arose as to the best manner of disinfecting the clothing of the body louse and its eggs. The use of cyanide gas as a disinfectant was proposed.¹⁵ It was understood that it would take approximately 45 minutes exposure to the gas to destroy the body louse and its eggs. Even then it was doubtful that the eggs would be destroyed. Having in mind the fact that vermin of all sorts are comparatively readily destroyed by heat, it was thought that the portable disinfector might prove effectual for that purpose. To determine its value for this service, the following tests were made:¹⁶

THE TIME REQUIRED EFFECTUALLY TO DELOUSE CLOTHING BY MEANS OF THE HARTSOCK MODEL, "AMERICAN" KINYOUN-FRANCIS STEAM AND FORMALDEHYDE DISINFECTOR

Inasmuch as active lice are more easily killed than nits, the time required effectually to delouse clothing is the time required to kill the nits. Through the courtesy of the Bureau of Entomology of the Department of Agriculture, I was supplied with 160 nits of *Pediculus humanus vestimenti*, deposited from July 2 to July 5, inclusive. Under proper conditions they would have hatched from July 9 to July 16, inclusive. Those conditions (of body heat and humidity) were not supplied until after some of the nits had been subjected to the action of the disinfector. The exposures were made on July 13 in the forenoon and were as follows:

Forty-six nits were exposed for five minutes. During this time the maximum temperature within the chamber was 250° F. The maximum temperature within the bundle in which the nits were wrapped was 192° F. The bundle was made up of old underwear, packed medium tight, and measured 14½ inches long and 7½ inches in diameter.

Thirty-four nits were exposed, similarly wrapped, for 10 minutes. The maximum temperature in the chamber during this period was 257° F. The temperature within the bundle was not taken, but it is probable that inasmuch as the period of exposure was twice as long as before, the penetration was more complete.

Thirty-five nits, similarly wrapped, were exposed for 20 minutes. This time the temperature within the chamber reached 266° F. The temperature within the bundle was not recorded.

Forty-five nits were kept as controls, and these, of course, were not subjected to the action of the disinfector at all.

Each group of nits was then encased in a Baet entomological box and the boxes, placed in small cotton bags, were worn beneath the undershirt. Within 24 hours some of the 45 control eggs had hatched. On July 19 no more had hatched. The others may be considered as dead. Hence, the mortality of the control nits is 23 per cent.

To date, July 22, none of the exposed eggs has hatched.

These data are presented concisely in Table I.

TABLE I.—The destruction by steam of the nits of *Pediculus humanus vestimenti* by means of the Hartsock model, "American" Kinyoun-Francis steam and formaldehyde portable disinfector

Duration of exposure	Maximum temperature in chamber	Temperature in center of bundle	Number of eggs	Number hatched	Percentage mortality
<i>Minutes</i>	° F.	° F.			
0	-----	-----	45	35	23
5	250	192	46	0	100
10	257	-----	34	0	100
20	266	-----	35	0	100

These experiments seem to indicate that nits exposed to the action of steam under 15 pounds pressure in the Hartsock model, "American" Kinyoun-Francis steam and formaldehyde disinfectant, even when well covered with several thicknesses of underclothing, are killed within five minutes.

It is probable, therefore, that exposure for 10 to 15 minutes in this apparatus will be more than sufficient effectually to delouse clothing.

The question of disinfectors was presented to the committee on sterilizers at their meeting in Washington in April, 1917.¹ The number and type of disinfectors had not been clearly determined at that time. For a fixed hospital it was thought that the stationary type would be satisfactory and probably preferable; the portable type would have a wide field of usefulness, both in camps in the United States and overseas. The first instructions for the purchase of portable disinfectors was issued June 21, 1917, and called for 12.¹⁷ The next instructions were issued at the end of August, 1917, and called for 28.¹⁸ The number of portable disinfectors authorized for purchase during the period June, 1917, to December, 1918, inclusive, appears in the following table, showing dates and firms from which purchased:¹⁹

Sterilizers

Date	Firm	Quantity	Type	Unit price	Cost
1917					
May 19	American Sterilizer Co.	1	Steam ^a	\$1, 449. 00	\$1, 449. 00
May 21	do	1	Electric	614. 25	614. 25
May 31	do	1	Steam ^b	1, 166. 00	1, 166. 00
June 26	do	6	do. ^a	1, 400. 00	8, 400. 00
Aug. 9	do	34	do. ^a	1, 400. 00	47, 600. 00
Aug. 17	do	1	do. ^c	798. 00	798. 00
Oct. 29	do	6	do. ^a	1, 400. 00	8, 400. 00
Dec. 18	do	1	Electric	699. 00	699. 00
Dec. 22	do	13	Steam ^d	1, 551. 00	20, 163. 00
Do.	do	2	do. ^d	1, 541. 00	3, 082. 00
Dec. 28	do	1	Electric	721. 00	721. 00
1918					
Jan. 18	do	1	Steam ^d	1, 548. 00	1, 548. 00
Jan. 31	do	1	Electric	690. 00	690. 00
Feb. 7	do	1	do	860. 00	860. 00
Feb. 14	do	1	Kerosene	520. 90	520. 00
Feb. 26	do	1	do	560. 00	560. 00
Feb. 27	do	1	Electric	860. 00	860. 00
Mar. 1	do	50	Steam ^d	1, 565. 00	78, 250. 00
Mar. 6	do	1	Electric	860. 00	860. 00
Mar. 26	do	1	do	850. 00	850. 00
Mar. 27	do	1	do	850. 00	850. 00
Apr. 22	do	1	do	1, 291. 00	1, 291. 00
Apr. 25	do	2	do	560. 00	1, 120. 00
Apr. 27	do	1	Kerosene	520. 00	520. 00
May 22	do	1	Steam ^d	1, 575. 00	1, 575. 00
May 24	do	1	do. ^c	1, 002. 00	1, 002. 00
June 17	do	6	Kerosene	520. 00	3, 120. 00
Aug. 5	do	1	Steam ^c	1, 125. 00	1, 125. 00
Do.	do	3	do. ^d	1, 610. 00	4, 830. 00
Aug. 6	do	2	do. ^d	1, 610. 00	3, 220. 00
Aug. 21	do	30	do. ^e	2, 100. 00	63, 000. 00
Aug. 30	do	28	do. ^e	2, 100. 00	58, 800. 00
Sept. 9	do	1	do. ^d	1, 656. 00	1, 656. 00
Sept. 11	do	1	Kerosene	520. 00	520. 00
Sept. 12	do	2	do	520. 00	1, 040. 00
1917					
June 26	Hospital Supply Co.	6	Steam ^a	1, 400. 00	8, 400. 00
Aug. 9	do	12	do. ^a	1, 400. 00	16, 800. 00
Dec. 3	do	1	Electric	790. 00	790. 00
Dec. 22	do	15	Steam ^d	1, 551. 00	23, 265. 00
1918					
Mar. 5	do	1	Electric	1, 408. 50	1, 408. 50
May 24	do	1	do	898. 25	898. 25
June 17	do	7	Kerosene	537. 00	3, 762. 50
Aug. 3	do	1	Steam ^c	754. 00	754. 00
Aug. 12	do	7	do. ^e	2, 025. 00	14, 175. 00
Aug. 17	do	1	do. ^d	1, 565. 00	1, 565. 00

See footnotes at end of table.

Sterilizers—Continued

Date	Firm	Quantity	Type	Unit price	Cost
1918					
Aug. 21	Hospital Supply Co.	4	Steam ^a	\$2,025.00	\$8,100.00
Aug. 30	do	2	do. ^a	2,125.00	4,250.00
Sept. 24	do	1	Kerosenc	591.00	591.00
Sept. 27	do	1	do	591.00	591.00
Nov. 4	do	1	Gas	556.00	556.00
1917					
June 26	Kny-Scheerer Corporation	6	Steam ^a	1,400.00	8,400.00
Dec. 22	do	15	do. ^d	1,551.00	23,265.00
1918					
Feb. 15	do	1	Electric	975.00	975.00
Mar. 6	do	1	Steam ^c	738.00	738.00
June 18	do	1	do. ^c	1,040.00	1,040.00
July 3	do	1	Electric	848.00	848.00
July 24	do	1	Steam ^b	1,215.00	1,215.00
Aug. 21	do	15	do. ^e	2,030.00	30,450.00
Aug. 24	do	1	do. ^c	506.00	506.00
Aug. 29	do	1	Gas	775.00	775.00
Aug. 30	do	1	do	775.00	775.00
Do	do	10	Steam ^e	2,030.00	20,300.00
Sept. 17	do	6	Kerosene	494.00	2,964.00
1917					
June 27	Scanlon-Morris Co.	6	Steam ^a	1,400.00	8,400.00
Aug. 9	do	10	do. ^a	1,550.00	15,500.00
Dec. 22	do	15	do. ^d	1,550.00	23,265.00
1918					
Feb. 4	do	1	do. ^b	1,143.00	1,143.00
Feb. 6	do	1	do. ^c	868.00	868.00
Feb. 22	do	1	do. ^c	1,150.00	1,150.00
Mar. 26	do	1	do. ^c	675.00	675.00
May 28	do	1	Kerosene	1,079.00	1,079.00
June 10	do	1	Steam ^b	1,300.00	1,300.00
Aug. 21	do	7	do. ^e	2,045.00	14,315.00
Sept. 10	do	3	do. ^e	2,200.00	6,600.00
1917					
June 26	Wilmot Castle Co.	6	do. ^a	1,400.00	8,400.00
Aug. 9	do	4	do. ^a	1,466.00	5,864.00
Dec. 22	do	15	do. ^d	1,551.00	23,265.00
Dec. 28	do	1	do. ^b	1,254.00	1,254.00
1918					
Aug. 21	do	10	do. ^e	2,020.00	20,200.00
Sept. 3	do	8	do. ^e	2,025.00	16,200.00
	Total	418			649,394.50

^a Standard outfit with dressing drums and 6-horsepower boiler.

^b Standard outfit with dressing drums but without boiler.

^c Smaller size without boiler.

^d Standard outfit with dressing drums and 12-horsepower boiler.

^e Standard outfit with 2 dressing sterilizers, dressing drums, and 12-horsepower boiler.

Calls for these portable disinfectors steadily increased. The output by the firms already mentioned was limited. New sources of supply were sought in October, 1918. Several manufacturers of boilers were approached with a view of interesting them in the manufacturers of these disinfectors. Only firms known to have the facilities for the manufacture of such apparatus and to be financially sound were included in this survey of facilities. Some of the firms interviewed were capable of producing only the steam boilers, while others were able to produce the entire outfit. Several of the firms found to be interested were furnished blue prints and specifications for consideration and to determine their ability to produce the outfits.²⁰ Fortunately, the cessation of hostilities terminated the need for disinfectors before it became necessary to place orders in addition to those already enumerated.

DISTRIBUTION

Portable disinfectors, being bulky, were purchased in accordance with a definite schedule of requirements. It was not contemplated that they would be stored at any point longer than was necessary to make the distribution required. A number of them were distributed among the training camps within the United States, but the bulk of them were intended for use overseas. One of the base hospitals sent to France in July, 1917, was provided with one of these disinfectors. Its use and advantages were promptly appreciated.²¹ A request was cabled to the Surgeon General, August 16, for 15 of them.²² Instructions were given that 5 be shipped at once to the medical supply depot in France. They arrived at the port of embarkation by the end of August and were promptly floated. The chief surgeon, A. E. F., was advised that 5 disinfectors would be shipped at once and the remainder as soon as available.²³ Instructions were issued November 5 for the shipment of 10 portable disinfectors in addition to the 5 ordered shipped in August.²⁴ Thereafter shipments were made direct from the manufacturers to the ports of embarkation as the apparatus became available. The number shipped steadily increased. In the month of October, 1918, 37 were floated, making a total of 146 shipped to France.²⁵ Water transportation was insufficient to take care of the full requirements for that month, which were 60.²⁵ The following table shows the rate of delivery by months during the calendar year 1918:²⁶

Disinfectors, portable steam

Date	Firm	Quantity authorized	Quantity canceled	Quantity delivered	Type	Unit price	Cost
July 3, 1917	American Sterilizer Co.	12	0	5	Cylindrical	\$1,750.00	\$8,750.00
Sept. 21, 1917	do	28	0	7	Rectangular	2,500.00	17,500.00
Nov. 8, 1917	do	1	0	28	do	2,750.00	77,000.00
Dec. 5, 1917	do	125	0	1	do	2,700.00	2,700.00
Apr. 1, 1918	do	50	0	125	do	2,500.00	312,500.00
Aug. 23, 1918	do	100	51	50	do	2,600.00	130,000.00
Dec. 18, 1918	do	2	0	49	do	2,750.00	140,250.00
Dec. 23, 1918	do	3	0	2	Cylindrical	2,250.00	4,500.00
Dec. 6, 1917	Hospital Supply Co	50	0	3	do	2,555.00	7,665.00
Jan. 7, 1918	Kny-Scheerer Corporation ..	50	0	50	Rectangular	2,575.00	128,750.00
Sept. 23, 1918	do	50	20	30	do	2,575.00	128,750.00
					Cylindrical	2,660.00	79,800.00
	Total	471	71	400			1,038,165.00

SPARE PARTS

Many of the pieces of apparatus, both of the standard sterilizing outfit and the portable disinfectors, were lost, broken, or damaged in transportation to France.²⁷ Spare parts were necessary to replace these broken or damaged parts, and a list of needed parts was prepared in July, 1918.²⁸ The number of these spare parts shipped from month to month was increased with the number of sterilizing outfits and disinfectors overseas. In preparing these lists the different manufacturers of the outfits were requested to furnish a list of the parts which they had replaced in the past and the relative proportions of each required.²⁸

OTHER TYPES OF DISINFECTORS

For fixed hospitals which were likely to be permanent after the end of the war, it was considered expedient to furnish stationary types of disinfectors instead of the portable type. The chambers of these disinfectors, as a rule, were approximately the same size as that of the portable outfit, but variations were made according to the requirements of the individual hospital. A number of the stationary disinfectors were purchased.

REFERENCES

- (1) Letter from the chairman, committee on bed, clothing, and miscellaneous hospital supplies, to the War Department, Office of the Surgeon General, May 11, 1917, transmitting a report and recommendation of the special committee on sterilizers. On file, Finance and Supply Division, S. G. O., 14636-13-1.
- (2) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, May 25, 1917. Subject: Supplies for a million men. On file, Finance and Supply Division, S. G. O., 14039-20-14.
- (3) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, August 3, 1917. Subject: Steam sterilizing outfits. On file, Finance and Supply Division, S. G. O., 14039-20-14.
- (4) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, November 16, 1917. Subject: Purchase of disinfectors and sterilizing outfits. On file, S. G. O., Finance and Supply Division, $\frac{713-359}{257}$.
- (5) First indorsement from the Surgeon General's Office to the officer in charge, Medical Supply Depot, New York, August 13, 1918, relative to the purchase of 100 sterilizing outfits. On file, Finance and Supply Division, S. G. O., $\frac{713-359 \text{ N. Y.}}{886}$.
- (6) Quantities of deliveries of combining sterilizing outfits, U. S. Army pattern, delivered January 18, to December 31, 1918, compiled in the Surgeon General's Office in 1918. On file, S. G. O., Finance and Supply Division, $\frac{531 \text{ Misc.}}{154}$.
- (7) Letter from the medical supply officer, U. S. Army, New York, to the Surgeon General, November 22, 1917. Subject: Sterilizing sets. On file, Finance and Supply, Division, S. G. O., $\frac{713-539 \text{ N. Y. D.}}{276}$.
- (8) Third indorsement from Lieut. Col. E. B. Vedder, Army Medical School, to the medical supply officer, New York City, December 6, 1917, relative to the most suitable sizes of dressing sterilizers. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y. D.}}{276}$.
- (9) Sixth indorsement from the medical supply officer, New York, to the Surgeon General December 20, 1917, relative to the size of horsepower boilers supplied with sterilizing outfits. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y. D.}}{276}$.
- (10) Letter from the department surgeon, Northeastern Department, Boston, to the Surgeon General, February 7, 1918. Subject: Hospital facilities. On file, Finance and Supply Division, S. G. O., $\frac{188-80 \text{ D. S. B.}}{33}$.
- (11) Letters from the Surgeon General to the officer in charge, Medical Supply Depot, New York City, March 18, 1918. Subject: Steam sterilizers and sterilizing outfits. On file, Finance and Supply Division, S. G. O., $\frac{188-80 \text{ D. S. B.}}{33}$.
- (12) Letter from the American Sterilizer Co., Erie, Pa., to Col. H. C. Fisher, War Department, June 27, 1917, relative to portable disinfectors. On file, Finance and Supply Division, S. G. O., $\frac{28 \text{ A. S. C.}}{40}$.

- (13) Letter from the American Sterilizer Co., to Col. Edwin P. Wolfe, M. C., July 22, 1926, relative to portable disinfectors. On file, Finance and Supply Division, S. G. O., 28 A. S. C.
40
- (14) Letter from the Surgeon General to the chief surgeon, A. E. F., France, March 23, 1918. Subject: Portable disinfectors. On file, Finance and Supply Division, S. G. O., 28 A. S. C.
13
- (15) Letter from the officer in charge, Medical Supply Depot, New York, to the Surgeon General, June 26, 1918. Subject: Request for the services of bacteriologists. On file, Finance and Supply Division, S. G. O., 713-539 N. Y.
796
- (16) Letter from First Lieut. Joseph W. Smith, jr., M. C., to the Surgeon General, U. S. Army, July 20, 1918. Subject: Investigation of disinfectors. On file, Finance and Supply Division, S. G. O., 713-539 N. Y.
796
- (17) Letter from the Surgeon General to the officer in charge, Medical Department, New York, June 21, 1917. Subject: Disinfectors. On file, Finance and Supply Division, S. G. O., 14039-107.
- (18) Letter from the Surgeon General to officer in charge, Medical Supply Depot, New York August 18, 1917. Subject: Portable disinfectors. On file, Finance and Supply Division, S. G. O., 713-539
34
- (19) List of disinfectors, portable, steam, purchased during the World War, compiled from official records in the Surgeon General's Office.
- (20) Letter from the officer in charge, Medical Supply Depot, New York, to the Surgeon General, November 16, 1918. Subject: Portable disinfectors. On file, Finance and Supply Division, S. G. O., 713-539 N. Y.
1110
- (21) First indorsement, chief surgeon, Base section No. 1, to chief surgeon, Lines of Communication, A. E. F., October 14, 1917. Subject: Steam disinfectors. On file, Finance and Supply Division, S. G. O., 713-250
2
- (22) Paragraph 15. Subject: Paragraph 1, Cable 102, H. A. E. F., Paris, to The Adjutant General, August 16, 1917, relative to steam sterilizers. On file, Finance and Supply Division, S. G. O., 713-250
2
- (23) Cable from the Adjutant General to the Commanding General, H. A. E. F., August 20, 1917, relative to shipment of disinfectors called for on Cable No. 102, H. A. E. F. On file, Finance and Supply Division, S. G. O., 713-250
2
- (24) Eighth indorsement, Surgeon General's Office to officer in charge, Medical Supply Depot, New York, November 15, 1917, directing shipment of portable disinfectors. On file, Finance and Supply Division, S. G. O., 713-250
2
- (25) Memorandum for Col. E. P. Wolfe, M. C., from Capt. Fred. J. Murray, U. S. A., October 30, 1918, relative to shipment of portable disinfectors to France during 1918. On file, Finance and Supply Division, S. G. O.
- (26) Number of disinfectors, portable, delivered in 1918, compiled in the Surgeon General's Office, 1918. On file, Finance and Supply Division, S. G. O., 531 Misc.
154
- (27) Letter from the chief surgeon, A. E. F., to the Surgeon General, April 16, 1918. Subject: Damaged disinfectors in transit. On file, Finance and Supply Division, S. G. O., 250 France
340
- (28) Letter from the Surgeon General to the officer in charge, medical supply depot, New York, July 11, 1918, relative to spare parts for sterilizers for overseas shipments. On file, Finance and Supply Division, S. G. O., 713-539 N. Y.
814

CHAPTER XXXVII

X-RAY EQUIPMENT AND SUPPLIES

The X-ray apparatus in the possession of the Medical Department when we entered the World War consisted of the stationary apparatus at general hospitals and at the larger military posts. In addition there were a few portable sets which had been developed during the years immediately preceding 1917. This portable outfit consisted of a motor generator and a high-tension transformer. The motor generator was composed of a gas engine of the marine type, a direct-connected alternating-current generator, and a rectifying disk mounted on the shaft of the motor. These had served a good purpose on the Mexican border and at Vera Cruz, but were cumbersome and unreliable for the work of a great war.¹

The problems presented to the Medical Department when we entered the World War, with regard to X-ray equipment, were to provide stationary X-ray plants in sufficient numbers for the fixed hospitals in the United States and overseas, and to devise and secure the manufacture of a practicable portable apparatus.¹ In this connection, the American Roentgen Ray Society was of material assistance to the Medical Department.

STATIONARY APPARATUS

In the latter part of 1916 the American Roentgen Ray Society appointed a committee on preparedness, the function of which was to consider ways and means whereby the members of the society could render the most effectual service to the Government in the event of the entry of the United States into the war. This committee gave considerable attention to matters of X-ray equipment. In the early part of 1917 a special committee was appointed by the society to standardize X-ray apparatus and equipment. Because of the extremely technical nature of the X-ray apparatus it was decided that it would be impracticable and unnecessary to have all machines purchased identical in all respects. Individual processes and designs could be continued so long as the machines produced came clearly within the particular general requirements. Specifications for X-ray machines were drawn up by the committee with that object in view; performance tests were given more consideration than physical appearance and design. It was the conclusion of the committee that five types of apparatus, made by the five principal manufacturers, would come within the specifications.²

The committee compiled a list of all the apparatus and accessory articles needed for any kind of work likely to be required in the large military hospitals in the United States or in the base hospitals overseas. Specifications were prepared for the essential parts of the equipment, such as X-ray machine,

roentgenoscopic table, tube racks, tube stands, and vertical roentgenoscopes. This standard list was furnished the Surgeon General May 1, 1917, and served as the basis of the early procurement.³ The list as originally compiled was modified from time to time as experience suggested, but these modifications were only in minor details. The list was revised and with amendments and additions published as Part IV, "X-ray apparatus and supplies," List of Staple Medical and Surgical Supplies, Council of National Defense.

With this standard list of equipment, the problem presented was the procurement of X-ray machines in sufficient numbers to meet the immediate requirements in the United States. These machines were secured by giving orders, in as nearly equal numbers as possible, to five of the largest manufacturers of such apparatus.⁴ These manufacturers were selected because the machines manufactured by them were known to be satisfactory in all the civil hospitals. They had also been tested out by the Medical Department of the Army. It was impossible to provide a single type or make of X-ray machine because of the inability of any one manufacturer to furnish the machines rapidly enough. It was found that nearly all the machines to be furnished in the United States could be built for alternating current. The few places where only direct current was furnished were supplied with comparatively little delay with direct-current machines, a few of which were procured.¹

The apparatus installed in the various large military hospitals in the United States proved very satisfactory. Accordingly, decision was reached to provide the large hospitals to be established overseas with the same type of equipment. Some disappointment was experienced with the X-ray machines sent overseas because of insufficient information concerning current conditions in France. It was very difficult at the beginning of the war to secure rotary converters in large numbers, and the machines to be furnished rapidly were necessarily constructed for alternating current. It was deemed advisable to send alternating-current machines in sufficient numbers for the hospitals then contemplated in France, and to convert such of these as were necessary into direct-current machines by providing rotary converters.¹ Some difficulty was experienced in securing these rotary converters, which resulted in delay in providing X-ray apparatus for places where there was only a direct-current supply. Even in those places the emergency was met by providing another type of equipment known as the bedside apparatus.¹

PORTABLE OUTFITS

There were very few hospitals in the United States which could not be supplied readily with electric current from some outside plant. It was anticipated, however, that many hospitals in France would be so placed that no electric current of any sort would be available. If such hospitals were to be provided with an X-ray outfit it must be able to generate its own current. This anticipated need for such equipment received early attention. A satisfactory portable outfit was developed through the combined efforts of the engineers of the General Electric Co., of Schenectady, N. Y.; the Domestic Engineering Co., of Dayton, Ohio; and the Victor X-ray Corporation of Chicago. Specifications for the outfit were submitted to the Surgeon General

June 13, 1917. This outfit was devised largely by Dr. W. D. Coolidge and his assistant, Mr. Moore, in the research laboratory of the General Electric Co. It consisted essentially of a direct-connected gas-engine generator, a step-up transformer, a filament current transformer, a filament current control, a small booster, and the necessary milliammeters, voltmeters, and operating switches.¹

The generating apparatus consisted of a Deleo-light engine manufactured by the Domestic Engineering Co. This engine was directly connected to a dynamo of 1 kilowatt capacity delivering a direct current at 32 volts. It was modified by changing the armature and field windings and by adding a pair of slip rings so as to furnish an alternating current. A throttle governor was provided to regulate the voltage. This governor consisted of a solenoid

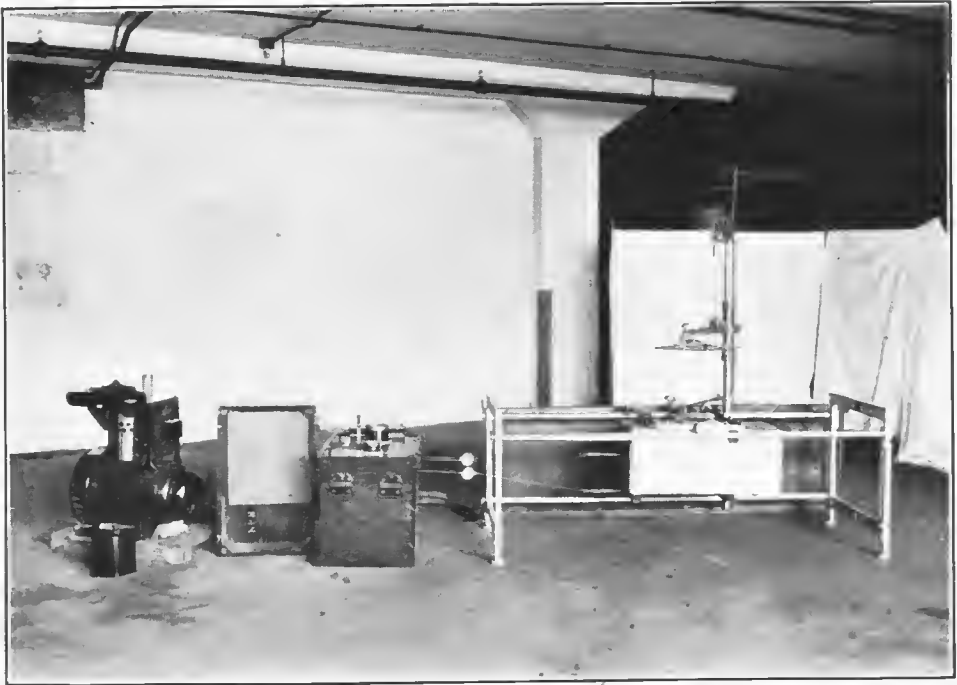


FIG. 37.—Portable X-ray outfit, model of 1917. Table top removed

mounted above the carburetor, the movable core of the solenoid being connected to the butterfly valve of the throttle. The solenoid was operated by direct current taken from the commutator on the generator.¹

The X-ray transformer was an oil-insulated, closed-core type of transformer, the middle point of whose secondary winding was grounded and connected to the milliammeter. The filament current transformer was also oil insulated. The remaining electrical parts of the outfit consisted of a filament current control, a small "booster" to prevent current drop when the load was thrown on an operating switch, a milliammeter, a voltmeter, and the X-ray tube. The latter was a tube designed by Doctor Coolidge especially for this outfit and was a modification of the original Coolidge tube. It was called a radiator tube and

was so constructed that it rectified its own current. It thereby rendered complicated and cumbersome rectifying devices unnecessary.¹

The electrical parts of the outfit were mounted in a solidly constructed box called the instrument box. This box was connected to the generator set by a 50-foot cable. The instrument box, when in use, was placed at the end of the X-ray table, and the engine at any convenient place within 50 feet.¹

The portable outfit was used in France in many evacuation hospitals, mobile hospitals, and even in some field hospitals. It was a simple, highly efficient, and readily transportable outfit. Its total weight was less than 1,000 pounds. The outfit was remodeled and greatly improved during 1919. Practically all the defects noted during the war were eliminated.¹

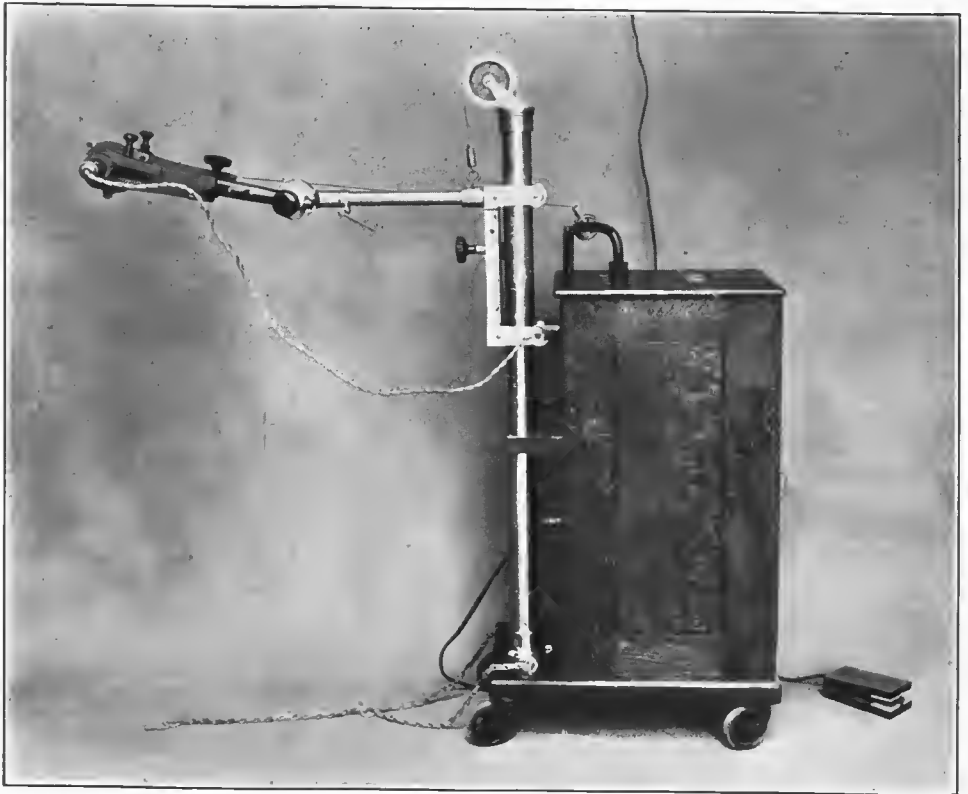


FIG. 38.—Standard bedside X-ray outfit

BEDSIDE UNIT

While the development of the portable outfit generating its own current was in progress another portable type of apparatus which did not have its own generating plant was devised by Prof. J. S. Shearer, of Cornell University. This apparatus was complete in one small cabinet, to which was attached a tube stand carrying a very flexible tube holder. The X-ray transformer was placed inside this cabinet. The special point in the construction of this transformer was that the Coolidge filament transformer was an integral part of the

main X-ray transformer. The necessity for an extra transformer for the filament current of the Coolidge tube was thereby avoided. The radiator type of Coolidge tube was used by this apparatus also. This apparatus was called a bedside unit.¹

The bedside unit filled a place of great usefulness during the war. It could be operated on either direct or alternating current, and its capacity was limited so that it could be attached directly to any electric lighting socket. This made it very portable and enabled it to be used at the bedside in the wards as its name suggests. This was done in thousands of cases of chest complications accompanying influenza during the epidemic of 1918, and in the case of many fractures that could not be moved to the X-ray room. Professor Shearer was able later, in France, to make a simple modification that made it possible to operate the bedside unit from the current supplied by the Delco engine of the portable outfit.¹

MOBILE OUTFITS

A highly satisfactory portable outfit had been developed, as already noted, but it had to be loaded into some kind of a truck to be moved from one place to another. It seemed desirable to have special transportation for a number of these portable outfits so that they could be sent quickly to mobile or evacuation hospitals or other points where wounded were being brought in unusual numbers. This was accomplished by a simple modification of the standard United States Army ambulance so that the entire outfit, including the standard Army portable X-ray table, could be transported safely and put into operation in a few minutes.¹ The gas-engine generator was mounted on a heavy wooden base of 2-inch material and placed inside the ambulance body just behind the driver's seat. This base was fastened by screws to a frame secured to the side walls and floor of the ambulance body. The instrument box, bedside unit, and other equipment were packed in the space between the generator and the rear end of the body. The table top was suspended on the outside of the body flat against the side and protected from the rain by a waterproof canvas curtain which rolled down over the outside of the table top.

Only 17 of these mobile outfits actually reached France, and none of them could be placed in service prior to the armistice. Five of them accompanied the Third Army into Germany, where their usefulness was thoroughly demonstrated.

LIST OF UNIT EQUIPMENT

Since the hospitals in which the X-ray apparatus was installed varied in size from 25 beds to more than 1,000 beds, it became necessary to select the apparatus and provide a list of accessory articles for hospitals of varying size. It was decided to furnish the standard bedside X-ray unit as suitable equipment to hospitals of less than 75 beds and to provide the larger hospitals with the standard X-ray apparatus of interrupterless type and with supplies and accessories according to the size of the hospital. Accordingly, lists of equipment were prepared.⁵ These lists, in order of sequence, follow.

SPECIFICATIONS A, FOR STATIONARY X-RAY MACHINE (INTERRUPTERLESS TYPE)

Each machine to consist of the articles enumerated below.

Cabinet.—A cabinet made of high-grade hardwood free of knots or blemish; all glass parts best French plate not less than three-sixteenths inch thick.

Transformer.—A high-tension transformer, having a normal rating of at least 10 kilowatts, transformer winding to be so proportioned that it will deliver at its secondary terminals an alternating current of at least 100,000 volts potential in actual service. It must stand a continuous run of two hours at 60,000 volts, delivering 5 milliamperes to the tube and backing up an 8-inch spark, and be capable of delivering 50 milliamperes to the tube backing up a 6-inch spark.

Rectifier.—A rotary high-tension rectifying or commutating device accurately balanced, directly connected with the shaft of the rotary converter or synchronous motor set, adjusted to revolve near or in contact with suitable terminals by means of which the high-tension alternating current from the transformer is changed into a high-tension pulsating unidirectional one through the tube circuit; and in case a disk type of rectifying device is employed, the disk must be cut out between the conducting segments so as to provide an ample air gap, or the metal collecting segments must be set out from the edge of the disk.

Switchboard.—A substantial switchboard of good insulating materials, on which are securely mounted the necessary switches for properly operating the outfit; each outfit to be provided with a polarity indicator.

Motor.—A satisfactory synchronous motor, of suitable rating, operating on an alternating current of the phase and potential noted in the circular of advertisement, same to be provided with all the necessary connections for proper operation.

Control.—A controlling rheostat for primary of the high-tension transformer, to be well ventilated and so constructed and mounted as to permit of fine graduation of current flow and to operate continuously for fluoroscopy or treatment without overheating. In addition to the rheostat, an auto-transformer control will be furnished.

Milliammeter.—A milliammeter, reading accurately and with an 8-inch double scale, with shunt reading 0-10 and 0-100 milliamperes securely mounted on the machine and conveniently placed for observation.

Mountings.—Switch board, transformer, rheostats, motors, time switch, connections, etc., to be mounted on the cabinet, or detached, as specified in the circular of advertisement. A separate rheostat for the primary will be allowed if satisfactory in appearance and size.

Terminals.—Each machine to be provided with substantial terminal posts mounted on the cabinet and automatic conductor cord reel (8-foot cords) for directly connecting with an X-ray table to be attached to each post. The two main terminals to have an adjustable parallel spark gap of not less than 10 inches, the third terminal to be provided with a suitable device for regulating the vacuum of the tube. All spark gap and regulating devices to be so regulated and designed that they can be conveniently and easily manipulated from the switchboard end of the machine.

Fluoroscopy.—Machine to deliver a satisfactory current for making fluoroscopic observations.

Connections.—Such fuses and internal connections as may be required to operate the outfit: two 10-foot lengths of best quality No. 2 flexible conductor cord with suitable lugs, etc., on its ends, for connecting the machine with the terminals of the main feed wires.

Each machine to be complete, with all necessary connections, to be practically noiseless in operation, and to run without noticeable vibration.

Each outfit to be well constructed mechanically in every detail; materials to be best quality; workmanship and finish to be first class in every respect. Apparatus to be so constructed that it can be set up and all electrical connections made without the aid of an expert and all parts of the outfit to be readily accessible for inspection.

All parts of the apparatus, mechanical and electrical, to be guaranteed for two and one-half years from the date of delivery, during which time breakdowns resulting from defects in the apparatus will be repaired by the contractor without expense to the purchaser.

Detailed blue prints and specifications for the apparatus, showing clearly the internal construction of the various parts, to accompany each bid. Such blue prints and specifications as are not required will be returned to the bidder. The acceptance of each machine shall be contingent upon actual testing out of machine at place of delivery specified in contract of purchase.

SPECIFICATION B, PORTABLE AND BASE HOSPITAL X-RAY TABLE

Table, X-ray, for portable apparatus, consisting of pair of cast aluminum end frames; slotted to receive four tubing members each 6 feet long, each end of these four members (which are interchangeable) to be provided with a screw and handle which locks them rigidly in place in the slots, providing a light, strong, and rigid frame upon which the regulation litter or a special top may be laid. The top of the table will have the following specifications:

Dimensions.—Length over all, 83 inches; width over all, 26 inches; rails, 2 by 2 inches.

Material.—Rails and handles of straight-grained sound wood, free from knots. Handles round, straight-grained rod of suitable size. Tops of "Continental Bakelite," approximately one-tenth inch thick and of dimensions as ordered by the builder.

Finish.—Woodwork to be finished in as nearly waterproof manner as possible. No finish on Bakelite.

Construction.—Rectangular frame 6 feet 4 inches by 26 inches outside; well constructed. Each side rail to have a groove as shown by sample submitted. Rail slit to take Bakelite top, with glue and dowel pin, as shown in model and sample submitted. Top to be as tense as material will permit.

Rail frame.—To allow shift of patient; rectangular frame of straight grained 2 by 2-inch wood. One side rail with raised ridge to take groove of top. Crosspieces to be attached under side rails with serews and angle iron, to allow these pieces to fit between metal frames of standard table 6 feet 2 inches inside. Side rails to be 6 feet 8 inches long.

A roller-supported carriage is constructed to travel on tops of the upper side members and fitted with roller bearings. This carriage consists of two side members of square cross section and two transverse members of round cross section. Traveling on the round cross members and underslung therefrom is a tube box supported by spool rollers with roller bearings, box to be covered with lead having weight of 4 pounds to a square foot. The opening in the middle of the top of the box will be provided with diaphragms, the shutters of which may be moved independently and give a diamond-shaped opening or slit parallel to long axis of the table at will. The box must be so constructed as to carry conveniently and safely the special type of Coolidge tube described below and provide for free access of air to the radiator. Stops should be provided on the tube-box carrier, which with sliding rings provided with milled head screws will permit of a tube shift of (a) 10 cm., (b) 15 cm., (c) any desired shift to be measured by calipers. The tube mounting must be provided to pass through the end of the box and with attachments for Coolidge filament and operating wires from the reels. A simple catch is provided to fasten the tube carrier in place. The radiator must be protected from injury by covering the ventilating openings with wire netting. Convenient brakes are to be provided to fix the tube carriage in its longitudinal and lateral runs. A string-operated switch, 10 amperes, 250 volts, is to be provided, having special clamp to attach same to table and with eyelets on the carriage to keep string in place. The switch must open or close two circuits simultaneously. Flexible 4-wire cable is attached to this switch, having at the other end plug connection fitting sockets in the instrument box.

Fluoroscope, for portable apparatus; dimensions 10 by 10 inches. The carrier to have the following features:

1. It must run easily on suitable bearings on two side rails of the table.
2. It must be readily locked in any desired position independent of tube box.
3. Provision should also be made to lock the carrier to the tube box.
4. The arm carrying the screen should be capable of rotation about a vertical axis.

5. A metal frame holding the screen should be fastened to this arm at one corner of the frame so as to allow rotation of the screen about a vertical axis passing through the corner.

6. The screen, with its frame and lead glass, should be easily removable from the holder to permit its use separately when desired.

7. The screen will be pierced in its exact center by circular hole, 3 mm. in diameter and lined with aluminum.

The specifications for the base hospital table are identical with those above except as follows:

1. The tube box shall take the regular type of tube instead of the radiator type. The mounting on the carrier to be interchangeable with the placing of the stretcher top or its movement parallel to the length of the table.

2. Suitable high-tension insulated leads are to be attached by clamps to the ends of the table so arranged as not to interfere in any way with the placing of the stretcher top or its movement parallel to the length of the table.

SPECIFICATION C, FOR TUBE STAND

The tube stand shall be of the general type originated by the Kelley-Koett Co., so constructed and counterbalanced that the tube carriage will move smoothly and easily and remain in any position without adjustment of screws or other contrivances. The stand must be of strong and rigid construction so that there is no noticeable vibration when in use, nor perceptible movement of the tube carriage when being used for compression of the abdomen while the patient breathes. Arrangement must be made for shifting the tube both laterally and in the direction of the length of the table and for tilting it for stereoscopic work.

Stand must be provided with a lead glass bowl equal in capacity to one-sixteenth inch lead. The base must be of a size and weight to render stand secure against overturning and provided with large easily acting and tracking castors with at least one-half inch trail. Highest part of base must not exceed 6 inches from floor. Stand must be provided with slot for diaphragms and filters and with two cones, one 5-inch and one 6-inch diameter, and a set of aluminum filters of 1, 2, 3, and 4 mm.

PORTABLE X-RAY OUTFIT APPARATUS

Booster, for portable apparatus, to take care of drop in voltage, in filament circuit when full lead is thrown on the gas-electric set; shall be of such design that with its primary in series with the supply voltage and its secondary in series with the primary of the filament transformer it will compensate for the drop in voltage to such an extent that the filament current will not vary over 0.2 ampere from its original setting; furnished with switch by which booster can be short-circuited.

Gasoline electric set (Delco), for portable apparatus, consisting of a one-cylinder gasoline engine with a built-in generator, with the following modifications: (1) Special armature winding with slip rings so that both alternating and direct current are available, direct current being used for field excitation; (2) special ignition system, rendering use of storage batteries unnecessary; (3) special voltage control by which a solenoid fed by direct current supply controls the carburetor; (4) suitable resistance across alternating-current and direct-current terminals to protect from surges. Capacity, 750 watts. Each machine to be packed in a permanent shipping and carrying case, and to be furnished with one set of extra brushes and fuses.

Filament control, inductive type, capable of giving a variation over a range from 4 to 5 amperes in the filament circuit.

Rheostat for solenoid control of engine speed, to have a resistance of approximately 2,000 ohms and to be capable of carrying continuously not less than 0.25 ampere, to be substantially constructed, the wires shellacked or enameled in position and with metal bands clamping the windings at end of cylinder.

Transformer, for portable apparatus, closed-core type, both terminals developed, oil insulation, provided with an oil-tight top. When excited by the gas-electric set described

above and using only one-half of the sine wave, it shall be capable of delivering to the X-ray tube 10 milliamperes, with a useful voltage corresponding to a back-up spark of 5 inches between points; this useful voltage to be determined by connecting a kenotron in series with the X-ray tube and measuring the potential drop across the tube by means of a point gap in parallel with the tube. The higher inverse voltage resulting from the use of only one-half of the wave shall be measured by means of a point gap in parallel with both the X-ray tube and kenotron and shall not exceed useful voltage by 3 inches.

Transformer, Coolidge filament-lighting, oil insulated, with an oil-tight cover; primary and secondary windings to be insulated from each other for a voltage not less than that corresponding to a back-up spark of 8 inches measured between points. With double cord reel for connecting the cathode of the X-ray tube and the transformer; Victor Electric Corporation's standard transformer for 110 volts, 60 cycle, or equivalent.

PORTABLE X-RAY TABLE TOP

Dimensions.—Length over all, 83 inches; width over all, 26 inches; rails, 2 by 2 inches.

Material.—Rails and handles of straight-grained sound wood free from knots. Handles round, straight-grained rods of suitable size. Tops of "Continental Bakelite," approximately one-tenth inch thick and of dimensions as ordered by the builder.

Finish.—Woodwork to be finished in as nearly waterproof manner as possible. No finish on Bakelite.

Construction.—Rectangular frame, 6 feet 4 inches by 26 inches outside; well constructed. Each side rail to have a groove as shown by sample submitted. Rail slit to take Bakelite top with glue and dowel pin, as shown in model and sample submitted. Top to be as tense as material will permit.

Rail frame.—To allow shift of patients. Rectangular frame of straight-grained 2 by 2 inch wood. One side rail with raised ridge to take groove of top. Cross pieces to be attached under side rails with screws and angle iron. To allow these pieces to fit between metal frames of standard table 6 feet 2 inches inside. Side rails to be 6 feet 8 inches long.

A roller-supported carriage is constructed to travel on tops of the upper side members and fitted with roller bearings. This carriage consists of two side members of square cross section and two transverse members of round cross section. Traveling on the round cross members and underslung therefrom is a tube box supported by spool rollers with roller bearings, box to be covered with lead having weight of 4 pounds to square foot. The opening in the middle of the top of the box will be provided with diaphragms, the shutters of which may be moved independently and give a diamond-shaped opening or slit parallel to long axis of the table at will. The box must be so constructed as to carry conveniently and safely the special type of Coolidge tube described below, and provide for free access of air to the radiator. Stops should be provided on the tube-box carrier, which, with sliding rings, provided with milled-head screws, will permit of a tube shift of (a) 10 cm.; (b) 15 cm.; (c) any desired shift, to be measured by calipers. The tube mounting must be provided to pass through the end of the box and with attachments for Coolidge filament and operating wires from the reels. A simple catch is provided to fasten the tube carrier in place. The radiator must be protected from injury by covering the ventilating openings with wire netting. Convenient brakes are to be provided to fix the tube carriage in its longitudinal and lateral runs. A string-operated switch, 10 ampere, 250 volts, is to be provided, having special clamp to attach same to table and with eyelets on the carriage to keep string in place. The switch must open or close two circuits simultaneously. Flexible four-wire cable is attached to this switch having at the outer end plug connection fitting sockets in the instrument box.

Fluoroscope, for portable apparatus; dimensions, 10 by 10 inches; the carrier to have the following features:

1. It must run easily on suitable bearings on two side rails of the table.
2. It must be readily locked in any desired position independent of tube box.
3. Provision should also be made to lock the carrier to the tube box.
4. The arm carrying the screen should be capable of rotation about a vertical axis.

5. A metal frame holding the screen should be fastened to this arm at one corner of the frame so as to allow rotation of the screen about a vertical axis passing through the corner.

6. The screen, with its frame and lead glass, should be easily removable from the holder to permit its use separately when desired.

7. The screen will be pierced in its exact center by circular hole, 3 mm. in diameter, and lined with aluminum.

Tube, special, Coolidge air-cooled type, with radiator type of anode. Tube $3\frac{3}{4}$ inches in diameter, tungsten target, backed with copper connected to heavy copper rod extending outside tube and connected to air-cooled radiator, capable of rectifying its own current. A shipping and carrying case is to be provided by the company furnishing tube, to be of the general design of that furnished by the General Electric Co.

Voltmeter, alternating current, scale 0-175.

Instrument box, of substantial construction is to be provided in which are permanently the following:

X-ray transformer.

Coolidge filament transformer.

Filament control.

Milliammeter C-15 M. B. Weston miniature preferred.

Voltmeter as specified.

Rheostat as specified.

Wiring diagram.

Operating switch.

General design as set up by the Victor Electric Corporation. To be furnished with approved insulators removable for shipment, well-constructed reels, good chest handles or equivalent, split plug connectors, and connecting cable 50 feet long.

SPECIFICATIONS FOR UNITED STATES ARMY BEDSIDE X-RAY UNIT

Cabinet and tube holder.—To be made of best quality polished quartered oak. Door to have piano hinges full length. Base of cabinet, $24\frac{1}{2}$ by 15 by $1\frac{3}{8}$, cabinet 15 inches wide, 19 inches long, and 36 inches high, $\frac{3}{4}$ -inch stock. Polished on all sides. Cabinet to be mounted on rubber-tire wheels 4 inches in diameter. Mounted on the base a nickel-plated tube stand with a ball-bearing arm, ball-bearing head at top, a tube holder made of wood to support the lead-glass holder at each end, and arranged so that the tube can be put into any position. The whole arrangement counterbalanced. The nickel-plated stand to be of $2\frac{1}{2}$ inch tubing, 5 feet over all. Lead-glass shields are to be used in connection with the special radiator type of Coolidge X-ray tube, the opening of 2 inches in diameter to be covered with 1 mm. of aluminum, properly mounted on the shield. This lead-glass shield to entirely inclose the X-ray tube, except at the end and the 2-inch opening. This shield to be made of lead glass equivalent to one-sixteenth inch of metallic lead, must be of uniform wall thickness, and pressed instead of blown.

High-tension transformer.—To be of such a size that it will fit in the upper portion of the cabinet, and is to be mounted in a steel tank with an oil-tight top. To be of the closed-core type and to have the filament current transformer inside of the same tank. Transformer tank to be mounted on a well-braced shelf, rigidly fastened for trans-Atlantic shipment, and leaving sufficient space below shelf for apparatus hereinafter mentioned. Transformers to be designed so that they will deliver a current of 5 milliamperes at a 5-inch useful voltage to the Coolidge tube, and under these conditions operating on the 110-volt, 60-cycle current; the total primary current is not to exceed 5 amperes. Transformers to be designed so that they will operate on any frequency from 25 to 133, without any change in controls or wiring systems. The primary of the transformer to be arranged so that it can be used with a 110-volt direct-current rotary, a 110-volt alternating current, or a 220-volt direct current, so that in order to change from alternating current to direct current it is simply necessary to throw the switch to the proper side. These positions to be plainly marked with the words "alternating" on one side and "direct" on the other.

Cable.—An 8-foot cable to be supplied to connect with the electric service. A 10-foot cable with a foot switch is to be supplied, so arranged that both the filament current and the high-tension current come on at the same instant.

Milliamper meter.—A milliamper meter is to be mounted in the top of the cabinet to measure tube current, reading from 0 to 10 milliamper meters. This milliamper meter is to be connected in series in the middle of the secondary and to be grounded to the case.

Reels.—There is to be a single reel to connect with the positive end of the Coolidge tube, and a 2-wire cable with a lamp socket, to connect with the negative end of the Coolidge tube. All binding posts, tape, or other electrical connections are to be plainly labeled in such a manner as to avoid danger of removal or erasure.

Wiring diagram.—A complete wiring diagram is to be attached to the inside door of the cabinet, protected by a thin sheet of transparent celluloid, and explicit statements of the changes needed in connection when using other than the current herein specified shall be given thereon.

Extension cords.—Twenty-foot lengths with suitable terminals.

X-ray apparatus for base hospital, 500 to 1,000 beds

Apparatus, X-ray, interrupterless type, to operate on type of current stated in contract.....	number..	1	Crocks, earthenware, 5-gallon.....	number..	2
Apron:			Films:		
Lead, protecting, with leather straps.....	do....	2	Dental—		
Waterproof, 50 inches long.....	do....	1	Holders for development, Eastman...do....	do....	10
Box for localizing apparatus.....	do....	1	1½ by 2½ inches (No. 4).....	gross..	1
To contain the following:			1¼ by 1½ inches (No. 1).....	do....	1
1. Parallel wire device for Strohl's method.			X-ray—		
2. Blaine's parallax localizer.			14 by 17 inches.....	dozen..	5
3. Localizing scale for cross-thread method.			10 by 12 inches.....	do....	10
4. Profoundometer localizer.			8 by 10 inches.....	do....	10
5. Hirtz compass.			5 by 7 inches.....	do....	5
6. Fluoroscopic adapter for Hirtz compass.			Film holders (case type) Eastman, 10 by 12 inches to accommodate 10 by 12 and 8 by 10 films between 2 screens.....	dozen..	2
7. Sutton localizing set.			2 screens.....	dozen..	2
Box lined with ⅜-inch sheet lead, water-tight, to be connected with sewer; inside measurements, 42 inches long, 22 inches wide, 19 inches deep. This box to hold tanks for developing, etc. (to be made by carpenter).....	number..	1	Faucets, enamel ware, 6-inch.....	number..	2
Box lined with ½-inch sheet lead on all sides; 10 inches wide, 20 inches long, 18 inches deep, made of ¾-inch lumber, with hinged lid; for protection of X-ray plates (to be made by carpenter).....	number..	1	Glass enterer.....	do....	1
Box wooden, 12 inches long, 12 inches wide, 3 inches deep (to be made by carpenter).....	number..	3	Glass, lead, ⅜ inch thick, 8 by 10 inch.....	pieces..	1
Bonnet, fluoroscopic (to be purchased in France).....	number..	2	Gloves, opaque, protective, gauntlet.....	pairs..	2
Brush, camel's-hair, 3-inch.....	do....	1	Goggles, automobile type, fitted with red and green superimposed clear polished celluloid, Arlington Pyralis, colors 24 and 181, 0.01 inch thick, finish H. 11.....	pairs..	2
Carriers, plate, eore:			Insulators:		
10 by 12 inch size, monel metal.....	dozen..	1	4-arm, for high-tension wires.....	do....	2
14 by 17 inch size, monel metal.....	do....	½	Wall for carrying high-tension wires through partitions.....	number..	3
Carrier, film (case) Eastman, for development:			Lead foil, medium thickness.....	pounds..	10
10 by 12.....	dozen..	1	Light, incandescent, blue, with pull switches.....	number..	2
8 by 10.....	do....	1	Lead, in sheets, 4 pounds to square foot.....	square feet..	100
14 by 17.....	do....	½	Localizer:		
Charts, eye localizing, Kelley-Koett.....	number..	200	Eye, Kelley-Koett.....	number..	1
Chemicals:			Profoundometer.....	sets..	1
Barium sulphate, for X-ray diagnosis.....	pounds..	50	Sutton.....	do....	1
Bromo alum.....	do....	5	Blaine's parallax.....	number..	1
Formaldehyde.....	do....	5	Marker, skin (to be purchased in France).....	do....	1
Hydroquinone.....	do....	5	Pitchers, enamel ware, 2-quart.....	do....	2
Metol, or equivalent.....	do....	½	Preservers, negative:		
Potassium bromide.....	do....	1	For 14 by 17 plates.....	do....	100
Sodium carbonate, dry.....	do....	5	For 10 by 12 plates.....	do....	200
Sodium byposulphite.....	do....	100	For 8 by 10 plates.....	do....	400
Sodium sulphite, dry.....	do....	15	For 5 by 7 plates.....	do....	100
Compass, Hirtz (to be purchased in France).....	number..	1	Paper, tracing:		
Fluoroscopic, adapter for.....	do....	1	14 by 17 inches.....	sheets..	500
			10 by 12 inches.....	do....	500
			Plate rack, folding, for 12 plates.....	number..	2
			Pencils, grease, Blaisdell, red and blue, of each.....	do....	6
			Plate changer, stereoscopic, for 14 by 17 plates, Kelley-Koett.....	number..	1

Plates, X-ray:	
14 by 17 inches.....dozen..	6
10 by 12 inches.....do.....	6
8 by 10 inches.....do.....	10
5 by 7 inches.....do.....	6
Rack, tube, 5-inch holes, wooden (to be made by carpenter).....dozen..	1
Ruler, wood (15 inches) with metric system, having 2 metal buttons 3 mm. in diameter, the centers of which are exactly 10 cm. apart.....number..	1
Reels, trolley:	
Plain.....do.....	4
Double-Coolidge.....do.....	2
Röntgenoscope, vertical, arranged for Coolidge tube, box protected by sheet lead $\frac{1}{8}$ inch thick on front and sides, furnished with good grade fluoroscopic screen, 11 by 14 inches, mounted in screen holder with protected handles and covered with lead glass at least $\frac{7}{8}$ inch thick.....number..	1
Rotary converter, $7\frac{1}{2}$ kilowatts capacity, complete with starting box and switches, capable of continuous operation at $7\frac{1}{2}$ kilowatts and of sustaining an overload of 150 per cent for 10 seconds, and to deliver a satisfactory alternating current to the X-ray machine from a direct-current source (to be furnished only where direct current is the sole source of supply).....number..	1
Safe light, dark room, Wratten.....do.....	6
Sandbags, 3 by 4 by 8 inches, empty.....do.....	1
Scale, localizing, for cross-thread method.....do.....	1
Screens, intensifying:	
Mounted in cassettes, detachable—	
Size 14 by 17.....do.....	2
Size 10 by 12.....do.....	2
Size 8 by 10.....do.....	2
Size 5 by 7.....do.....	2
Without cassettes, furnished in cardboard folder—	
Size 14 by 17.....number..	
Size 10 by 12.....do.....	4
Size 8 by 10.....do.....	4
Size 5 by 7.....do.....	4

Stand:	
Tube, Kelley-Koett type, with 2 cones, 5 and 7 inch.....number..	1
Insulating, for Coolidge tube transformer.....do.....	1
Stereoscope, Wheatstone, furnished with four 100-watt nitrogen lamps permitting of gradual regulation.....number..	1
Switch:	
Foot, so devised that the room may be in total darkness without either X ray or electric light, or with X ray on and no electric light, or with lights on and no X ray (Kelley-Koett).....number..	1
High-tension—	
Double-throw, Coolidge equipped.....do.....	1
Single-throw, Coolidge equipped table, base hospital type.....number..	1
Tank, porcelain:	
$4\frac{1}{2}$ by $14\frac{3}{4}$ by 20 inches.....do.....	1
$14\frac{3}{4}$ by $14\frac{3}{4}$ by 20 inches.....do.....	2
Thermometer, bath.....do.....	2
Trays, enamel ware:	
For 14 by 17 plates.....do.....	2
For 10 by 12 plates.....do.....	2
Tools, set, consisting of hammer, saw, case opener, large and small screw drivers, and heavy cutting pliers.....sets..	1
Transformer, Coolidge tube, insulated against breakdown test of 50,000 volts.....number..	1
Tubes, Coolidge:	
Medium focus.....do.....	3
Special radiator type.....do.....	2
Tubes, tungsten target, 7-inch.....do.....	2
Tunnel, plate changing, aluminum, 17 by 17 inches, with one plate draw.....number..	1
Wire, copper, spool 12 yards in length, No. 18 spools.....number..	1
Wedge, wooden, 12 by 3 inches, angle 23°do.....	1
Wires, bronze, for trolley system, No. 10.....feet....	150

X-ray apparatus for hospital of 75 to 150 beds

Apparatus, X-ray, interrupterless type, to operate on type of current stated in contract, specifications A.....number..	1
Apron:	
Lead, protective.....do.....	1
Waterproof, 50 inches long.....do.....	1
Box lined with $\frac{3}{8}$ -inch sheet lead, water-tight, to be connected with sewer; inside measurements 42 inches long, 22 inches wide, 19 inches deep; this box to hold tanks for developing, etc. (to be made by carpenter at hospital).....number..	1
Box lined with $\frac{1}{8}$ -inch sheet lead on all sides; 10 inches wide, 20 inches long, 18 inches deep, made of $\frac{3}{4}$ -inch lumber, with hinged lid; for protection of X-ray plates (to be made by carpenter at hospital).....number..	1
Carriers, plate, core:	
10 by 12 inches, Monel metal.....dozen..	1
14 by 17 inches, Monel metal.....do.....	$\frac{1}{2}$
Chemicals:	
Barium sulphite for X-ray diagnosis.....pounds..	10
Chromic alum.....do.....	1
Hydroquinone.....do.....	1
Metol or equivalent.....ounces..	2
Sodium carbonate, dry.....pounds..	5
Sodium hyposulphite.....do.....	25
Sodium sulphite, dry.....do.....	5

Crocks, earthenware, 5-gallon.....number..	2
Films, dental:	
Holders for development, Eastman.....do.....	2
$1\frac{1}{4}$ by $1\frac{1}{2}$ inches.....dozen..	6
Funnels, enamel ware, 6-inch.....number..	2
Fluoroscope, 11 by 14, special folding, with demountable stand and detachable plate-holding device.....number..	1
Glass, lead, $\frac{1}{8}$ inch thick, 8 by 10 inches.....pieces..	1
Gloves, opaque, protective, gauntlet.....pairs..	1
Goggles, automobile type, fitted with red and green superimposed clear polished celluloid, Arlington Pyralin, colors 24 and 181, 0.01 thick, finish II.II.....number..	1
Insulators:	
4-arm for high-tension wires.....do.....	2
Wall, for carrying high-tension wires through partitions.....number..	3
Lead, sheet, 4 pounds to square foot.....square foot..	100
Pitchers, enamel ware, 2 quart.....number..	2
Preservers, negative:	
For 14 by 17 plates.....do.....	100
For 10 by 12 plates.....do.....	200
For 8 by 10 plates.....do.....	400
Plate rack, folding, for 12 plates.....do.....	2

Plates, X-ray:	
14 by 17 inches.....dozen..	4
10 by 12 inches.....do.....	4
8 by 10 inches.....do.....	5
Rack, tube, 5-inch holes, wooden (to be made by carpenter).....number..	1
Reels, trolley:	
Plain.....do.....	4
Double Coolidge.....do.....	1
Safe, light, dark room Wratten.....do.....	1
Screens, intensifying, mounted in cassettes, detachable:	
14 by 17.....number..	2
10 by 12.....do.....	2
Stand, tube, Kelley-Koett type, specification C.....number..	1
Stereoscope, Wheatstone.....do.....	1
Switch:	
Foot, so devised that the room may be in total darkness without either X ray or electric light, or with X ray on and no electric light, or with lights on and no X Ray (Kelley-Koett).....number..	1

Switch—Continued.	
High-tension, double-throw.....number..	1
Table, base hospital type, specification B....do....	1
Tank, porcelain:	
4½ by 14¾ by 20 inches.....do.....	1
14¾ by 14¾ by 20 inches.....do.....	2
Thermometer, bath.....do.....	1
Trays, enamel ware:	
For 14 by 17 plates.....do.....	2
For 10 by 12 plates.....do.....	2
Transformer, Coolidge tube.....do.....	1
Tubes:	
Coolidge, medium focus.....do.....	2
Tungsten target, 7-inch.....do.....	2
Tunnel, plate changing, aluminum, 17 by 17 inches, with one plate draw.....number..	1
Wedge, wooden, 12 by 12 by 3 inches, 23°.....do....	1
Wire, bronze, for trolley system, No. 10.....feet..	150

X-RAY OUTFITS FOR HOSPITAL OF SEVENTY-FIVE BEDS OR LESS

EQUIPMENT

United States Army bedside unit.....	1
Coolidge tube, radiator type.....	2
Rotary converter that will start on 110 volts without requiring a starting resistance. Must operate unit as on 110-volt alternating current.	
Fluoroscope, 11 by 14, special folding, with demountable stand and detachable plate-holding device as furnished by Waite & Bartlett.....	1
Fluoroscope, hand, with 1-piece extra lead glass.....	1
Gloves, gauntlet, lead rubber.....	2
Auto transformer, 1½ kilowatts, 110 to 220.....	1
10-ampere screw fuse plugs.....	4
Extra set of brushes for rotary converter.....	1
10-ohm resistance for 220-volt rotary.....	1
Extra lead glass shield.....	1
Extra reel.....	1
Goggles, automobile type, fitted with red and green superimposed clear polished celluloid, Arlington Pyralin in colors 24 and 181, 0.01 inch thick, finish H. II.....pairs..	1
Foot switch (W. & B. dental).....	1
Apron, protective.....do.....	1
Box, illumination, 8 by 10 inches.....	1

Chemicals:	
Chrome alum.....pounds..	1
Hydroquinone.....do.....	2
Metol.....ounces..	4
Potassium bromide.....pounds..	1
Sodium carbonate, dry.....do.....	2
Sodium hyposulphite.....do.....	10
Sodium sulphite, dry.....do.....	2
Films:	
Dental, negative, 1¼ by 1½ inches.....gross..	1
X-ray—	
5 by 7 inches, Eastman Kodak Co.....dozen..	10
8 by 10 inches, Eastman Kodak Co.....do.....	10
Gloves, opaque, protective, gauntlet.....pair..	1
Pitcher, enamel, 2-quart.....do.....	1
Safe lights, Eastman Brownie.....do.....	2
Screens, intensifying, aluminum cassettes:	
5 by 7 inches.....do.....	4
8 by 10 inches.....do.....	2
Trays, enamel ware:	
14 by 17 inches.....do.....	2
8 by 10 inches.....do.....	2

PORTABLE OUTFIT COMPLETE WITH ACCESSORIES

Portable outfit, apparatus as per list.....sets..	1
Camel's-hair brush.....do.....	1
Carriers, film (case), Eastman, for development:	
8 by 10.....dozen..	½
10 by 12.....do.....	½
14 by 17.....do.....	½
Chemicals:	
Chrome alum.....pounds..	2
Formaldehyde.....do.....	1
Hydroquinone.....do.....	1
Metol, or equivalent.....ounces..	2
Potassium bromide.....do.....	4
Sodium carbonate, dry.....pounds..	3
Sodium hyposulphite.....do.....	25
Sodium sulphite, dry.....do.....	5
Dental films, 1¼ by 1½.....gross..	1

Developing tray:	
14 by 17, porcelain lined.....do.....	3
10 by 12, porcelain lined.....do.....	3
Film holders (case type) for radiographic work, Eastman, to accommodate 10 by 12 films between two screens.....do.....	2
Films, X-ray:	
14 by 14.....dozen..	2
10 by 12.....do.....	2
8 by 10.....do.....	6
5 by 7.....do.....	6
Funnel, enamel ware.....do.....	1
Goggles, automobile type, fitted with red and green, superimposed clear polished celluloid, Arlington Pyralin colors 24 and 18, 0.01 inch thick, finish H. II.....pairs..	2

Graduates, 250 c. c.....	2	Sandbags, empty, 5 by 4 by 18 inches.....	number..	6	
Localizer, eye, Kelley-Koett.....	number..	1	Screens, intensifying:		
Charts, eye, Kelley-Koett.....	do....	200	14 by 17, in cassettes.....	do....	1
Nut wrench, Carl, 6-inch, with thin jaws, Kelley-Koett.....	number..	1	8 by 10, in cardboard folder.....	do....	2
Powders, developing, Eastman, each to make one quart of developer.....	number..	20	10 by 12, in cardboard folder.....	do....	2
Protective aprons.....	do....	2	Thermometer, bath.....	do....	1
Protective gloves, gauntlets.....	pairs..	2	Tools, set of, consisting of hammer, saw, case opener, large and small screw drivers, heavy cutting pliers.....	number..	1
Rack, plate drying, folding, for 1 dozen plates.....	number..	1	Tunnel, plate changing, 17 by 17, with one plate draw.....	sets..	1
Ruler, wood, 15 inches long, metric system one side, English system other, with metal buttons, their centers being exactly 10 c.m. apart, Kelley-Koett.....	number..	2	Wire:		
Safe light, oil or candle.....	do....	2	Annunciator.....	pounds..	2
			Copper, spool 12 yards in length, No. 16.....	pound..	1
			Cable, 50 feet.....	number..	1

MOBILE X-RAY OUTFIT

PORTABLE X-RAY OUTFIT MOUNTED IN AMBULANCE BODY		Instrument box, etc.—Continued.	
Booster for portable apparatus.....	1	Rheostat as specified.....	
Gasoline-electric set (Delco).....	1	Wiring diagram.....	
Filament control, inductive type.....	1	Operating switch.....	
Rheostat for solenoid control of engine speed.....	1	Tool set complete.....	1
Transformer:		Cables, 50 feet.....	1
For portable apparatus, closed core type, oil insulation, with oil-tight top.....	1	UNITED STATES ARMY BEDSIDE X-RAY UNIT	
Coolidge filament lighting, oil insulated, with an oil-tight cover.....	1	Cabinet and tune holder.....	1
Table, X-ray, for portable, apparatus complete, with rail frame.....	1	High-tension transformer.....	1
Table tops of continental Bakelite.....	3	Cable:	
Fluoroscope for portable apparatus, 10 by 10 inches, with carriers.....	1	8-foot, to connect with electric service.....	1
Tube, special Coolidge air-cooled type, with radiation type of anode.....	3	10-foot, with foot switch.....	1
Voltmeter, alternating current, scale C-175.....	1	Milliamperemeter, reading 0 to 10 milliamperes... 1	
Instrument box, in which are permanently the following:		Lead-glass shield.....	1
X-ray transformer.....	1	Reels:	
Coolidge filament transformer.....		Single, to connect with positive end of Coolidge tube.....	1
Filament control.....		A 2-wire cable, with Camp socket, to connect with negative end of Coolidge tube.....	1
Milliammeter, 0 to 15 milliamperes.....		Wiring diagram.....	1
Voltmeter as specified.....		Extension cord, 20 feet.....	1
		Rotary converter (will start on 220 volts).....	1
		Fluoroscope, 11 by 14, special folding, as furnished by W. & B.....	1
		10-ampere screw fuse plugs.....	2

PURCHASES

Because of the variation in the types of electric current generated by the various electrical plants throughout the United States, orders for specific apparatus could not be given until the sites of the camps had been selected and the type of current to be furnished at each camp had been ascertained. Letters were written to the various electric power companies in the vicinity of the camps very shortly after the location of the camps had been furnished the Surgeon General.⁶ This information was compiled and furnished the officer in charge of the New York medical supply depot. Instructions were issued May 25, 1917, for the purchase of 30 interrupterless apparatus. As soon as it became known that current was available at the hospitals the contracts to the five principal manufacturers of apparatus were let.⁴ By the time the contracts were let the number of apparatus to be purchased had increased to 37.⁴ Distribution within the United States was made quite promptly. Additional machines were furnished as new camps and larger hospitals developed.

Very soon after the military program for the shipment of troops overseas had been made know to the Surgeon General, instructions were issued by the

finance and supply division of his office for the purchase of 100 complete outfits for hospitals of 1,000 beds for shipment to France.⁷ In order to provide for various types of current, instructions were issued November 1, 1917, to purchase 50 rotary converters, 7½ kilowatts, shunt wound, 1,800 revolutions per minute, to operate on 220-volt direct current and to produce practically 154 volts, 50 cycle, alternating. Also 50 step-up transformers, primary, tapped for 80, 110, 154 volts; the secondary to deliver 220 volts; all transformers to be oil insulated.⁸

Following the principle of breaking up the orders, these 100 machines were distributed among four manufacturers.⁷

In the fall of 1918 arrangements were in progress for the purchase of 100 additional outfits, but before the purchase was consummated hostilities ceased. The total number of these large machines purchased during the World War appears in the tabulation, p. 600.

PORTABLE OUTFITS

The first order for portable outfits was for 25 placed during the early summer of 1917. The order for this number was placed with a view of equipping the hospitals at National Guard camps. That plan was shortly changed because it was decided to build the hospitals at those cantonments in pavilion form and to provide them with electric current. This made it possible to utilize the stationary apparatus.⁹ The portable apparatus were accordingly set aside for shipment to France.

The 25 originally were augmented by 75 in instructions issued from the Surgeon General in the fall of 1917. All of these were intended for shipment overseas.¹⁰ Additional purchases of these outfits were made from time to time as required to meet the situation; in all, 393 outfits were purchased.

BEDSIDE UNITS

The first purchase of bedside units was directed in instructions issued from the Surgeon General's Office September 13, 1917.¹¹ These instructions directed the purchase of 100 such units, including tubes, fluoroscopes, rotary converters, and autotransformers. By that time the special tube required for this outfit had been perfected by the General Electric Co., and the instructions called for the purchase of 200 such tubes. Of these outfits, 80 were to be shipped to France and the remainder distributed within the United States. A further order for 150 bedside units was placed in March, 1918; subsequent orders raised the number to 547.

In procuring the various types of apparatus, delays in delivery were experienced. These delays for the most part were due to difficulties in getting raw materials and semifinished parts and to those incident to the congestion of the transportation lines. Some of the delays were due to faulty organization and factory operation, but those delays were eventually overcome and full cooperation was secured. While the prices for the large interrupterless apparatus varied somewhat with the different makes, the cost of this apparatus to the Government was reasonable and as a rule concessions were made.¹²

DISTRIBUTION

As has already been indicated, each large hospital in the United States was provided with a standard interrupterless X-ray machine and complete outfit. The smaller hospitals were provided with appropriate equipment. The hospitals at the flying fields were furnished the standard bedside unit.¹³ The shipments of the standard interrupterless machines and other bulky pieces of apparatus were made direct from the makers to the hospital in which they were to be installed. Except for the delays incident to slow transportation, no inconvenience resulted. The apparatus was usually at the camp and installed as soon as the hospital was ready to function. The bedside units were all received at the New York depot, from which, with appropriate equipment, they were shipped to the hospital for which intended. In these shipments no special packing or arrangements were made other than those common among the makers.

The larger part of the equipment was intended for use and found its way overseas. The quantities sent overseas and those placed in use for domestic purposes appear below (p. 600).

In preparing the equipment for shipment to France, special precautions were taken to make sure that the various parts of any particular equipment could be collected readily and the entire outfit assembled for issue. The plan adopted at the New York depot to meet this end is quoted below.

MARCH 12, 1918.

From: Medical Supply Officer, United States Army, New York City.

To: Medical Supply Officer, Medical Supply Depot,

American Expeditionary Forces, France.

Subject: Seventeen portable X-ray equipments.

1. We shipped you, on March 4, the 17 complete original portable X-ray equipments ordered last fall, in accordance with specifications issued at that time. For your convenience, these boxes were numbered according to a system devised to simplify their assembling into equipments.

2. Each piece is marked with an equipment number, denoted by a roman numeral, and a piece number, denoted by a regular arabic number. The equipments are numbered from I to 17 in roman numbers (I to XVII) and the piece numbers range from 1 to 13 in arabic numbers.

3. In assembling an equipment complete, for reshipment to a point in France, all that will be necessary will be to pick out an equipment marked with a roman number and the pieces marked with the arabic number from 1 to 13, as—

ONE SET		ONE SET		ONE SET	
Roman No.	Arabic No.	Roman No.	Arabic No.	Roman No.	Arabic No.
I	1	II	1	III	1
I	2	II	2	III	2
I	3	II	3	III	3
I	4	II	4	III	4
I	5	II	5	III	5
I	6	II	6	III	6
I	7	II	7	III	7
I	8	II	8	III	8
I	9	II	9	III	9
I	10	II	10	III	10
I	11	II	11	III	11
I	12	II	12	III	12
I	13	II	13	III	13

4. The following is a brief description of the pieces numbered from 1 to 13.

Box No. 1:

- X-ray transformer.
- Coolidge Transformer, Filament Lighting.
- Rheostat for Filament Control.
- Rheostat for solenoid control of engine speed.
- Booster.
- Milliammeter.
- Cable for connecting transformer to electric plant.

Box No. 2: One large gray box, which is to be used to carry a portable dark-room and photographic supplies. When shipped, it contained a portable dark room. Photographic and developing supplies are contained in the bottom of the case as follows:

- 5 pounds sodium hyposulphite.
- 1 pound sodium sulphate.
- 1 pound chrome alum.
- 2 pounds barium sulphate.
- 2 lead protective aprons.
- 2 funnels.
- 2 pair goggles.
- 2 trays, 14 by 17.
- 2 pair gauntlet gloves.
- 2 pitchers.

Box No. 3: Gasoline electric set for generating electricity for X-ray transformer.

Boxes No. 4, 5, and 6, in all equipments, are carrying cases for the radiator type of Coolidge tube. Each contains such a tube. There should be 3 tubes for each equipment. Therefore, there should have been 51 tubes shipped, but instead of this there were 26 tubes shipped. The balance of 25 tubes, to make up the balance quantity of 51, has been turned over to Maj. Leo Wald, School of Military Roentgenology, Cornell Medical College, 28th Street and First Avenue, New York City. They are to be brought over as part of the personal baggage of the Sanitary Corps men, soon leaving for France. This is to insure the tubes reaching there on time.

The number of the boxes forwarded in the shipment from this depot direct to you, are as follows:

Equipment No.—	Equipment No.—Continued.
I..... 5	X 4 and 6
III..... 4, 5, and 6	XI 5
IV..... 5 and 6	XII..... 5 and 6
V..... 5 and 6	XIII..... 6
VI..... 4 and 5	XVI..... 4 and 5
VIII..... 5 and 6	XVII..... 4, 5, and 6
IX..... 4, 5, and 6	

Box No. 7: Contains photographic material and supplies from the Eastman Kodak Company, as follows:

- 10 dozen films, X-ray, 8 by 10 inches.
- 3 dozen plates, X-ray, 8 by 10 inches.
- 2 Brownie safe lights.
- 5 packages X-ray developing powder.

Box No. 8: 3 dozen plates, 10 by 12.

Box No. 9:

- 2 dozen plates, 10 by 12.
- 2 dozen plates, 8 by 10.

Box No. 10:

- 1 dye localizer.
- 2 plate-changing tunnels, 10 by 10.
- 2 plate-changing tunnels, 12 by 12.
- 2 plate-changing tunnels, 17 by 17.

Box No. 11: 3 stretcher tops and one stretcher top frame. (This material is for use with the portable table.)

Box No. 12: Portable table, base.

Box No. 13: Portable table, top.

5. We have shipped you, by registered parcel post, two separate boxes, each containing 17 padlock keys. These packages were marked, "Keys for padlocks on portable darkroom carrying cases." These are for piece No. 2 in all the equipments.

6. We have also shipped you 3 boxes, each containing 34 padlock keys, marked "keys for padlocks on carrying cases—portable X-ray outfits." These are for the carrying cases for the Coolidge tubes, piece Nos. 4, 5, and 6, in all of the equipments.

7. The keys shipped as mentioned above have been separated into different boxes to insure at least one set reaching you safely. The keys are interchangeable.

Colonel, Medical Corps, U. S. A.

The difficulties in obtaining the necessary pieces of apparatus to complete these equipments delayed the shipment of X-ray outfits to France. By the end of April, 1918, however, the following outfits had been delivered to Pier 45, North River, for shipment to France: ¹⁴ 65 standard base hospital units, 17 standard portable outfits, 80 standard bedside units. Each of these outfits was complete when it left the depot. By the end of June the numbers had been increased to 100 base outfits, 97 portable outfits, and 165 bedside units. ¹⁵ Complete information concerning each shipment was furnished the medical supply officer, A. E. F. By the end of the year the total shipped had reached those given in the column overseas on the list (p. 600).

X-RAY TUBES

When the United States entered the World War two principal types of X-ray tubes were being purchased: A so-called gas tube and a Coolidge tube. The tendency appeared to be in favor of the Coolidge tube, but many of the roentgenologists who were called into the service were accustomed to using the gas tube, and that class of tube was purchased in considerable numbers. This tube had the further advantage that several firms were manufacturing it, and only one firm the Coolidge tube. Consequently, in equipping the hospitals with X-ray tubes it was decided to provide a proportion of both types. At this time only the large or standard Coolidge tube was being manufactured, and this required for its use devices for rectifying the direction of the current. With the development of the portable and the bedside units, smaller tubes, capable of rectifying their own current, were developed and later came to be supplied in large numbers. The respective numbers of Coolidge tubes and gas tubes purchased are given in the list of X-ray apparatus (p. 600).

Inasmuch as platinum was required in varying amounts in the manufacture of the different types of tubes, the increasing platinum shortage made necessary a modification of the type of tube to be furnished. Because of the large quantities of platinum used in the platinum target tubes, manufacture of that type of tube was discontinued in favor of the tungsten target tube, there being no shortage of the latter metal. The quantity of platinum ultimately used in all makes of tubes was greatly reduced, it being found that even the platinum wire used, anode and cathode, could be materially reduced and still give satisfactory results. ¹⁶ In the effort to conserve the supply of platinum all

broken X-ray tubes, especially those of the platinum target type, were salvaged and the metal parts turned in to the New York medical supply depot for the recovery of the platinum they contained.¹⁵

Tube makers were advised by the Surgeon General, March 28, 1918, to discontinue the manufacture of the platinum target tubes and air-cooled tubes and to confine manufacturing efforts to the tungsten target tubes only.¹⁷ On July 2, 1918, instructions were issued to the medical supply depot, New York, that all platinum-faced target tubes returned to the depot for repair were to be classified immediately as scrap regardless of the condition of the tube, and that no repair on tubes of that class would be authorized. No parts of these tubes was considered of any value except the target. The tubes were obsolete and the platinum exceeded the value of the tube.¹⁵ Previous instructions had been issued directing the platinum target tubes to be turned over to purchases of platinum as scrap.¹⁸ All platinum in the United States at that time was practically controlled by the Government. Scrap platinum thus turned in found its way back into articles containing platinum which were being manufactured for the Government. It was necessary to obtain priority for the platinum required for X-ray tubes being purchased.¹⁹ While at times there was a slight delay in obtaining these priorities, no material difficulty was experienced or undue delay therefrom.²⁰

For a time the tubes were tested at the medical supply depot, New York, but later the practice was discontinued.²¹

DISTRIBUTION

As previously noted, the original requirements for all hospitals were met by shipment either from the New York medical supply depot or direct from the tube makers. A considerable breakage was reported in these tubes, and because of the transportation facilities the interval which elapsed between the time the tubes were forwarded for repair and their receipt back at the hospital became rather long. The need for a more prompt exchange of tubes was felt. To facilitate this exchange and to insure the more prompt arrival of the tubes at the requiring hospital, the Surgeon General issued instructions April 8, 1918, to the medical supply officers concerned to establish a stock of tubes at Chicago, Atlanta, San Antonio, and San Francisco.²² Ten tubes each, Coolidge medium focus and tungsten target 7-inch, were ordered to each of these depots, with instructions to issue the tubes only on approved requisitions to such posts as required them. They were directed to make requisition on the New York depot for requirements of this stock from time to time as issue made necessary.²³ A minimum stock of three tubes was required. Whenever the stock was reduced to that number requisitions were forwarded for enough tubes to bring the stock up to 10 tubes of each type.

X-ray tubes turned in for repair were sent to the New York depot, where they were replaced by shipment of a new tube, and the damaged tube, if worth repairing, was sent to the manufacturer for repair.²⁴ The original tubes, when repaired and received back at the New York depot, were placed in stock for reissue.²⁵

The number of X-ray tubes required in France was very large. Originally, they were prepared for shipment there in very light "bird-cage" crates, in which the tube was supported in place by a sling of ticking. These cages had projections at the bottom to prevent their being tipped over. It had been found that shipping them in the vertical position resulted in less breakage than in any other position, hence, the design of the crate. For various reasons, partly due to the manner in which these bird-cage carrying cases had been handled, a very extensive breakage was reported from overseas. A special box was designed to carry the tubes which it was thought would be sure to prevent the breakage. These special boxes consisted essentially of a strong outer box and an inner box suspended on springs. In the inner box the tube was placed, and supported as carefully as it could be. It was found that the breakage of tubes shipped by this method was considerably greater than that which resulted from the shipment in the light bird-cage crate. This was apparently due to the fact that in unloading it the stevedores did not recognize the fragile nature of the material and the boxes were handled more roughly. A drop of the box of a few feet was sufficient to break the tube. The breakage caused a great deal of anxiety to both the Medical Department and the General Electric Co., which supplied the tubes. It was decided to discontinue the use of the special box and to make all shipments in the bird-cage crate.²⁶ An inspection of the loading procedures at the port of embarkation indicated that the tubes were very often laid on the side and that no precaution was taken to secure them in place. Other than this they were handled in a careful manner.²⁷

At the request of the General Electric Co., authority was given that organization to direct the storing of this special type of cargo.²⁸ Under this policy the tubes were practically the last articles of equipment to be loaded on the transport. They were stored between decks with life preservers and mattresses as dunnage. No winches were worked on the boat after the tubes had been placed aboard. The tubes were carried up by hand and carefully placed in the hold so that no breakage occurred in the loading. On the arrival of the transport overseas the tubes were unloaded before any of the other cargo was removed. As a result, the breakage was almost entirely eliminated.²⁶ The tubes were shipped from the factory at Schenectady either by truck, if a truck train happened to be passing through on its way to New York, or by express.²⁹ After delivery in France an equal amount of care was taken in handling them from base ports to supply depots, and thence to the hospitals which required them.

FLUOROSCOPIC SCREENS

After the early purchases, little difficulty was experienced in obtaining an adequate number of screens of suitable quality. As the quantities required increased, the difficulties in securing satisfactory screens increased in like proportion. Ultimately, however, a satisfactory screen was obtained in numbers to meet the demand.

As the X-ray work in the various camps developed, the number of plates required steadily rose. The demands for plates from overseas were also increasing. The requirements by the end of March, 1918, had risen to such heights

that doubt began to be entertained concerning the ability of the manufacturers to obtain sufficient glass to meet them. With a view of reducing the consumption of plates the following instructions were issued:

APRIL 17, 1918.

From: The Surgeon General, United States Army.

To: All hospitals, and Cornell Medical College, Fort Riley, and Fort Oglethorpe.

Subject: Plates and films in X-ray work.

1. The question of an adequate supply of photographic glass suitable for coating in the making of sensitized X-ray plates is becoming a very pressing one. It may reasonably be expected that within a short time 14 by 17 plates will be practically unobtainable unless efforts are made to conserve this glass by avoiding the use of the smaller sizes of plates.

2. Fortunately, there has been developing a photographic film, double coated, and covered by an emulsion fully as sensitive and fast as that with which plates are coated. This film has many advantages. First, it is obtainable and will be obtainable. Second, its weight and bulk as compared to the corresponding quantity of plate surface is infinitely in its favor. Third, its cost is actually less than that of the photographic plates.

3. It is therefore desired by the X-ray division that requisitions from the various X-ray laboratories should call for increasing quantities of this special X-ray film and decreasing quantities of plates.

4. 14 by 17 plates for chest work will of necessity be furnished until such time as a satisfactory method of employing films for stereoscopic chest work has been devised.

5. The advantages of these films, aside from their lack of weight and bulk, are that they are actually faster than plates, that they are capable of giving beautiful detail, and that large numbers of films can be developed in tanks or trays of small size. These films are particularly adaptable for gastro-intestinal work, and when used between two screens are exceedingly fast.

6. For shipment overseas these films may be expected to practically supplant plates for the reason that 100 dozen 10 by 12 films weigh less than 5 per cent and do not occupy more than 5 per cent of the space of the same quantity of ordinary glass plates.

7. Film holder to be employed in the development of these films will be supplied on requisition, and there will also be supplied with these films, and without requisition, a heavy opaque paper folder to be employed in place of the ordinary light-type envelope.

8. It is directed that great care be taken in the handling of these films to avoid finger marking the emulsion and kinking the celluloid upon which the gelatine emulsion is coated.

9. Where these films are employed in the ordinary black and orange envelopes care must be taken to avoid surface scratching by the edges of the envelope, which scratches will appear as black streaks upon development.

Prior to 1917 the principal dependence in X-ray work had been upon plates. X-ray films were but little used except in dentistry. Developments were in progress, however, even then, for the production of the larger size films required for X-ray work. Samples were submitted by the manufacturers and found very satisfactory in stomach and gall-bladder work and for other equally exacting requirements.³⁰ They began to be used in increasing quantities in the Army. They were sent in increasing proportion to France. The earlier shipments were mostly plates, but the later shipments gave preference to films. By the end of April, 1918, 9,130 dozen films, assorted sizes, 5 by 7 inches, 8 by 10 inches, 10 by 12 inches, 11 by 14 inches, and 14 by 17 inches, had been shipped to France. During the same period 7,346 dozen plates, in sizes, 8 by 10 inches, 10 by 12 inches, and 14 by 17 inches, had been forwarded. The dental films during that period numbered 3,280 dozen.¹⁴ The total number of plates and films purchased during the World War period is shown in the table (p. 600.)

An investigation of the glass and X-ray plate situation made during the early part of August showed the shortage of plates from which the Medical Department had been suffering for several months was more apparent than real.³¹

The American Window Glass Co., makers of the glass used in X-ray plates, promised all the glass necessary, and further difficulties along that line were eliminated.³¹ Orders were placed the latter part of August for 1,400 dozen plates per month distributed in the proportion of 600 dozen 14 by 17 inches, 400 dozen 10 by 12 inches, and 400 dozen 8 by 10 inches. The order was to run for a year.³²

CANCELLATIONS FOLLOWING SIGNING OF THE ARMISTICE

Immediately following official information of the signing of the armistice, machinery was set in motion for the termination of unfilled contracts for X-ray equipment and supplies.³³ In the negotiations for the settlement of these contracts varying proportions of the contracted materials were accepted and the remainder canceled. Such quantities as the future needs seemed to indicate as desirable were furnished the contracting officer, and the settlement of all such contracts was effected in due course and without difficulty.

X-ray apparatus contracted for and distributed up to November 25, 1918

Apparatus	Overseas	Domestic	In depot	Undelivered total	Contracted
Bedside units	300	197		50	547
Boxes:					
Localization	60	25	19	366	470
Portable instrument	270	18	10	100	398
Changers, plate	250	109	63	50	472
Converters, rotary, 7½ kilowatts	87	4	23		114
Localizers, eye	150	50	50	150	400
Roentgenoscopes	150	122	75	50	397
Sets, DeLo electric	327	10	21	35	393
Stands, tube	150	171	61	35	417
Stereoscopes	150	184	78	122	409
Tables	520	185	106		811
Transformers	125	127	82	27	361
Tubes:					
Coolidge	3,833	753	800	240	7,626
Oas, 7-inch	1,020	316	520		1,836

X-RAY FILMS AND PLATES

Size	Films, Eastman	Plates		Total dozens
		Eastman	Diagnostic	
DENTAL				
1¼ by 1½ inches (No. 1)	48,474			48,474
1½ by 1¼ inches (No. 1A)	20,727			20,727
2¼ by 3 inches (No. 2)	90			90
X-RAY				
5 by 7 inches	6,131	5,523		11,654
8 by 10 inches	40,331	22,218	5,710	68,259
8½ by 14 inches	9,250			9,250
10 by 12 inches	40,063	18,071	5,308	63,442
11 by 14 inches	112	822		934
14 by 17 inches	17,106	23,383	7,718	48,207

REFERENCES

- (1) Letter from Arthur C. Christie, to Col. Edwin P. Wolfe, M. C., January 15, 1921. Subject: Account of X-ray apparatus used by the U. S. Army in the World War. On file, Finance and Supply Division, S. G. O., $\frac{808 \text{ X-ray}}{100A}$.
- (2) Letter from Dr. Lewis Gregory Cole, Chairman, Committee on Preparedness, American Roentgen Ray Society, to Col. Fisher, S. G. O., War Department, April 27, 1917. Subject: X-ray apparatus. On file, Finance and Supply Division, S. G. O., 14744-A.
- (3) Letter from A. D. Ballou, Council of National Defense, to Lieut. Col. Fisher, M. C., S. G. O., May 1, 1917. Subject: X-ray apparatus. On file, Finance and Supply Division, S. G. O., 14744-C.
- (4) Letter from the medical supply officer, U. S. Army, New York, to the Surgeon General, U. S. Army, August 11, 1917. Subject: Places to be furnished with stationary X-ray apparatus. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{144}$.
- (5) First indorsement, Surgeon General, to the officer in charge, Medical Supply Depot, New York. On file, Finance and Supply Division, S. G. O., 713-539.
- (6) Letters from Maj. A. C. Christie, Reserve Corps, to various light and power companies in the United States, June 2, 1917, relative to type, voltage, and cycle of current furnished by them. On file, Finance and Supply Division, S. G. O., 14846-D to I.
- (7) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, October 25, 1917. Subject: X-ray apparatus for 100 base hospitals. On file, Finance and Supply Division, S. G. O., $\frac{808 \text{ X-ray}}{15}$.
- (8) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, November 1, 1917. Subject: X-ray apparatus for 100 base hospitals. On file, Finance and Supply Division, S. G. O., $\frac{808 \text{ X-ray}}{15}$.
- (9) Letter from Maj. A. C. Christie, M. R. C., to Col. H. D. Snyder, August 23, 1917, relative to the purchase of X-ray equipment. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{56}$.
- (10) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, November 28, 1917. Subject: Portable X-ray apparatus. On file, Finance and Supply Division, S. G. O., $\frac{250 \text{ Fr.}}{133}$.
- (11) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, September 13, 1917. Subject: X-ray supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{122}$.
- (12) Letter from Major A. C. Christie, M. R. C., S. G. O., to the Wappler Electric Company, New York, N. Y., June 5, 1917, relative to X-ray machines. On file, Finance and Supply Division, S. G. O., 14846-N.
- (13) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, October 16, 1917. Subject: X-ray apparatus for aviation camps. On file, Finance and Supply Division, S. G. O., $\frac{808 \text{ X ray}}{1}$.
- (14) Report on X-ray apparatus, equipment, and supplies, shipped from Medical Supply Depot, New York to France, embracing period from July 1, 1917, to April 27, 1918, On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ NYD}}{648}$.

- (15) Third indorsement, Surgeon General, to the officer in charge, Medical Supply Depot, New York, July 2, 1918, relative to X-ray tubes turned in for repair. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ NYD}}{774}$.
- (16) Letter from Green & Bauer (Inc.), Hartford, Conn., to G. C. Johnston, major M. R. C., S. G. O., March 26, 1918, relative to platinum in X-ray tubes. On file, Finance and Supply Division, S. G. O., $\frac{291 \text{ G \& B}}{1}$.
- (17) Letter from Maj. Geo. C. Johnston, M. R. C., S. G. O., to E. Matchlett & Sons, New York City, March 20, 1918, relative to manufacture of platinum-faced target X-ray tubes. On file, Finance and Supply Division, S. G. O., $\frac{463 \text{ E. M. C.}}{1}$.
- (18) First indorsement, Surgeon General, to the officer in charge, Medical Supply Depot, New York, June 24, 1918, relative to disposition of platinum from X-ray tubes turned in. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ NYD}}{774}$.
- (19) Letter from Lieut. Col. A. C. Christie, M. C., N. A., S. G. O., to the General Electric Co., Schenectady, N. Y., March 12, 1918, relative to priorities. On file, Finance and Supply Division, S. G. O., $\frac{263 \text{ G. E. Co.}}{10}$.
- (20) Telegram from F. M. Hoben, General Electric Co., New York, to Lieut. Col. A. C. Christie, S. G. O., March 21, 1918, relative to platinum. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{507}$.
- (21) Letter from the medical supply officer, New York City, to Maj. George C. Johnston, S. G. O. April 25, 1918. Subject: Testing Coolidge tubes. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{574}$.
- (22) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, April 8, 1918. Subject: Supply of X-ray tubes. On file, Finance and Supply Division, S. G. O., $\frac{713 \text{ Misc.}}{37}$.
- (23) Letters from the Surgeon General to the officers in charge, Medical Supply Depots, Atlanta, Chicago, San Antonio, and San Francisco, April 8, 1918. Subject: Supply of X-ray tubes. On file, Finance and Supply Division, S. G. O., $\frac{713 \text{ Misc.}}{37}$.
- (24) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, N. Y., May 25, 1918. Subject: Coolidge tubes for issue from Supply Depots. On file, Finance and Supply division, S. G. O., 713 Misc.
- (25) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, July 6, 1918. Subject: Procedure in replacement of X-ray tubes returned for repair. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y. D.}}{806}$.
- (26) Letter from Lieut. Col. George C. Johnston, M. C., U. S. A., to Mr. K. S. Kendrick, General Electric Co., Supply Department, Schenectady, N. Y., October 4, 1918, relative to overseas shipment of X-ray tubes. On file, Finance and Supply Division, S. G. O., $\frac{263 \text{ G. E. Co.}}{34}$.
- (27) Letter from Supply Department, General Electric Co., Schenectady, N. Y., to Lieut. Col. A. C. Christie, S. G. O., June 6, 1918, relative to loading of X-ray tubes on ships. On file, Finance and Supply Division, S. G. O., $\frac{263 \text{ G. E. Co.}}{25}$.

- (28) Fourth indorsement, from the commanding general, Port of Embarkation, Hoboken, N. J., to chief of Embarkation Service, Washington, D. C., June 22, 1918, relative to loading X-ray tubes for overseas shipment. On file, Finance and Supply Division, S. G. O., $\frac{263 \text{ G. E. Co.}}{25}$.
- (29) Letter from Howard W. Dunk, 604 West One hundred and twelfth Street, New York, N. Y., formerly sergeant, first class, Medical Department, to Col. Edwin P. Wolfe, M. C., May 7, 1927, relative to the operation of the X-ray department, Medical Supply depot, New York, 1917-18. Data compiled from depot records. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{1243}$.
- (30) Letter from Maj. A. C. Christie, M. R. C., S. G. O., to Eastman Kodak Co., Rochester, N. Y., June 30, 1917, relative to X-ray plates and films. On file, Finance and Supply Division, S. G. O., $\frac{55 \text{ Misc.}}{1}$.
- (31) Memorandum for Colonel Darnall from Maj. George Johnston, M. R. C., August 8 1918. Subject: Shortage of X-ray plates. On file, Finance and Supply Division, S. G. O., $\frac{750-714 \text{ SG}}{635}$.
- (32) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, August 19, 1918. Subject: Contract for X-ray plates. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{901}$.
- (33) Letters from the Surgeon General to the officer in charge, Medical Supply Depot, New York, November 13, 1918, relative to cancellation of contracts. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{1160-1164}$.

SECTION VII

DENTAL AND VETERINARY EQUIPMENT AND SUPPLIES

CHAPTER XXXVIII

DENTAL EQUIPMENT AND SUPPLIES

PORTABLE DENTAL OUTFIT

Professional dentistry was introduced into the Army of the United States in 1901 following the act of February 2 of that year reorganizing the Medical Department. This act provided, among other things: ¹

That the Surgeon General of the Army with the approval of the Secretary of War, be, and he is hereby, authorized to employ dental surgeons to serve the officers and enlisted men of the Regular and Volunteer Army, in the proportion of not to exceed one for every one thousand of said Army, and not exceeding thirty in all. Said dental surgeons shall be employed as contract dental surgeons under the terms and conditions applicable to Army contract surgeons and shall be graduates of standard medical or dental colleges, trained in the several branches of dentistry, of good and professional character, and shall pass a satisfactory professional examination: *Provided*, That three of the number of dental surgeons to be employed shall be first appointed by the Surgeon General, with the approval of the Secretary of War, with reference to their fitness for assignment under the direction of the Surgeon General, to the special service of conducting the examinations and supervising the operations of the others.

By the act of March 3, 1911,² a Dental Corps was added to the Medical Department, replacing the contract dental surgeons authorized by the act of February 2, 1901. This act increased the number of dental surgeons to 60 and provided for as many acting dental surgeons as might from time to time be authorized by law. The total number of dental surgeons and acting surgeons was limited to one to each 1,000 actual enlisted strength of the Army, the same as in the preceding act. This act placed the dental surgeons of the Army upon a permanent and substantial footing.

In accordance with the act of February 2, 1901, the number of contract dental surgeons was limited to 30 and in no case was this number to exceed 1 per 1,000 of the enlisted strength of the Army. The strength of the Regular Army at that time was approximately 60,000. The troops were widely scattered. Because of this dispersion, and in order that as many of the enlisted personnel as practicable might receive dental treatment, dental surgeons were given a number of stations which they served on itinerary. This itinerary required that each contract dental surgeon have a dental outfit which could readily be taken with him wherever his itinerary called him and which would enable him to furnish the treatment required. It was necessary that the outfit be portable and packed in such manner that it could be shipped

readily and the contents be made available with a minimum of inconvenience. Such an outfit, consisting essentially of a portable engine and chair and the necessary instruments and accessories, was developed in 1901. Because of the conditions in which it was to be used, this outfit almost from the beginning was called a portable outfit.

A suitable foot engine was found which could be taken apart and packed in a small case about the size of an ordinary dress-suit case. This case was made of fiber board and contained compartments in which the several parts of the engine could be securely fastened for shipment. The case was provided with suitable catches and locks.



FIG. 39.—Portable dental outfit

An ingenious chair was developed which consisted of a skeleton frame, tripod base, and adjustable back and headrest. Seat, back, and supporting part of the headrest were made of canvas. The chair could be taken apart with facility and packed into a small box fitted with a compartment to receive each part. The foot rest consisted of two metal bars with cross pieces and when in use was attached to the top of the chest in which the chair was packed. The foot rest packed inside the chest with the chair for shipment. The general appearance of the chair and dental engine is shown in Figure 39. In this illustration the dental engine carrying case and one of the dental instrument chests appear in the right foreground.

The contents of the portable dental outfit changed from time to time. As advance in dental procedures progressed, new articles were added and obsolete

articles discarded. The contents of the outfit, as modified, appeared in each succeeding revision of the standard supply table from 1902 to 1916, inclusive.

In May, 1917, the dental equipment then in use was revised for war purposes. The list of contents of the outfit follows.

Portable outfit

M. M. D. 854.

(a) MEDICINES

*Acidum sulphuricum, ¼ pound, in glass-stopper bottle.....	bottles.....	1
*Acidum tannicum, powder, 3 ounces, in wide-mouth bottles.....	bottles.....	1
Acidum trichloroacetium, 1 ounce, in glass-stopper bottle.....	bottles.....	1
*Adrenalin chlorid, 1-mgm. tablets, 20 in tube.....	tubes.....	1
*Aethylis chloridum, 3 ounces, in metal tube.....	do.....	1
*Alcohol, 1 quart, in bottle.....	bottles.....	12
*Aqua hydrogenii dioxidi, 1 pound, in bottle.....	do.....	1
*Argentii nitras, crystals, 1 ounce, in bottle.....	do.....	1
*Chloroformum, ¼ pound, in tin.....	tins.....	2
*Cocainæ hydrochloridum, ¼ ounce, in wide-mouth bottle.....	bottles.....	1
*Cocainæ hydrochloridum, 10-mgm. hypodermic tablets, 20 in tube.....	tubes.....	4
*Colloodium, 1 ounce, in bottle.....	bottles.....	1
*Cresol, 1 pound, in bottle.....	do.....	1
*Emetinæ hydrochloridum, 22-mgm. hypodermic tablets, 20 in tube, as required.....	tubes.....	1
Eugenol, 1 ounce, in bottle.....	bottles.....	1
*Glycerinum, 1 pound, in bottle.....	do.....	1
*Liquor formaldehydi (37½ per cent), 1 quart, in bottle.....	bottles.....	1
Mercury, redistilled, 4 ounces, in bottle.....	do.....	3
*Morphinæ sulphas, 8-hypodermic tablets, 20 in tube.....	tubes.....	3
*Normal saline solution, tablets (par. 902), 100, in wide-mouth bottle.....	bottles.....	1
Novocain, 50-mgm. hypodermic tablets (or equivalent) ⅓-grain tablets, 100 in bottle.....	bottles.....	2
*Phenol, ½ pound, in bottle.....	do.....	1
Phenol, camphorated, 4 ounces, in bottle.....	do.....	1
*Sodii carbonas monohydratus, for surgical use, 1 pound, in wide-mouth bottle.....	bottles.....	3
Sodium and potassium, in sealed tube.....	tubes.....	6
*Spiritus ammoniæ aromaticus, ½ pound, in glass-stopper bottle.....	bottles.....	1
*Thymol, 1 ounce, in bottle.....	do.....	1
*Thymolis iodidum (Aristol), 1 ounce, in bottle.....	do.....	2
*Tinctura aconiti, 1 ounce, in bottle.....	do.....	1
*Tinctura iodi, 4 ounces, in glass-stopper bottle.....	do.....	2

(b) STATIONERY

*Ink:

*Black, powder nr tablets (sufficient in box for 1 quart of fluid).....	boxes.....	1
*Red, 2 ounces, in bottle.....	bottles.....	1
*Pads, prescription.....	number.....	12
*Paper:		
Blotting—		
*For desks.....	quires.....	1
*Small pieces for hand blotters.....	pieces.....	10
*Carbon, letter.....	sheets.....	10
*Fasteners.....	number.....	50
*Manifolding, letter, perforated.....	sheets.....	100
*Typewriter, letter.....	do.....	100
*Writing, letter.....	do.....	50
*Note, 100 sheets in pad.....	pads.....	3
*Paste, photo and library.....	jars.....	1
*Pencils, lead.....	number.....	6
*Penholders.....	do.....	2
*Pens, steel.....	do.....	24
Ruler.....	do.....	1

(c) BOOKS

(Contained in field desk)

Army Regulations.....	copies.....	1
Dental Materia Medica, and Therapeutics (Prinz).....	copies.....	1
Dental Pathology, Therapeutics, and Pharmacology (Burehard-Inglis).....	copies.....	1
Dentistry, First-Aid (Ryan).....	do.....	1
Dentistry, Operative (Johnson).....	do.....	1
Handbook for Sanitary Troops (Mason).....	do.....	1
Manual for the Medical Department.....	do.....	1
Oral Surgery (Brown).....	do.....	1

(d) BLANK FORMS

(Contained in field desk)

Correspondence book (supplied by Adjutant General's Department).....	number.....	1
Dental engagement slip, Form 65.....	do.....	250
Invoice of, or receipt for, dental supplies, Form 31.....	number.....	24
Register of dental patients, card, Form 79.....	do.....	500
Report of dental work, Form 57.....	do.....	12
Requisition for blank forms, Form 37.....	do.....	4
Requisition for dental supplies:		
Annual, Form 36.....	do.....	6
Special, Form 35.....	do.....	24
Return of medical property:		
Front, card, Form 17.....	do.....	4
Original, Form 17a.....	do.....	800
Retained, Form 17b.....	do.....	800
Back, card, Form 17c.....	do.....	4

(e) INSTRUMENTS AND APPLIANCES

Alloy balance.....	number.....	1
Amalgam carrier, double end, No. 5.....	do.....	1
Bands, fracture, Angle's 4 bicuspids and 2 molar sets.....	do.....	2

Blower, chip:		Engine instruments for hand piece No. 7—Continued.	
And hot-air syringe, No. 38.....	number.....	Mandrels—	
Extra bulbs for.....	do.....	302, 303, of each.....	number.. 6
Boiler, instrument, small, approximately 12 by 6 by 4 inches.....	number.....	Morgan-Maxfield.....	do..... 3
Bottles, office, preparation, No. 6, as required.....	do.....	Points, carborundum, medium grit, mounted, 183, 186, 187, 189, 211, 219, 226, 227, 234, 241, of each.....	number.. 2
Broach reamers, extra fine, and fine, 6 in package, of each.....	packages.....	Excavators, Black's cutting instruments, 1, 17, 19, 21, 23, 34, 37, 39, 49, 50, 57, 58, 63, 64, 67, 68, 73, 74, 81, 83, of each.....	number.. 2
Burnishers, L. H., Nos. 29, 32, 34-S, 39, of each.....	number.....	Explorers, L. H., 5, 6, 11, 12, 18, of each.....	do..... 2
Case, office:		Forceps, rubber-dam:	
Oak, preparation, 18 half-ounce glass-stopper bottles.....	number.....	Clamp, Brewer's type.....	do..... 1
Preparation, extra ½-ounce glass-stopper bottles for.....	number.....	Punch, perfected.....	do..... 1
Chisels, L. H., Nos. 3, 33, 34, 41, 42, 48, of each.....	do.....	Forceps, tooth-extracting, Nos. 10, 15, 18R, 18L, 65, 150, 151, 222, of each.....	number.. 1
Clamps, rubber dam, Ivory's Nos. 19, 20, 21, 22a, 23a, 56 and Bi-nap, of each.....	number.....	Holder:	
Cleaners, root canal, Donaldson's or S. S. W., No. 5, all fine, 6 in package.....	packages.....	For cotton, Metbol's type.....	do..... 1
Corkscrew, folding.....	number.....	For mercury, ebony, No. 2.....	do..... 1
Elevators:		For nerve broach, No. 2.....	do..... 1
Knott's type, right and left, metal handle, of each.....	number.....	Rubber-dam, Anatomik.....	do..... 1
No. 3, metal handle.....	do.....	Hone, oil, Arkansas stone, in wooden box.....	do..... 1
Engine, dental:		Lamp, alcohol, No. 26, with flame shield.....	do..... 1
All cord, with K3 attachment for No. 7 hand piece.....	number.....	Extra wicks for.....	do..... 6
Cable, "A," as required *.....	do.....	Lancet, abscess, metal handle, octagon, No. 5.....	do..... 1
Sheath for, as required *.....	do.....	Lancet, gum, metal handle, octagon, No. 2.....	do..... 1
Cords for, extra (specify type of engine used).....	do.....	Mallet, metal case, No. 15.....	do..... 1
Duplex springs for, as required *.....	do.....	Matrix retainer, Ivory's, No. 1.....	do..... 1
Duplex springs, sheath for, part 10X, as required *.....	number.....	Extra bands for, bicuspid and molar, of each.....	do..... 12
Hand piece for "M" contra-angle, for slip-joint, No. 2.....	number.....	Matrix strips, copper, soft, ½ inch wide, 36 gauge, 5 in box, 6 inches long.....	boxes... 1
Hand piece for No. 7, straight, for slip-joint, No. 2.....	number.....	Mechanical dam, automaton.....	number.. 1
Lubricating oil for, 1 ounce, in bottle.....	bottles.. 3	*Medicine droppers.....	dozen... 3
Slip-joint connections for—		Mirrors, mouth:	
Part C2, as required *.....	number.....	Aluminum handles, No. 4.....	number.. 2
Part F2, as required *.....	do.....	Extra glasses for, magnifying and plain, size No. 4, of each.....	number.. 3
Engine instruments for hand piece, "M" contra-angle:		Mortar and pestle, glass, No. 2.....	do..... 1
Burs—		Pliers, dressing:	
Dentate, 557, 558, 559, 560, 568, of each.....	number.. 12	No. 2.....	do..... 2
Fissure, 700, 701, 702, 703, of each.....	do..... 6	No. 17.....	do..... 2
Inverted conc, 33½, 34, 35, 37, 39, 41, of each.....	number.. 12	Pliers, office, smooth beak, No. 122.....	do..... 1
Plug-finishing, 200, 202, 221, of each.....	do.....	Pluggers:	
Round, ½, 1, 2, 4, 6, 8, 9, of each.....	do..... 12	Amalgam, Woodson's, Nos. 1, 2, 3, of each.....	do..... 1
Drills, 100, 103, of each.....	do..... 6	Plastic, L. H., Nos. 4, 28, 37, 39, 40, 40a, of each.....	number.. 1
Mandrels:		Root-canal, Donaldson's, Nos. 2, 4, 6, of each.....	do..... 1
302, 303 of each.....	do..... 6	Pots, medicine, glass, Dappen's green and white of each.....	number.. 1
Morgan-Maxfield.....	do..... 2	Probes, silver.....	do..... 1
Points, carborundum, medium grit, mounted, 183, 186, 187, 189, 211, 219, 226, 227, 234, 241, of each.....	number.. 2	Saw, dental:	
Engine instruments for hand piece No. 7:		Complete, Gordon White.....	do..... 1
Burs:—		Extra blades for.....	do..... 6
Dentate, 557, 558, 559, 560, 568, of each.....	do..... 12	Ribbon, ¼-inch, thin.....	do..... 3
Fissure, 700, 701, 702, 703, of each.....	do..... 6	Scalers:	
Inverted cone, 33½, 34, 35, 39, 41, of each.....	do..... 12	L. H., Nos. 3, 6, 30, 33, 34, 40, 41, 54, 59, 62, of each.....	number.. 2
Plug-finishing, 200, 202, 221, of each.....	do..... 12	Pyorrhea, as required.....	do.....
Round, ½, 1, 2, 4, 6, 8, 9, of each.....	do..... 2	Screw porte, Morrison improved No. 2.....	do..... 1
Drills, 100, 103, of each.....	do..... 6	Scissors, gum, curved on flat, No. 22.....	do..... 1
		Separator, adjustable, Ivory's.....	do..... 1
		Shears, No. 32.....	do..... 1
		Slab, mixing, glass, No. 6.....	do..... 1
		Spatulas, Nos. 22, 24, of each.....	do..... 1
		Strips, celluloid, thin, in boxes of 100.....	boxes... 4

* Supplemental articles required to supply old-type cable foot engine.

Syringe:

Hypodermic—	
Dental, all metal, No. 172A.....number..	1
All metal, extra needles for, Imperial razor-edge points, gauge 24, straight and curved, of each.....number..	12
Extra needles for conductive anesthesia (Fischer's type), 42 mms. and 23 mms. length, as required.....do.....	
Needles, 42 mm. and 23 mm. length, hubs for, as required.....number.....	
Water, self-filling, all metal.....do.....	1
Extra pipes for, curved.....do.....	2
*Thermometer, clinical.....do.....	1
Tool, universal.....do.....	1
Wire, ligature, Angle's, No. 187.....boxes..	1

(f) FURNITURE

*Basins, hand, e. w.....number..	1
Chairs, dental, portable, metal frame in chest.....do.....	1
Chest:	
Empty, for dental engine (state type).....do.....	1
Supply, empty.....do.....	1
Instrument, empty.....do.....	2
Cuspidor, nickel-plated, No. 6.....do.....	1
Desk, field, dental, empty.....do.....	1
Stand, portable, complete, less table, for field use, Clark's type.....number..	1
Table, pressed steel, white, No. 90, Harvard type, table base to fit Clark's type stand.....number..	1

(g) MISCELLANEOUS

Alloy, copper, 1 ounce, in box.....boxes..	2
Alloys, to comply with Black's physical standards, 1 ounce, in bottle.....bottles..	12
Box, soap, metal, small.....number..	1
*Brushes, hand, fiber.....do.....	4
Cement:	
Copper oxyphosphate, black.....boxes..	6
Oxyphosphate, colors, yellow, white, light-gray, pearl-gray, dark-brown, of each.....do.....	6
*Chamois skins.....number..	4
*Cotton, absorbent:	
In roll.....pounds..	1
Rolls, 6 inches long, $\frac{5}{8}$ inch, $\frac{1}{2}$ inch, $\frac{3}{8}$ inch in diameter, 100 in box, of each.....boxes..	2
Cots, finger, rubber.....dozen..	1
Covers, paper, aseptic, 12 by 12, for bracket table, 100 in box.....boxes..	2
Cups:	
Polishing, soft rubber, small.....number..	72
Tin, 2 in nest.....nests..	1

Disks:

Bristle, Nos. 9 and 11, add cup shape, of each.....number..	18
Carborundum, knife-edge, diameter $\frac{1}{2}$, $\frac{3}{8}$, $\frac{3}{4}$, of each.....number..	9
In boxes, 100 each—	
Sandpaper, sizes $\frac{1}{2}$, $\frac{3}{8}$, $\frac{3}{4}$, grit 00, as required.....number.....	
Garnet paper, sizes $\frac{1}{2}$, $\frac{3}{8}$, $\frac{3}{4}$, grit $\frac{1}{2}$, as required.....number.....	
Emery paper, sizes $\frac{1}{2}$, $\frac{3}{8}$, $\frac{3}{4}$, grit 0, as required.....number.....	
Cuttlefish paper, sizes $\frac{1}{2}$, $\frac{3}{8}$, $\frac{3}{4}$, grit fine, as required.....number.....	
Fiber, devitalizing, arsenical, in jar.....jars..	1
Floss, silk, waxed, 24 yards in spool.....spools..	24
Gowos, operating.....number..	6
*Graduate, glass, 10-c. e.....do.....	1
Gutta-percha, stoppiag:	
High heat, sticks, $\frac{1}{2}$ ounce in box.....boxes..	4
Temporary, pink, sticks, 1 ounce in box.....do.....	4
Modeling composition, Perfection (Detroit), $\frac{1}{2}$ pound in box.....boxes..	2
Napkins, dental, aseptic, 500 in box.....do.....	2
Paper:	
Articulating, thio, in books.....books..	1
Ribulous, Japanese, 100 sheets in package.....packages..	2
Paper points, absorbent.....boxes..	6
Plaster of Paris, French, impression, 4 pounds, in screw-top tin.....tins..	1
Points:	
Root-canal, gutta-percha, Nos. 8, 10, 12, of each.....boxes..	2
Soft rubber, corrugated, No. G, No. L, of each.....number..	24
Pumice stone, powdered, 1 pound, in screw-top tin.....tins..	1
Rubber dam, plain, median, 18 feet by 6 inches, in sealed tins.....tins..	2
Sandarac, gum, 1 ounce, in carton.....cartons..	1
*Soap, Ivory.....cakes..	6
*Soap, scouring.....pounds..	2
Stove, alcohol, Dangler type.....number..	1
Strips, polishing, assorted grits, in boxes.....boxes..	3
*Towels, hand.....number..	60
*Tumblers, glass.....do.....	4
Wheel, carborundum, square edge, Nos. 301, 302, 304, 305, of each.....number..	2
Wood, orange, sticks, large, 25 in bundle.....bundles..	2

The articles listed in the tables which are to be furnished by the surgeon from post supplies, under the provisions of paragraph 49i, are indicated by an asterisk before each item. (Par. 852, M. M. D.)

The dental surgeon secured his technical equipment and replenishments on requisitions in the same manner as other medical supplies were obtained. These requisitions were made in triplicate and forwarded through the surgeon of the post at which the dental officer was serving, and the chief surgeon of the department, to the Surgeon General. These requisitions were forwarded annually for all articles on the supply table for which a definite allowance was fixed. The articles for which no definite allowance was fixed and for special articles not on the supply table, were forwarded quarterly as the need arose.³

BASE DENTAL OUTFIT

The portable outfit was not particularly adapted to the more complicated treatment and procedure required at the large hospitals. It contained no provision for dentures and bridges. Since there was need for a larger and more extensive outfit for general hospitals and for the larger and more important military posts, a supplementary unit was provided.⁴ It consisted essentially of a few additional pieces of furniture, including a standard dental chair and cabinet for instruments, a few additional instruments and a laboratory outfit, and the necessary supplies for dentures. This outfit was used in conjunction with the dental engine, dental instruments, and miscellaneous supplies of the portable outfit. Provision was made for the use of an electrical equipment at a few places where electric current was available. This equipment was originally classified as additional dental outfit. It later came to be known as base outfit.⁴ The contents of this outfit, like that of the portable outfit, were modified from time to time and revised again in May, 1917. The contents of the outfit of 1917 provided during the war period, appears below:

Base outfit

[The articles listed in the table which are to be furnished by the surgeon from post supplies are indicated by an asterisk before each item]

(a) OFFICE FURNITURE AND EQUIPMENT		Heater, electric:	
Anvil, cast base.....	number.. 1	No. 3, spray bottles and water glass ¹	1
Apron, rubber.....	do.... 1	No. 3, cut-off No. 4, with 8 feet of tubing for operating spray bottles ¹	1
Air compressor, unit, automatic:		Instrument boiler, small with gas heating attachment ²	1
Electric, with tank, No. 95 ¹	do.... 1	*Jars, large, for dressings.....	2
Tubing, connections and valves, for, as required.....	number.....	*Looking-glass.....	1
*Baskets, letter.....	do.... 2	Mat, rubber, for dental chair.....	1
*Baskets, waste paper.....	do.... 2	Mirror, hand, bevel, 5-inch.....	1
Bench, combination, No. 17, with bellows.....	do.... 1	*Paper weights.....	2
Bookcase (Globe), oak, sectional, base, top and units, for books, blanks and records as required.....	number.....	Port polisher, contra-angle.....	1
*Brooms, corn.....	do.... 1	Wood points for, assorted in box.....	boxes.. 1
*Brooms, whisk.....	do.... 1	Post puller, Little Giant.....	number.. 1
Cabinet, dental, aseptic, pressed steel, No. 510.....	do.... 1	Root reamer, Peeso's Nos. 2 and 3, for hand piece No. 7, of each.....	number.. 2
*Chairs:		Root facer, safe side, Nos. 7, 8, and 9, for hand piece No. 7, of each.....	number.. 2
*Arm.....	do.... 4	*Screen, bed, folding, frames for, white enamel.....	do.... 1
Dental (Harvard, Diamond, or Columbia), wood seat and back (white), as required.....	number.....	Shade bar.....	do.... 1
*Office, revolving.....	do.... 1	*Sheets, cotton, for screen.....	do.... 2
*Rocking.....	do.... 2	*Stamp, penalty.....	do.... 1
*Clock, for office.....	do.... 1	*Stool, revolving, white enamel (for laboratory).....	do.... 1
Cups, drinking:		Switchboard, electric, type 1A.....	do.... 1
Paper, 100 in box.....	boxes.. 8	Syringe:	
Holder No. 1, for.....	number.. 1	Hot-air, electric.....	do.... 1
*Cups, sponge.....	do.... 2	Water—	
*Cuspidors.....	do.... 2	21 A.....	do.... 1
Cuspidor, fountain:		21 A, extra nibs for.....	do.... 2
No. 6, complete with saliva ejector, floor connection for, and table attachment, white enamel.....	number.. 1	*Tables, bedside, white enamel.....	do.... 2
No. 6, extra bowls for, as required.....	do....	Table, pressed steel, white, No. 90, Harvard type, table base to fit chair arm.....	number.. 1
*Desk, office.....	do.... 1	Trays, aseptic, enamel, steel, 12 $\frac{3}{4}$ by 12 $\frac{3}{4}$ inches.....	number.. 2
Engine, dental, electric, folding bracket, all-cord, with part K-3, for hand piece No. 7 where current is available ²	number.. 1	Typewriter.....	do.... 1
*Envelope opener.....	do.... 1	Record ribbons for, as required.....	do....
Forceps, crown slitting.....	do.... 1	Water cooler, 6 gallons.....	do.... 1
		(b) LABORATORY EQUIPMENT	
		Articulator:	
		Plain line.....	number.. 1
		Crown and bridge, No. 5.....	do.... 1

¹ Issued only to stations where electric current is available.

² Issued only to stations where gas is available.

outfits were needed wherever the troops were stationed, and that type of equipment had to be provided; but it was feared, in making early plans for the supply of dental equipment, that the combined output of all the manufacturers of dental apparatus, instruments, and supplies would be unable to meet the requirements of the Army.⁶ As the large hospitals were developed at the training camps, the need for the larger base outfit at those hospitals became urgent and it was decided to provide one base outfit for each hospital. After the troops had arrived at the camps and they were examined physically, it became evident that dental treatment more extensive than had been anticipated would be necessary. While peace-time recruiting regulations required the rejection of applicants who had a number of teeth missing, the war-time requirements⁷ paid relatively little attention to the teeth, provided the man was otherwise sound. Dentures and restorations became the rule. Since work of this character could not well be done with the portable outfit, and the large dental chair and electric dental engine in common use could be obtained more readily than the portable type, it was decided in the autumn of 1917 to establish at every training camp dental infirmaries equipped with base dental outfits, where the services of the dental surgeon could be fully utilized and practically every kind of dental treatment needed could be furnished.⁸ After considerable study, it was decided that three or four dental infirmaries, properly located, could serve the camp better than one. Accordingly, these infirmaries were designed for one orthodontist and nine operating dental surgeons. A new unit of equipment was designed for them, the object being to provide a maximum of service with a minimum of equipment. While dental chairs and electric engines were provided for each operating dental surgeon, much of the equipment was used in common. A list of this equipment follows:

Supplies for 1 unit of 9 operating dental surgeons and 1 exodontist for cantonments—3 units to be supplied to each cantonment

(Supplies that may be drawn from hospital stock are not on this table)

(a) MEDICINES		
Acidum trichloracetium, 1 ounce, in glass-stopper bottle.....	bottles..	3
Eugenol, 1 ounce, in bottle.....	do.....	3
Mercury, redistilled, 4 ounces, in bottle.....	do.....	30
Novocain, 50-mgm. hypodermic tablets, or equivalent.....	tubes.....	50
Paraform, compressed tablets, Formacoid type, or equivalent, with directions, 1/8-grain tablets, 100 in bottle.....	bottles.....	12
Phenol, 1/2 pound in bottle.....	do	3
Sodium and potassium, in sealed tube.....	tubes.....	10
(b) STATIONARY		
Erasers, steel.....	number.....	1
Examination blanks.....	do.....	
Files, Shannon.....	do.....	4
Ruler.....	do.....	2
(c) BOOKS		
As required.....		
(d) BLANK FORMS		
Dental engagement slip, Form 65.....	number..	5,000
Invoice of, or receipt for, dental supplies, Form 31.....	number..	50
Register of dental patients, card Form 79.....	number..	5,000
Report of dental work, Form 57.....	do.....	50
Requisition for blank forms, Form 37.....	do.....	8
Requisition for dental supplies:		
Special, Form 35.....	do.....	100
Annual, Form 36.....	do.....	12
Return of medical property:		
Front, card, Form 17.....	do.....	12
Original, Form 17a.....	do.....	1,200
Retained, Form 17b.....	do.....	1,200
Back, card, Form 17c.....	do.....	12
(e) INSTRUMENTS AND APPLIANCES		
Alloy balance.....	number..	9
Amalgam carrier (double end) No. 5.....	do.....	9
Bands, fracture, Angle's, 4 bienspid and 2 molar.....	sets.....	12
Blower, chip:		
And hot air syringe, No. 38.....	number..	10
Extra bulbs for.....	do.....	20
Bottles, office, preparation No. 6.....	gross..	1
Boiler, instrument, large.....	number..	1
Broach reamers, extra-fine, fine, 6 in package, of each.....	packages..	24
Case, office preparation, extra 1/2 ounce glass-stopper bottles for.....	gross..	1/2

Chisels, L. H. Nos. 3, 33, 34, 41, 42, 48, of each number 10
 Clamps, rubber dam, Ivory's, Nos. 19, 20, 21, 22A, 23A, 56, and binap, of each number 10
 Cleansers, root-canal, Donaldson's or S. S. W. No. 5, all fine, 6 in package packages 125
 Corkscrew, folding number 1
 Elevators, Knott's type, right and left, metal handle each number 3
 Elevator, No. 3, metal handle do 3
 Engine, dental;
 Extra cords for (specify type of engine used) number 30
 Handpiece for "ML," contra-angle, for slip joint No. 2 number 10
 Handpiece for No. 7, straight, for slip joint No. 2 number 10
 Lubricating oil for, 1 ounce in bottle bottles 20

ENGINE INSTRUMENTS FOR HANDPIECE RIGHT CONTRA-ANGLE

Burs:
 Dentate, Nos. 557, 558, 559, 560, 568, of each number 120
 Fissure, Nos. 700, 701, 702, 703, of each do 60
 Inverted cone, Nos. 33½, 34, 35, 37, 39, 41, of each number 120
 Plug-finishing, Nos. 200, 202, 221, of each do 12
 Round, Nos. ½, 1, 2, 4, 6, 8, 9, of each do 120
 Drills, Nos. 100 and 103, of each do 30
 Mandrels:
 No. 303 do 60
 Morgan-Maxfield do 30
 Points, carborundum, medium grit, mounted, Nos. 183, 186, 187, 189, 211, 219, 226, 227, 234, 241, of each number 24

ENGINE INSTRUMENTS FOR HANDPIECE No. 7

Burs:
 Dentate, Nos. 557, 558, 559, 560, 568, of each number 120
 Fissure, Nos. 700, 701, 702, 703, of each do 60
 Inverted cone, Nos. 33½, 34, 35, 39, 41, of each number 120
 Plug-finishing, Nos. 200, 202, 221, of each do 12
 Round—
 Nos. ½, 1, 2, 4, 6, 8, 9, of each do 120
 Drills, Nos. 100, and 103, of each do 30
 Mandrels:
 No. 303 do 60
 Morgan-Maxfield do 30
 Points, carborundum, medium grit, mounted, Nos. 183, 186, 187, 189, 211, 219, 226, 227, 234, 241, of each number 24
 Excavators, Black's cutting instruments, Nos. 1, 17, 19, 21, 23, 34, 37, 39, 49, 50, 57, 58, 63, 64, 67, 68, 73, 74, 81, 83, of each number 10
 Explorers, L. H., Nos. 5, 6, 11, 12, 18, of each number 15

Forceps:
 Rubber-dam—
 Clamp, Brewer's type do 9
 Punch perfected do 9
 Tooth-extracting, Nos. 10, 15, 18R, 18L, 65 150, 151, 222, of, each number 2
 Holder for cotton, Methot's type do 10
 Holder for mercury, ebony box wood No. 1 do 30
 Holder for nerve broach No. 2 do 9
 Holder, rubber-dam, Anatomik do 9
 Hone, oil, Arkansas stone, in wooden box do 9

Lamp, alcohol:
 No. 26, with flame shield number 12
 Extra wicks for do 48
 Lancet:
 Abscess, metal handle, octagon, No. 5 do 10
 Gum, metal handle, octagon, No. 2 do 10
 Mallet, metal case, No. 15 do 10
 Matrix retainer, Ivory's:
 No. 1 do 9
 Extra bands for, bicuspid and molars, each do 120
 Matrix strips, copper, soft, ½ inch wide, 36 gauge, 5 in box, 6 inches long number 10
 Mechanical dam, Automaton do 10
 Mirrors, mouth:
 Aluminum handles, No. 4 do 18
 Extra glasses for, magnifying and plain, size No. 4, of each number 20
 Mortar and pestle, glass, No. 2 do 9

Pliers:
 Dressing—
 No. 2 do 20
 No. 17 do 10
 Smooth beak do 10
 Pluggers:
 Amalgam, Woodson's Nos. 1, 2, 3, of each do 10
 Plastic, L. H., Nos. 4, 28, 37, 39, 40, 40A, of each number 10
 Root-canal, Donaldson's, No. 2, 4, 6, of each number 10
 Pots, medicine, glass, Dappen's, green and white, of each number 11
 Probe, silver do 10
 Saw, dental, complete, Gordon White do 10
 Extra blades for do 30

Scalers:
 L. H. Nos. 3, 6, 30, 33, 34, 40, 54, 59, 62, of each number 10
 Pyrrohea do sets 10
 Screw Porte, Morrison improved, No. 2 number 3
 Scissors, gum curved or flat, No. 22 do 10
 Separator do 9
 Shears do 10
 Slab, mixing glass No. 6 do 10
 Spatulas, Nos. 22 and 24, of each do 10
 Strips, celluloid, thin, in boxes of 100 boxes 20
 Syringe, hypodermic:
 Dental, all metal, No. 172A number 10
 All metal, extra needles for, Imperial razor-edge points, gauge 24, straight and curved, of each dozen 5
 Extra needles for conductive anesthesia (Fischer's type), 42-mm. and 23-mm., length 1¾ inches, of each dozen 10
 Extra hubs for, 42-mm. and 23-mm. length needles number 10
 Tool, universal do 2
 Wire, ligature, Angle's No. 187 boxes 2

(f) MISCELLANEOUS

Alloy, copper, 1 ounce in box boxes 10
 Alloys, to comply with Black's physical standards, 1 ounce in bottle bottles 100
 Cement:
 Copper, oxyphosphate, black boxes 10
 Oxyphosphate, colors, yellow, white, light gray, pearl gray, dark brown, of each boxes 40
 Cotton, absorbent, rolls, 6-inches long, ¾ inch, ½ inch, ⅓ inch, in diameter, 100 in box, of each boxes 1
 Cots, finger, rubber dozen 6

Covers, paper, aseptic, 12 by 12, for bracket table, 100 in box.....boxes..	50	Shade bar.....number..	2
Cups, polishing, soft rubber, small.....gross..	10	Syringe, water 21A.....do....	10
Disks:		Extra bulbs for.....do....	24
Bristle, Nos. 9 and 11, and cup shape of each.....do..	2	Table, aseptic bracket.....do....	10
Carborundum, knife-edge, diameter ½ inch, ⅝ inch, ¾ inch, of each.....number..	60	Typewriter.....do....	1
In boxes, 100 each—		Table for typewriter.....do....	1
Sandpaper, sizes ½, ⅝, ¾ grit 00.....do....	10	LABORATORY EQUIPMENT	
Garnet paper, sizes, ½, ⅝, ¾, grit ½.....do....	10	Anvil, swaging.....number..	1
Emery paper, sizes, ½, ⅝, ¾, grit 0.....do....	10	Articulator:	
Cuttlefish paper, sizes ½, ⅝, ¾, grit fine.....number..	10	Plain line.....do....	4
Fiber:		Crown and bridge, No. 5.....do....	4
Devitalizing, arsenical, in jar.....jars..	10	Bowls, plaster, A and B, of each.....do....	1
Silk, waxed, 24 yards in spool.....gross..	1	Bridge, repair set.....do....	2
Gowns, operating.....number..	50	Extra nuts for.....do....	24
Gutta-percha, stopping:		Brush, laboratory, plain, stiff bristles, ⅞ inch.....number..	4
High heat sticks, ½ ounce, in box.....boxes..	20	Chalk, prepared, 2 pounds in friction or screw top tin.....tins..	3
Temporary, pink, sticks, 1 ounce in box.....do....	50	Cones, felt, large, blunt, pointed, of each.....number..	6
Modeling composition, Perfection (Detroit) ½ pound in box.....boxes..	20	Dentimeter, Kirk's No. 2.....do....	4
Napkins, dental, aseptic, 500 in box.....do....	20	File, gold:	
Paper:		Flat, 6 inches.....do....	2
Articulating, tbin, in books.....books..	20	Half-round, 6 inches.....do....	2
Japanese, bibulous, 100 sheets in package.....packages..	20	Round, 6 inches.....do....	2
Paper points, absorbent.....boxes..	40	Gauge, plate and wire, Brown & Sharpe.....do....	1
Plaster of Paris, French, impression, 10-pound carton.....cartons..	3	Hammer, swaging, 1½ pounds.....do....	2
Points:		Investment, compound, 3 pounds in tin.....tins..	6
Root-canal, gutta-percha, Nos. 8, 10, 12, of each.....boxes..	25	Knives, plaster, Nos. 5 and 10, of each.....number..	2
Soft rubber, corrugated, Nos. G and L, of each.....gross..	1	Ladle, melting, No. 8.....do....	2
Pumice stone, powdered.....pounds..	10	Lamp, alcohol, large, Purdy's.....do....	2
Rubber dam, plain, medium, 18 feet by 6 inches, in sealed tins.....tins..	20	Lathe, electric, including 7 chucks and burr cbuck.....number..	1
Sandarac gum, 1 ounce in carton.....cartons..	6	Lead, ½-pound ingots.....ingots..	10
Stove, alcohol, Dangler type (or kerosene).....number..	2	Metal, Melotte's.....do....	10
Strips, polishing, assorted grits, in boxes.....boxes..	50	Molding compound, ½-pound tin.....tins..	2
Wheels, carborundum, square edge, Nos. 301, 302, 304, 305, of each.....dozen..	4	Pliers:	
Wood, orange, sticks, large 25 in bundle.....bundles..	25	Contouring—	
OFFICE FURNITURE AND EQUIPMENT			
Anvil, cast base.....number..	1	No. 115, Crescent.....number..	2
Apron, rubber.....do....	2	No. 114, Johnson.....do....	2
Air compressor, unit automatic, electric, with 40-gallon tank, tubing, and connections.....number..	1	Round nose, No. 107.....do....	2
Bench, combination, No. 17, with bellows.....do....	1	Rubber, red.....pounds..	6
Cabinet:		Sandpaper, Nos. 00 to 1, of each.....sheets..	50
Dental, small.....do....	9	Saw, frame, mechanical.....number..	2
Filing, Medical Department.....do....	1	Extra blades, for.....do....	24
Cbairs, dental (Harvard Diamond, or Columbia), white.....number..	9	Shears Nos. 8, 10, 11, of each.....do....	2
Cuspidor, fountain:		Soldering and heating outfit, gasoline generator, No. 45, complete, with blowpipe stand.....number..	1
Complete with saliva ejector, floor connection for, and table attachment, white enamel.....number..	10	Soldering appliance, Melotte's improved, with blowpipe, pad, and clamps, complete.....number..	1
No. 6, extra bowls for.....do....	3	Spatula, plaster, 4-inch.....do....	2
Engines, dental, electric, folding bracket, all cord, with part K-3 for H. P. 7.....number..	10	Tongs, soldering, 7-inch.....do....	1
Forceps, crown slitting.....do....	2	Trays:	
Cut-off No. 4, with 8 feet of tubing, for operating spray bottles and 1 atomizer.....number..	10	Lower impression, Nos. 1, 3, 8, 15, 17, 22, of each.....number..	2
Root reamer, Peeso's Nos. 2 and 3, for No. 7 H. P., of each.....number..	9	Upper impression, Nos. 1, 3, 5, 12, 14, 18, of each.....number..	2
Root facer, safe side, Nos. 7, 8, 9, for No. 7 H. P. of each.....number..	9	Tubing, rubber, ½-inch, heavy wall, white.....feet..	16
		Tweezers, Nos. b, c, d, e, l, of each.....number..	1
		Vise, bench, jeweler's, 2-inch.....do....	1
		Wax, inlay.....boxes..	6
		Wax, pink, ½-pound box.....do....	4
		Wheels:	
		Brush, Nos. 3, 5, 6, 16, 24, 26, of each.....number..	2
		Carborundum, lathe, square edge, 1 and 2 inch, diameter, ⅜-inch width, grits C and E, of each.....number..	2
		Felt, square edge No. 3, round edge No. 4, knife edge No. 2, of each.....number..	2

Whetstone, carborundum, 5-inch.....	number..	1
Wire, binding, 32-gauge.....	spools..	2
Wax, yellow, impression.....	pounds..	6
ADDITIONAL ARTICLES		
Burnishers, tantalum double-end, No. 1.....	number..	2
Spatula, agate or bone.....	do.....	2
Sythetic porcelain:		
10 sbade, full portion in box.....	boxes..	2
Caulk's, shade guide for.....	number..	4
Anchor flasks.....	do.....	3
Bolts for.....	sets..	4
Cups, die plate, No. 5.....	number..	1
Flask, "box".....	do.....	1
Flask press.....	do.....	1
Ladles, with handle (melting), No. 5 and 6, of each.....	number..	1
Lead.....	ingots..	1
Molding rings, large and small, for metal dies, Bailey type, of each.....	number..	1
Molding sand.....	pounds..	10
Plate, German silver, Brown & Sharpe gauge, No. 30, size 6 by 6 inches.....	pieces..	6

Solder, silver.....	ounce..	1
Swager (metal).....	number..	1
Swaging mallet, horn.....	do.....	1
Vulcanite file, round and half-round, of each.....	do.....	1
Vulcanite serappers and finishers, Nos. 3, 7, 8, 2, 6, 27, of each.....	number..	1
Vulcanizer, 3 flasks, gas or kerosene.....	do.....	1
Wire, German silver, gauge 12, 16, 18, 4-foot lengths, of each.....	lengths..	1
Zinc ½-pound ingots.....	ingots..	10
ADDITIONAL ARTICLES FOR EXTRACTING ROOM		
Chairs, dental.....	number..	1
Engine, dental.....	do.....	1
Cabinet, for ward.....	do.....	1
Tablet, bedside, w. e.....	do.....	1
Burs:		
Bone, Allfort's, Nos. A, B, and C, of each.....	number..	3
Shamburg, surgical, Nos. 1 and 2 of each.....	do.....	2
Instrument boiler, small.....	do.....	1

The organization of these dental units and the type of work contemplated is described in the following letter of instructions, promulgated by the Surgeon General to all officers of the Medical Department concerned, October 16, 1917: "

DENTAL UNITS

1. Dental surgeons will be organized to work in units, for each of which a dental infirmary will be constructed. Until such time as dental unit buildings shall be completed, working space for the dental personnel should be provided in the base hospital and regimental infirmaries or other suitable available buildings. In selecting such space, due and equitable consideration should be had for the needs of the dental service.
2. While not permanently assigned to any definite organization, a dental unit will ordinarily serve a brigade, with such additional organizations as may be conveniently assigned.
3. Each dental unit will operate under an assistant dental surgeon, selected by the dental surgeon for his suitability for such detail. All dental officers are under the immediate control of the dental surgeon, who in turn is under the immediate supervision of the division surgeon. The dental personnel of the surgical head units will be assigned by the Surgeon General.
4. Ordinarily one assistant dental surgeon and 10 operating dental surgeons will be assigned to each dental unit. This number may be modified as circumstances render advisable, subject to the approval of the Surgeon General.

DENTAL PROPERTY AND REPORTS

1. Dental reports will be submitted as follows:
 - a. To the dental surgeon (direct).
 1. Consolidated report by each dental unit.
 2. Consolidated report by dental officers attached to the surgical head unit.
 3. Individual report by dental surgeons not included above, should there be such.
 - b. The dental surgeon will consolidate such individual reports (class 3) as he may receive, and forward all reports to the Surgeon General, through the division surgeon.
2. The dental property in use by the dental personnel in the camp should be carried on the return of the camp medical supply officer, who will issue it on memorandum receipts to such officers as the dental surgeon may designate. All requests for dental supplies and equipment must be approved by the dental surgeon, who will be responsible for the submission of the necessary requests for the proper equipment of the dental service at the camp and for the proper care, use, and preservation of all dental equipment in use.

TYPES OF DENTAL WORK AUTHORIZED
IN THE UNITED STATES

1. Dental officers will do the usual work now authorized by regulations.
2. The base hospital dental laboratories, dental units, general hospitals, and other important stations designated by the Surgeon General, will be equipped to do the following work in addition.
3. Repair of crowns, bridges, and plates for men who have been accepted wearing these appliances.
4. Making new plates for men for whom their regimental surgeon or the dental surgeon recommend such work as necessary for health.

IN FRANCE

1. Dental units will be sent over with personnel and equipment sufficient to do practically the same types of work as described above for the United States. These units will be assigned to such hospitals, tactical organizations, or territorial sections, as the chief surgeon may decide.
2. The units attached to the head surgery hospitals will be especially organized with personnel and equipment to do the types of work required.

EQUIPMENT FOR BASE AND EVACUATION HOSPITALS

Since the dental infirmaries described above were intended for the most part to furnish treatment to the military personnel not on sick report, it was necessary to provide means in base hospitals for full dental treatment for such patients as might be undergoing treatment therein. The list of dental equipment which was compiled for this purpose appears below.

This equipment was designed for economy of apparatus and efficiency of service. It was intended to provide equipment for four dental surgeons.

Base hospital unit dental equipment

[Basis: 1,000-bed capacity; 4 Dental Corps officers]

MEDICINES	INSTRUMENTS AND APPLIANCES
Acidum trichloroaceticum, U. S. P., 1 ounce, in amber glass-stopper bottle.....bottles..	Amalgam carrier (double-end), No. 5.....number..
Aethylis chloridum, 3 ounces in metal tube.....tubes..	Blower, chip:
Alcohol, ethyl, 1 quart in bottle.....bottles..	And hot-air syringe, No. 38.....do.....
Aqua ammonia fortior, U. S. P., 1 ounce in bottle.....bottles..	Extra bulbs for.....do.....
Aqua hydrogenii dioxiidi, 1 pound in bottle.....do.....	Boiler, instrument, small, approximately 12 by 6 by 4 inches (with alcohol lamp that nests inside boiler, and collapsible legs).....number..
Argentii nitras, crystals, 1 ounce in bottle.....do.....	Broach reamers, fine and extra fine, 6 in package.....packages..
Chloroformum, ¼ pound in tin.....tins..	Burnishers:
Cocainae hydrochloridum, 10-mgm. hypodermic tablets, 20 in tube.....tubes..	L. II., Nos. 29, 32, 348, 36, of each.....number..
Eugenol, in standard 1-ounce bottles.....bottles..	Tantalum, double-end.....do.....
Iodine crystals, 1 gm. in tube.....tubes..	Case, office preparation, aluminum, with 8 1-ounce square glass-stopper bottles filled as shown (6 full); Eugenol, phenol, formo-eresol, silver nitrate (saturated solution); formalin, 25 per cent aqua ammonia fortior; (2 empty).....number..
Liquor cresolis compositus, 1 quart in bottle.....bottles..	Chisels:
Mercury, redistilled, 4 ounces in wooden screw-top, wooden container.....number..	L. II., Nos. 3, 33, 34, 41, 42, 48, of each.....do.....
Morphinae sulphas, 8-mgm. hypodermic tablets, 20 in tube.....tubes..	Maxillo-surgery, set of two, straight and convex, 5 mm. width, Tieman type.....sets..
Novocaine, or proceain, 50-mgm. hypodermic "F" tablets, or equivalent.....tubes..	Clamps, rubber dam, ivory, Nos. 19, 20, 21, 22A, 23A, 56, and bi-nap, of each.....number..
Paraform, compressed tablet, Formacoid type, ½-grain tablet, 100 in bottle, or equivalent.....bottles..	

Cleasers, root canal, Donaldson's, No. 5, all fine, 6 in package.....	48	Fracture appliances, Usona, No. 3 fracture outfit, in small box, including wrenches.....	4
Corkscrew, folding.....	4	Holder:	
Curette, antrum, size 2, Tieman type.....	4	Cotton, Methot's type (snap cover like briquet, keeping cotton from dust).....	4
Elevator, periosteal, dental, Tieman type.....	4	Mercury, ebony boxwood, No. 2.....	4
Elevators, set of 4 shanks, metal handle, nickel plated, Dodel or Knott type.....	4	Nerve broach, No. 2.....	4
Engine, dental, all cord:		Rubber dam, Anatomik.....	4
With K-4 attachment, slip joint No. 2 (see note A).....	4	Knife, tenotome, M. O. $\frac{3}{4}$ -inch blade, No. 104, C. N. D. Cat.....	4
Extra cords for.....	12	Lamp alcohol, Capital:	
Hand piece for—		No. 21.....	4
Contra-angle "M", for slip joint No. 2.....	8	Extra wicks for.....	24
Straight, No. 7, for slip joint No. 2.....	8	Mallet, in metal case, No. 15.....	4
Engine instruments for hand piece contra-angle "M":		Matrix retainer, Ivory's No. 1.....	4
Burs—		Extra bands for.....	96
Dentate, Nos. 558, 559, 560, 567, 568, of each.....	48	Mechanical dam, automaton.....	4
Fissure, Nos. 700, 701, 702, 703, of each.....	48	Medicine droppers.....	12
Inverted cone, Nos. 33 $\frac{1}{2}$, 34, 35, 37, 39, 41, of each.....	48	Mirrors, mouth, Nos. 52 and 53 S. W., of each.....	4
Round, Nos. $\frac{1}{2}$, 1, 2, 4, 6, 8, 9, of each.....	48	Extra glasses for, of each.....	12
Plug finishing, Nos. 200, 202, 221, of each.....	8	Mortar and pestle, ground glass, No. 2.....	4
Drills, Nos. 100 and 102, of each.....	48	Pliers: dressing—	
Mandrel—		No. 2.....	8
No. 303.....	24	No. 17.....	8
Morgan-Maxfield.....	8	Cone socket, No. 102.....	4
Points, carborundum, medium grit, mounted, Nos. 183, 186, 187, 189, 211, 219, 226, 227, 234, 241, of each.....	8	Pluggers:	
Polishers, Young's mandrel.....	8	Amalgam, Woodson's, Nos. 1, 2 and 3, of each.....	4
Engine instruments for hand piece, No. 7, straight:		Plastic, 1. h., Nos. 4, 28, 37, 40, 40a, of each.....	4
Burs—		Root canal Donaldson's, Nos. 2, 4, 6, of each.....	4
Bone—		Pots, medicine, glass, Dappen's, green and white.....	8
Allport A, B, and C, of each.....	8	Probe, silver, No. 156.5, C. N. D. Cat.....	4
Friedman, Nos. 5, 8, 22, 27, 29, 31, of each.....	24	Saws, dental, ribbon, thin, $\frac{3}{8}$ -inch.....	24
Dentate, Nos. 557, 558, 559, 560, 568, of each.....	48	Scalers, 1. h., Nos. 3, 6, 30, 33, 34, 40, 41, 53, 59, 62, of each.....	4
Fissure, Nos. 700, 701, 702, 703, of each.....	48	Scissors, enucleating, No. 576.1, C. N. D. Cat.....	4
Inverted cone, Nos. 33 $\frac{1}{2}$, 34, 35, 37, 39, 41, of each.....	48	Separator, adjustable, Ivory's.....	4
Plug, finishing, Nos. 200, 202, 221, of each.....	8	Shears.....	4
Round, Nos. $\frac{1}{2}$, 1, 2, 4, 6, 8, 9, of each.....	48	Slab, mixing, glass, No. 6.....	4
Disks, bristle—		Spatula:	
Small, stiff, mounted.....	49	Agate or bone.....	4
Cup-shaped, small, stiff, mounted.....	48	Nos. 22 and 24, of each.....	4
Drills, Nos. 100 and 103, of each.....	24	Spoons, table, triple-plated.....	4
Facers, root, safe side, Nos. 7, 8, 9, of each.....	8	Syringes:	
Mandrel, No. 303.....	24	Hypodermic—	
Points, carborundum, medium grit, mounted, Nos. 183, 186, 187, 189, 211, 219, 226, 227, 234, 241, of each.....	8	Luer type, 2 c. c., graduated in one-tenths.....	4
Polishers, Young's mandrel.....	16	Needles for, slip joint, 25 gauge, $\frac{3}{4}$ -inch.....	48
Reamers, root, Peeso's, Nos. 1, 2, 3, of each.....	4	All metal, screw joint, (par. 956, M. M. D., 1916).....	4
Dissolving cup.....	4	Fischer type, screw joint, 2 c. c.....	4
Excavators, Black's cutting instruments, Nos. 17, 19, 21, 23, 34, 37, 39, 40, 50, 57, 58, 63, 64, 69, 70, 73, 74, 81, 83, 93, of each.....	4	All metal and Fischer type, both screw joint, 2 c. c., needles for—	
Explorers, 1. h., Nos. 5, 6, 11, 12, 18, of each.....	4	23 gauge, $\frac{1}{8}$ inch, straight.....	12
Forceps:		23 gauge, $\frac{1}{8}$ inch, curved.....	12
Rubber-dam clamp—		23 gauge, $\frac{1}{4}$ inch, straight.....	12
Brewer's type.....	4	23 gauge, $\frac{1}{4}$ inch, curved.....	12
Perfect.....	4	25 gauge, $\frac{3}{4}$ inch, straight.....	24
Tooth extracting, Nos. 10, 15, 18R, 18L, 65, 150, 151, 222, of each.....	4	All metal and Fischer type, both screw joint, 2 c. c., needles for, Shimmel type—	
		26 gauge, 1 inch, No. 31, short hub.....	16
		26 gauge, 1 $\frac{3}{8}$ inch, No. 34, long hub.....	16
		All metal, screw joint, extra lead washers for.....	48

Saw frame, mechanical.....number.. 1
 Extra blades for.....do.... 24
 Shade bar, S. S. W.....do.... 1
 Shears, Nos. 8 and 11, of each.....do... 1
 Silix, pulverized, 20 pounds in sack (Grit XXX)
sacks.. 1
 Soldering black, S. S. W. No. 2, asbestos, with holder
number.. 1
 Soldering and heating outfit, gasoline generator, No.
 45, complete, less blowpipe stand (issued only to
 stations where gas is not available).....number.. 1
 Spatula:
 Plaster, 4-inch.....do.... 1
 Wax, No. 2, S. S. W.....do.... 1
 Teeth, vulcanite, "Diatric type," upper and lower
 sets, standard sizes and shades.....sets.. 24
 Tongs, soldering, 7-inch.....number.. 1
 Trays:
 Lower impression, Nos. 1, 3, 5, 15, 17, 22, of each
number.. 1
 Upper impression, Nos. 1, 3, 5, 12, 14, 18, of each
number.. 1
 Bridge impression, universal type.....do.... 2
 Tubing, rubber, heavy-walled, white, 1/2-inch
feet.. 16
 Tweezers, soldering, Nos. 662E, 662F, 662 P. C. D.,
 of each.....number.. 1

Vise:
 Bench, jeweller's, 2-inch.....number.. 1
 Pin, double-end.....do.... 1
 Vulcanite files, round and half-round.....do.... 2
 Vulcanite scrapers and finishers, Nos. 3, 7, 8, 26, 27,
 of each.....number.. 1
 Vulcanizer, Lewis cross-bar:
 3 Whitney flasks, gas or gasoline burner, with
 flasks inclosed.....number.. 1
 3-flask—
 Extra disks for safety valve, 1 dozen in box
boxes.. 1
 Extra packings for.....number.. 2
 Wax:
 Pink, base plate, 1/2 pound in box.....boxes.. 6
 Inlay, in boxes.....do.... 1
 Yellow beeswax, in 1/2-pound box.....do.... 2
 Wheels:
 Brush, Nos. 3, 5, 6, 16, 24, 26, of each.....number.. 1
 Carborundum, lathe, square edge, 1 and 2
 inch diameter 7/8 inch width, Grits C. & E.,
 of each.....number.. 2
 Felt, square edge No. 3, round edge No. 4,
 knife edge No. 2, of each.....number.. 1
 Whetstone, carborundum, 5-inch, and hone, oil,
 Arkansas stone, combined, in wooden holder with
 cover.....number.. 1
 Wire, binding, 32-gauge.....spools.. 1

PROSTHETIC DENTAL SURGICAL EQUIPMENT

Articulator, anatomical, complete.....number.. 1
 Casque, annex complete, with attachments for re-
 constructive surgery of face and jaws.....number.. 1
 Expansion arch splints (sets of lingual and buccal
 appliances).....sets.. 1
 Files, half-round, 6-inch.....number.. 1
 Flasks, box, complete.....do.... 1
 Flux, "Maxilor," powder, 1/2-pound tins.....tins.. 1
 Fracture bars.....number.. 1
 Hammer, swaging, 1 1/2 pounds.....do.... 1
 Jackscrews, orthodontia type, Nos. C, E, and F, of
 each.....number.. 6
 Ladle, melting:
 No. 5.....do.... 1
 No. 6.....do.... 1
 Handle for Nos. 5 and 6.....do.... 1
 Lead, 1/2-pound ingots.....ingots.. 12
 Mallet, horn.....number.. 1
 Metal:
 "Maxilor," for cast splints.....pounds.. 2
 "Victoria," 2-ounce ingots.....ingots.. 6
 Molding rings (Brophy):
 Large.....number.. 1
 Small.....do.... 1
 Nuts, square, to fit threaded wire of gauges 8 and
 10, 3 nuts for each size of threaded wire.....number.. 6
 Plate, German silver, Brown & Sharpe gauge No. 30,
 size 6 by 6 inches.....pieces.. 6
 Pliers, No. 122.....number.. 1
 Sand, molding.....tins.. 3
 Screws, small, headed, with nuts:
 Gauge 10, 1 1/2 cm. long.....number.. 6
 Gauge 13, 1 1/2 cm. long.....do.... 6
 Solder, silver.....ounces.. 4

Splint lock:
 Closed bite, threaded tube and wire.....number.. 6
 Open bite.....do.... 6
 Trays, wooden, for molding.....do.... 1
 Tubing, Melchoir, or German silver, seamless:
 Round, gauges 7, 8, 10, length 6 inches, of each
pieces.. 1
 Square, 6 and 8, length 3 inches, of each.....do.... 1
 Wire:
 German silver, gauges 12, 16, 18, 4-foot lengths,
 of each.....feet.. 4
 Ligature, gauge No. 28 (box 187).....boxes.. 1
 Melchoir, or German silver—
 To fit tubing and gauges Nos. 7, 8, 10, length
 12 inches, of each.....pieces.. 1
 Square, gauges 8 and 10, to fit the Nos. 6 and
 8 gauge square tubing, length 3 inches, of
 each.....pieces.. 1
 Gauge Nos. 8 and 10, threaded, length 3
 inches, of each.....pieces.. 1
 Zioc, 1/2-pound ingots.....ingots.. 12

ADDITIONAL FURNITURE AND EQUIPMENT

SPLINTS, JAW; APPLIANCES FOR POST DENTAL
 FRACTURES (VILLAIN)
 Connecting rods:
 Threaded.....number.. 3
 Cranks for.....do.... 3
 Rod, threaded, with head and screw.....do.... 3

Anvil, cast base.....number.. 4
 Apron, rubber.....do.... 4
 Air compressor unit, automatic, electric:
 With tank No. 95 (see note B).....do.... 1
 Tin tubing, connections, and valves for (see
 note B).....number.. 1
 Baskets, letter.....do.... 1
 Baskets, waste paper.....do.... 1
 Bench, combination, No. 17, with bellows.....do.... 1
 Bookcases, sectionl, complete, (W. D. Cat., stan-
 dard office supplies and equipment), as follows:
 1 2-drawer vertical cap size section (9092-a).
 1 6-file document section, (9148-a).
 1 9-drawer legal blank section (9144-a).
 1 Storage section without door (9188-a).
 1 Top (9380-b-1).
 1 Sanitary base (9384-b-2-aa).....number.. 1

Exodontia (Winter).....copy..	1	Operative Dentistry (Black) volumes 1 and 2..copy..	1
Materia Medica (Printz)	1	Oral Surgery, Blair.....do.....	1
Oral Abscess (Thoma).....do.....	1	Practice and Principals of Crown and Bridge Work	1
Oral Anesthesia (Thoma).....do.....	1	(Coslee).....copy..	1
Oral Diseases and Malformations (Brown).....do.....	1	(See note D.)	

NOTE A.—Issued in lieu of engine, dental, white enamel, electric, to stations where electric current is not available.
 NOTE B.—Issued only to stations where electricity is available. In requisitioning electric equipment specify kind of current available (direct or alternately), giving voltage, cycles, phases, etc.
 NOTE C.—Issued only to stations where running water is not available.

NOTE D.—Military publications are furnished as part of the base hospital library unit for common use of all officers of the unit.

Weight and Displacement Data, Packed for Shipment

	Weight	Displacement
	<i>Pounds</i>	<i>Cubic feet</i>
Medicines.....	95	3
Instruments and appliances.....	900	24
Miscellaneous.....	420	10
Dental Laboratory Equipment.....	342	7
Prosthetic Dental Surgical Equipment.....	45	1
Additional Furniture and Equipment.....	8,000	550
Stationery.....	25	1
Blank forms.....	22	1
Dental library unit.....	80	3
Total.....	9,929	600

The need of a dental outfit for evacuation hospitals also presented itself, and a table of equipment of a dental unit for such hospitals was prepared. This outfit, with a very few modifications, was the standard portable outfit to which a modified laboratory equipment of the base outfit was added.¹⁰ Evacuation hospital dental units were assembled complete and forwarded overseas, in such numbers as were required. The articles in this unit were selected with great care for the emergency work required at such hospitals. Its contents were similar to those of the equipment for an overseas base hospital. (See Chap. XXXIII.)

PRODUCTION OF DENTAL INSTRUMENTS

The United States has long been the leader in the world's production of dental instruments. In this it had a very great advantage over the surgical industry. The conditions surrounding the dental instrument industry in 1917 were very much more favorable. The manufacturing concerns were well established and organized for quantity production. The expansion of the industry was effected without great difficulty. Dental instruments, for the most part, have been machine made. They have been of such uniform and satisfactory quality that, as is not the case with surgical instruments, they have been sold almost to the exclusion of foreign makes.¹¹

The problem of a supply of dental instruments was never so serious as that of surgical instruments; nevertheless, the demand for them exceeded the capacity of the old established factories to produce. Several new plants for the manufacture of dental burs and the smaller instruments for which the demand was the greatest came into being during the World War.¹¹ Although shortages existed many times, they were met in due time. For the most part, deliveries by the several manufacturers were prompt and fairly in accordance with

promised schedule. The war contracts, when finally completed or terminated, found the Medical Department with large stocks of every kind of dental instruments and appliances on hand. The war contracts running at the time of the signing of the armistice were completed or terminated in conformity with the needs of the Medical Department. The terms of settlement were fair and satisfactory to the majority of the contractors. The only difficulty experienced was in adjusting the contracts of the manufacturers but recently embarked on the production of dental instruments.

PURCHASES

In providing dental equipment for the first million men, instructions issued by the Surgeon General, May 25, 1917, directed the purchase of 500 sets of portable dental apparatus.¹² On July 2, 1917, instructions were issued for the purchase of 400 additional dental outfits.¹³ The president of the dental manufacturers' war emergency association estimated the time for completing the production of the 500 outfits to be about two months.¹⁴ The order was placed June 7, and the officer in charge of the medical supply depot at New York, reported, September 19,¹⁵ that the delivery of the 500 outfits had just been completed, and the outfits were assembled at the New York depot as rapidly as the materials were received. In September, 1917, the number of outfits assembled per week had reached 75. Of the 900 outfits ordered purchased, 524 had been assembled and issued before the end of September, 1917.

Instructions were issued by the Surgeon General about the end of August, 1917, for the purchase of 1,000 additional portable dental outfits. The progress on delivery of the articles contained in these outfits was such that the medical supply officer at New York anticipated that 1,400 outfits would have been assembled and distributed by the end of 1917.¹⁵

Additional purchases of portable outfits were made from time to time as the increase in the number of dental officers made necessary. The last authorization to purchase was issued August 14, 1918, and called for 1,000 such outfits.¹⁶ The total number of portable dental outfits, for which orders were placed during the period April 4, 1917, to November 30, 1918, was 4,030.¹⁷ On October 4, 1918, there were in active service in the United States Army, 4,135 dental officers, of whom 2,330 were in the United States and 1,805 overseas.¹⁸

BASE OUTFITS

The first purchase of the base dental outfits during the war period was authorized August 14, 1917.¹⁹ This authorization called for 60 such outfits. Thirty-two of the outfits were intended for the base hospitals at the various training camps; the remaining 28 were intended for overseas. The actual purchases made during the quarter ending September 30, 1917, of dental outfits were limited to the 60 authorized. When the development of the dental infirmaries, the purchase of large numbers of dental chairs and electrical dental engines were made. Each dental infirmary was equipped with 10 chairs and 10 engines. Approximately 400 chairs and engines were required for the equipment of all the infirmaries authorized to be established. As base hospitals

began to be sent overseas in increasing numbers in the fall of 1918, base outfits in large numbers again became necessary. The total purchases of dental chairs and electrical dental engines during the period April, 1917, to November, 1918, were 1,550 chairs and 1,184 electric dental engines.¹⁷

REPLENISHMENT SUPPLIES

In addition to the articles contained in the portable outfits and the base outfits authorized to be purchased, authorization was given October 8, 1917, for the purpose of a miscellaneous lot of dental supplies equivalent to approximately 2,000 portable outfits and 100 base outfits, excepting only the heavier bulky articles.²⁰ On February 11, 1918, the Surgeon General furnished a new schedule for the purchase of dental supplies to the officer in charge of the medical supply depot at New York.²¹ This schedule provided a definite allowance for 1,000,000 men as an initial equipment and, in addition, specified the quantities to be purchased quarterly. A new schedule was promulgated in June and augmented in August, 1918. The total quantities of dental supplies of all kinds purchased during the World War, so far as can be determined from available records, appear in the appendix (p. 912).

DISTRIBUTION

The earlier plan for distribution of the portable dental outfits within the United States contemplated placing a definite number of these outfits at each of the medical supply depots. The Surgeon General's instructions of July 26, 1917, directed the distribution of these outfits to medical supply depots as follows:²² Atlanta, 200; Chicago, 110; Philadelphia, 110; St. Louis, 110; San Antonio, 110; San Francisco, 62. From each of these depots the outfits were to be issued to the troops in the area supplied by them. It was also intended to stock these depots with miscellaneous dental supplies. The quantities available, however, did not keep pace with the demand, and it was later decided to make all distribution of loose dental stock direct from the New York medical supply depot.

The War Department tables of organizations obtaining in the spring of 1917 allowed 27 dental surgeons per division, and on this basis 27 dental outfits were issued to each organized division.²³ This allowance was increased in March, 1918, to provide for 31 dental surgeons, of whom 1 acted as division dental surgeon.²⁴ Under this new authorization 30 portable outfits were issued per division. So far as practicable the outfits issued to and in use by dental surgeons in each division in the United States were completed in all respects before the departure of the division for service overseas and taken with them.

The portable outfit for overseas service included all the articles in the outfit considered actually necessary and which had formerly been supplied from hospital stock at the stations where dental surgeons served. The original outfit consisted of six packages: Dental engine in chest, dental chair in chest, field desk, two instrument chests, and a supply chest. For overseas service five additional packages were added: One containing a portable stand and table; one a coal-oil stove, single burner; one a box of medicines; another a

box of miscellaneous supplies; and finally a box of alcohol. These 11 packages measured 39.28 cubic feet and weighed 775 pounds.²⁵ Considerable difficulty was experienced by the Medical Department in securing transportation for these outfits overseas, which led frequently to the situation where a dental surgeon arriving overseas was without an outfit for several weeks. To overcome this, the Surgeon General, on the initiative of the chief surgeon, A.E.F., instituted a movement in June, 1918, to have the outfits transported overseas as personal baggage.²⁶

SHIPMENTS TO FRANCE

The plans for dental equipment for the overseas forces contemplated that only portable outfits would be sent. The standard dental chairs, cabinets, benches, and switchboards were bulky and there was insufficient cargo space. The electric dental engines were excluded on account of lack of definite information of the electric current available. Such information as had been received indicated that the current supply differed in practically every city in France, and the voltages and cycles, if alternating, varied greatly from those in use in the United States. The type of current, voltage, and, if alternating, the cycle, on which the equipment is to operate must be known before any electric equipment can be purchased. The universal motor that would operate on any ordinary current had not then come into general use, although a few were being made. The base dental outfit could not well be sent to France. The portable outfit, on the other hand, could be used anywhere, provided the necessary shelter, light, and heat were provided.

The plan of distribution of portable dental outfits followed very much the peace-time arrangement of issuing an outfit to every dental surgeon unless he were assigned to a hospital having other dental equipment. The plan was, during 1917, to issue a portable outfit to every dental surgeon under orders for overseas duty. The New York depot was instructed to issue outfits to such dental surgeons as they passed through that port en route to France. The surgeon of the port was also informed of this plan and cooperated in securing the equipment.²⁷ The dental surgeons themselves were instructed to report in person at the New York depot en route and obtain their outfit. Any dental surgeon en route to France who did not have an outfit could obtain one by calling at the depot and showing his orders. It was the continuing endeavor of the Surgeon General's Office and the New York medical supply depot to equip every dental surgeon before he left the United States. Without his equipment on arrival at the port of debarkation, his time would be wasted. The outfit was loaded on the same ship with the dental surgeon whenever that was practicable.

It was reported that some dental officers passing through the port either did not report at all or their stay was too short to enable them to secure an outfit. To meet this condition portable outfits were sent to the medical supply depot in France from time to time as the need indicated. Instructions were issued August 22, 1917, for the shipment of 20 portable outfits to that depot.²⁸ Instructions of October 15, 1917, directed the shipment of 30 more such outfits, complete as listed in the supply table, omitting four medicines

not considered necessary.²⁹ These shipments continued to be made. The medical supply officer, New York, reported September 13, 1918, that there had been shipped to France during the period June 1 to August 31, 1918, 391 complete portable outfits.³⁰

A few base dental outfits were sent to France in the fall of 1917, but shipments of such outfits were discontinued.

The officer in charge of the base medical supply depot in France forwarded a requisition for dental supplies under date of August 4, 1917. This requisition called for a miscellaneous assortment of articles on the dental supply table. It reached the Surgeon General August 23, 1917.³¹ Eight days later a cablegram was received from the commanding general, A. E. F., that the dental supplies requested on that requisition were urgently needed.³² On September 10 the medical supply officer at New York reported the shipment that day of 83 packages of dental supplies, weighing 6,935 pounds.³³ All articles on the requisition were included in the shipment. Loose dental stock continued to be sent to France until the armistice was signed. Beginning with October, shipments went forward, in so far as available stocks would permit, in accordance with a monthly automatic replenishment list. This list represented the estimated requirements for one month. The articles included in this list were limited to the expendable articles on the supply table. As many times the quantities on the automatic replenishment list were sent each month as there were times 26,000 troops in France. The nonexpendable articles on the supply table were to be sent as initial equipment and upon requisition.

The automatic supply table received from the chief surgeon, A. E. F., in May, 1918, called for quantities materially greater than those on the table previously used. It had been difficult to secure the quantities on the former automatic replenishment list and it became doubly so with those on the new list. Production was unable to keep pace with the demands in spite of expansion of existing facilities and the development of new sources of supply. Because shipments overseas had fallen so far short of the quantities directed to be shipped, the Surgeon General, on October 26, 1918, directed the officer in charge of the medical supply depot in New York to suspend all domestic shipments of dental supplies that would in any way interfere with shipments of such supplies to the American Expeditionary Forces, until the automatic replacements for France, up to and including the September replacement, had been docketed.³⁴

Although the shipments never caught up with the automatic supply table received in May, 1918, huge quantities of all kinds of dental supplies were forwarded and there is no evidence that a shortage of them existed during 1918. Even during 1917, after the initial shipment reached France, there was no real difficulty in meeting all legitimate requirements.

REFERENCES

- (1) Act of February 2, 1901 (31 Stats. 748).
- (2) Act of March 3, 1911 (36 Stats. 1054).
- (3) Manual for the Medical Department, U. S. Army, 1916, 492-495.
- (4) *Ibid.*, 855-856.

- (5) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, May 16, 1917. Subject: Dental supply table. On file, Finance and Supply Division, S. G. O., 14039-50.
- (6) Letter from the medical supply officer, New York, to the Surgeon General, September 14, 1917. Subject: Suggestions as to relief of congestion of supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{130}$.
- (7) Special Regulations No. 65, W. D., 1917.
- (8) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, October 10, 1917. Subject: Supplies for one unit of 10 operating dental surgeons. On file, Finance and Supply Division, S. G. O., $\frac{531 \text{ Misc.}}{53}$.
- (9) Dental Letter No. 2, Surgeon General's Office, October 16, 1917.
- (10) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, June 14, 1918. Subject: Dental equipment. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y. D.}}{757}$.
- (11) Letter from G. W. Wallerich, in charge of instrument department, General Purchasing Office, Medical Department, Washington, D. C., 1918, to Col. Edwin P. Wolfe, M. C., July 29, 1927, relative to surgical and dental instruments. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{1258}$.
- (12) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, May 25, 1917. Subject: Supplies for a million men. On file, Finance and Supply Division, S. G. O., 14039-20.
- (13) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, July 2, 1917. Subject: Portable dental outfits. On file, Finance and Supply Division, S. G. O., 14039-136.
- (14) Letter from Frank H. Taylor, President Dental Manufacturers' War Emergency Association, Philadelphia, Pa., to Col. H. C. Fisher, S. G. O., June 25, 1917, relative to dental requirements, Army, Navy, and Red Cross. On file, Finance and Supply Division, S. G. O., $\frac{187 \text{ D. M. W. E. A.}}{1}$.
- (15) Letter from the officer in charge, Medical Supply Depot, New York, to the Surgeon General, August 30, 1917, and first indorsement, S. G. O., September 1, 1917. Subject: Portable dental outfits. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{88}$.
- (16) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, August 14, 1918. Subject: Portable dental outfits. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{210}$.
- (17) Total purchases, April 6, 1917, to November 11, 1918, compiled from records on file in the Surgeon General's Office. On file, Finance and Supply Division, S. G. O., $\frac{531 \text{ Misc.}}{P}$.
- (18) Memorandum for Colonel Darnall from Lieut. Col., J. R. Bernheim, Dental Corps U. S. Army, October 7, 1918. Subject: Dental officers. On file, Finance and Supply Division, S. G. O., $\frac{531 \text{ Misc.}}{D}$.
- (19) First indorsement, Surgeon General, to the officer in charge, Medical Supply Depot, New York, August 14, 1917, concerning base dental outfits. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{11}$.
- (20) First indorsement, Surgeon General, to the officer in charge, Medical Supply Depot, New York, October 8, 1917, approving request of that officer of October 5, 1917, to purchase dental supplies, quantities listed. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{166}$.

- (21) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, February 11, 1918. Subject: Schedule of dental supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y. D.}}{433}$.
- (22) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, July 26, 1917. Subject: Portable dental outfits. On file, Finance and Supply Division, S. G. O., 14039-182.
- (23) Second indorsement, Surgeon General to the medical supply officer, 5th division, Camp Logan, Tex., February 4, 1918, relative to dental outfits. On file, Finance and Supply Division, S. G. O., $\frac{534-127\text{-Logan}}{117}$.
- (24) Letter from The Adjutant General to the Surgeon General, March 26, 1918. Subject: Dental personnel attached to divisions. On file, Finance and Supply Division, S. G. O., $\frac{750-14 \text{ A. G.}}{124}$.
- (25) First indorsement, Medical Supply Depot, New York, to the Surgeon General, February 2, 1918. Subject: Dental equipment. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{408}$.
- (26) Par. 5, Cable No. 1316, H. A. E. F., June 16, 1918 and First Indorsement, Surgeon General's Office to Embarkation Service (attention Mr. Jordan). On file, Finance and Supply Division, S. G. O., $\frac{250 \text{ France}}{291}$.
- (27) Letter from the Surgeon General to the surgeon, Port of Embarkation, Hoboken, N. J., August 23, 1917. Also: First Indorsement, surgeon, Port of Embarkation, Hoboken, N. J., to the Surgeon General, September 12, 1917, relative to issue of portable dental outfits. On file, Finance and Supply Division, S. G. O., $\frac{583-340}{11}$.
- (28) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, August 22, 1917. Subject: Issue of portable dental outfits to France. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{53}$.
- (29) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, October 15, 1917. Subject: Dental outfits to France. On file, Finance and Supply Division, S. G. O., $\frac{713-250}{4}$.
- (30) First Indorsement, Medical Supply Depot, New York, to the Surgeon General, September 13, 1918, relative to Dental equipment. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{912}$.
- (31) Requisition for dental supplies, A. E. F., August 4, 1917. On file, Finance and Supply Division, S. G. O., $\frac{713-250}{4}$.
- (32) Par. 5, Cable No. 134, H. A. E. F., Paris, August 31, 1917.
- (33) Letter from the officer in charge, Medical Supply Depot, New York, to the Surgeon General, September 10, 1917. Subject: Dental supplies to France. On file, Finance and Supply Division, S. G. O., $\frac{713-250}{4}$.
- (34) Letter from the Acting Surgeon General to the officer in charge, Medical Supply Depot, New York, October 26, 1918. Subject: Replacements. Copy on file. Historical Division, S. G. O.

CHAPTER XXXIX

VETERINARY EQUIPMENT AND SUPPLIES

By the act of June 3, 1916, the Veterinary Corps was created, and by the terms of the act made a part of the Medical Department.¹ Thereafter the storage and issue of veterinary supplies which previously had been a function of the Quartermaster Department, devolved upon the Medical Department. The act making the appropriations for the Military Establishment for the fiscal year 1917 had already been passed when the act of June 3, 1916, became a law. Such funds as had been appropriated for the procurement of veterinary supplies were necessarily granted to the Quartermaster instead of to the Medical Department. Following that legislation, the Surgeon General requested authority to include provisions in the Medical and Hospital Department estimates for the fiscal year 1918 for the purchase of veterinary supplies.² The request was approved by the Secretary of War September 8, 1916. The estimates were submitted by the Surgeon General September 13, 1916, accompanied by a proposed amendment to incorporate in the act under the title "Medical and Hospital Department" the phrase "for the purchase of veterinary supplies." It had been the custom of the Quartermaster General to base his estimates for veterinary supplies at \$1 per head within the United States; at \$1.20 per head in the insular possessions for all animals for which treatment at public expense was authorized. The estimates for the Medical Department for the fiscal year 1918 followed this custom and included therein the item, "Veterinary medicines and supplies, at one dollar per animal, a function to be newly devolved upon the Medical Department beginning July 1, 1917, if these estimates are confirmed, approximately 70,000 animals * * * \$70,000."³

The Surgeon General submitted to the House Military Committee, at a hearing January 9, 1917, the following reasons for the introduction of the new language and the estimates:³

The appropriations for the Quartermaster Corps (incidental expenses) have heretofore provided for the purchase of medicines for horses and mules. A large proportion of these medicines are identical with medicines habitually carried in stock in the depots of the Medical Department. Those not so carried are similar to the medicines purchased by the Medical Department and subject to similar tests. On the supposition that the Medical Department could better procure and test the veterinary medicines required in the Army, an arrangement was sanctioned by the Secretary of War a few years ago by which such supplies thereof as were in the Medical Department stock should be issued on quartermaster requisitions (the appropriations concerned being subsequently adjusted by proper action), and those not so in stock should, when that course was convenient, be purchased by Medical Department agencies on quartermaster account. This procedure, while it has been attended with satisfactory results as to prices and qualities, has involved considerable accounting routine which could profitably be avoided. So long as the veterinary service of the Army was either regimental or quartermaster there was some reason for leaving the procurement

of veterinary supplies technically in the hands of the Quartermaster Corps. Now, however, that the Veterinary Corps, established by the national defense act of June 3, 1916, has been made a part of the Medical Department it is the view of the War Department upon full consideration that it will promote military efficiency to transfer to the Medical Department the duty of procuring veterinary supplies, so as to concentrate control of the veterinary service, as well as responsibility for it, under the Surgeon General. Accordingly the current estimates for the Quartermaster Corps have, it is understood, omitted the provision heretofore appearing for the purchase of medicines for horses and mules, and in lieu thereof a new provision is submitted in the medical and hospital estimates "for the purchase of veterinary supplies."

General Orders, No. 115, War Department, August 28, 1911, promulgating the veterinary supply table for the Army, fixed the money allowance at \$1 a year for each animal within the continental limits of the United States and \$1.20 a year for each animal in tropical climates outside the United States. At the present juncture there are forty-odd thousand animals pertaining to the Regular Army and in the neighborhood of 50,000 with the National Guard. It is presumed that 70,000 at least will be on hand under Federal care during the fiscal year 1918, for which veterinary supplies will have to be provided. Such provision, at the moderate rate of \$1 a year for each animal, constitutes item 3 above.

The phraseology of the appropriation under the title "Medical and Hospital Department," in the act of May 12, 1917, included as a new item the words: "For the purchase of veterinary supplies and hire of veterinary surgeons."

While the regular estimates, Medical and Hospital Department, for the fiscal year 1918 were pending before Congress the Surgeon General, under instructions from the Secretary of War, submitted, on March 31, 1917, a supplemental or deficiency estimate for the fiscal year ended June 30, 1917, in the total sum of \$24,780,000. The early declaration of war was then in prospect and that sum was required not merely for the fiscal year 1917, but also for the fiscal year 1918, to be, however, "immediately available." It included an item, "veterinary supplies, 1918, at \$1 per animal * * * \$616,178."

The item \$616,178 for veterinary supplies, animal strength of 616,178 was distributed as follows: Regular Army in service, 95,502; Regular Army for 4 increments, 38,820; for National Guard, 202,462; for Volunteers, 279,394. In succeeding estimates the sums included for veterinary supplies were based upon the computed cost of the quantities of supplies required instead of at a fixed rate per animal.

The urgent deficiency appropriation, making available for immediate use funds for the procurement of veterinary supplies by the Medical Department, was not approved until June 15, 1917.⁴ It accordingly became necessary to make some arrangement for supplies to cover the interval between that date and the time that the supplies could actually be delivered. It was known to the Surgeon General that a considerable quantity of veterinary supplies was on hand at different quartermaster supply depots and that extensive procurement of such supplies for the Quartermaster Corps was in progress at the medical supply depot at St. Louis, Mo. Since these supplies would serve a useful purpose in bridging the interval, efforts immediately were made by the Surgeon General to gain control of them. Instructions were issued later for the transfer of supplies at the El Paso and San Antonio depots to the medical supply depot at San Antonio, and those at Atlanta to the medical supply depot in that city. On August 22, 1917, these instructions were confirmed by an order from the War Department, as follows:⁵

I. All veterinary instruments, books, medicines, and supplies for the treatment of public animals and authorized private horses of mounted officers at posts, stations, or depots will be transferred as soon as practicable by the Quartermaster Corps to the Medical Department, and will be taken up and accounted for on the returns of the latter department, as medical property. At depots or other places where there is no officer of the Medical Department on duty, request will be made to The Adjutant General of the Army to designate an officer to receive and receipt for such report.

It was feared that even this measure would be inadequate to provide a sufficient quantity of veterinary equipment to meet the immediate needs of the camps until deliveries on orders had been received. This related particularly to articles of surgical equipment. It was anticipated that many of the veterinary surgeons called into service would have articles of equipment which could be utilized in the military service and might be willing to part with them for a consideration. In order that such articles of equipment might be secured, the following instructions were issued by the Surgeon General, May 5, 1917, to newly appointed veterinary officers:⁶

The commercial sources of supply for veterinary apparatus are, it is learned, near exhaustion, and for some months to come it will be quite impossible to procure therefrom the veterinary outfits that will be needed by veterinary officers coming into the military service.

In view of this situation the Secretary of War has authorized the Medical Department to invite veterinary officers who are newly entering the military service during the present emergency to bring with them such parts of their own private outfits, in good condition, as are designated on the annexed list, with the understanding that the Medical Department will purchase them subject to a reasonable discount from original cost for depreciation due to previous use.

A veterinary officer complying with this invitation will be expected to assume the cost of transporting the articles from his home to the point where he reports for duty, and the cost of transporting back again the articles which are not accepted by the Medical Department as indicated below.

Upon reporting for duty the commanding officer of the organization to which the veterinarian is assigned will appoint a board of officers to inspect the apparatus which the veterinarian has brought with him, to determine its condition and suitability for military service, and to appraise the value of the portion found to be in good condition and suitable (considering as an element of present value the original cost thereof, the usual period of durability, the period during which it has been used, and the cost of transporting or delivering it at the station of duty). Upon report of these findings, voucher for the purchase of acceptable apparatus will in due season be executed and payment made therefor, whereupon title to them will pass to the United States.

Additional equipments not so provided must be procured on requisition through the regular channels of Medical Department supply. A veterinary officer newly reporting for military service should make it his first duty to learn what additional veterinary equipments and supplies will be needed in his work, and should forward timely requisition therefor through the surgeon of the organization or command to which he is assigned. To that end he should acquaint himself particularly with the general regulations governing requisitions in the Medical Department, paragraphs 476 to 490 of the Manual therefor, of which the surgeon should have a copy.

In cases of great emergency, when absolutely necessary medicines are not on hand and time does not permit of awaiting their supply on requisition, the veterinary officer may request the surgeon of the command to purchase locally under the provisions of paragraph 476.

LIST OF ARTICLES DESIRED

Pocket or operating case, including trocar and canula.....	1	Set casting harness, preferably web construction.....	1
Hypodermic syringe with extra needles..	1	Hoof tester.....	1
Hoof case, 3 knives.....	1	Mouth speculum.....	1
Hypodermic tablet case, equipped....	1	Set of dental floats with extra blades..	1

The records of the Surgeon General's Office fail to show that any considerable number of instruments were secured in this manner. However, utilizing the old types of instruments and cases received from the several depot quartermasters, no material inconvenience resulted.

DEVELOPMENT OF A VETERINARY SUPPLY TABLE

When war had been declared, a list of articles with probable quantities to be purchased became at once necessary. Such a list was compiled by the supply division with the advice and assistance of an experienced veterinary officer. This list, except for instruments and appliances, was submitted to the chairman of the commission on pharmaceuticals acting in conjunction with the Council of National Defence, on April 19, 1917.⁷ The committee suggested the quantities which could be supplied without affecting the trade.

Further work on the supply table was resumed in May and a tentative list compiled. The quantities to be purchased as initial supply were calculated. Instrument cases were developed and general specifications for them prepared during the following months. Samples of these cases were ordered and examined, and changes effected. The final determination of the contents of these cases was delayed because the samples forwarded by express had gone astray and could not be located. Following this, a list of articles and quantities to be issued as initial supply to the training camps was compiled.

A formal supply table showing articles and quantities allowed was prepared and distributed in the fall of 1917. It was published officially in Changes No. 4, Manual for the Medical Department, 1918. This table, in turn, was subjected to intensive study, and was revised in February, 1918. The system observed by the veterinary service of the British Army received consideration and was largely followed in the new supply table. The veterinary supply table, as finally revised, appears below. In it the unit system of the Medical Department as provided for other units was applied to the Veterinary Corps.

Veterinary supply table, 1918

FORMULE OF NONOFFICIAL COMPOUND MEDICINAL PREPARATIONS, LISTED IN THE SUPPLY TABLES

		VETERINARY	
Adrenalin et cocaina comp. hypodermic tablets:		Sulphocarbolas compositas tablets:	
Adrenalin chlorid	0.0299	Zinci sulphocarbolas.....	650
Coeninae hydrochloridum .....	.1195	Sodii sulphocarbolas	650
Acidum boricum.....	.0149	Calcii sulphocarbolas	650
Pilulae aloini compositae (equine purgative):		Hydrargyrichloridum corrosivum tablets (anti-	
Aloinum.....	4.250	septic):	
Hydrargyri chloridum mite.....	1.000	Ammonii chloridum.....	475
Strychninae sulphas.....	.016	Hydrargyrichloridum corrosivum.....	500
Oleoresina zizigiberis .....	.325	One tablet to $\frac{1}{2}$ liter of water makes a 1 to	
Piluli acetas compositus (compressed tablets):		1,000 solution.	
Plumbi acetas.....	3.110		
Zinci sulphas	2.074		

List of veterinary supplies

(All furnished by the Medical Department)

(a) MEDICINES, ANTISEPTICS AND DISINFECTANTS

Acidum boricum, powdered, 1 pound in bottle.
 Acidum hydrochloricum, $\frac{1}{2}$ pound in bottle.
 Acidum salicylicum, 4 ounces in bottle.
 Adrenalin et cocaina, veterinary hypodermic tablets, 15 in tube (par. 902).
 Ether, $\frac{1}{2}$ pound in tin.
 Alcohol:
 3 pints in tins.
 5 gallons in stone jar, tin, or bottle.
 Ammonii carbonas, 4 drachms in ball.
 Arecolinae hydrobromidam, $\frac{1}{2}$ -grain veterinary hypodermic tablets, 12 in tube.
 Argenti nitras fusus, 1 ounce in bottle.
 Camphora gum, $\frac{1}{2}$ pound in bottle.
 Calx (unslaked lime).
 Chloroformam, $\frac{1}{4}$ pound in tin.
 Chloralum hydratum, 4 drachms in ball.
 Cupri sulphas, $\frac{1}{4}$ pound in tin.
 Ferri sulphas exsiccatus, 2 pounds in bottle.
 Glycerinum, 3 pints in tin.
 Hydrargyri chloridum corrosivum tablets, 250 in bottle (par. 902).
 Hydrargyri chloridum mite, 30-grain C. T., 100 in bottle.
 Hydrargyri iodidum rubrum, 1 pound in bottle.
 Iodum ampoules each containing iodine, 1 gm.; potassii iodidum $1\frac{1}{2}$ gms.

Iodoformum, $\frac{1}{4}$ pound in bottle.
 Liquor eresolis compositas:
 6 ounces in bottle.
 1 pound in tin.
 10 gallons in tin.
 Magnesii sulphas, 100 pounds in keg.
 Mallein.
 Oleum lini, 10 gallons in tin.
 Petrolatum:
 12 ounces in tin.
 3 ounces in tin.
 Pnenol, $\frac{1}{2}$ pound in bottle.
 Pilula aloini compositae (equine purgative), 12 capsules in package (par. 902).
 Plumbi acetat compositae, C. T., 50 in bottle (par. 902).
 Potassii nitras, 60-grain C. T., 100 in bottle.
 Sapo mollis, 1 pound in jar.
 Spiritus ammoniae aromaticus, 1 pound in bottle.
 Strychninae sulphas, $\frac{1}{2}$ -grain veterinary hypodermic tablets, 12 in tube.
 Sulphur.
 Tablets, hypodermic, see subparagraph (d) "Cases."
 Tar pine, 1 pound in tin.
 Vaccine, anthrax (double vaccination).
 Vaccine prophylactica, strangles.
 Zinci oxidum, $\frac{1}{4}$ pound in bottle.

(b) INSTRUMENTS

Bistouries:
 Probe pointed—
 Curved.
 Straight.
 Sharp pointed, curved.
 Cases:
 Dental,^a in roll (par. 969).
 Hoof^a (par. 972).
 Post-mortem,^a veterinary (par. 975).
 Rectal pump^a (par. 976).
 Thermo-cautery,^a ether (par. 977).
 Catheters, horse, rubber.
 Curettes:
 $7\frac{1}{2}$ -inch.
 Quitter, sharp, open bowl.
 Directors, grooved, 6-inch.
 Files, straight, 10-inch.
 Floats, lock:
 Straight joint.
 Angular.
 Extra blades for—
 File.
 Rasp.
 Forceps:
 Dissecting.
 Dressing.
 Plain, straight, heavy.
 Double curved, 10-inch.
 Hemostatic.
 Hopkins.
 Ronguer, Luer's, curved.
 Tissue.
 Wood, splinter.

Gonges, bone, curved.
 Hoof buffers.
 Hoof gouges.
 Hoof hammers.
 Hoof knives:
 Right.
 Left.
 Double edge.
 Hoof parers.
 Hoof pincers.
 Hoof rasps, 14-inch.
 Hoof sage knives:
 Right.
 Left.
 Hoof tester:
 Large.
 Small.
 Mallet, rawhide
 Mirror, head.
 Band for, fiber.
 Molar cutters, improved:
 Open.
 Half open.
 Closed.
 Molar extractors, improved:
 Upper.
 Lower.
 Molar separators, closed
 Molar cutters, extractors, separators, handles for.
 Needles:
 Seton.
 Surgical, in paraffin envelopes, 6 in package.
 Suture, Bayer's.

^a Will be issued until present supply is exhausted, and a more suitable type adopted.

Probes, flexible:
 10-inch.
 4-inch.

Punches, dental, curved.

Razors:
 Honer for.
 Strops for.

Retractors, Parker's nested.

Scalpels:
 Small.
 Medium.
 Large.

Scissors:
 Dressings, 6½ inches.
 Operating—
 Two points blunt.
 One point sharp, one blunt.

Shears, fetlock.

Speculums, mouth, hospital.

Sutures:
 Silk, braided, sizes 13, 14, 15, in spools.
 Linen, merzon, in skeins.
 Type, sterilized, 18 inches each, 2 pieces in package.

Syringes:
 Hypodermic—
 10 c.c. in canvas case.^b
 Extra needles for.
 Extra wires for.
 30 c.c. in case.
 Extra needles for.
 Extra wires for.

Luer's, glass, ½ c.c.
 Extra needles for.
 Extra wires for.

Metal, dose, 2-ounce, extra heavy, complete.
 Extra pipes for, two sizes.

Thermometers, clinical, veterinary, in case.

Trephines, Nye's ¾-inch head
 Extra beads for, 1-inch.

Trocars and canulas.

Tubes, trachea.
 Bouffette's.

(c) STATIONERY

Bands, elastic, of the following sizes: Thread bands, 1-5¼ inch, 2½-inch and 3-inch; heavy bands, ¼ by 2½ inches and ½ by 3 inches.

Baskets:
 Letter.
 Waste paper.

Blotters, band

Books:
 Blank—
 Crown (cap) 250 pages
 8 vo 150 pages
 Note, manifolding, 4 by 6 inches—
 Binders.
 Fillers.

Caps, sponge.

Envelope openers.

Envelopes, official:
 Large.
 Letter.
 Note.

Erasers:
 Rubber—
 Pencil.
 Typewriter.

Steel.

^b Until present stock is exhausted, syringe, hypodermic, 5 c.c. will be issued.

Files, Shannon (for clinical histories).

Ink:
 Black, powder or tablets (sufficient in box for 1 quart of fluid).
 Red, 2 ounces in bottle.

Inkstands.

Labels:
 For dispensing set.
 For vials.
 Poison, assorted.

Pads, desk.

Pads:
 Ink, for stamps.
 Prescription.

Paper:
 Blotting—
 For desks.
 Small pieces for hand blotters

Carbon—
 Cap, 100 sheets in box.
 Letter, 100 sheets in box.

Fasteners.

Manifolding—
 Cap, 250 sheets in package.
 Letter, 500 sheets in package.

Typewriter—
 Cap, 250 sheets in package
 Letter, 500 sheets in package

Weights.

Writing—
 Letter.
 Note.
 100 sheets in pad.

Paste, photo and library.

Pencils:
 Lead.
 Indelible.

Penholders.

Penracks.

Pens, steel.

Rulers.

Stamps:
 Penalty, rubber.
 Rubber.

Tape, office, red.

(d) MISCELLANEOUS

Ambulances, motor.

Bandages:
 White cotton flannel, 5 yards by 3 inches.
 Muslin, roller, compressed, 5 yards by 3 inches.

Basins, granite:
 1-quart.
 2-quart.
 4-quart.

Blankets, horse.

Boilers, instrument.

Bottles, mixing, 4-ounce, wide-mouth, with rubber corks to fit.

Boxes, pack-mule, empty.

Brooms, corn.

Brushes:
 Hand, fiber.
 Scrubbing.

Buckets, galvanized iron.

Candles.

- Cases, hypodermic tablets, 9 vials filled and 2 empty as follows: ϵ
- 3 arecoline, $\frac{1}{2}$ grain.
 - 1 glonoin, $\frac{1}{16}$ grain.
 - 5 strychnine, $\frac{1}{2}$ grain.
 - 2 vials, 2 drams, empty.
 - 2 rubber stoppers to fit.
- Chairs, folding.
- Chests, tool, No. 2, par. 938.
- Clippers:
- Horse, hand.
 - Blades for.
 - Machine, No 1, inclosed type.
 - Extra blades for.
 - Extra heads for.
- Cotton, absorbent:
- Sterilized, in 1-ounce package.
 - 1 pound in rolls.
- Cutters, wire, small.
- Desks:
- Field, No. 2 (par. 941)
 - Office.
- Disinfectors:
- Cog, gear, double-acting, spray pump, 50-gallon, mounted on skids.
 - Hand, spray.
 - Thresh.
- Emery wheels, for sharpening clipper blades.
- Files, 3-sided, for sharpening clipper blades.
- Funnels, enamel ware:
- 4-inch.
 - 6-inch.
- Gauze:
- Plain bleached, 50 yards in bolt.
 - Sublimated, 2 half-yard lengths in package.
- Gloves, rubber, sizes 8 $\frac{1}{2}$ and 9.
- Gowns, operating.
- Graduates, enameled, 500 c. c.
- Grindstones, kitchen, complete.
- Guns, balling.
- Hones.
- Hoods, operating.
- Hobbles, English, complete.
- Hose, rubber, 50-foot lengths.
 - Metal connections for.
- Irrigators, 4-quart, enameled, seamless, complete
- Knives, butcher, wooden handle.
- Lamps:
- Brazing.
 - Spirit, glass.
- Lanterns:
- Candle, folding.
 - Candles for.
 - Complete.
 - Extra globes for.
 - Extra wicks for.
- Matches, safety, 12 boxes in package.
- Measures, grain, metal, 3 quarts.
- Medicine droppers.
- Mortars and pestles, Wedgewood, 20 c.m.
- Muslin unbleached.
- Nozzles, hose.
- Oakum, surgical.
- Paper:
- Toilet.
 - Wrapping, brown.
- Pill tiles, 6 by 6 inches (metal).
- Pins, safety.
- Plaster, adhesive, zinc oxide, 5 yards by 2 $\frac{1}{2}$ inches, in spools.
- Plaster, of Paris, 4 pounds in tin.
- Powder dusters, hard rubber.
- Saddles, pack (par 953).
- Saline apparatus.
- Saws, bone, butcher's, heavy.
- Scales and weights, Troemer's.
- Soap:
- Common.
 - Ivory.
- Spatulas:
- 4 inches.
 - 6 inches.
- Steels.
- Sterilizers.
- Stocks, metal.
- Stoves, coal oil, blue flame, one burner.
 - Wicks for.
- Tables, equine, operating.
- Tags, linen, shipping 5 $\frac{1}{2}$ by 2 $\frac{1}{2}$ inches, wired, 100 in box.
- Test tubes, 3 in nest, in tin container.
- Towels, hand.
- Trays:
- Instrument, white enameled, seamless, nested in sets of 4, largest approximately 11 $\frac{3}{4}$ by 7 $\frac{1}{2}$ by 2 $\frac{1}{2}$ inches. rest smaller to nest.
 - Metal, white enamel, 8 $\frac{3}{4}$ by 5 $\frac{1}{2}$ by 2 inches.
- Tube containers, 9 $\frac{1}{2}$ by $\frac{3}{8}$ inches.
- Tubing:
- Rubber $\frac{1}{4}$ -inch.
 - Heavy-wall, maroon, $\frac{3}{8}$ inch outside diameter, 1, inch wall.
- Twine in balls, coarse.
- Typewriters.
 - Record ribbons for.
- Vials, 2-ounce, in tin case (for iodine), empty, with rubber stopper.
- Veterinary hospital chests (pars. 978 to 985).
- Veterinary officer's field chests (par. 987).
- Veterinary field unit chests (par. 986).
- Wallets:
- Farriers (par. 970).
 - Veterinary officers (par. 974).

Articles furnished by the Quartermaster Corps

- Ambulances, 2-mule, with harness complete.
- Anvils, 1 hundredweight.
 - Blocks for.
- Aprons:
 - Horseshoer, leather.
 - Linen, butcher type.
- Axes:
 - With helves.
 - Fire, with helves.
 - Pick, with helves.
- ϵ Until present stock is exhausted, the following will be issued: 1 apomorphine hydrochlor., $\frac{1}{16}$ grain; 3 arecoline, 1 grain; 2 cocaine hydrochlor., 2 grains; 1 glonoin, $\frac{1}{16}$ grain; 5 strychnine sulph. $\frac{1}{2}$ grain.
- Barrows, wheel.
- Brooms, stable.
- Brushes:
 - Daudy.
 - Horse.
 - Whitewash, with handles.
- Buckets, fire.
- Canvas, 27 inches wide.
- Carts, feed, 2-wheeled.
- Coal oil, 5 gallons in tin.

Crowbars, 5½ or 6 feet.
 Diggers, post hole.
 Flags, distinguishing:
 Veterinary hospital.
 Mobile veterinary section.
 Forges, field.
 Forks:
 Long-handled, 4 tine.
 Hay and manure, stable.
 Gasoline.
 Grease, lubricating.
 Halters.
 Halter shanks (see Rope, cotton, ½ inch).
 Harness menders (Q. M. M. appendix No. 14-32).
 Harness, sets, complete (lead; wheel).
 Horses, riding.
 Mauls, sledge hammer.
 Mules:
 Draft.
 Pack.
 Nails:
 10d
 20d
 Horseshoe, Nos. 4 and 5.

Oil lubricating, motor.
 Paulins, 20 by 30 feet.
 Picket-line 3-inch hawsers, tarred, 100 feet in length.
 Pins, metal, picket line, 2 feet 6 inches by 2 inches.
 Rakes, steel.
 Ranges, field, complete.
 Rivets, and burs, assorted.
 Rope:
 Cotton—
 ½-inch.
 ¾-inch.
 Lash, cotton, ¼-inch.
 Sets, saddler's tools (Q. M. M. Appendix. No. 14-31).
 Shoes:
 Horse, Nos. 2, 3, 4, 5.
 Mule, Nos. 2, 3, 4, 5, 6.
 Shovels:
 Long-handled
 Scoop
 Snaps, halter.
 Trucks, motor, 1½ tons.
 Wagons, escort, with harness, complete.

Articles furnished by the Ordnance Department

Bags, nose.
 Blacksmith's kit, complete.
 Buckets, canvas, watering.

Combs, curry.
 Equipments, horse, complete.
 Pistols.

Case, dental, veterinary

Bone drill, set of three.....set.....	1	Forceps, wolf-tooth, 9-inch.....tubes..	1
Chisel, bone, size 6 mm.....number..	1	Gouge, bone, size 6 mm.....do.....	1
Curette.....do.....	1	Handles, universal, forged steel, with wood grips to fit standard cutters and extractor.....pairs..	1
Dental floats:		Mallet, lead 130.....number..	1
Lock—		Molar cutter:	
Angular.....do.....	1	Open.....do.....	1
Straight joint.....do.....	1	Half open.....do.....	1
Universal file blades for, to fit standard floats.....number..	2	Closed.....do.....	1
Universal rasp blades for, to fit standard floats.....number..	4	Molar extractor, improved:	
Dental pick.....do.....	1	Upper.....do.....	1
Dental punch, curved.....do.....	1	Lower.....do.....	1
Extractor, root or splinter.....do.....	1	Speculum, mouth (without levers).....do.....	1
File and rasp, 12-inch.....do.....	1	Trephine, Nye's, 7⁄8-inch head.....do.....	1
		Extra heads for.....do.....	1

Supplied to all posts, remount depots, auxiliary remount depots, and veterinary hospitals.

Wallet, Farrier's

(Leather)

IN COVER, INSIDE			
Chloralum hydratum, 6 balls in paraffined paper tube.....tubes..	1	Iodum-potassii-iodidum, 10 ampules, in carton.....cartons..	1
		Sutures, assorted, and 3 needles, surgical, in box.....boxes..	1
IN POUCH		FLAP	
Alcohol, 1 pint, in tin.....tins..	1	Forceps, dissecting.....number..	1
Bandages, muslin, roller, compressed, 5 yards by 3 inches.....number..	10	Hoof knife.....do.....	1
Cotton, absorbent, compressed, 1 ounce, in package.....packages..	5	Scalpel.....do.....	1
Hydrargyri chloridum corrosivum tablets, 25 in hard-rubber tube.....tubes..	1	Scissors, dressing.....do.....	1
		Thermometers, clinical, veterinary, in case.....do.....	2

Case, general operating, veterinary

(In canvas case)

Bistoury, curved:		Retractors:	
Probe pointed, 2-inch.....	number..... 1	Packers, double end, aested.....	number..... 2
Sharp pointed, 2-inch.....	do..... 1	Fritch.....	do..... 2
Ecraseur, automatic, quick release.....	do..... 1	Scalpels, 3 sizes, 2-inch, 1¾-inch, 1½-inch.....	do..... 3
Emasculator, Doctor White.....	do..... 1	Scissors:	
Forceps—		Lacroix, fistula, 10-inch.....	do..... 1
Bone-cutting, Liston, 9-inch.....	do..... 1	Straight, 5½-inch, 1 point sharp, 1 blunt.....	do..... 1
Dressing, and bullet, 10-inch.....	do..... 1	Scoop, fistula, 6-inch.....	do..... 1
Hemostatic:		Speculum:	
Jones's, 5½-inch.....	do..... 3	Eye, large.....	do..... 1
Pean's, straight, 10-inch.....	do..... 1	Nasal, fenestrated.....	do..... 1
Mouse-tooth, 5½-inch.....	do..... 1	Sutures, silk, heavy twisted.....	cards..... 1
Needle, Mathieu, 7½-inch.....	do..... 1	Syringe:	
Thumb, 5-inch.....	do..... 1	Antitoxin—	
Grooved director, nickel-plated 5½-inch.....	do..... 1	Metal slip joint—	
Head mirror:		½-ounce.....	number..... 1
3½-inch, with ½-inch opening.....	do..... 1	1-ounce.....	do..... 1
Headband for.....	do..... 1	Needles for.....	do..... 24
Needles:		Case for needles.....	do..... 1
Seton, jointed, 10-inch, with sharp point and eye.....	number..... 1	Hypodermic—	
Surgical—		5 c.c., Quitman.....	do..... 1
Assorted.....	dozen..... 1	5 c.c., Quitman needles for.....	do..... 12
Metal case for.....	number..... 1	Quitman, case for extra needles.....	do..... 1
Nose twitch, humane.....	do..... 1	Tenaculum.....	do..... 1
Neurotomy hooks.....	do..... 2	Tenotomes.....	do..... 2
Probe, flexible, jointed, 10-inch.....	do..... 1	Tracheotomy tube, 2 sizes.....	do..... 2
		Trephine, Galt, 1-inch, with metal handle.....	do..... 1
		Trocar, Fash, reversible.....	do..... 1

Cases, forceps, hemostatic

(In canvas roll)

Forceps:		Forceps—Continued.	
Straight Halstead, mosquito, screw lock.....	number..... 1	Straight—Continued.	
Curved, Pean's, 8½-inch, screw lock.....	do..... 1	Kocher's 5½ inch, screw lock.....	number..... 2
Straight—		Curved, Kelly-Pean, 6¼-inch, screw lock.....	do..... 2
Kelly-Hopkins, 6-inch, screw lock.....	do..... 4	Straight, Halstead Army, 5½-inch, screw lock.....	do..... 2

Case, hoof

(In canvas roll)

Curette, 7½-inch.....	number..... 1	Hoof knife hone, 5-inch carborundum, fine.....	number..... 1
Groover, hoof, Hughes pattern:		Kaife, horseshoer's:	
Oval.....	do..... 1	Left, small size, metal handle.....	do..... 1
Pointed.....	do..... 1	Right, small size, metal handle.....	do..... 2
Hoof gouge.....	do..... 1	Scalpel, with 2-inch blade.....	do..... 1
Hoof kaife file, rat-tail shape, 4-inch.....	do..... 1	Tester, hoof, standard pattern, small size.....	do..... 1

Case, hypodermic syringe, veterinary

(In canvas case)

Syringe, hypodermic, 5 c. c., Quitman, hollow plunger.....	number..... 1
Needles for.....	do..... 8

Wallet, veterinary officer's

(Leather)

Book, note, manifoldng:		Contents of pocket case—Continued.	
Binder.....	number..... 1	Knife, folding, with 1 probe-pointed bistoury and 1 scalpel.....	number..... 1
Filler.....	do..... 1	Kaife, folding with 1 sharp-pointed bistoury and 1 scalpel.....	number..... 1
Case:		Needles surgical, in paraffin envelope, 6 in package.....	package..... 1
Hypodermic tablets, veterinary.....	do..... 1	Probe, 10-inch.....	number..... 1
Pocket, surgical.....	do..... 1	Scissors, dressing.....	do..... 1
Contents of pocket case:		Sutures, silk, braided, No. 14, on spool.....	spool..... 1
Caustic holder.....	do..... 1	Syringe, hypodermic, 10 c. c., with extra tube of needles.....	number..... 1
Curette.....	do..... 1		
Forceps, hemostatic.....	do..... 2		
Hopkins type.....	do..... 1		
Hoof gouge.....	do..... 1		

VETERINARY HOSPITAL CHEST No. 3

(All contents supplied by the Medical Department)

Acidum boricum, powdered, 1 pound in bottle bottles.....	8
Chloralum hydratum, 4 drams in ball, 6 in tube.....tubes.....	42
Capri sulphas, ¼ pound in tin.....tins..	60
Hydrargyri chloridum mite, 30-grain tablets (100 in bottle)..... bottles.....	15
Pilulæ aloini compositæ (equine purgative) 12 capsules in package (par. 902).....packages..	10

VETERINARY HOSPITAL CHEST No. 4

(All contents supplied by the Medical Department)

Basins, granite, 2-quart.....number..	6
Case, post-mortem, veterinary (par. 975).....do....	1
Clippers, horse, hand.....do.....	2
Floats, lock:	
Straight joint.....do.....	2
Angular.....do.....	2
Extra blades for—	
File.....do.....	24
Rasp.....do.....	48
Graduates, enameled, 500 c. c.....do.....	4
Hobbles, English, complete.....sets..	2
Soap, Ivory.....cakes.....	25
Syringes, metal, dose, 2-ounce.....number..	2
Pipes for, 2 sizes, of each.....do.....	4
Twine in ball, coarse.....ball.....	1

VETERINARY HOSPITAL CHEST No. 5

(All contents supplied by the Medical Department)

Bandages, muslin, roller, compressed, 5 yards by 3 inches.....number.....	324
Cotton, absorbent, 1 pound in roll.....pounds..	25

VETERINARY HOSPITAL CHEST No. 6

(All contents supplied by the Medical Department)

Books, note, manifolding, 4 by 6 inches:	
Binders.....number.....	3
Fillers.....do.....	18
Cotton, absorbent, 1 pound in roll.....pounds..	3
Envelopes, official, letter.....number.....	25
Gauze, plain, bleached 50 yards in bolt.....bolts..	6
Pencils, indelible.....number.....	6
Plaster, adhesive, zinc oxide, 5 yards by 2½ inches, in spool.....spools.....	3
Oakum, surgical, 1 pound in package.....packages..	12
Requisition blanks, form No. 35.....number.....	25

VETERINARY HOSPITAL CHEST No. 7

(All contents supplied by the Medical Department)

Molar cutters, improved: ^a	
Open.....number.....	1
Half open.....do.....	1
Closed.....do.....	1
Molar extractors, improved: ^a	
Upper.....do.....	1
Lower.....do.....	1
Molar separator, ^a closed.....do.....	1
Molar cutters, extractors, separator, ^a handles for.....set.....	1
Speculum, mouth.....number.....	1

^a Case, dental, in roll (par. 969) will be issued until present stock is exhausted and substitution made.

^b Until present stock is exhausted bandages 3 yards by 4 inches will be issued.

VETERINARY HOSPITAL CHEST No. 8

(All contents supplied by the Medical Department)

Clippers, machine.....number..	1
Extra blades for.....do.....	12
Extra heads for.....do.....	2

VETERINARY FIELD UNIT CHEST

(All contents supplied by the Medical Department)

Acidum boricum, powdered, 1 pound bottle.....bottles..	1
Alcohol, 3 pints in tin.....tins.....	1
Ammonium carbonas, 4 drams, in ball, 6 in tin.....do....	4
Bandages, ^b muslin, roller, compressed, 5 yards by 3 inches.....number.....	100
Chloralum hydratum, 4 drams in ball, 6 in tube.....tubes.....	3
Cotton, absorbent, sterilized, in 1-ounce package.....packages.....	32
Gauze, sublimated, 2-half-yard lengths in package.....packages.....	12
Hydrargyri chloridum corrosivum tablets, 250 in bottle (par. 902).....bottles..	1
Iodum-potassii iodidum.....ampoules..	50
Liquor cresolis compound, 8 ounces in bottle.....bottles.....	1
Oakum, surgical, 1 pound in package.....packages..	2
Petrolatum, 12 ounces in tin.....tins.....	1
Pilulæ aloini compositæ (equine purgative) 12 capsules in package (par. 902).....packages..	2
Plumbi acetas compositus, C. T. 50 in bottle (par. 902).....bottles.....	1
Soap, Ivory.....cakes.....	3
Suture, silk, braided, No. 14.....spools.....	1
Thermometers, clinical, veterinary, in case.....number..	2
Towels, hand.....do.....	2
Tray, metal, white enamel, 8¾ by 5½ by 2 inches.....number.....	1
Vial 2-ounce, empty, with rubber stopper, in tin case, for iodine.....number.....	1

VETERINARY OFFICER'S FIELD CHEST

(Issuable to each veterinary officer detached. Container, wooden, iron-bound box, approximately 20 by 9 by 10 inches; weight filled, 40 pounds. All contents supplied by the Medical Department)

Acidum boricum powdered, 1 pound in bottle.....bottle.....	1
Alcohol, 3 pints in tin.....tins.....	1
Bandages, ^b muslin, roller, compressed, 5 yards by 3 inches.....number.....	48
Case, pocket, veterinary (par. 974).....do.....	1
Case, hypodermic tablets, 9 vials filled and 2 empty (see par. 966, d).....number.....	1
Case, rectal pump, (par. 976).....do.....	1
Cotton, absorbent, in 1-pound roll.....pounds..	2
Envelopes, official, letter.....number.....	25
Floats, lock:	
Straight joint.....do.....	1
Angular.....do.....	1
Extra blades for—	
File.....do.....	2
Rasp.....do.....	2
Gauze, sublimated, 2 half-yard lengths in package.....packages.....	12
Graduate, enameled, 500 c. c.....number.....	1
Hydrargyri chloridum corrosivum tablets, 250 in bottle (par. 902).....bottles.....	2

Iodum-potassii iodidum.....ampoules..	50	Syringe:	
Oakum, surgical, 1 pound in package.....package..	1	Hypodermic, 10 e. e.....number..	1
Paper, writing, letter, 100 sheets in pad.....pads..	1	Metal, dose, 2 ounces.....do.....	1
Pencils, indelible.....number..	4	Extra pipes for, 2 sizes, of each.....do.....	1
Petrolatum, 12 ounces in tin.....tin..	1	Suture, ⁴ linen, merzou, in skein.....skeins..	3
Pill-tite.....number..	1	Thermometer, clinical, veterinary, in ease.....number..	1
Pilulæ aloini compositus (equine purgative) (par. 902), 12 capsules in package.....packages..	2	Tins, containing ammonium carbonas balls.....do.....	2
Pins, safety.....paper..	1	Tube:	
Plumbi acetas compositus, C. T., 50 in bottle (par. 902).....bottles..	2	Containing chloral hydrate balls.....do.....	1
Requisition blanks, form No. 35.....number..	25	Trachea.....do.....	1
Report blanks Veterinary Corps.....do.....	25	Twine, in ball, coarse.....do.....	1
Spatula, 6-inch.....do.....	1	Vial, 2-ounce, empty, for iodine (rubber stopper), in tin case.....number..	
Suture tape, sterilized, 18-inches each, 2 pieces in package.....packages..	1		

⁴ Supplied in packages until present stock is exhausted.

Equipments of veterinary units

Articles	Quantity	Source of supply ^a	Articles	Quantity	Source of supply ^a
<i>Veterinary field unit</i>			<i>Veterinary field unit—Continued</i>		
Chest:			DIVISIONAL MOBILE VETERINARY SECTION—Continued		
Veterinary field unit (par. 986).....number..	1	M	Wagon, escort, with harness, complete.....number..	1	Q
Veterinary officer's field (par. 987).....number..	1	M	Wallets:		
Horses, riding.....do.....	4	Q	Farrier's (par. 970).....do.....	2	M
Horse equipments:			Veterinary officer's (par. 974).....do.....	1	M
Officer's complete.....do.....	1	O	CORPS MOBILE VETERINARY HOSPITAL		
Enlisted men's complete.....do.....	3	O	Ambulance, 2-mule, with harness complete.....number..	1	Q
Pistols.....number..	4	O	Blacksmith's kit, complete.....do.....	1	O
Wallets:			Chests:		
Farrier's (par. 970).....do.....	2	M	Veterinary field unit (par. 986).....do.....	6	M
Veterinary officers (par. 974).....do.....	1	M	Veterinary officer's field (par. 987).....number..	2	M
DIVISIONAL MOBILE VETERINARY SECTION			Horses, riding.....do.....	12	Q
Blacksmith's kit complete.....number..	1	O	Horse equipments:		
Boxes, pack mule, empty.....do.....	2	M	Officer's, complete.....do.....	1	O
Chests:			Enlisted men's, complete.....do.....	11	O
Veterinary field unit (par. 986).....do.....	4	M	Mules, draft.....do.....	6	Q
Veterinary officer's field (par. 987).....number..	1	M	Nails, horseshoe:		
Horses, riding.....do.....	12	Q	16 nails for each mounted officer and each mounted man as a part of his equipment.....		Q
Horse equipments:			4 and 5, of each.....pounds..	3½	Q
Officer's, complete.....do.....	1	O	Pistols.....number..	37	O
Enlisted men's, complete.....do.....	11	O	Range, field No. 2, complete.....do.....	1	Q
Mules:			Shoes, horse and mule.....do.....		Q
Draft.....do.....	4	Q	(1) Fitted shoes—		
Pack.....do.....	1	Q	For riding horses, (1 fore and 1 hind shoe carried by rider for his mount).....		
Nails, horseshoe:			For draft mules, (2 fore and 2 hind shoes per draft mule; carried in wagon).....		
16 nails for each mounted officer and each mounted man as a part of his equipment.....		Q	(2) Extra shoes—		
4 and 5, of each.....pounds..	3	Q	For horses.....pounds..	36	Q
Pistols.....number..	22	O	For draft mules.....do.....	18	Q
Saddles, pack (par. 953).....do.....	1	M	Wagons, escort, with harness complete.....number..	1	Q
Shoes, horse and mule.....do.....		Q	Wallets:		
(1) Fitted shoes—			Farrier's (par. 970).....do.....	4	M
For riding horses (1 fore and 1 hind shoe carried by rider for his mount).....			Veterinary officer's (par. 974).....do.....	2	M
For pack mule (1 fore and 1 hind shoe per pack mule; carried in pack).....					
For draft mule (2 fore and 2 hind shoes per draft mule; carried in wagon).....					
(2) Extra shoes—					
For horses.....pounds..	36	Q			
For pack mule.....do.....	2	Q			
For draft mule.....do.....	12	Q			

^a M=Medical Department; Q=Quartermaster Corps; O=Ordnance Department.

Articles	Quantity		Source	Articles	Quantity		Source
	Base hospital, 500 patients	Veterinary hospital, 1,000 patients			Base hospital, 500 patients	Veterinary hospital, 1,000 patients	
VETERINARY HOSPITAL				VETERINARY HOSPITAL—Continued			
Ambulance:				Jacks, wagon.....do.....	1	2	Q
Motor.....number.....	1		M	Lamps:			
2 mule, with harness, complete.....number.....		1	Q	Brazing (blowtorch).....do.....	8	12	M
Anvils, 1 hundredweight.....do.....	5	5	Q	Spirit, glass.....do.....	2	2	M
Blocks for.....do.....	5	5	Q	Lanterns, complete.....do.....	20	40	M
Aprons, horseshoer's leather.....do.....		5	Q	Extra globes for.....do.....	20	40	M
Axes:				Extra wicks for.....do.....	40	40	M
With helves.....do.....	4	6	Q	Leather:			
Fire, with helves.....do.....	4	6	Q	Harness.....sides.....	3	3	Q
Pick, with helves.....do.....	8	8	Q	Bridle.....do.....	3	3	Q
Bag, nose.....do.....	500	1,000	O	Latigo.....do.....	1	1	Q
Barrows, wheel.....do.....	8	16	Q	Matches.....packages.....	2	4	M
Blacksmith's kit, complete.....do.....	5	5	O	Mauls, sledge-hammer.....number.....	10	10	Q
Blankets, horse.....do.....	500	1,000	M	Mules, draft.....do.....	12	26	Q
Boiler, instrument.....do.....	1	2	M	Nails:			
Brooms:				10d.....pounds.....	12	15	Q
Corn.....do.....	4	8	M	20d.....do.....	12	15	Q
Stable.....do.....	30	60	Q	Horseshoe, Nos. 4 and 5.....do.....	5	10	Q
Brushes:				Nozzles, hose.....number.....	2	3	M
Dandy.....do.....	250	500	Q	Oil, lubricating, motor.....gallons.....	7	9	Q
Hand, fiber.....do.....	12	24	M	Paulins, 20 by 30 feet.....number.....	6	8	Q
Horse.....do.....	250	500	Q	Pins, metal, picket line, 2 feet 6 inches by 2 inches.....number.....	40	80	Q
Scrubbing.....do.....	72	100	M	Pistols.....do.....	21	26	O
Whitewash with handle.....do.....	20	25	Q	Posts, picketing.....do.....	100	200	O
Buckets:				Rakes, steel.....do.....	24	34	Q
Canvas, watering.....do.....	50	66	O	Ranges, field, complete.....do.....	2	3	Q
Fire.....do.....	50	100	Q	Rivets and bars, assorted.....pounds.....	3	5	Q
Galvanized iron.....do.....	50	100	M	Rope:			
Candles.....pounds.....	15	25	M	Cotton 3/4 inch.....feet.....	150	250	Q
Canvas, 27 inches wide.....yards.....	150	200	Q	Lash, cotton, 1/4 inch.....do.....	200	400	Q
Carts, feed, 2-wheeled.....number.....	4	8	Q	Scales and weights, Troemer's.....number.....	1	1	M
Case thermo-cantery, ether (par. 977).....number.....	1	1	M	Sets, saddler's tools (Q. M. M., Appendix 14-31).....do.....	1	3	Q
Chest:				Shears, fetlock.....number.....	10	15	M
Tool, No. 2 (par. 938).....do.....	1	1	M	Shoes:			
Veterinary field unit.....do.....	12	12	M	Horse—			
Veterinary hospital.....set.....	1	1	M	No. 2.....sets.....	100	150	Q
Veterinary officer's field.....number.....	4	7	M	No. 3.....do.....	300	450	Q
Clippers:				No. 4.....do.....	300	450	Q
Horse, band.....do.....	12	24	M	No. 5.....do.....	50	75	Q
Blades for.....do.....	12	24	M	Mule			
Machine.....do.....	5	10	M	No. 2.....do.....	250	375	Q
Extra blades for.....do.....	10	20	M	No. 3.....do.....	500	750	Q
Extra blades for.....do.....	20	40	M	No. 4.....do.....	500	750	Q
Coal oil, 5 gallons in tin.....tins.....	5	10	Q	No. 5.....do.....	250	375	Q
Combs, curry.....number.....	250	500	O	No. 6.....do.....	250	375	Q
Crowbars, 5 1/2 or 6 feet.....do.....	2	2	Q	Shovels:			
Cutters, wire, small.....do.....	5	5	M	Long-handled.....number.....	20	30	Q
Diggers, post hole.....do.....	3	4	Q	Scoop.....do.....	25	35	Q
Disinfectors:				Snaps, halter, extra, for repairs.....dozen.....	40	50	Q
Cog gear, double-acting, spray pump, 50-gallon, mounted on skids.....number.....	1	2	M	Soap:			
Hand, spray.....do.....	5	6	M	Common.....pounds.....	100	200	M
Flags, distinguishing:				Ivory.....cakes.....	36	60	M
Veterinary hospital.....do.....	1	1	Q	Stocks, metal.....number.....	2	2	M
Mobile veterinary section.....do.....	1	1	Q	Stoves, coal-oil; blue flame, 1 burner.....number.....	1	2	M
Forks:				Wicks for.....do.....	2	4	M
Hay and manure stable.....do.....	20	40	Q	Table, equine, operating.....do.....	1	1	M
Long-handled (4-tine).....do.....	10	20	Q	Thread, saddler's:			
Gowns, operating.....do.....	5	6	M	3-ounce.....balls.....	2	3	Q
Grease, lubricating.....pounds.....	5	5	Q	10-ounce.....do.....	2	3	Q
Grindstone, kitchen, complete.....number.....	1	1	M	Towels, hand.....dozen.....	20	30	M
Guns, balling.....do.....	2	2	M	Trucks, motor, 1 1/2 tons.....number.....	1	1	Q
Halters.....do.....	600	1,200	Q	Wagons, escort, with harness, complete.....number.....	3	6	Q
Halter shanks, cotton rope, 1/2 inch, 6-foot lengths.....number.....	1,500	2,500	Q	Wallets:			
Harness menders (Q. M. M., Appendix 14-32).....number.....	2	2	Q	Farrier's (par. 970).....do.....	10	20	M
Horses, riding.....do.....	4	4	Q	Veterinary officer's (par. 974).....number.....	4	7	M
Horse equipments, complete.....do.....	4	7	O	Wax, saddler's.....ounces.....	1	1	Q
Hose, rubber, 50-foot lengths.....do.....	4	6	M	Whips, driver's.....number.....	3	6	Q
.....lengths.....do.....	4	6	M				
Metal connections for.....number.....	4	6	M				

* Obtained locally.

(g) BLANK FORMS, ORDNANCE DEPARTMENT			(h) INSPECTOR GENERAL'S DEPARTMENT		
Nos. 18a, 150, of each	number..	6	No. 1.....	number..	4
No. 151.....	do.....	50	No. 1a.....	do.....	10
No. 152.....	do.....	12			
No. 386.....	do.....	24			
Nos. 1715, 1879, of each.....	book..	1			

NOTE.—Issued to the veterinarian of the following organizations: Cavalry, Artillery, mobile veterinary section, corps mobile veterinary hospital, base or army veterinary hospital, and veterinary hospital.

Library unit for veterinary hospitals

- The Anatomy of the Domestic Animals. Sisson.
- Principles of Microbiology. Moore.
- The American Illustrated Medical Dictionary. Dorland.
- A Manual of Veterinary Hygiene. Smith.
- Infection and Resistance. Zinsser.
- Order 211. Regulations Governing the Meat Inspection of the United States Department of Agriculture, 1914
- Bureau of Animal Industry.
- Meat Hygiene. Edelman. Translated by Mohler and Eichhorn.
- Clinical Diagnostics of the Internal Diseases of Domestic Animals. Malkmus. Translated by White and Fischer.
- Colics of the Horse. Reeks.
- A Textbook of the Principles and Practice of Veterinary Medicine. White.
- Diseases of the Horse's Foot. Reeks.
- Milk Hygiene. Klein.
- Epizootics and their Control during War. Miessner.
- General Therapeutics, Frohner's. Klein.
- United States Pharmacopœia.
- Veterinary Materia Medica and Therapeutics. Winslow.
- Manual of Veterinary Physiology. Smith.
- A Handbook of Horseshoeing. Dollar.
- The Army Horseshoer. Government Printing Office.
- General Veterinary Surgery. Frohner. Translated by Udail.
- The Exterior of the Horse. Goubaux and Barrier.
- Feeds and Feeding Manual. Henry.
- Special Report on Diseases of the Horse. United States Department of Agriculture.

Individual equipment was provided for veterinary officers and for enlisted men in the form of a wallet, veterinary officer's, and a wallet, farrier's. The field equipment was carried in the chest, veterinary officer's, and chest, veterinary field unit. Some additional equipment for the divisional mobile veterinary section was carried in two pack-mule boxes. A division veterinarian's office equipment was provided. The divisional veterinary units were expected to have their complete equipments with them when they left for overseas service. The veterinary field equipment of a division included the following articles:⁸

Chests:		Wallets—Continued.	
Veterinary field unit.....	number.. 13	Veterinary officer's.....	number.. 12
Veterinary officer's.....	do..... 12	Boxes, pack-mule.....	do..... 2
Desk, field, veterinarian's, No. 1.....	do..... 1	Saddle, pack.....	do..... 1
Wallets:		Division veterinarian's office equipment.....	do..... 1
Farrier's.....	do..... 20		

PLAN OF PROCUREMENT AND DISTRIBUTION

In the general plan for the procurement and distribution of supplies required by the Medical Department, veterinary supplies were assigned by the Surgeon General to the medical supply depot at St. Louis, Mo. This decision of the Surgeon General was reached very early, and the following information was furnished the officer in charge of that depot, April 21, 1917:⁹

1. It is probable that the pending Army bill will transfer the purchase of veterinary supplies to the Medical Department, in which case it is contemplated that the purchase and distribution of these articles shall be assigned to the St. Louis depot. An effort will be made to obtain a suitable veterinary surgeon to assist you in this work, as indicated in Supply No. 685.

2. Some time ago a board of veterinarians was appointed upon the request of this office to meet in the Southern Department for the purpose of preparing a veterinary supply table.

3. I am sending you herewith a preliminary list of veterinary supplies that are under consideration. This is by no means the final supply table and is sent to you merely that you may have some idea of what is contemplated. The bill has not yet been passed assigning this purchase to the Medical Department, nor are funds available. The final veterinary supply table has not yet been acted upon.

4. The inclosed list was suggested by Mr. Frank Ryan, president of Parke, Davis & Co. (who is acting in conjunction with the Council of National Defense), as amounts which the drug firms might be asked to supply at one time.

* * * * *

After the tentative supply table had been developed and the quantities to be purchased had been determined, the following instructions were issued to the officer in charge of the medical supply depot at St. Louis:¹⁰

1. Inclosed herewith is a tentative estimate of a quantity of veterinary supplies for the fiscal year ending June 30, 1918. It is contemplated that these supplies be purchased in six increments at intervals of one month.

2. It is desired that the committees on pharmaceuticals, surgical instruments, and surgical dressings be advised of your probable requirements at the earliest practicable date. * * *

3. These committees will inform you of the manufacturers who can supply these articles and the quantity allotted to each, as well as the rate of production which may be expected.

4. The veterinary panniers have not yet been decided upon, and instructions covering their purchase and issue will be sent you at a later date.

The quantities on the tentative list were somewhat in excess of those recommended by the committee on pharmaceuticals on April 19.⁷ The instructions to divide the quantities into six parts and make purchase of one part at successive intervals had been based on the recommendation of the committee to purchase pharmaceuticals in smaller quantities at intervals of two months. The instructions were modified later to procure one-sixth of the medicine and one-third of the remaining articles on a 10-day circular at intervals of 2 months.¹¹ These instructions were amended later, in so far as they related to surgical instruments and appliances, to direct that the full quantity of each article be furnished the committees on surgical instruments and surgical dressings and that awards and recommendations be had from those committees for the awards and the distribution of the contract.¹² Orders for medicines and miscellaneous articles were placed in July, but orders for instruments could not be placed until the contents of the standard cases had finally been determined. In subsequent purchases of veterinary supplies the customary routine of procurement was observed.

The first circular proposal for bids for the purchase of supplies, authorized May 21, 1918, contained 143 items, of which 75 were medicines; 5, surgical dressings; 6, cases of instruments; 8, surgical appliances; 1, thermometers; 48, miscellaneous. The circular was issued at the St. Louis depot, June 15, 1917, and bids were opened June 26, 1917.¹³ At the suggestion of the chairman of the surgical instrument committee, the officer in charge, was advised by wire, June 29, that the surgical dressings committee would allot bandages, absorbent cotton, and adhesive plaster; that the surgical instrument committee would

allot instrument cases, casting harness, operating hoods, razors, saddlebags, suspending slings, syringes, metal, and syringes, hypodermic; and that the committee on thermometers would allot the thermometers.¹⁴ The award on the remaining items was made by the medical supply officer, who was instructed to expedite delivery. The quantities of veterinary instruments ordered at this time were as follows:¹⁵

Cases:		Dental floats, straight, screw driver end on handle.....	number.....	1,280
Farrier's.....	number.....	3,840		
Foot.....	do.....	80		
General operating.....	do.....	40		
Hypodermic syringe.....	do.....	1,440		
Hypodermic tablets.....	do.....	1,040		
With 12 vials filled as follows:				
1 aponorphine hydrochloride, $\frac{1}{16}$ grain.				
3 arecoline, 1 grain.				
2 cocaine hydrochloride, 2 grains.				
1 digitaline, $\frac{1}{4}$ grain.				
1 glonoin, $\frac{1}{16}$ grain.				
4 strychnine sulphate, 1 grain.				
Pocket.....	number.....	1,040		
Post-mortem.....	do.....	80		
Rectal pump.....	do.....	120		
Thermocantery, ether.....	do.....	80		
Clippers, horse, hand.....	do.....	480		
		Universal file blades for.....	do.....	7,680
		Universal rasp blades for.....	do.....	7,680
		Dental rolls.....	do.....	80
		Harness casting, Knowles's.....	do.....	1,120
		Hoods, operating, horse.....	do.....	160
		Needles, surgical, assorted.....	dozen.....	400
		Ophthalmoscope.....	number.....	40
		Razors.....	do.....	240
		Saddlebags, veterinary.....	do.....	960
		Slings, suspending.....	pairs.....	240
		Syringe, dose, metal, 1-ounce, 2-ounce, 4-ounce, of each.....	number.....	1,440
		6-inch pipes for, $\frac{3}{16}$ inch and $\frac{1}{8}$ inch of each.....	number.....	2,880
		Tube, stomach, 10-foot.....	do.....	160
		Reed cleaning stylets for.....	do.....	160

Ten additional items of surgical instruments and operating equipment were added August 1, 1917, and the quantity of 11 items on the list of May 21, 1918, was increased. The quantity of two items was decreased.¹⁵ Orders and contracts were placed, and supplies were delivered in about the usual time; that is, medicines, enamel ware and glassware promptly, surgical dressings a little later. Surgical instruments were delivered last because they had to be manufactured at a time when every factory was rushed with other Government orders.

For several months the stock of standard articles being insufficient to fill requisitions for veterinary supplies received from the various organizations, the nonstandard items received from the Quartermaster Corps were substituted whenever practicable. The majority of veterinary officers, who had not been in the service long enough to become familiar with the supply table, adapted themselves quite well to the unsettled conditions and prescribed the items issued them with success. It soon became evident that veterinarians at the several camp veterinary hospitals were asking for supplies in excess not only of authorized allowances but of actual needs. On account of the limited quantity of supplies available, it was necessary to limit the quantity issued to that of the allowance. Some complaint was made that the number of medicines in this standard list was inadequate; that many very essential drugs appearing in previous lists were omitted. The officers making these complaints were advised by the Surgeon General that, under the circumstances, it was more desirable to practice preventive medicine than to treat conditions after their development among animals.¹⁶ In the former case less medication was required.¹⁶

For the proper protection of sick animals, the officer in charge of the medical supply depot at New York, was directed, September 14, 1917, to purchase 60,000 horse blankets for use of the veterinary service, and to distribute

them in certain numbers to the various camps and medical supply depots.¹⁷ This number was increased September 24, 1917, to 70,000.¹⁸ The officer in charge of the medical supply depot at New York reported January 23, 1918, that 55,455 of these blankets had been received at the camps and depots, including those sent overseas, or were then in France.¹⁹ These blankets do not appear to have been extensively used in many of the camps, whether from lack of need of them or from lack of information concerning their availability, is not known. In some instances such blankets were obtained from the Quartermaster Corps.

The second set of instructions covering the purchase of veterinary supplies was sent to the officer in charge, medical supply depot at St. Louis, February 12, 1918.²⁰ The schedule transmitted with these instructions grouped the supplies in three classes: (1) Medicines, antiseptics, and disinfectants; (2) surgical instruments; (3) miscellaneous. The last item covered surgical dressings and other hospital equipment and supplies. The schedule gave the quantities required for one year for 250,000 animals, and the quantities which were to be purchased per quarter. The officer in charge was instructed to invite proposals quarterly for these supplies, one class at a time, and for all articles in that class, and for the full quantity to be purchased in the quarter. Bidders were to be permitted to submit quotations for one or more items of the proposal and for the whole or any part of an item, but were required to state the rate of delivery and the total quantity they would undertake to deliver without fail within 90 days from date of award. Awards were to be made and the date and hour of opening of the bid was to be stated in all circular advertisements. These instructions contemplated the procurement of a sufficient quantity of every item on the list to bring the total quantity of that item procured since April 1, 1917, up to the quantity given in the schedule, as required for 250,000 animals for one year. The officer in charge of the medical supply depot was directed to report any item the quantity of which on the list appeared to be too low. Approximately a dozen items were so reported by the officer in charge.

The next instructions to purchase were issued in June, 1918. A different form of schedule was used in stating the quantities to be purchased. It was similar to that sent to the depot at New York for the purchase of general hospital supplies. (See p. 182.) The schedule gave the quantities of veterinary supplies for one division, including hospitals, required for six months. The instructions prescribed the number of times the quantities in this schedule were to be purchased.²¹ After the various chests had been determined, instructions were issued concerning the quantity of each type to be purchased.

In the general development of centralization of procurement of surgical instruments in the general purchasing office, Medical Department, Washington, D. C., veterinary medicines and instruments were assigned to it for purchase. As deliveries were made the accepted supplies were forwarded to the medical supply depot at St. Louis, Mo., for storage and issue. Except for the fiber chests entering into the veterinary unit equipment, an ample quantity of veterinary supplies was available at the time of signing the armistice.

DISTRIBUTION

Inasmuch as the authority for the Medical Department to procure and distribute veterinary supplies did not become a law until June 15, 1917,⁴ instructions relative to distribution of such supplies could not be issued at an earlier date. It was contemplated that all medical supply depots making distribution of supplies to the training camps would carry and issue veterinary supplies. The slowness with which these supplies were received from manufacturers and increasing demands for them at camps and overseas prevented this widespread distribution of the stock. It made necessary the distribution of all such supplies from the depot at St. Louis.⁹ In order that all personnel of the Medical Department concerned in the use of veterinary supplies might be informed of the manner in which they were to be obtained, the following telegram was sent on July 1, 1917, to all department surgeons:²²

Supply number one thousand fifty one. Veterinary supplies and equipment will hereafter be furnished by the Medical Department. Issue on requisitions approved by the department surgeons. Use post stock so far as practicable until veterinary stock is available. Purchase articles not in stock as necessary to fill approved requisitions. Veterinary vaccines should be obtained from Army Medical School.

On the same date, the following telegram was sent to the medical supply depots distributing to troops:²³

Supply number one thousand fifty. Beginning this date all veterinary supplies and equipment will be furnished by the Medical Department. A copy of the standard supply table will be forwarded as soon as available. Until received General Orders number twenty War Department February twenty sixth nineteen hundred nine will govern. Requisition should be made on Medical Department blank form number thirty five. Articles should be limited to the supply table except for satisfactory reasons. Veterinary surgeons should inventory veterinary equipment and supplies in their possession and forward list to this office at earliest practicable date. For the present the return of veterinary property will be made annually on form seventeen, A, B, and C.

To clear up some questions received by the officer in charge, medical supply depot, St. Louis, concerning the method of handling veterinary supplies, the following instructions were issued July 4, 1917:²⁴

1. Replying to your telegram of the 30th ultimo, relative to veterinary supplies, your attention is invited to the inclosed copy of correspondence between this office and the Quartermaster General relative to the transfer of veterinary supplies. Copies of the act making appropriations for the fiscal year 1918, approved May 12, and of the urgent deficiency act, approved June 15, are being forwarded under separate cover, this date. These acts both contemplate procurement and issue of veterinary supplies by the Medical Department.

2. All veterinary supplies received from the depot quartermaster should be taken up on your return of medical property under the heading "Veterinary supplies." A copy of your acknowledgment to the depot quartermaster, St. Louis, of the receipt of these supplies should be furnished this office.

3. Veterinary supplies will, hereafter, be carried as a part of the Medical Department supplies under their proper title, "Veterinary supplies," in the same manner as dental instruments and supplies are carried in paragraphs S54 to S56, inclusive.

4. Requisitions will be prepared by veterinary surgeons on Form 35, Medical Department, and issues may be made on them when approved by department surgeons.

5. For the present these supplies will be issued and invoiced to the proper veterinarian in like manner as supplies are issued to regimental surgeons and dental surgeons. If two veterinarians be on duty with the same organization, the property should be invoiced to the senior.

6. General authority to purchase articles not in stock to fill approved requisitions were sent you by telegraph on the 1st instant. These instructions hold until the articles listed on the tentative veterinary list, forwarded you under date of May 21, have been received. It is desired that all unusual articles on these requisitions be eliminated. It is evident that the tendency of veterinarians is to include a great many articles of undemonstrated efficacy and which might very well be dispensed with. Bacterins and vaccines for veterinary use may be obtained from the Army Medical School, this city, and mallein from the nearest branch of the Bureau of Animal Industry of the Department of Agriculture.

7. The veterinary requisitions forwarded by you have been returned approved for issue as modified, with authority to purchase.

8. All orders placed by you for veterinary supplies on behalf of the Quartermaster Department since June 15, 1917, may be paid for out of urgent deficiency appropriation for the Medical Department. Orders placed by you remaining undelivered on that date should be canceled, and new orders placed to cover them. This will obviate any question of settlement of accounts. All supplies delivered prior to June 15, on orders placed at the request of the depot quartermaster, should be paid for by the Quartermaster Department. In other words, June 15 is the dividing line between the supplies purchased by the Quartermaster Department and those purchased by the Medical Department. All supplies paid for out of money pertaining to the Medical Department are to be taken up on your returns as pertaining to that department.

The telegram of July 1 to all department surgeons was supplemented by letter of instructions of July 10 accounting more clearly the particulars to be observed in the issue of veterinary supplies. Copy of these instructions appear below:²⁵

1. In conformity with the Army appropriation act for the fiscal year 1917, approved May 17, and the urgent deficiency act, approved June 15, 1917, veterinary supplies will hereafter be furnished by the Medical Department and issued in the same manner as post, field, and dental supplies.

2. A veterinary supply table is in course of preparation and will be forwarded as soon as completed. Until its receipt, the supply table published in General Orders, No. 20, War Department, February 26, 1902, will govern both as to items and as to quantity of preparations to be asked for.

3. Requests for veterinary supplies will be made by the senior veterinarian on duty with the organization in the manner prescribed in paragraph 482, Manual for the Medical Department, 1916. These requisitions should be forwarded through the post or regimental surgeon.

4. You are authorized to approve veterinary requests for all articles on the supply table, the same as other requisitions, and to delegate this authority to division surgeons within your department under such instructions and limitations as you may deem for the best interests of the service. A stock of veterinary supplies is now being purchased by the Medical Department. As soon as this is available a sufficient quantity will be sent to the medical supply depot which has been designated to supply troops within your department. Until these supplies have been received, the officer in charge of that depot may substitute stock on hand or purchase in open market such quantities as are needed to fill requisitions.

5. Vaccines for veterinary use will be obtained from the Army Medical School, Washington, D. C., and kept in stock at the medical supply depot within your department. Commercial vaccines will not be purchased. Curative sera, the efficacy of which has been demonstrated, may be purchased by the officer in charge of the medical supply depot on your approval, in such quantities as are required to meet the existing emergency. Requisitions should be carefully scanned that needless expense from the use of products, the efficacy of which remains to be proved, may be avoided.

6. Returns of veterinary supplies to be rendered annually by the responsible veterinarian, in the manner prescribed in paragraph 507, Manual for the Medical Department, 1916.

7. Suggestions relative to the improvement of the veterinary service, and especially to the supplies, should be forwarded to this office.

Some difficulty was experienced for several months in disseminating information to veterinary personnel concerning the method of obtaining veterinary supplies. The camp medical supply depots carried a stock of veterinary as well as other medical supplies. It was months, however, before the remount depots and some other veterinary units fully understood that they could secure their needed supplies from that depot by the simple process of submitting a requisition for them. This may have arisen from a doubt in the mind of the camp medical supply officer concerning his responsibility for supplies for the veterinarian at the remount depot. The remount depot, while immediately adjacent to the camp, was for months an independent unit.

Because of the shortage of veterinary supplies for many months it seemed unwise to stock the distributing depots with this class of supplies. Issues were made direct from the St. Louis depot to camp supply depots and to separate stations. Issues were made on requisitions received through the prescribed channels.

Shipments of veterinary supplies to the American Expeditionary Forces in France encountered the same difficulties and delays experienced in the shipment of other classes of supplies. Delay in receipt of supplies was the principal cause in the delay in forwarding them. The St. Louis depot had the advantage of position, in that shipments could be routed with equal facility to any of the ports on the Atlantic seaboard or on the Gulf.

When the first convoy of troops sailed for France in June, 1917, the distribution of veterinary supplies was not under the control of the Medical Department, consequently none of these supplies were included in the shipment of medical supplies sent with that convoy. After the arrival of this convoy in France the need for veterinary supplies developed, and a requisition based on approximately 50,000 animals was forwarded by the chief quartermaster, A. E. F. This requisition was promptly forwarded to the medical supply depot at St. Louis, for issue. The commander in chief, A. E. F., informed The Adjutant General, September 17, 1917, that veterinary supplies were urgently needed and that none had been received in France to date.²⁶ Reply was made to this by the Surgeon General by cable, September 21, 1917, to the effect that shipment of veterinary supplies had gone forward on the steamship the *City of Savannah*, and that a second shipment of 34,000 pounds was then going forward to Newport News, Va.²⁷ The Surgeon General, a few days later, advised the surgeon, base group, A. E. F., in France, by letter, that 289 packages of veterinary supplies had already gone forward; that a second shipment weighing 34,180 pounds, occupying 1,601 cubic feet, was being loaded at Newport News; that additional shipments would be forwarded as fast as they could be secured; and that the allowance for 50,000 animals, of which these two shipments were a part, should be ample to meet the requirements.²⁸ The veterinary supplies forwarded on the *City of Savannah* on October 2, 1917,

amounted to 37,437 pounds and 1,732 cubic feet. The *City of Savannah* docked in France about October 17, and the officer in charge of the medical supply depot, A. E. F., reported November 7, that 216 of the 289 packages had been received and that the remainder was expected.²⁹

In compliance with the request of the commander in chief, A. E. F., that shipment of supplies be put on an automatic basis, a list of supplies estimated as sufficient to provide for 10,000 animals for one month was compiled. There were approximately 10,000 animals per division and 10,000 was taken as the unit of supply for animals as 26,000 was for personnel. A copy of this list was furnished the officer in charge, medical supply depot at St. Louis, Mo., October 26, 1917, with instructions to ship four times that quantity in November.³⁰ The automatic supply list for December was forwarded to the officer in charge, medical supply depot, St. Louis, December 18, 1917.³¹ That for January was forwarded December 31, 1917.³² The veterinary supplies on the December automatic shipment, amounting to 535 packages, 46,000 pounds, 1,950 cubic feet, was ready for shipment December 28, 1917.³³ Under instructions from the chief of embarkation service these supplies were shipped to Mobile, Ala.³⁴

By November 2, 1917, the fourth shipment of supplies on the requisition from France had been assembled and was ready for shipment, together with the automatic replacement for October amounting to 34,720 pounds, 1,250 cubic feet. The shipment was forwarded through Newport News.³⁵ On November 22, 1917, another lot of veterinary supplies amounting to 119 packages, 14,580 pounds, 687 cubic feet, was ready for shipment.³⁶ Thereafter the shipment of veterinary supplies on automatic replacement, in increasing quantities, was forwarded monthly, in accordance with instructions issued by the Surgeon General to the respective ports of embarkation and directed by the chief of embarkation service.

The quantities of supplies included in these automatic shipments increased rapidly in conformity with the number of troops overseas. In supplying the equipment required by the various organizations overseas, a constant endeavor was made to send all items contained in the supply table for the equipment of every particular organization, whether the articles were furnished by the Medical Department, the Ordnance Department, or the Quartermaster Department. For the smaller units, for example, the division surgeon's office, and divisional veterinary units, division veterinary mobile hospitals, the supplies were issued to the given unit before it left its station in the United States. For the larger units, such as base hospitals for 500 animals, and veterinary hospitals for 1,000 animals, the equipment was to be assembled at the port of embarkation and issued to the units at the time of embarkation.

A cablegram from the commanding general, A. E. F., October 11, 1917, called for one base veterinary hospital and six veterinary hospitals for the Line of Communications.³⁷ Action on equipment of these organizations was delayed because at the time of receipt of the cablegram there had been no personnel of the Veterinary Corps available. This personnel had to be secured through the draft and trained. The officer in charge, finance and supply division, Surgeon General's Office, was advised December 12, 1917, that organizations had been

formed at Camp Devens for a veterinary hospital for 500 animals and one for 1,000 animals; that they had been reported to the chief of embarkation service as ready to sail; that the five other units requested in the cablegram would be ready to sail within a short time.³⁸ The question of individual equipment for officers and men was raised in order that they might be properly equipped. After the lapse of considerable time the question was decided and the equipment issued. Instructions were given, January 17, 1918, for the issue of the Medical Department part of the equipment for one veterinary base hospital for 500 animals and for Veterinary Hospital No. 1 to Camp Devens; Veterinary Hospitals Nos. 2 and 6, at Camp Upton, and for Veterinary Hospitals Nos. 3, 4, and 5, at Camp Lee.³⁹ The Quartermaster General and the Chief of Ordnance were each furnished a list of articles of their respective departments which entered into the equipment of these hospitals. They were requested to send the requisite quantities there to the commanding officers of the hospitals at their respective camps.⁴⁰ A part of the equipment of these organizations was issued from the medical supply depot, New York, the latter part of January, 1918.⁴¹ Material difficulty was experienced in getting the equipment for these units, and it was not until near the end of April that they were ready to sail. Even then they did not have the entire equipment, parts of which continued to arrive at Camp Devens until May.

Not much greater success attended the organizing and equipping of the veterinary hospitals in the second phase. Information concerning the prospective organization of 5 veterinary hospitals, 1 corps mobile veterinary hospital, and 1 Army mobile veterinary hospital for the second phase was received January 30, 1918.⁴² The authority to organize them was not given, however, until the middle of April, and the units were organized at Camp Lee shortly thereafter. They were expected to be ready for service overseas in two months.⁴³ Instructions were issued for the shipment of the medical part of the equipment on May 13, 1918. Requests were sent to the Quartermaster General and to the Chief of Ordnance on the same day for the shipment to Newport News of the articles pertaining to their respective departments.⁴⁴

Later information indicated that these units were due to sail about July 15, 1918, and that the equipment should be ready by that time.⁴⁵ The medical supply officer, Newport News, reported, June 17, 1918, that all the medical property except horse blankets, disinfectors on skids, metal stocks, and extra blades for hand dippers had been received.⁴⁶ The failure to ship these articles was due to depleted stock at the St. Louis depot and to slow deliveries from contractors. All the ordnance supplies had been received except nose bags and pistols. None of the quartermaster supplies had been received.⁴⁶ A subsequent report of July 1 indicated that a third of the quartermaster supplies had been received and the balance promised at an early date.⁴⁷ There were still articles due July 13, 1918.⁴⁸

The veterinary hospitals of the third, fourth, and fifth phases of General Pershing's priority schedule, ordered supplied during July and August, were equipped with about the same degree of expedition. A report from the port medical supply officer, Newport News, Va., September 23, 1918, indicated that

complete medical and ordnance equipment had been received for the hospitals of the third and fourth phases, but that the quartermaster part of the equipment had not arrived.⁴⁹ The equipment for these units had been shipped to France by the end of October, 1918.⁵⁰

VETERINARY AMBULANCES

The need of veterinary ambulances with the American Expeditionary Forces called for the development of a suitable type of conveyance. Accordingly, measures were inaugurated to develop one. Prior to 1917, so far as known, no veterinary ambulance or other vehicle intended for that purpose had been purchased or used in the Army. Nor did it appear that they were in common use anywhere. A few had been designed for and were in use in State and city institutions caring for animals. It was with difficulty and after considerable delay that even a photograph of such a vehicle was obtained.

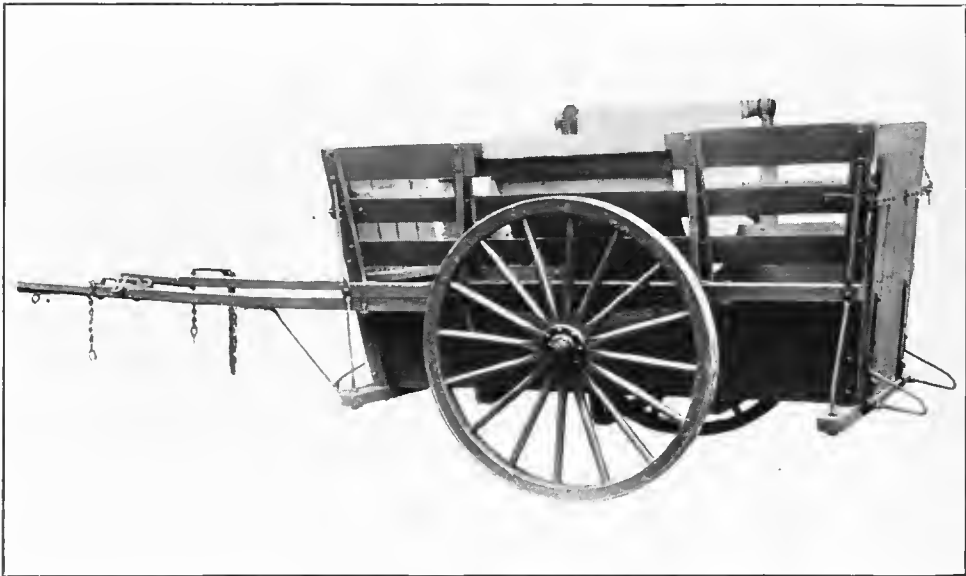


FIG. 40.—Veterinary ambulance, side view

After a suitable design for the body of the conveyance had been found, the type of chassis or running gears upon which to mount it was no less perplexing. Since the distances to be traversed were considerable, a motor chassis seemed appropriate; but the need of the floor of the body to be only a few inches from the ground in order to get the animal into it without too much of an effort disqualified the motor chassis. It was decided, finally, to construct a number of animal-drawn ambulances according to the design selected and give them a trial at the various remount depots. The type furnished for this purpose is shown in Figures 40 and 41. This ambulance, like all other animal-drawn vehicles, was supplied by the Quartermaster Corps.

The slowness of this conveyance and the limited distances which it could travel in a day with animal motive power precluded its extensive use in the

combat zone. Efforts continued for a number of months to design a motor veterinary ambulance which would be satisfactory. Very little information was at hand concerning the type of motor veterinary ambulances used by the Allies. The commander in chief, A. E. F., reported, in April, 1918, in response to a cabled request from the Surgeon General, that working drawings and specifications of approved types of motor veterinary ambulances were not then available.⁵¹ Other work on standard motor ambulances, considered of more vital importance, prevented further consideration of motor veterinary ambulances and no design for such vehicles was developed.

A device was developed at the motor ambulance supply depot, Louisville, Ky., for converting the horse-drawn veterinary ambulance into a trailer so that

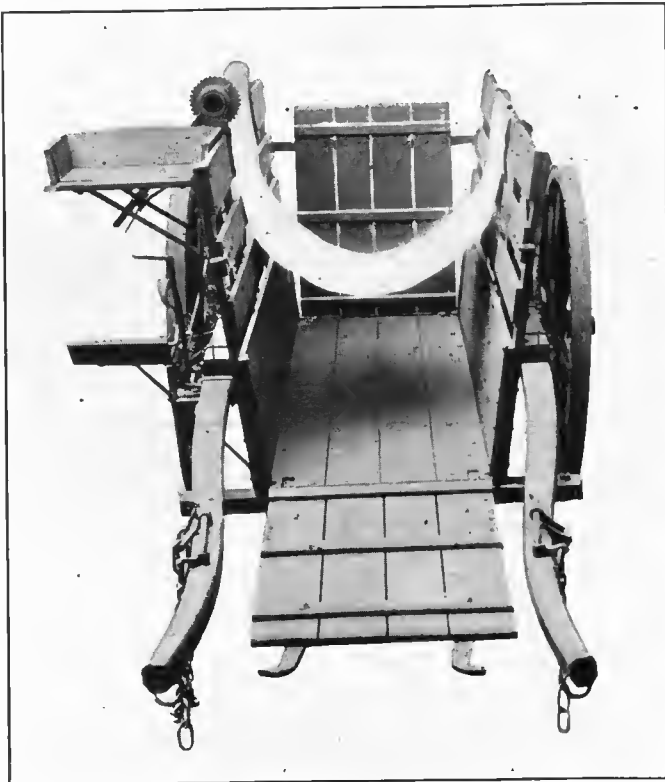


FIG. 41.—Veterinary ambulance, front view

it could be towed by a motor truck. This device consisted of a V-shaped metal frame with a ring or loop at the pointed end of the V which would fit the pintle hook of the truck. The free ends of the V were each provided with two U-bolt devices to fasten them securely to the shafts of the ambulance. One such vehicle was equipped with this device and towed behind a standard motor ambulance with a satisfactory degree of success.⁵² It is not known to what extent the device was used, if at all.

A small number of the animal-drawn ambulances, shown above, reached the United States troops in France, where they were not much used except for the transportation of equipment.⁵³

VETERINARY BIOLOGICALS

While veterinary biologicals, prophylactic and therapeutic, were on the market during the World War, the value of many of them was uncertain and remained to be proved. Very few of them were considered to have sufficient merit to justify their use. This being the case, it was decided that such vaccines as were authorized for veterinary use would be supplied by the Army Medical School. Certain curative sera, such as tetanus antitoxin, the efficacy of which had been proved, might be purchased. At that time glanders was quite prevalent throughout the United States. There was prospective need of interstate shipment of animals. Under State law and interstate commerce regulations, horses could not be shipped from one State to another without having been tested to determine whether they were suffering from glanders. In making this test mallein was commonly used. It was prepared in various forms. Some of the veterinary supply houses put it up in tablet form and sold large quantities of these tablets. The action of this preparation in tablet form was quite uncertain. Arrangements were made with the Bureau of Animal Industry, Department of Agriculture, to furnish mallein in solution in such quantities as might be required for the testing of animals purchased by the Army. The Bureau of Animal Industry was prepared and offered to make complement fixation test for glanders whenever requested to do so. Accordingly, arrangements were made whereby a definite quantity of mallein was furnished by the Bureau of Animal Industry and shipped weekly to the remount depots at the different military trainings camps. After all the animals required had been purchased, the weekly shipments were discontinued and shipments made only upon request.

The quantities of mallein required continued to increase during 1918, and while the Bureau of Animal Industry was able to expand its facilities, it was deemed expedient to have an additional source of supply. It was also desirable that Army personnel be trained in the production of animal vaccines and bacterines. A veterinary laboratory, directly under the control and direction of the veterinary division, Surgeon General's Office, was established at Philadelphia, Pa., in the early part of 1918. This laboratory conducted investigations relative to bacterial diseases among animals. In addition, it prepared mallein. As the facilities of the laboratory increased and the skill and technique of the personnel engaged therein improved, the quantities of mallein steadily rose. By the end of December, 1918, the laboratory was able to produce all the mallein required by the Army. The laboratory as a separate entity was discontinued at Philadelphia at the end of March, 1920, and transferred to the Army Medical School, Washington, D. C., where it became the veterinary section of the laboratory maintained at that school. The quantities of mallein produced by this laboratory were⁵⁴ January 1, 1918, to December 31, 1918, 43,500 doses; January 1, 1919, to December 31, 1919, 657,665; doses; total for the period, 701,165 doses.

REFERENCES

- (1) Act of June 3, 1916 (39 Stats. 1054).
- (2) Letter from the Surgeon General to The Adjutant General, August 24, 1916. Subject: Purchase of veterinary supplies. On file, Record Room, S. G. O., 158777-II (Old Files).
- (3) Memorandum of General Gorgas hearing before the House Military Committee, January 9, 1917. On file, Record Room, S. G. O., 158777-L (Old Files).
- (4) Act of June 15, 1917 (40 Stats. 196).
- (5) G. O., No. 113, W. D., August 22, 1917.
- (6) Memorandum from the Surgeon General, May 5, 1917, regarding veterinary apparatus and supplies. On file, Finance and Supply Division, S. G. O., 14700-E.
- (7) Letter from Lieut. Col. H. C. Fisher, M. C., S. G. O., to Mr. Frank Gibbs Ryan, chairman of the Committee on Pharmaceuticals, Room 953, Munitions Building, Washington, D. C., April 19, 1917, transmitting list of veterinary supplies for 650,000 for 6 months. On file, Finance and Supply Division, S. G. O., 14700-A.
- (8) First indorsement, Surgeon General, to the Division Veterinarian, 15th Division, Camp Logan, Tex., relative to overseas equipment. On file, Finance and Supply Division, 534-127 Logan
157
February 19, 1918, $\frac{750-714 \text{ S. G.}}{732}$. Also: Letter from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, Mo., November 12, 1918. Subject: Field desk No. I. On file, Finance and Supply Division, S. G. O., $\frac{750-714}{772}$.
- (9) Letter from the Surgeon General to officer in charge, Medical Supply Depot, St. Louis, April, 21, 1917. Subject: Veterinary supplies. On file, Finance and Supply Division, S. G. O., 14700-B.
- (10) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, May 21, 1917. Subject: Veterinary supplies. On file, Finance and Supply Division, S. G. O., 14066-14.
- (11) Second indorsement, Surgeon General, to the officer in charge, Medical Supply Depot, St. Louis, Mo., June 9, 1917, relative to purchase of veterinary supplies. On file, Finance and Supply Division, S. G. O., 14066-14.
- (12) Telegram from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, Mo., June 20, 1917, relative to purchase of veterinary supplies. On file, Finance and Supply Division, S. G. O., 14066-14³.
- (13) Copy of circular on file, Finance and Supply Division, S. G. O., $\frac{533-715}{14}$.
- (14) Telegram from the Surgeon General to officer in charge, Medical Supply Depot, St. Louis, Mo., June 29, 1917, relative to award of veterinary supplies. On file, Finance and supply Division, S. G. O., 14066-14⁵.
- (15) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, Mo., August 1, 1917. Subject: Supplies. On file, Finance and Supply Division, S. G. O., 14066-14¹².
- (16) Correspondence between the Surgeon General and the division veterinarian, Camp Lee, Va., April, 1918. On file, Finance and Supply Division, S. G. O., $\frac{531-177 \text{ Lee}}{190}$.
- (17) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, September 14, 1917. Subject: Horse blankets. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{128}$.
- (18) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, September 24, 1917. Subject: Horse blankets. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{128}$.

- (19) First indorsement, medical supply officer, New York, to the Surgeon General, January 23, 1918. Subject: Horse blankets. On file, Finance and Supply Division, S. G. O., 713-539 N. Y.
128
- (20) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, Mo., February 12, 1918. Subject: Procurement schedule, veterinary supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-750}{182}$.
- (21) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, Mo., June, 1917. Subject: Procurement schedule, veterinary supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-750 \text{ W.D.}}{182}$.
- (22) Telegram from the Surgeon General to department surgeons, July 1, 1917, relative to veterinary supplies. On file, Finance and Supply Division, S. G. O., 14700-1 (1051).
- (23) Telegram from the Surgeon General to department surgeons, July 1, 1917, relative to veterinary supplies. On file, Finance and Supply Division, S. G. O., 14700-1 (1050).
- (24) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, July 4, 1917. Subject: Veterinary supplies. On file, Finance and Supply Division, S. G. O., 14700-1.
- (25) Letter from the Surgeon General to department surgeons, July 10, 1917. Subject: Veterinary supplies. On file, Finance and Supply Division, S. G. O., 14700-1.
- (26) Paragraph 9, Cable No. 160, Headquarters, American Expeditionary Forces, Chaumont, France, to The Adjutant General, Washington, September 15, 1917, relative to veterinary supplies. On file, Finance and Supply Division, S. G. O., $\frac{250}{37}$.
- (27) Cable from the Surgeon General to Bradley, chief surgeon, U. S. Army, France, September 21, 1917, relative to shipment of veterinary supplies. On file, Finance and Supply Division, S. G. O., $\frac{250 \text{ F}}{37}$.
- (28) First indorsement, Surgeon General, to the surgeon, Base Group and Line of Communications, A. E. F., September 25, 1917. Subject: Veterinary supplies. On file, Finance and Supply Division, S. G. O., $\frac{250}{37-A}$.
- (29) Fourth indorsement, medical supply depot, France, to the chief surgeon, Line of Communications, November 7, 1917, relative to veterinary supplies. On file, Finance and Supply Division, S. G. O., $\frac{250}{37-A}$.
- (30) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, Mo., October 26, 1917. Subject: Veterinary supplies for expeditionary forces. On file, Finance and Supply Division, S. G. O., $\frac{713-707}{163}$.
- (31) First indorsement, Surgeon General, to the officer in charge, Medical Supply Depot, St. Louis, Mo., December 18, 1917, transmitting December automatic replacement. On file, Finance and Supply Division, S. G. O., $\frac{713-707 \text{ St. Louis D.}}{163}$.
- (32) First indorsement, Surgeon General, to the officer in charge, Medical Supply depot, St. Louis, Mo., January 15, 1918, relative to January automatic replacement. On file, Finance and Supply Division, S. G. O., $\frac{713-707 \text{ St. Louis D.}}{163}$.
- (33) Telegram from the medical supply officer, St. Louis, Mo., to the Surgeon General, December 28, 1917, relative to shipment of veterinary supplies for overseas. On file, Finance and Supply Division, S. G. O., $\frac{713-707 \text{ St. Louis D.}}{163}$.
- (34) Telegram from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, Mo., December 29, 1917, relative to shipment of veterinary supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-707 \text{ St. Louis D.}}{163}$.

- (35) Telegram from the medical supply officer St. Louis, to the Surgeon General, November 2, 1917, relative to overseas shipment of veterinary supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-707 \text{ St. Louis D.}}{163}$.
- (36) Telegram, medical supply officer, St. Louis, Mo., to the Surgeon General, November 22, 1917, relative to veterinary supplies for overseas shipment. On file, Finance and Supply Division, S. G. O., $\frac{713-707 \text{ St. Louis D.}}{163}$.
- (37) Par. 7, Cable No. 212, Headquarters, A. E. F., Chaumont, to The Adjutant General, October 11, 1917, relative to veterinary service. On file, Finance and Supply Division, S. G. O., Cables Received Book.
- (38) Memorandum from chief, Veterinary Division, S. G. O., to chief, Finance and Supply Division, S. G. O., December 12, 1917, relative to equipping veterinary hospitals, first phase. On file, Finance and Supply Division, S. G. O., $\frac{750-594}{82}$.
- (39) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, St. Louis, Mo., January 17, 1918. Subject: Equipment for veterinary hospitals. On file, Finance and Supply Division, S. G. O., $\frac{750-594}{82}$.
- (40) Letters from the Surgeon General to the Quartermaster General and the Chief of Ordnance, January 7, 1918, relative to issue of equipment to veterinary hospitals. On file, Finance and Supply Division, S. G. O., $\frac{750-594}{82}$.
- (41) Letter from the Surgeon General to the officer in charge, Medical Supply Depot, New York, January 17, 1918. Subject: Supplies for veterinary hospitals. On file, Finance and Supply Division, S. G. O., $\frac{750-594}{82}$.
- (42) Letter from the chief, Veterinary Division, S. G. O., to the officer in charge, Finance and Supply Division, S. G. O., January 29, 1918. Subject: Equipment for additional veterinary units to be organized. On file, Finance and Supply Division, S. G. O., $\frac{750-714}{126}$.
- (43) Letter from the chief, Veterinary Division, S. G. O., to officer in charge, Finance and Supply Division, S. G. O., April 17, 1918. Subject: Veterinary units to be organized at Camp Lee, Va. On file, Finance and Supply Division, S. G. O., $\frac{750-714}{126}$.
- (44) Letters from the Surgeon General to the Quartermaster General, to the Chief of Ordnance and to the officer in charge, Medical Supply Depot, St. Louis, Mo., May 13, 1918. Subject: Equipment for veterinary hospitals. On file, Finance and Supply Division, S. G. O., $\frac{750-714}{126}$.
- (45) Letters from chief, Veterinary Division, S. G. O., to the officer in charge, Finance and Supply Division, S. G. O., June 10, 1915. Subject: Equipment for veterinary units, second phase. On file, Finance and Supply Division, S. G. O., $\frac{750-714}{126}$.
- (46) Memorandum from Capt. Shelby G. Fell, to Maj. R. A. LaGrinder, June 17, 1918. Subject: Supplies ordered, invoiced and received on veterinary hospitals. On file, Finance and Supply Division, S. G. O., $\frac{750-714}{126}$.
- (47) Sixth indorsement, medical supply depot, Newport News, Va., to the Surgeon General, July 1, 1918, relative to receipt of equipment for veterinary hospitals. On file, Finance and Supply Division, S. G. O., $\frac{750-714}{126}$.

- (48) Memorandum from the medical supply officer, Newport News, Va., to the commanding officer, Port of Embarkation, Newport News, Va., June 13, 1918, relative to receipt of supplies for veterinary hospitals. On file, Finance and Supply Division, S. G. O., 531-127 Lee.
224
- (49) Letter from port medical supply officer, Newport News, Va., to the Surgeon General, September 23, 1918. Subject: Status of veterinary hospitals. On file, Finance and Supply Division, S. G. O., 583-538 N. N..
88
- (50) First indorsement, Surgeon General, to the commandant, Veterinary Training School, Camp Lee, Va., November 5, 1918, relative to equipment of Veterinary Hospitals Nos. 13, 16, 18. On file, Finance and Supply Division, S. G. O., 531-127 Lee.
262
- (51) Paragraph 5, Cable No. 836, Headquarters, A. E. F., Chaumont, to The Adjutant General April 2, 1918. On file, Finance and Supply Division, S. G. O., Cables Received Book.
- (52) Letter from the officer in charge, Medical Supply Depot, Louisville, Ky., to Maj. W. T. Fishleigh, S. C., S. G. O., April 3, 1918. Subject: Towing attachment for horse ambulance. On file, Finance and Supply Division, S. G. O., 713-440.
180
- (53) Memorandum for Colonel Wolfe from Col. W. Geo. Turner, V. C., August 3, 1926, relative to veterinary ambulances. On file, Finance and Supply Division, S. G. O., 490 Memo.
171-A
- (54) Report of officer in charge, veterinary laboratory section, Army Medical School, to the Surgeon General, June 30, 1920. On file, Finance and Supply Division, S. G. O., 500 Misc..
20

SECTION VIII

ACTIVITIES OF DISTRIBUTING MEDICAL SUPPLY DEPOTS*

CHAPTER XL

NEW YORK MEDICAL SUPPLY DEPOT^b

At the beginning of the World War, the New York medical supply depot was located in 543 Greenwich Street, in a six-story and basement, fireproof, loft-type structure divided longitudinally by a fire wall. It had approximately 65,000 square feet of floor space and was provided with two elevators of freight type. The first floor was about 3 feet above the street level and provided along the front with loading platform of the same height for convenience in receiving and shipping. This floor was used for receiving, shipping, storage, carpenter shop, and offices for the receiving and shipping clerks. The sixth floor was used as offices, a display room for samples, an instrument repair shop, and for a limited amount of storage. One of the other floors was used as a packing and issue room and was adequately provided with shelving for supplies and counters for packing and storage. The remainder of the floor was devoted to bulk storage. On still another floor was installed a complete pharmaceutical chemical laboratory for the examination of such supplies as required a chemical analysis.

Early in 1917, in making plans to provide the equipment and supplies peculiar to the Medical Department, the Surgeon General decided to allocate to the New York depot the purchase of all those articles appropriate to general hospital use as distinguished from those required in the field or for veterinary use.¹ It was further decided to relieve the New York depot of all small requisitions and to confine its issues to the supply of other depots where shipments could be made in bulk. It was intended to relieve it of all retail work and and confine its issues to wholesale distribution.¹

When consideration was given these plans at the depot preparatory to putting them into effect, it was apparent that additional storage space and better warehouse facilities would be immediately required. More commodious office space and improvements in depot methods to adapt them to the increased activities became necessary. The great masses of supplies which must be issued could not be handled at the depot. The bulk of them must be shipped from manufacturers to issuing depots and ultimate distributing points. Definite lines of cleavage between medical and dental supplies and equipment must be

* In Chap. II the number and location of the medical supply depots in the United States are given; in this section, the activities of the New York medical supply depot are recorded as representative of like depots elsewhere. Since the motor ambulance supply depot at Louisville was the only depot of its kind, its activities also are included.

^b Except as otherwise indicated, the following statements of fact are based on "History of Medical Supply Depot, U. S. Army, New York, N. Y., during the European War, May 10, 1919, submitted to the Surgeon General by Col. Frederick W. Hartsock, M. C., in charge." On file, Finance and Supply Division, S. G. O., 713-539 N. Y.,

established, and also between the various commodities. Receiving, shipping, and warehousing space must be increased to handle a volume of supplies the magnitude of which had never before been contemplated.

Fortunately about this time a building on Morton Street extending from Washington to Greenwich Street had just been completed and was available for lease in its entirety. It was a 10-story and basement structure with 120,000 square feet of floor space, and fireproof throughout. It was provided with ample elevator and sprinkler service and embodied the latest developments in storage warehousing. After a short delay authority for the lease of this building was telegraphed to the depot quartermaster, New York, by The Adjutant General, May 15, 1917, and the offices were moved thereto from 543 Greenwich Street shortly afterward. The new building was known as 628 Greenwich Street. A franchise was granted the New York Central Railroad, June 8, 1917, by the mayor of the city of New York, for the projection of a spur track from its main lines on West Street extending along Morton Street to Greenwich Street and in proximity to the new building. This permitted the placing of 6 to 8 cars at a time in front of the building for loading or unloading. This spur track greatly facilitated the receiving and shipping of supplies and obviated a vast amount of trucking which would otherwise have been necessary. Some delay was experienced in putting this spur into service due to transportation difficulties in securing materials to effect a crossing of the street-car lines on Washington Street. There were shipping platforms on Morton, Greenwich, and Washington Street fronts making it possible to load or unload supplies at three sides of the building at the same time. The long platform on the Morton Street side gave ample accommodations for 25 trucks at one time.

In the new medical supply depot the western half of the second and third floors was set aside for office space. The eastern half of the second and third floors was set aside for packing rooms. The ground floor was utilized for receiving and shipping departments, respectively. The Morton Street side of the floor was used entirely for receiving, and the back section for shipping.

The packing department was divided as follows: On the second floor, half of the building was set aside for miscellaneous bin stock, including drugs and all small items of hospital equipment of miscellaneous character. A system of steel stacks was installed with suitable packing tables and covered this entire floor. A miscellaneous assortment of proper bin stock was placed in this section.

An instrument packing section was installed on the anterior half of the third floor. It was equipped with pressed steel bins, suitable packing counters, and shelving.

The fifth floor was divided in two parts for packing. The anterior half was devoted entirely to X-ray packing and the posterior half to dental packing. Steel bins and steel packing shelves of the most modern type were installed.

The remainder of the building was devoted to warehousing, each floor carrying separate types of miscellaneous or special articles.

As the production of supplies increased, not only was the building at 628 Greenwich Street filled to its capacity but also that at 543 Greenwich Street. Relief from the congestion became necessary. Such supplies destined for

overseas shipment as could be stored at the embarkation depot of the Medical Department for this port were sent to Pier 45, North River, at the foot of Christopher Street. The congestion increasing during the winter months of



FIG. 42.—New York medical supply depot

1917-18, further relief was obtained through the courtesy of the Treasury Department in the temporary assignment of 100,000 square feet of space in the Appraisers' Building at Greenwich, Christopher, and Hudson Streets. The

need for extra storage space again became urgent by the end of April, 1918. To meet promptly the increasing demands upon the depot it was considered necessary to maintain maximum and minimum stocks not only for current needs but also to provide a reserve against emergencies. While overseas shipments could be made by direct routings of supplies from manufacturers to the piers in New York Harbor, a certain amount of supplemental stock in the depot was always necessary. It was not always possible to so coordinate the routings as to fully utilize the piers for that purpose. Lack of storage space was then retarding production.²

The effort to acquire this increase in storage space met with vigorous objection on the part of the director of storage, who held it imperative that no supplies be sent to New York for domestic distribution; that only by limiting rail traffic to and from New York to actual necessities would it be possible to handle overseas shipments with any degree of promptness, and that no space at any point in New York City would be authorized by his office for supplies to be shipped into that city for domestic distribution.³ In view of this objection the acquisition of additional storage space was held in abeyance for a time and an effort was made to so rearrange shipments of supplies that existing storage facilities could be made to meet the requirements. It was contemplated that the New York depot would be used extensively for assembling unit equipment for base hospitals ordered overseas for duty. Bulky articles such as bedsteads, mattresses, pillows, and hospital furniture in general would be routed to Pier 45, North River, New York, for temporary storage, either at the Port Newark Terminal, Newark, N. J., or at the Bush Terminal in Brooklyn, N. Y., pending their transportation overseas.⁴

This procedure did not bring the needed relief. The volume of supplies handled by the New York medical supply depot continued to increase. The need for additional space and greater security of storage became daily more urgent. By July 1, 1918, the main warehouse, at 628 Greenwich Street, had become largely a combination office building and specialty shipping house. The great expansion of various departments, such as packing drugs, X-ray and dental supplies, utilized nearly the entire space in that building. The 543 Greenwich Street building, by that time, had come to be used for reserve storage, although it was poorly adapted to that purpose because of insufficient capacity and lack of adequate sprinkler system and elevator service.⁵

While it was not the policy of the Medical Department to store an unnecessarily large amount of equipment in New York City, a considerable quantity of reserve stock was always necessary at that point. To insure expedition in shipment and to safeguard against delays in making replacements for losses by fire, submarines, and other disasters, six weeks' to three months' replenishments of supplies were required. It was necessary, too, that an adequate stock be always available in New York to safeguard against delay in production, freight congestion, and other traffic reasons due to blizzards and bad weather in winter. To meet these conditions application for increased space was renewed in July. Authority was granted by the Assistant Secretary of War, August 12, 1918, for the lease of a nine-story and basement warehouse on the southeast corner of Greenwich and Leroy Streets.⁶ This building was

of fireproof construction, contained 131,000 square feet of floor space, and was equipped with adequate sprinkler system, elevator service, and all modern warehouse conveniences.⁵ It was taken over as part of the New York medical supply depot, August 19, 1918, and by the end of the following January had been practically filled with medical and hospital supplies. It was used entirely for bulk storage and was thoroughly accessible for whatever shipping was necessary when expedition demanded.

PERSONNEL

The personnel at this depot, at the time of the mobilization of the troops along the Mexican border in 1916 consisted of the officer in charge and one assistant, both officers of the Medical Corps of the Regular Army, one officer of the Medical Reserve Corps on active duty as chemist, and 28 civilian employees in the various grades of clerks, packers, watchmen, messenger, and skilled and unskilled laborers.⁷ During the fiscal year ending June 30, 1917, there was a slight increase in the civilian employees, chiefly among the laborers. From that date until the peak was reached in the fall of 1918, the increase in personnel was rapid.

COMMISSIONED PERSONNEL

It had been the policy of the Surgeon General for a number of years to utilize this depot for the training of medical officers in supply work. To this end junior officers were detailed to duty there for definite periods. Unfortunately the strength of the Medical Corps was too small to permit the assignment of more than one assistant to the depot at any one time. Fortunately, however, the few so trained, together with those who had gained experience at the other medical supply depots, proved sufficient to fill the key positions in administration, procurement, and distribution, and to supervise and direct the work of those less experienced. The number of the commissioned personnel had risen to 19 when the armistice was signed, of whom 14 were officers of the Sanitary Corps with rank from second lieutenant to major. Only two of the 19 officers were members of the Regular Army, the officer in charge and his dental assistant.

CIVILIAN EMPLOYEES

Civilian employees had been secured, for many years, in conformity with law and regulations through the United States Civil Service Commission. Laborers, for a shorter period, had been secured under the United States labor regulations.⁸ While this method had never proved entirely satisfactory in peace-time operation, no material inconvenience resulted from it. It was permissible, under the regulations, for the officer in charge to select one of the three highest on the register of eligibles whenever it became necessary to fill a vacancy among the employees in any position under civil service requirements. Selections were generally made after a full consideration of the records furnished by the secretary of the second civil service district and a personal interview with the eligibles certified.

Under the stress of war conditions the roster of eligibles in the second civil service district was soon exhausted in the effort to select the needed employees.

The number and classes of applicants being received by the Civil Service Commission were wholly inadequate to provide personnel for the special needs of the depot. Importunate requests for clerks, packers, laborers, etc., could not be met and recourse to other methods became necessary. Employees were secured wherever they could be had through advertisements in the daily newspapers and by other means. By agreement with the secretary of the second civil service district these employees were passed upon by the service and their appointments confirmed. The depot was enabled, thereby, to obtain the desired personnel as rapidly as needed.

ENLISTED PERSONNEL

In addition to the civilian employees who could be obtained through the civil service, it early became evident that specialists would be needed in every department and that they must be men of business ability, experts in their lines. Permission was granted by the War Department to utilize for this purpose an enlisted personnel to be selected by the depot. Plans to this end were made and carried out. Every department was scheduled for a certain type and number of young business men. The administrative assistant was detailed by the officer in charge to visit various large business houses in New York, explain the depot's need, and request each firm to apportion one or two of its best young men for enlistment as assistants at the depot. These firms readily responded to this request, selected employees with requisite qualifications and sent them to the depot, where they were enlisted and assigned to duties in accordance with their special qualifications. By this means there was collected, in a short period of time, a representative force, every man a specialist in his line.

ORGANIZATION

The organization obtaining at the time of our entrance into the World War, together with the methods of the depot, had fairly well met the strain of the hurried procurements of medical and hospital supplies required for the border mobilization. But even then it was foreseen that a great increase in personnel and storage space would be necessary if the depot were ever confronted with actual war conditions. The methods, satisfactory for peace conditions, must undergo extensive revision. The system in vogue was wholly inadequate to handle a situation so entirely different. Complications of an overseas war, and the tremendous increase in the volume of business to be handled, demanded a business system which would operate speedily and accurately, and be capable of expansion to meet any demand placed upon it. To develop such a system a number of efficiency experts were called in from various business organizations to make a study of the needs of a medical supply system and to suggest business methods for the expansion of the New York depot. A careful consideration was given to the best commercial practices and from them were selected such procedures as would fit into the peculiar type of activities required at the depot. The experts who studied the depot procedures made their reports and submitted their conclusions. These reports were then compared and a study made of their best points. The procedures considered most suitable for the

peculiar type of business handled by the depot were then extracted and utilized in the development of depot organization and operation. Continued efforts were made to create an organization along the most efficient modern business lines. The plan of administration of the depot was designed to coordinate the functions of warehousing and shipping, procurement and finance, and the general clerical staff into a harmonious whole; to act in liaison with the central agency of supply in the Surgeon General's Office; to maintain contact with the local embarkation agencies for overseas shipments; and to keep in touch with the various methods and plans of the War Department. The general plan of organization of the depot as it finally worked out is shown below.⁹

FINAL ORGANIZATION

ADMINISTRATIVE DEPARTMENT

1. Personnel.
 - a. Military.
 - b. Civilian.
2. Stenographic section.
3. Mail section.
 - a. Incoming mail.
 - b. Outgoing mail.
 - c. Central files.
4. Methods control section.
5. Plant protection section.
6. Utilities section.
7. Messengers.

PURCHASING DEPARTMENT

1. Contracts.
2. Purchase orders.
3. General filing section.

PRODUCTION DEPARTMENT

1. Production records section.
2. Priorities and raw materials section.
3. Direct routing section.

INSPECTION DEPARTMENT

1. Specifications section.
2. Factory inspections section.
3. Warehouse inspections section.

FINANCE DEPARTMENT

1. Accounts section.
 - a. Contracts.

1. Accounts section—Continued.
 - b. Purchase orders.
 - c. Pay rolls.
2. Disbursing section.

REQUISITION DEPARTMENT

1. Editing section.
2. Billing section.
3. Service section.
4. Stock records section.
5. Panama Canal section.

WAREHOUSING DEPARTMENT

1. Receiving section.
2. Warehousing section.
3. Packing section.
 - a. General hospital supplies.
 - b. Surgical instruments.
 - c. X-ray apparatus and supplies.
 - d. Dental equipment and supplies.
4. Shipping section.
 - a. Domestic shipments.
 - b. Overseas shipments.
5. Traffic section.
 - a. Rail.
 - b. Motor transport.
6. Property section.
7. Box making and printing section.

SPECIAL DEPARTMENTS

1. Dental.
2. Surgical instruments.
3. X ray.

ADMINISTRATIVE DEPARTMENT

The principal administrative office was under the immediate direction of the officer in charge. In this duty he was assisted by an executive officer, who had charge of routine matters, such as plant protections, administration of personnel, both enlisted and civilian, and the policies of the depot and their relations to outside activities. In this duty was involved the maintenance of

morale, the conduct of business negotiations with port authorities, the city of New York, and outside commercial interests. The position required not only tact and personality but a thorough knowledge of local conditions in New York, general as well as business. Upon the efficient handling of these duties by the executive officers depended the smoothness and dispatch of the general operation of the depot. For a considerable part of the time the officer in charge conducted personally many of the negotiations for the purchase of supplies.⁹

PERSONNEL SECTION

This section kept records, prepared rolls, rendered required reports, and in general administered the affairs of the depot personnel. As the depot affairs increased it became necessary to divide the section into two subsections, one for enlisted personnel and the other for civilian employees.⁹

ENLISTED PERSONNEL

This subsection corresponded in a general way to a company office. It kept the service and clothing records and pay cards of the enlisted personnel of the Medical Department assigned to the depot. It prepared the pay rolls, morning reports, sick reports, change of status reports, returns of personnel for the Surgeon General's Office, etc. It arranged for drills, musters, and such technical training as was considered necessary. It assigned personnel to the several departments of the depot in conformity with instructions previously received from the executive officer. It also looked after the general welfare of the detachment and performed such other duties as were assigned to it.⁹

CIVILIAN EMPLOYEES

The duties of this subsection were limited to the civilian employees on duty at the depot. It maintained a close and effective liaison with the office of the secretary of the second civil service district of New York. It looked more or less extensively after the welfare of the employees while on duty, and kept a check on their efficiency and the manner of performing their respective duties. It prepared the monthly pay rolls and the reports of the civil service employees required by the Surgeon General. It had general charge of the rest room and emergency aid. It prepared requests to the local civil service authorities for additional personnel and for changes in classifications. It had also the duty of procuring personnel from outside sources whenever the civil service rosters failed, and of arranging for their rating and assignment to the depot by that service.⁹

MAIL AND FILE SECTION

The method of handling and filing mail varied somewhat at different periods in the depot history. During the early months of 1917 the methods observed were those which had been in effect in the preceding period. As the volume of correspondence increased, the method of filing changed. The War Department system of filing according to classified subjects was installed in the early part of 1918.¹⁰

For a considerable part of the war period all correspondence was placed in the main files. As a number of departments in the depot and the complexity of the work increased, each department was permitted to maintain a file of its own. This file related only to matters handled by the particular department. In it were placed copies of the correspondence originating in or relating to the department. The original correspondence continued to be placed in the main files. Variations of the method were observed with regard to contracts, purchase orders, and requisitions. All correspondence relating to a given contract, purchase order, or requisition was attached to and filed with the contract, purchase order, or requisition to which it referred. Under this method full information of all action taken regarding any contract, purchase order, or requisition was immediately available upon reference to that contract, order, or requisition.¹⁰

Special files were maintained for correspondence dealing wholly with depot personnel, whether civilian or military.

Letters of a confidential nature were kept in another file securely locked to prevent their unauthorized use.¹⁰

METHODS CONTROL SECTION

This section was the center of control and operations. It was under an officer designated as methods control officer. It operated entirely apart from any of the other branches of the depot and was under the direct orders of the officer in charge. It was in close touch with the many interlocking branches of the depot. The selection of personnel from the numerous appointees became a study of individual capabilities. Each section of the depot was placed under the charge of an individual more or less familiar with the particular duties of the section in the depot plan. It took but a short time to complete the organization, but it required months of experience and training to get the machinery into smooth operation. It was necessary at times to rearrange the personnel, to eliminate the incapable in order to effect a smoothly working business organization.⁹

The functions of the methods control section were to keep the business of the depot running smoothly. To accomplish this a daily review of each department was made to determine whether it functioned properly and in full cooperation with other departments. The methods control officer was authorized to effect any change, in a minor way, found necessary to accomplish that result. It was his special duty to know daily whether any department was falling behind in the accomplishments of its missions and how it cooperated with the other departments. Changes were made as they became necessary to readjust the phases of the organization and to care for the increasing business. There was close liaison and cooperation between the control section and all departments of the depot.⁹

PLANT PROTECTION SECTION

Soon after the declaration of war the depot was expanded by the lease of the building on Morton Street. That building was made the center of operations, being fireproof and having a modern sprinkler system. It was made the warehouse center for materials which in case of damage by fire could not readily

be replaced. The depot offices were early transferred to that building. The question of plant protection arose almost as soon as the Morton Street building had been leased. The dangers which might arise during war from sabotage, foreign spies, and international interference were visualized. To overcome them the assistance of numerous governmental agencies already existing was sought. The Department of Justice, in connection with the United States Secret Service, was requested to furnish agents for assignment to duty in the depot on plant protection. A number of operatives were assigned for this work. The chief operative had charge of the checking system on employees. The Western Electric method of photographing and furnishing cards to all depot personnel was put in force. Confidential agents were distributed in all parts of the depot. The chief agent was designated superintendent of labor, and had under him a number of watchmen whose duties were similar to those of watchmen in business concerns. In addition to their ordinary duties the watchmen were required to maintain a careful check on the sprinkler system and the engineering facilities of the plant.⁹

A detachment of soldiers in uniform, fully armed and under a special officer, was maintained both as inside and outside guard. This detachment maintained patrols in the adjacent vicinity for additional security. A house-to-house inspection was made by Government agents of all the buildings in the immediate vicinity of the warehouses. In this search two definite foreign agents were apprehended and interned at Fort Oglethorpe for the remainder of the war. The Military Intelligence Department provided a number of operatives whose business it was to prevent fraud, theft, and irregular business methods in connection with outside agencies. The buildings were provided with automatic alarms and a fire-control system connected with the American District Telegraph. The windows on the side of the street adjacent to the elevated railway were protected by metal shutters to prevent bombs and incendiary material being thrown into the building from the railway trains. As a result of the measures taken only one fire occurred, and in that instance the alarm was given so promptly by the mechanical devices installed in the building that the fire was extinguished without material loss.⁹

UTILITIES SECTION

The utilities section had general charge of the janitor service in the various warehouses, of the sprinkling system, and of the maintenance of heating, electric light, telephone, and fire-alarm systems. This section was immediately under the superintendent of labor. It had as one subsection a carpenter shop and as another a box-making department and labeling machine. The utilities section also maintained a cold-storage plant for the preservation of serums and other biologicals and a vault for the safe storage of narcotics and alcoholics. The vault for narcotics was under the charge of the superintendent of labor personally. He was the only person permitted to carry the keys and was responsible for their safe-keeping. Issues from this vault were made only on requisition slip from the packing department and were handled by a specially designated packer.⁹

MESSENGERS

A force of messengers of varying size was maintained primarily under the jurisdiction of the executive officer. They acted as inside and outside messengers in the handling of mail and in a general messenger service.

PURCHASING DEPARTMENT

In the reorganization of the depot, in the early part of 1917, following the declaration of war, the purchase section of the peace-time administrative division became the purchasing department. It was known by that title until January, 1919, when the depot was consolidated with other supply agents in New York into a single organization under the direction of the zone supply officer. It was rapidly expanded to handle the vast quantities of supplies being purchased. It developed in conformity with prevailing commercial practice. The department was divided into sections along commodity lines. The sections, as a rule, handled two or more allied commodity groups. It had as its chief an officer of the Sanitary Corps selected for his special qualifications as a purchasing agent in civil life. He was assisted by commissioned, enlisted, and civilian personnel in such numbers as the needs of the work required. This personnel was assigned to duties in accordance with individual qualifications and training. As a result the organization developed rapidly in efficiency.¹¹

The department was very closely associated with the inspection department, the warehousing department, the finance department, the property records department, and the production department. Its closest associates were the inspection and production departments, the development of which was practically simultaneous with that of the purchasing department and covered the same geographical territory. At first they functioned as sections of the purchasing department, but as the volume of purchases increased and the demands for supplies became more acute they were organized into separate departments.¹¹

Each commodity section had a chief, selected because of his familiarity with the particular commodity in civil life. These chiefs of sections were obtained from representative business organizations in the city and were inducted into service for the particular duties to which they were assigned. They were familiar not only with the commodity as such, but also with the sources of supply of raw materials which entered into it and the manufacturer who produced the commodity. Each section was provided with adequate personnel, enlisted and civilian. The enlisted personnel were also selected from local commercial houses for their technical qualifications in the procurement of supplies. The civilian employees furnished for the most part the clerical and stenographic assistance. The purchasing and the procurement activities of these sections reached their height about the end of March, 1918; thereafter both gradually diminished as the activities of the general purchasing office, Medical Department, in Washington, increased and as centralization of procurement through interbureau requisitions developed.¹¹

A complete list of manufacturers and large suppliers of all articles to be purchased was kept in this department. Whenever purchases were to be made, circulars of advertisement soliciting bids on the articles required were sent to

such firms on the list as manufactured the articles desired. With very few exceptions all purchases in large quantities were made direct from the manufacturers rather from wholesalers or jobbers. If the quantities were small, the articles actually in stock and the prices reasonable, orders were placed wherever the article could be obtained to advantage. When time permitted, circulars of advertisement were issued by commodity groups and sent only to the manufacturers of those groups. If the time were limited and the demand urgent, a general circular covering all the articles required and including a number of different commodity groups was issued. Copies of this circular were sent to all the manufacturers of the commodity groups involved in the circular. Each manufacturer bid on the articles he could produce. As the bids were received at the depot they were kept unopened in a secure container until the day for the opening arrived. The circular always contained an invitation to the bidders to be present, either in person or by representative, at the formal opening. Many of the bidders availed themselves of the opportunity and were present. On the day and at the hour set for the opening the bids were formally opened and were read in the presence of the purchasing officer and such bidders as were present. Abstracts were prepared as the bids were read. Samples were requested when considered necessary in making the award. After all factors had been considered awards were made and contracts prepared. The quantities to be purchased were often much larger than a single manufacturer could produce within the limited time available. Awards were accordingly divided among the bidders in conformity with their production ability. The lowest bidder was given all he could produce and an effort was made to secure the article from the other bidders at the same price. In some articles, such as mattresses, the combined output of all the manufacturers hardly sufficed to meet the requirements. Awards were usually made on the basis of the quantities promised within 60 or 90 days. Contracts were written and, after signature by the contractor and contracting officer, were sent to the Surgeon General for approval. A sufficient number of copies of the contracts were prepared to furnish the required information to the several interested departments of the depot. Statutory requirements for the filing of a copy of every contract with the returns office, Department of the Interior, were duly observed.¹¹

A copy of every approved contract was kept on file in the purchasing department and numbered serially as issued. Prior to 1917 no system of numbering contracts had been used; contracts were identified by the date and the name of the contract. A system of numbering contracts serially was started July 15, 1917, beginning with number 100. The series was continued in direct numerical sequence until December 31, 1917, when the number 1885 was reached. Beginning January 1, 1918, a new series was started with the number 2,000. This series continued until the close of the war. No special classifying symbol or letter other than the contract number was used. The contracts approved in the office of the Surgeon General bore an additional number given them by that office. The number given in the Surgeon General's Office followed one general series for all the depots from 1 upward, beginning June 15, 1917.¹²

Not all purchases were made by contracts. Under statutory authorization the purchases of \$500 or less could be made in the open market without

advertising. These purchases were made on purchase orders. If immediate deliveries could be made, the amount of the purchase on purchase orders often exceeded the \$500 limit. Purchase orders had been in use in the same form for many years and had been numbered consecutively in one series during that time. The number of that series had reached No. 24000 when war purchases began. It was discontinued July 23, 1917; the final number in the series being 26700. The following day a new series was started beginning with No. 1. This series continued in use until the end of 1918. The numbers in the series had exceeded 18,000 by the end of June, 1918. Purchase orders did not require approval by the Surgeon General's Office and consequently were not numbered therein.¹²

After each contract had been written, a card index was prepared showing the name of the manufacturer, the date of the contract, the articles being purchased, the price paid, and the promised rate of delivery. Another index was also prepared showing the same data for the individual article. From the one card could be readily obtained the information concerning the contractor and his deliveries; from the other file could be obtained at a glance all data relative to any war article.¹¹

PRODUCTION DEPARTMENT

The purchase section of the administrative division of the peace organization of the depot had a subsection known as records and follow up. The duties of this section were to maintain contact with the firms with whom contracts had been placed, to follow production, and expedite deliveries. In the peace organization these duties had been comparatively simple. When the increased purchases extended to the Mexican border mobilization in 1916 the duties of this subsection were considerably expanded. In those purchases a great many shipments were made direct from the manufacturers to their ultimate destination. This subsection then took on the added function of keeping in contact with the contractors and followed deliveries until the articles ordered from them had been delivered to the transportation agency. It became necessary to expand it still further after the purchases of war requirements began. The subsection was accordingly expanded and became the production department. It was placed under an officer of the Sanitary Corps with extensive experience in factory organization and production work.

The organization of the production department followed in general that of the purchasing department. The energies of the department were directed: First, to a record follow up of the state of production of every article and order;⁹ second, assisting manufacturers in procuring needed raw materials through the Priorities Board in Washington; third, rendering such assistance. It made suggestions and gave technical advice with reference to the best method of production for the expedition and delivery of the fabricated materials. The department kept exact records of all contracts, where they were placed, the state of production, shipment, and deliveries. The records were so arranged and kept that information was available at all times concerning the status of production. It cooperated with the Priorities Board in a special effort to obtain

the best special priority on materials and their prompt delivery. The urgency of war demands often required a higher priority rating on some of the materials than was possible for the expedition of manufacture. Shortage of materials often involved a study on substitution. It was often necessary to change the original specifications for equipment by reason of these substitutions and because other materials were more readily available.⁹

The production department in conjunction with the inspection department was continually on the lookout for new sources of supply and for new facilities which could be converted to the manufacture of articles required by the Medical Department in which the standard sources of supply proved inadequate.⁹

INSPECTION DEPARTMENT

War conditions which wrought such changes in the procurement of supplies required equally marked changes in the routine inspection of supplies. The vast quantities to be purchased and the inability from lack of time and space to handle all supplies through the depot made it necessary to transfer the point of inspection from the place of receipt of the supplies to the place of their manufacture. This revolutionized the entire procedure. The demand for supplies was urgent and incessant and the need for prompt inspection became imperative. Payment for supplies delivered waited upon acceptance. Acceptance, in turn, had to wait on inspection to determine whether deliveries conformed to contract requirements. Acceptance had also to precede the issue of the articles. The prompt placing of supplies in use was dependent in no small measure upon the facility and speed of the inspection. Acceptance without inspection was not a wise procedure and would have established dangerous precedents.

Prior to the war none of the depot employées had been trained in the technique of inspection of supplies. Other provisions for the inspection of the supplies to be purchased became necessary. Fortunately for the Medical Department and for the New York medical supply depot in particular, other means were provided. The services of expert merchandise appraisers of the United States customs service had been tendered to the War Department for the inspection of supplies and had been placed at the disposal of the depot. This obviated any need to organize a corps of inspectors employed directly by the depot. The original agreement with the appraisers' force contemplated that one of the deputy appraisers would establish an office in the depot from which to handle and direct all inspection service rendered by the appraisers' personnel.¹³ This official was to have been the immediate point of contact between the two services.

The progress of procurement soon demonstrated the need of a department within the depot to handle all details relative to the inspection of supplies. In the first few months after the declaration of war the personnel of this department consisted, in addition to those in the medical laboratory, of one officer and two or three enlisted men.¹⁴ Its duties were limited to the examination of such supplies and samples as were received at the depot. As the volume of deliveries and direct shipments increased there was added to its duty of depot inspection the supervision and coordination of field

inspection. During the year 1917 this department was concerned only with the inspection of supplies purchased by the depot of which it was a part. It later became the clearing house for inspections made by the appraisers for the other purchasing agents of the Medical Department, both at Washington, D. C., and at St. Louis, Mo.¹⁴

The department had practically reached the height of its activities in the fall of 1918, when it handled nearly all field inspections of the Medical Department. It was organized along establishing commodity lines and was similar to that of the purchasing department, with which it cooperated very closely. As finally developed the inspection department had the following divisions: Main division, laboratory division, instrument division, appraisers division. The department was under the charge of an officer of the Medical Reserve Corps assisted by such number of officers of the Sanitary Corps, enlisted personnel of the Medical Department, and civilian employees as were necessary. The number of personnel fluctuated from time to time, but reached its maximum in the autumn of 1918.¹⁴

MAIN DIVISION

This division was in charge of a commissioned officer and had a personnel of approximately 30. It was divided into nine branches: Textiles, leather and rubber, hardware, hospital supplies, drugs and medical supplies, instruments and surgical supplies, medical and surgical appliances, packing, miscellaneous.

The personnel of this division were selected for their special qualifications and technical knowledge of the lines to which they gave their time. Several of them were graduates of technical colleges; others were successful business men. Every man was assigned to the particular duties which, by training and experience, he was best qualified to perform. The business men handled the same commodities they had handled in private life.¹⁴

After the department had been completely organized, the bulk of all inspections was made at the plant where they were manufactured. Every manufacturer when accepting a contract was informed that inspection and acceptance of the supplies by the inspection department would be required before shipment. As supplies were completed and became available for shipment the manufacturers informed the department of the quantities ready for inspection. An inspector then visited the plant, inspected the supplies, and made his report to the depot. If the report were satisfactory the supplies were released for shipment and the consignee was notified. The consignee, if other than the New York depot, notified the inspection department upon receipt of the shipment, and the supplies, if they had been already inspected and accepted, were released to him at once. If a chemical examination were necessary to acceptance, samples taken at random from the lot were sent to the inspection department and the supplies held until notice of acceptance had been received. These measures were taken to prevent shipment being made without the knowledge of the depot or without an examination to determine whether the quality of the article shipped conformed to the stipulations of the contract. As a rule all packages in which the supplies were examined by the inspector were marked by him,

"Inspected and passed." This was required before a shipment could be made unless delivery was to be inspected at destination. This service of inspection was extended ultimately to every factory from which the Medical Department purchased its supplies.¹⁴

Many of the articles purchased required technical examination. Occasionally this could be made at the factory, but as a rule it was necessary to send a suitable number of samples to the depot for examination, either in its own laboratory or in that of the United States appraisers, where the requisite facilities for such examinations were available. Inspections by standard sample could not, of course, be made in the field, especially where the article was being produced at the same time by a number of different factories. It became necessary therefore, to develop standard specifications by which articles could be purchased and to which deliveries must conform. The inspection department, largely through the cooperation of the appraisers division, compiled these specifications as rapidly as possible. Manufacturers were consulted in the preparation of specifications and very generally cooperated with the depot in their preparation and in deliveries of supplies purchased under them.¹⁴

As the volume of supplies required by the Medical Department increased, new sources of supply became necessary. In developing new sources of supply, factory inspections to determine facilities, capacity, and suitability of the plants were frequently necessary. Such inspections were made generally by the appraisers division, but often by personnel from the main division. These inspections served a very useful purpose in placing contracts. Generally the inspector working in that vicinity inspected the particular articles for which the new facility was required.¹⁴

MEDICAL LABORATORY DIVISION

This division was the normal development of the section of the same name during peace-time administration. The same officer remained in charge of it during the war who had been in charge prior to 1917. The peace-time personnel of this division had consisted, beside the officer in immediate charge, of a civilian assistant chemist and a laboratory attendant. The assistant chemist, having received a commission in another branch of the Army, left the depot at an early date and was replaced by an officer of the Sanitary Corps, who remained on that duty until mustered out in the general demobilization of the emergency forces.

The great increase in the quantities of articles purchased which required a chemical examination likewise greatly increased the work of this division. The initial personnel was augmented from time to time, but for a number of months the increase was not as rapid as the increase in the volume of work required. Delays in reporting upon samples increased and were often aggravating. The question of utilizing the services of the chemists of the customs service as an auxiliary to the laboratory division was at one time considered with a view of having the examinations made in various parts of the United States by chemists located near the point of manufacture. The examination of pharmaceuticals, however, required qualifications not possessed by the average analytical chemist. The plan was discarded in favor of expanding

existing Medical Department laboratories and increasing the number of chemists. It was expedient that the knowledge of the chiefs of these laboratories in examination of pharmaceuticals, gained by years of practical experience, be utilized in the supervision of the work. Without pharmaceutical training the average analytical chemist was unable to render an intelligent report on the examination of medicines, tablets, ointments, and the like. The chiefs of the laboratories supervised and directed the work of less experienced pharmaceutical chemists and thereby secured very satisfactory results. Steps were taken to increase the force at these laboratories. Personnel with training as analytical and pharmaceutical chemists were selected from the draft and assigned to the laboratory division in June, 1918. From those so assigned the most suitable were selected for the laboratory service. The numbers so obtained were ample. When the armistice was signed the force in the medical laboratory division consisted of two officers, six enlisted chemists, a laboratory assistant for the care of the laboratory utensils, and as many civilian attendants and stenographers as were necessary.¹⁵

The work of the medical laboratory division, while greatly augmented in volume, followed very closely the routine of pre-war days. Samples of articles to be examined were received through the main division of the inspection department from deliveries as they came in. The required examinations were made in the laboratory and the results were recorded on a suitable report form. The original of this form went to the main division for appropriate action. A duplicate copy was retained in the files of the laboratory for reference. Due to shortages in the supply of certain raw materials essential to the manufacture of pharmaceuticals and to manufacturing difficulties, the custom grew up of requiring samples to be furnished by the manufacturer prior to shipment and in many cases prior to the contract. These samples were examined to determine whether they conformed to contract stipulations. The analysis of the samples taken from deliveries was checked against that of the original samples.¹⁶ This procedure increased the work of the laboratory division, but was considered necessary to insure the delivery of articles of the quality required.

APPRAISERS DIVISION

It should be noted that the three divisions already mentioned functioned wholly within the depot. The appraisers division functioned almost wholly without the depot. A few expert examiners assisted with the inspection of surgical and dental instruments in the depot. The appraisers division was under the charge of a deputy appraiser who had an office in the appraisers stores, a building just across the street from the depot. The personnel of this division was divided into three groups, A, B, and C.

Group A handled principally articles made of metal, wood, and the like. It had the following divisions: Surgical instruments and dental instruments; sterilizers, disinfectors, operating-room equipment; enamel ware, galvanized-iron ware, copper utensils, syringes, hospital beds, bed screens, instrument boilers; kerosene stoves, flash lights, and tin containers; clocks, mirrors; the components of Carrel-Dakin apparatus; X-ray apparatus.

United States Appraiser, port of.....
 Packed in how many containers.....
 Containers numbered.....
 Shipped to.....

NOTE.—Inspectors will show contents, gross weight, and measurement of each case separately below.

INSPECTION DEPARTMENT, MEDICAL DEPOT, UNITED STATES ARMY

To Collectors and Appraising Officers:

Upon receipt of a contract from the C. V. R. Bureau, an inspector from your office should immediately visit the plant of the contractor, ascertain the following facts, and report at once to the C. V. R. Bureau:

Contract No. Date..... Contractor.....
 State whether contractor is agent for, owner of, or buyer from factory.....
 Factory, name.....
 Factory, location..... Street..... City..... State.....
 Articles.....
 Employees: Total..... Male..... Female..... Alien.....
 Number of employees on Medical Department contracts..... On other Government contracts.....

1. Number of looms or machines in factory: Total..... Number on Government contracts.....

2. Can unemployed machines or looms be used on Medical Department contracts?.....

3. Total estimated output of specified articles per week with the present equipment and force.....

4. Sanitary conditions of factory.....

5. Coal sufficient for what period of time?.....

6. Are goods being manufactured for Medical Department under subcontract?.....

7. Are goods being manufactured for Medical Department by subletting?.....

8. State kind and quantity of material necessary to complete contract.....

8 a. State quantity and kind of stock on hand.....

8 b. State whether balance of material necessary to complete contract is ordered, and whether deliveries are promised to insure prompt delivery.....

8 c. Is manufacturer unable to secure materials to meet his requirements under contract? If so, give names from whom to be procured, quantity and kind of material, dates ordered, and when needed.....

9. Is the plant equipped to produce articles in accordance with contract terms?.....

10. What dates have you arranged for inspection at certain fixed periods of time?.....

11. What physical or chemical tests are employed by the manufacturer?.....

11 a. Give construction specifications, formula, furnish blue print, photo, or cut, with dimensions, and if practicable forward samples with report.....

12. If the preliminary examination of the capacity and material of the plant leads to a conclusion that the contractor is unable to meet the contract demands, give facts below.....

in detail in order that medical supply officer may be advised at the earliest moment-----

(This report should be made in triplicate on this form and furnished to this office promptly.)

Respectfully,

Inspector -----, Port of -----

Date of inspection -----

Approved:

NOTE.—An explicit answer to question 11a and the furnishing of samples when practicable is absolutely necessary so that this bureau can prepare a comprehensive inspection report. All questions on this form must be answered, or reason given for not replying.

Form No. 36

SPECIFICATIONS FOR LINEN DISH TOWELS

Inspection Report No. -----

U. S. Appraiser

Port of -----

Inspection by

U. S. Appraiser

Size.—17" x 30" finished-----

Weight.—3¾ ounces each-----

Thread count.—To be not less than 22 threads to the inch in warp. 19 threads to the inch in filling-----

Yards.—Warp, not less than 9 nor more than 10 lea gray flax noil yarn; filling, not less than 9 nor more than 10 lea gray flax noil yarn-----

Hemming.—Two fold, ¼" wide-----

Hanger.—Cotton tape ¼" wide, loop 1"-----

This report is based upon the inspection of----- taken from a delivery of packages-----, numbered-----, inspected at-----, date-----, manufactured for-----, Contract No-----, date-----, to be shipped to-----

Delivery accepted—rejected. If rejected give reasons on reverse side.

Approved: -----

[Inspector.]

U. S. Appraiser, Port of-----

DELIVERIES

-----Date of report-----

Contract No.-----date-----Contractor-----Article-----

Manufacturer-----Contracted to deliver to date-----

Actually delivered inclusive of shipment inspected-----

Reasons for nonfulfillment of requirements of contracts as to deliveries-----

(On reverse side of this space)

REPORT OF FACTORY CONDITIONS

Contract No.-----date-----contractor-----

Article----- (Also state whether agent or owner of or buyer from factory)

Employees: Total-----; male-----; female-----; alien-----

Employees: employed on Medical Depot contracts-----or other Government contracts-----

1. No. of looms or machines in factory; total----- Employed on Government contracts-----

2. Can unemployed looms or machines be used on Medical Depot contracts-----

3. Sanitary conditions of factory-----

4. What percentage of material necessary to complete contract on hand-----

- 5. Coal sufficient for what period of time-----
- 6. If deliveries are delayed because of lack of material or coal, give facts and names and addresses from whom ordered-----
- 7. Are any goods being manufactured for Medical Depot under subcontract-----
- 8. Are any goods being manufactured for Medical Depot by subletting contract-----

(Use reverse side of this space for necessary remarks.)

Form No. 384.

INSPECTION DEPARTMENT, MEDICAL SUPPLY DEPOT

Report No. ----- Inspection date ----- at -----

U. S. Appraiser ----- port of Boston.

Contractor, BOTTOM TORRENCE CO., BENNINGTON, VT. Manufacturer, ditto.

Contract date, April 8, 1918. Contract No. G. P. O. 69.

Specifications for cotton pillow cases: Report of Inspector.---

Material.—36" Bld. cotton sheeting-----

Thread count.—Warp, 68; filling, 56-----

Weight.—4.93 yards to pounds (basis, 36")-----

Dimensions.—36" x 38" cloth size; (18¾ x 32") finished size-----

Stitching.—16 stitches to inch-----

Hemming.—2" at opening end-----

Sewing thread.—Good quality cotton-----

Total amount of contract.—19, 500 dozen-----

Packing.—Wooden cases, 100 dozen to case-----

Delivery: Beginning June 1, 25 per cent monthly-----

Inspector's report.—Based on inspection of ----- pieces.

Construction and material as specified, except as noted -----

Containers numbered ----- Shipped to -----

Accepted or rejected.

[Inspector.]

Approved:

U. S. appraiser, port of -----;

DELIVERIES

Date of report ----- Contract date ----- No -----

Contractor ----- Article -----

Manufacturer -----

Total contract quantity -----

Contracted to deliver to date -----

Actually delivered inclusive of shipment inspected -----

Reasons for nonfulfillment of contract terms of delivery -----

REPORT OF FACTORY CONDITIONS

Contract No. ----- Date ----- Contractor -----

Manufacturer ----- (agent, owner of, or buyer from factory).

Article -----

Employees: Total -----; Male -----; Female -----; alien -----

Number of employees on medical depot contracts -----; or other Government contracts -----

1. Number of looms or machines in factory: Total -----; Number on Government contracts -----

2. Can unemployed machines or looms be used on medical depot contracts?-----

3. Sanitary conditions of factory -----

4. What percentage of material necessary to complete contracts on hand-----

5. Coal sufficient for what period of time.....
6. If deliveries are delayed because of lack of material or coal give facts and names and addresses from whom ordered.....
7. Are any goods being manufactured for medical depot under subcontract.....
8. Are any goods being manufactured for medical depot by subletting contract.....

(Use reverse side of this space for necessary remarks.)

The inspection department was organized and its work carried on in such a manner as to cooperate most closely with the other departments of the depot to facilitate the delivery of supplies. It suggested the wording of specific contracts to insure that the desired type of the article would be purchased and that the packing requirements would be properly stated. It furnished the production department complete information concerning the plants from which supplies were being purchased and whether contractors would or would not be able to make shipment on the dates specified in their contract. If delays in production occurred, the inspection department investigated them, through its field inspectors, to determine the cause and to effect a remedy. It furnished the production department in New York and Washington reports on labor organizations, types of employees, materials on hand, and other details relating to Medical Department contracts. The information in these reports was obtained at first hand by investigations made at the plants of the manufacturers.¹⁴

The chief of the inspection department was made a member of the purchasing board or board of contract awards during the latter months of the war. Under the system adopted for the purchase of supplies, many articles were sent to the experts in the appraisers office for examination before purchase was made, in order that the best articles, and those most advantageous to the Medical Department, from a financial standpoint, might be selected. Specifications were modified and new specifications prepared whenever it was found necessary to meet the requirements of existing conditions.¹⁴

FINANCE DEPARTMENT

In the reorganization of the depot to meet war conditions the finance section became the finance department. Within a few months it had expanded from a single individual to an organization of more than 100; from handling a few hundreds of vouchers per month to handling several thousands of vouchers per week; from disbursements of approximately \$100,000 per month to disbursements running into millions of dollars per month. The expansion occurred under trying conditions. Qualified personnel were difficult to secure and time was essential for their proper training in the Government methods of finance and accounting. The depot was fortunate in securing the assistance of a local banking expert who took charge of the finance department. His technical training in civil fiscal matters proved to be of great value in handling the finances of the depot. Assistants were provided and trained to perform the technicalities of disbursements.⁹

The duties of the finance department were the same as those of its predecessor, the finance section. They were governed necessarily by statutory requirements. The new condition which had arisen called for various modifications of peace-time procedures and routine methods. Changes were

necessary to insure accuracy and efficiency. Disbursements rose steadily and reached their maximum of \$5,250,000 during the month of April. They declined steadily thereafter to December, 1918, when approximately \$2,250,000 were disbursed.¹⁹

During peace time the purchases were small and a large proportion of them were made on purchase orders. Under war requirements, while a great number of purchase orders were issued, the bulk of the procurement was by contract. Under peace-time procedure deliveries were made at the depot. War requirements demanded that the bulk of the shipments be made direct from the factory. Peace-time requirements had demanded advertising for proposals. War conditions and the instructions of the Secretary of War required procurements to be made without advertising. Usually the procurements were of such size that it was not a question of competition in the matter of price but rather competition in the development of manufacturing facilities to meet the requirements of war-time procurement. The depot itself expanded from a single building, of approximately 65,000 square feet, to several buildings containing nearly 300,000 square feet. The volume of deliveries into the depot reached huge proportions. All these conditions called for modifications of existing procedure in order that payments might be readily made, accounts settled promptly, and the supplies distributed with expedition.

In the process of development the finance department was divided into two sections, an accounts section, charged with the verification of accounts, and a disbursing section, charged with making all payments.⁹

ACCOUNTS SECTION

Before an account can be paid from public funds two essentials are necessary: First, the exact quantity delivered; second, that the materials delivered conform to the contract requirements. It was the duty of the accounts section to assemble this information in regard to all supplies delivered, whether at the depot or forwarded on direct shipments from the manufacturer to distributing depots, camps, or ports of embarkation.⁹

To this section came copies of all contracts and purchase orders placed by the purchasing department. In time of peace information that supplies had been delivered came to the finance section by notations made in the receiving office on the copies of contracts or purchase orders sent to that office for information and check against incoming supplies. In the reorganization of the depot following the declaration of war, the personnel in the receiving office were inexperienced and changed rapidly. The copies of contracts and purchase orders were required in the various sections or departments of the depot for various purposes. Difficulty was often experienced in locating the contract or purchase order when it was wanted to verify bills received. To overcome this difficulty a form of receiving report was devised and was filled out in the receiving office as the samples came in. It gave the name of the contractor, the articles and quantities delivered, the date of the receipt, and such other shipping data as might be considered essential. This report was made in triplicate, using different colored sheets for prompt and accurate distribution. One copy was retained in the receiving office, one copy accompanied samples

taken from the delivery, and the third copy went direct to the inspection department. After inspection the two copies were initialed by the chief of the inspection department and one copy was forwarded to the accounts section of the finance department. This report was used to verify the bills which had been received from the contractor. If delivery had been on purchase order, the bill and the receiving report, initialed by the inspector, were attached to the purchase order. The account was then ready for payment and these papers were referred to the disbursing section for the preparation of the voucher. In case of contract and deliveries at the depot, a notation was made on a blank sheet attached to the copy of the contract for that purchase, of the date of receipt, the quantity, and the date and fact of acceptance. The bills from the contractor were then verified with the receiving report. If they were found to agree, the account was ready for payment and the papers were forwarded to the disbursing section. For supplies which were not physically received at the depot but shipped direct from the manufacturer to other points, a different procedure was necessary. The manufacturer, when he had supplies ready for shipment, notified the depot of that fact. After inspection had been made through the inspection department, instructions were sent to the manufacturer indicating the quantity to be shipped and the destination. The instructions were accompanied by a Government bill of lading, one copy of which was required to be forwarded to the depot immediately after shipment. These bills of lading, the report of inspection, showing the quantity and the quality of the articles shipped, and the bills of the contractor, came to the accounts section where they were verified and appropriate notations made on the blank sheet attached to the contract for such purposes. The copy of the bill of lading and the inspection reports were accepted as satisfactory evidence of receipt of the articles enumerated therein and as justifying payment. When this information had been assembled in the accounts section, verified and found complete, the papers were referred to the disbursing section for payment.²⁰

DISBURSING SECTION

The disbursing section was custodian of all funds placed to the credit of the depot and the blank checks used in making disbursements. The disbursing officer was the accountable officer for these funds. All funds required for the payment of accounts at the depot were received on warrant from the Treasury Department. They were taken up and accounted for on an account current in conformity with the Treasury requirements. The monthly accounts current were forwarded to the Surgeon General's Office accompanied by an abstract of disbursements and the original vouchers of all funds paid out during the month.²⁰

In the routine operation of this section only verified accounts were handled. These accounts were received from the accounts section as already noted. Upon their receipt in the disbursing section vouchers were written and forwarded to the contractor for signature. When they were received back from the contractor checks were written, the proper notation was placed on the voucher, and the checks were mailed to the payee. It was the continuing effort of this

section to complete the payment for supplies at the earliest possible date after their delivery. After the depot was fully organized and the personnel in the various departments better trained, it was practicable to make disbursements within 10 days from date of the actual or constructive receipt of supplies. The prompt payments of accounts greatly facilitated the finances of the contractors and eased the money market in their locality. Prompt payments were of such an advantage to the contractors that many of them were willing to give a discount for payment within 10 days. These discounts varied from 1 to 5 per cent. The depot benefited by these prompt payments in the discount which it received. As much as \$20,000 in a single month was saved in this manner from discounts alone.²⁰

Payments to civilian employees at the depot were made by the disbursing section on pay rolls properly verified by the officials designated for that purpose. There was nothing peculiar or difficult in the payment of these pay rolls.²⁰ It became necessary in 1918 to indicate on the pay roll the proportion of the sums paid to each employee as increased compensation.

REQUISITION DEPARTMENT

The requisition department was responsible for handling of all paper work pertaining to supplies. It was the largest of the departments. It acted upon requests for supplies from the following sources:⁹ (1) Current requisitions from posts in the United States; (2) automatic requisitions for overseas use received from the War Department; (3) replacement requisitions for the various depots in the United States; (4) emergency requisitions from all sources, such as phone or telegraphic requisitions from posts or the War Department; (5) requisitions for overseas; (6) requisitions for supplies to be furnished to the Panama Canal.

Requisitions received in this department passed through the following sections: Editing section, billing section, service section, stock records section.

EDITING SECTION

All requisitions received at the depot came to the requisition department from the central mail and file section after they had been stamped with the date of receipt. Here a serial number was given them and they were entered on the requisition register. Two forms of the register were kept; one arranged serially in order of receipt of the requisitions and the other alphabetically on cards, by organization and place of origin. The entries on the serial register were made in order of sequence of receipt of the requisition. The data entered on that register were the serial number, name of the organization, the place at which it was located, and the date of receipt of the requisition. This register was continued throughout the fiscal year. At the beginning of the new year a new series of numbers, beginning with 1, was used. The alphabetical register was kept on library cards of suitable size and ruling to contain the information required. The name of the organization and the station were entered at the top of the card. The other data entered on the card were the serial number of the requisition, its date, the date and place of approval, the date of receipt, and, when practicable, the dates of shipments of supplies requested therein.⁹

After the requisition had been numbered and recorded, it followed a procedure which, perhaps for the want of a better term, was called editing. In

handling the requisition the editor determined, from the quantity of any article appearing on the requisition, whether it could be supplied from stock or whether it would be necessary to ship it direct from the contractor. In determining this fact the balances on the stock record cards were consulted. The articles which could not be supplied from stock were then indicated on the requisition by an appropriate symbol. Opposite articles which could be supplied from stock were entered other symbols which indicated whether packing were necessary or whether the quantities required could be issued in original cases. After the requisition had been considered by the editor and the distribution of the articles indicated thereon, it was turned over to a typist. The articles were extracted from the requisition and arranged in separate lists in accordance with the symbol. These lists were subdivided in accordance with the classes of articles and the warehouses involved. A separate list of articles to be packed was prepared for each subpacking section, and for each commodity or warehouse of articles which could be supplied in original packages. The list of articles which could not be supplied from stock were passed through the production department for order and record, and thence to the service section for file. Of the list of articles to be shipped from stock a complete set was sent to the warehouse shipping section. The second set, attached to the requisition, went to the service file. The third set was distributed to the various packing sections and to the warehouse section which handled bulk shipments. As the articles enumerated on the list were assembled, the quantities actually issued were noted on the list, if they differed in any way from the quantities originally entered thereon. It was sometimes necessary, in order to avoid unnecessary packing, that a larger or slightly smaller quantity be issued than that entered on the list. The actual quantity issued being necessary for property accounting purposes, it was customary to note the changes on the slip because that slip ultimately reached the property accounts department. These lists accompanied the packages to the shipping section. When all the slips on any requisition had been received in the shipping section they were compared with the original set received from the editing section in order that the completeness of the shipment might be verified. After serving that purpose these lists were sent to the stock records section for notation on the stock cards. The quantities of bulk material actually shipped, as indicated by these slips, were deducted from the available stock balances, and the list, with notations to that effect, was passed on to the service section for check against the original requisition.⁹

After the requisition had been filled and the quantities shipped had been properly invoiced by the property accounts department, the original requisition was placed in the permanent requisition file. All correspondence thereafter relating to that particular requisition was filed with it. All material information concerning the requisition was obtainable from the requisition file.

BILLING SECTION

The billing section was responsible for preparing invoices for the consignee. These invoices were prepared from the requisition and its accompanying slips received from the service section. The data, with reference to each requisition, noted in this section, included shipping data. The shipping data were received

from the traffic section or one of its subbranches. The billing section maintained no permanent file. It held papers which were incomplete because of nonreceipt of goods, but as soon as they were completed, the papers were passed to their proper sections for file. A copy of each invoice went directly to the property accounts department.⁹

SERVICE SECTION

The chief duty of the service section was to see that service was rendered promptly, expeditiously, and efficiently. It had in its files all parts of the requisition which had not been completed. Its duty involved following up the requisition until it had been completed. It received reports from packing subsections, from the warehousing department, from the production department, and from the shipping department on all requisitions. If materials were not on hand it was the duty of the service section to report the matter promptly to the production department in order that additional supplies might be ordered in from contractors. It also maintained a check on the requisition department that requisitions were promptly edited and that there was no lag in the editing section.⁹

STOCK RECORDS SECTION

It is essential that a supply depot have at all times a complete and correct record of the quantities of every article actually on hand. The stock records section was organized to keep a daily record of the balances of all material physically present in the warehouses. In order to keep this record it was necessary that the receipt of all supplies delivered to the warehouses, and of all supplies emerging therefrom, be promptly recorded in suitable form for ready reference. Records in this section kept account only of bulk stock. Quantities issued, which involved less than an original package, did not appear on its record. This was obviated by reording the request for supplies needed by the various packing subsections for replenishment of bin stock. These requests were treated in all respects as requisitions and the quantities called for on them, in original package as necessary, were dropped from the stock records in this section the same as if they had been shipped to outside points.⁹

Information concerning supplies received was obtained from the copy of the receiving report or tally-in sheet initiated in the receiving section. These sheets, after they had received the approval of the officer in charge of the inspection department, passed through the stock records section for entry of the amount received, on their way to the finance department. The quantities on these sheets were promptly entered on the stock cards. As noted under the editing section, the quantities issued on requisitions were received in this section from the service section where they were entered on the stock cards and the balance obtained.⁹

This section maintained under each item a maximum and minimum of the quantity to be kept on hand. The maximum supply was determined by the experience of the depot in the matter of stock required for military use and for emergency purposes. Because of the limited warehouse capacity, the

maximum quantity of any article to be kept on hand was governed by the warehouse space available. This factor in turn was modified by the facility with which supplies could be received in the depot whenever the quantity became reduced. A sufficient stock of all articles to meet ordinary requirements was kept in the depot. Additional warehouse space could be obtained in New York City. The warehouse facilities of the depot could be expanded when necessary.⁹

The minimum stock was designated by the administration office and the quantity determined by the length of time required for replacement. It was usually a matter of judgment of the officers in charge. As occasion arose the minimum stock was increased or diminished in quantity. Whenever the stock balance reached the minimum figure on the ledger, a prompt report was made to the methods control section. Conference was then held with the production department and appropriate orders were issued for the replenishment of stock to the maximum figure. This information was furnished by memorandum to the service section, which followed up the instructions of the production department until the goods were delivered. If undue delay occurred the service section informed the methods control section and an investigation was at once made to determine the cause. Appropriate measures were immediately taken to remedy the difficulty.⁹

PANAMA CANAL SECTION

The Panama Canal section was one of the old sections in the depot and had been in existence for many years. It was responsible for procuring and delivering medical and hospital supplies for use of the Panama Canal government. Requisitions, in the customary form, were received from the authorities on the isthmus through the office in Washington. Under authority from the War Department the Panama Canal Commission was enabled to obtain supplies at cost from the Medical Department of the Army or to have them purchased by the depot, as required. The clerical work involved in the section with these supplies was more or less different from that of the Regular Army. It had been the custom for many years to assign this work to a separate section in the depot and to designate particular clerks to carry on the work. Requisitions and the purchase and delivery of supplies followed the same general procedure as those required by the Army. Disbursements and payments for these supplies, however, were made by a representative of the Panama Canal Commission stationed in New York City.⁹

WAREHOUSING DEPARTMENT

The warehousing department had charge of the physical handling of supplies delivered for storage into any one of the warehouses. The material so delivered was either stored for the maintenance of the stock for general use, or for an adequate reserve supply. Of all the material in process of manufacture, shipment, or delivery, purchased by the New York depot, the stock stored in New York City formed a very small part. The bulk of the supplies was shipped direct from the factory to distributing depots, camps, or ports of embarkation.⁹

The warehousing department was responsible only for materials delivered to the warehouses. From that point its operations began. The duties included receiving the material, and the extensive clerical work incident thereto, and furnishing information to the various departments of the arrival of supplies. After they had been warehoused the materials were ready for shipment on approved requisitions. That, in turn, involved the function of packing and shipping. Shipments were made to the shipping department in cooperation with the various sections, such as the traffic department, set up to expedite the delivery of materials. In warehouses the materials were arranged according to a definite plan in order that technical supplies might be handled by special sections and that materials which moved rapidly would be so warehoused that they would be easily accessible for quick withdrawal. The main warehouse at Morton and Greenwich Streets was used for nearly all classes of supplies. The smaller shipments were prepared entirely within that building. It was necessary to effect a complete assembly of such shipments within one plant. The other warehouses were used for general storage, particularly of bulky and slow-moving stock, which it was necessary to have on hand for an emergency. The experience of several months and the requirement list from the War Department made it possible to determine the amount of stock to be kept on hand. It was soon found that certain materials should be handled on a maximum and minimum basis on the stock records. If this were done any average requirements could be met.⁹

The buildings were of most modern warehouse construction. In warehousing due consideration was given to floor loads, aisle space, height of stacks, location of materials for easy access to elevator service. Technical supplies pertaining to special departments were assigned their own warehouse floor space. Special floor space was assigned the general packing department where small requisitions of a general type were packed. The main assembly point for outgoing shipments was located on the first floor of the Morton Street warehouse. Here all of the materials for reshipments arrived boxed, weighed, and with shipping directions. From this point materials emerged completely marked and were delivered to the shipping agents.⁹

RECEIVING SECTION

The receiving section was located on the landing floor of the several warehouses. The office of the clerical force of this section was near by. As materials were delivered to any of the warehouses they were carefully checked to determine whether the quantities received were those stated in the shipping invoice. Checkers were employed for this purpose who made out tally sheets containing all the data of the shipment. A shipping invoice was attached to the tally and both were turned into the receiving office. Two ledgers were kept in this section. One ledger contained the daily receiving sheets in ledger form and gave a history of the supplies which came in each day. The other ledger was arranged by names of contractors; each contractor was given a separate page on the ledger, that a quick check-up could be made of the total shipments received from each such contractor. In this ledger, entries similar

to those in the other ledger were made. In general the information on these ledgers was the date of receipt, the number of cases, a general description of the materials, and the name of the contractor. For the information of the stock department and the production department, a copy of the entries from the ledger was promptly transferred to the department involved. These reports were made immediately upon receipt of the supplies in order that all departments might be informed of the delivery as soon as practicable, and the goods made available for issue. Another copy of the receiving tally was forwarded to the inspection department where verification was made of the fact of inspection of the goods at the factory. If factory inspection had not been made, the inspection department immediately inspected the supplies so that they could be transferred to storage on the warehouse floors. By this means the authenticity of the shipment was verified and its compliance with contract specifications determined.⁹

The other department had almost an hourly balance on the stock. As soon as the stock department had received notice of the amount and character of the supplies delivered, entry was made on the stock and the information transmitted to the service department, where all unfilled requisitions were perused to determine whether the particular stock was needed to fill them.⁹

WAREHOUSING SECTION

The warehousing section received the materials from the receiving section and designated particular floor spaces where they would be stored. All materials of like classes were stored together. At the end of each stack a warehouse card was attached which gave the balances of the materials on hand in the particular stack. The quantity of materials received was entered on the card as soon as the supplies had been placed in the stack. When supplies were removed from the stack for shipment, the quantity shipped was entered on the stack card and proper deduction made. The warehouse officer was able thereby to determine at any time the exact quantity of articles in a given stack.⁹

This section had charge also of the elevator service and of laborers for the physical handling of the supplies.

PACKING SECTION

A general packing section was maintained for the packing of all sorts of loose shipments. It did not handle case goods. It carried a complete bin stock of supplies of the smaller articles, such as medicines and miscellaneous articles. Bin stock was obtained from the warehousing section by requisition slip whenever the quantity of any article became low or was exhausted. The packing section received requisitions from the requisition section after they had been fully edited. Loose supplies were packed as indicated. Besides the packing force, this section maintained a clerical force for the preparation of packers' lists of material packed. These lists were made in quintuplicate on an Elliott-Fisher billing machine. The information given on the packer's list was the point of delivery, station, list of articles, and number of the boxes. One copy of this sheet

was placed inside the package, another copy was pasted on the end of the box, where the contents could be easily read; the remaining copies of the packer's list were sent to the shipping department. After the supplies had been packed they were marked with destination, weight, and cubic contents and forwarded to the shipping section. It then became the duty of that section to handle the packages.⁹

While the bulk of packing was done in the general packing section, other sections handled special articles. Dental equipment and supplies, surgical instruments, and X-ray apparatus and supplies each had their own technical sections, where the supplies were packed and otherwise prepared for shipment.⁹

SHIPPING SECTION

The shipping section was located on the first floor of the warehouse and was under the jurisdiction of a designated officer selected for his skill in preparing shipments. This section received all materials from the various packing sections, assembled them together, marked them for shipment, prepared the shipping invoices, and delivered the materials in accordance with orders from the requisition department. Copies of all completely edited requisitions were kept in this section and shipments were checked against them.

The shipping section had two subsections, one for domestic shipments and the other for overseas shipments. Both of the subsections functioned in a similar manner. The supplies for domestic shipments were segregated in a designated place on the warehouse floor, where they were easy of access for shipment either by transfer to cars on the sidetrack in front of the warehouse, or to trucks waiting for them. Overseas shipments were delivered by truck transportation to the docks, generally Pier 45, North River, under separate papers. The functions of the depot ceased as soon as the materials with their accompanying shipping papers had been delivered to the docks. Not all of the supplies shipped by the Medical Department overseas passed through this particular dock. Some of them were ordered to Hoboken, while others were ordered to Port Newark Terminal or elsewhere for loading on transports. The procedure of handling and in the preparation of the shipping papers was the same to whichever loading point the supplies were delivered.⁹

TRAFFIC SECTION

The traffic section was a large organization and was located on the main floor of the principal warehouse. The organization began to function upon receipt of the complete requisition and its accompanying packer's list. From the data received which gave the designation of the shipment, contents, weight, cubic space, etc., this section was enabled to forward the materials by the most convenient route. It took care of rail shipments, overseas shipments, express and truck orders. It arranged for all classes of transportation, the routing of shipments, and traffic interchange. It handled also incoming shipments with their accompanying papers, accomplished the bills of lading, checked the contractor's bills, and furnished to the finance department, properly audited and ready for vouchering, the data necessary for the payment of those bills.⁹

PROPERTY SECTION

The warehousing department maintained a small property section to handle matters pertaining to the internal economy of the warehouse. This section concerned itself primarily with the relationship between the owners of the warehouses and the property contained therein. It was responsible for the maintenance and upkeep of the building. It maintained separate records in which was kept an account of all materials purchased for use within the depot, including handling equipment and all other supplies used for purely depot purposes. These materials were received either from depot stock on requisitions or through purchase orders on outside sources. It had supervision of the internal economy of the depot and was responsible for economic management in issue of such supplies as stationery and the like.⁹

DENTAL DEPARTMENT

In conformity with the general policy of the Surgeon General to provide the depots with technical advisors, an officer of the dental corps was assigned to duty in the depot early in 1917. The purchasing of dental supplies was, during the early purchases, made by the purchasing department. During the winter of 1917-18, as the volume of purchases of dental supplies rapidly increased, the dental section of the purchasing department was detached from that department and became the dental department. This department had as its chief an officer of the Dental Corps of the Regular Army. At the height of its activity it had 4 enlisted personnel and 26 civilian employees. After it was fully organized the department became practically self-contained. It received its own requisitions, advertized for its own supplies, recommended awards, and edited the dental requisitions. It received all dental supplies, assembled portable dental outfits, and packed and issued all those articles listed on the dental supply table.²¹ For a more efficient and economical operation of the dental department, the front half of the fifth floor of the Morton Street building was set apart for its use. Here complete equipment was installed for packing supplies and assembly of units. Mortar steel bins and shelves were installed for loose articles. Ample packing tables were provided for all packing purposes. Bulky articles, when the space on the fifth floor became overcrowded, were placed in storage on the sixth floor; practically the entire sixth floor was devoted to this purpose. After August, 1918, the bulk storage of such large articles as dental chairs, dental cabinets, work benches, portable dental engines, and unit equipment boxes were stored in the Leroy Street building.²¹

The dental department was organized into four sections, requisition including auditing, purchasing, warehousing, and packing. The packing section included unit assembly. The requirements were received from the Surgeon General's Office, either through direct instructions to purchase particular articles for unit assemblages, or by approved requisitions sent to the depot to be filled. At periodic intervals the purchasing section assembled these requirements, prepared circular advertisements representing totals of those require-

ments, and mailed the circulars to manufacturers of dental supplies. Bids as they were received were delivered to the dental department where they were safely kept until the date set for opening. They were then opened and abstracted and samples called for. The samples received were examined by the officer in charge of the department and, after mature consideration of all factors involved, awards were recommended. The recommendations were sent to the purchasing department, where contracts and purchase orders were written. A copy of these contracts and orders were sent to and filed in the purchasing section.²¹

The receipt and inspection of supplies followed the procedure of all other supplies purchased by the depot. The supplies were delivered to the dental department where they were checked against the receiving slip and the contractor's bill. If the quantities and quality were found to be correct the receiving slip and the contractor's bill, approved by the dental officer in charge, were sent to the finance department for payment. The follow up of the contracts was handled by the production department of the depot.²¹

The warehousing section of the dental department received the supplies from the receiving department of the depot and distributed them in accordance with prescribed storage requirements. Small articles, as a rule, were placed on the shelves. The larger articles were placed in bulk storage as already indicated.²

The packing section was divided into two subsections. The one handled the assembly of unit equipment and the other the general packing of dental supplies to fill current requisitions. The prevailing depot practice, whereby one group of personnel selected the articles to fill the requisitions and another checked against the requisitions the articles thus selected, was observed in the dental department. After selection and checking they were packed either in the unit containers or otherwise prepared for shipment.²¹

In the early period requisitions went to the editing section of the general requisition department. At a later period, after the dental department was fully organized, the requisition was sent direct from the mail and file section to the dental department. On many of the requisitions received the nomenclature of the articles desired was defective. This made the proper filling of the requisitions difficult. Not infrequently the wrong item would be specified. To overcome these defects and to make sure that the proper articles would be sent, an editing section was established for the correction of such requisitions.²¹ The editing section read the requisition carefully and changed the nomenclature to correspond with that of the standard supply table and made such other corrections as appeared necessary. If, as not infrequently happened, the requisition contained a few items other than dental supplies, those items were extracted and forwarded to the general requisition department of the depot.²¹

The articles to be assembled in the portable dental outfits and to be issued as base dental outfits were prescribed by the Surgeon General. Instructions from the Surgeon General usually directed the purchase or the issue of a definite number of portable outfits, base outfits, or base dental units. When the depot received these instructions they were translated into the quantities of the

individual articles composing the particular unit. Packing was effected in accordance with the supply table. Mimeograph lists of articles in each unit were prepared, and as articles were packed they were checked against these lists. The lists were then used for invoices and receipts.²¹

X-RAY DEPARTMENT

The X-ray department was established as a separate department during the summer of 1917, to handle all supplies and equipment immediately connected with X-ray apparatus. It remained an independent department in the depot, reporting directly to the officer in charge. Its independent set-up was occasioned largely by the manner of handling the development and standardization of X-ray machines and apparatus. All developmental work on X-ray machines and apparatus was directed by the X-ray section of the Surgeon General's Office. The work observed was carried on by the plants of the respective manufactures and by the Army Medical School, Washington, D. C., and the Cornell Medical College, New York. When the United States entered the war neither X-ray machines, X-ray tables, nor other apparatus had been standardized. Each manufacturer had followed his own inclinations. In order to get adequate production and to provide equipment which could be operated by individuals irrespective of the particular apparatus with which they were familiar made necessary steps toward standardization. As a result the X-ray division of the Surgeon General's Office conducted this standardization work and indicated to each manufacturer the quantity of the particular article he was expected to produce. This information came to the New York depot, where the actual contracts were prepared and furnished to the manufacturers.²²

The X-ray department at the height of its activity had approximately 25 enlisted men who were trained X-ray technicians, a clerical force of approximately 12 civilian employees, and a force of approximately 10 laborers. The enlisted personnel were engaged particularly in the preparation and placing of orders and contracts and partly as technicians in assembling and packing of X-ray equipment.²²

In the earlier purchases the supplies were intended for base hospitals being established at the various military cantonments, at general hospitals, and at base hospitals designated for the purpose. The major part of the bulky equipment for these hospitals was shipped direct from the manufacturers. Only the small articles, such as plates, films, photo-chemicals, and X-ray tubes, were handled directly through the depot. As hospitals began to be sent to the American Expeditionary Forces in France, complete X-ray outfits were assembled to accompany them. Some of these outfits were the standard base hospital outfit, others were special portable outfits designed for places where electric current was not available. The various component parts of these outfits were received at the depot, where they were inspected by the X-ray department and prepared for overseas shipment. Inspection of all bulky apparatus was made at the plant of the manufacturers by technicians detailed for that purpose from the X-ray division of the Surgeon General's Office. As X-ray apparatus was received at the depot it was again inspected to insure its completeness and working order.²²

INSTRUMENT DEPARTMENT

During the greater part of the calendar year 1917 the purchase, receipt, inspection, and issue of surgical instruments followed in a general way the peace-time procedure. Purchase was made by the purchasing department. The deliveries were made to the receiving department, where they were given a casual inspection and sent to the packing room. There a separate section was set apart for them, where they were assorted and prepared for shipment. The instruments were distributed on shelves without much consideration being given to the order of their arrangement. The bulk stock was kept in boxes in the back part of the section. As the requisitions were edited in the requisition department separate extracts were made of the instruments contained therein. These extracts came to the instrument section where the instruments were selected, checked, and packed for shipment. The personnel assigned to this section in the beginning had very little if any training in handling instruments, but they were the best that the depot had been able, in the hurry of expansion, to procure. More or less confusion and inefficiency resulted from this arrangement and much time was lost from lack of system.²³

The section was reorganized during the winter of 1917-18 and moved to the second floor to space assigned to it. Personnel trained in the manufacture and in the handling of instruments was obtained from various sources, principally through the draft agencies, and inducted into the service. A new system was installed for the handling of the work of the section. Shelving was put in and ample bin space provided. Each bin was marked with the name and number of the instrument it contained. These names and numbers were taken from the standard List of Staple Medical and Surgical Supplies, Part I, Surgical Instruments. The bins were arranged in groups according to the arrangement of the list of instruments as they appeared in the table of equipment of a 1,000-bed hospital for overseas service.^a Commodious packing tables were placed at a convenient distance from the bins. The bins were filled from bulk stock by or under the supervision of trained personnel thoroughly familiar with the instruments, to insure that no mistakes would be made in filling them. As the bins were emptied in filling requisitions, an informal requisition for stock would be made and the bins again filled. The quantities used in filling the bins would then be dropped from the stock record books.²³

As the extracts from requisitions were received they were divided into groups according to the grouping of the bin stock and given to clerks to select the instruments and quantities called for. Each such clerk would select the instruments called for, wrap them, and label the package with its contents. Only one kind of instrument was placed in a package. These packages were then checked against the requisition slips by an experienced checker and transferred to the packer for packing. Unit equipment for the overseas base hospitals was assembled in the same manner. A particular group of instruments was assigned to each clerk to select. As fast as they were selected and wrapped the instruments were checked and packed. After the instruments had been

^a See Chap. XXXIII.

properly arranged and the system understood by the employees, very little difficulty was experienced in filing requisitions rapidly and accurately.²³

Inspection of the instruments received was under the inspection department, but the technically trained personnel on duty in the instrument department were utilized in these inspections. Their services were particularly in demand for the inspections of instruments received in cases. The points principally looked for were the finish of the instruments, the bite of forceps, the articulation of the complicated instruments, and the edge of the cutting instruments. If any instruments were found defective in these respects the case was rejected and returned to the manufacturer.²³

As the demands for instruments increased during the summer of 1918, the trained personnel of the section were utilized in the purchase of instruments as well as in their distribution and inspection. After a time the section became entirely separate from other departments and assumed the dignity of a department. It had as its chief an officer of the Sanitary Corps who had extensive experience in the surgical instrument retail trade. There were attached to it two civilian experts in the manufacture of instruments, whose duty it was to supervise and instruct the converted industries, such as jewelers and toolmakers, in the details of the manufacture of surgical instruments and surgical needles.²³

REFERENCES

- (1) Memorandum on purchase, storage, and distribution of medical supplies and equipment transmitted by the Surgeon General to the Medical Supply Depot, New York, First Indorsement, April 7, 1917. On file, Finance and Supply Division, S. G. O., 14101-17.
- (2) Letter from the medical supply officer, New York, to the Surgeon General, April 29, 1918. Subject: Storage. On file, Finance and Supply Division, S. G. O., 713-539 N. Y. D.
629
- (3) Second Indorsement, from Director of Storage to the Surgeon General, May 3, 1918, relative to increased storage for Medical Supply Depot, New York. On file, Finance and Supply Division, S. G. O., 613-539 N. Y. D.
629
- (4) Fifth Indorsement, Surgeon General, to the medical supply officer, New York, May 17, 1918, relative to handling medical supplies at New York, N. Y. On file, Finance and Supply Division, S. G. O., 713-539 N. Y. D.
629
- (5) Letter from medical supply officer, New York, to the Surgeon General, July 16, 1918. Subject: Supplemental storage warehouse. On file, Finance and Supply Division, S. G. O., 713-539 N. Y. D.
832
- (6) Approval of Assistant Secretary on First Indorsement, Director, Purchase, Storage and Traffic, to Director of Operations, July 31, 1918, recommending the lease of building southeast corner Greenwich and Leroy Streets, New York City. On file, Finance and Supply Division, S. G. O., 713-539 N. Y. D.
832
- (7) Abstract of voucher No. 169, accounts of Col. L. Brechemin, M. C., for December, 1915. On file, Finance and Supply Division, S. G. O., Abstracts of disbursements.

- (8) Manual for the Medical Department, U. S. Army, 1916, pars. 109, 113.
- (9) Letter from Col. F. M. Hartsock, M. C., to Col. Edwin P. Wolfe, M. C., April 28, 1927, furnishing data on the history of the methods of the New York Depot during the war. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{1236}$.
- (10) Memorandum furnished Col. Edwin P. Wolfe, M. C., March 12, 1927, by H. C. Clancy, on duty in the Mail and Files Section, 1917-18. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{1249}$.
- (11) Letters from Harry R. Balfe, 100 Hudson Street, New York, N. Y., formerly captain, Sanitary Corps, in charge of Purchasing Department, Medical Supply Depot, New York, 1917-18, to Col. Edwin P. Wolfe, M. C., June 7, 1926, June 11, 1926, and June 14, 1926, relative to organization and operation of that department during the war period. On file, Finance and Supply Division, S. G. O., $\frac{713-539}{1232}$.
- (12) First Indorsement, from officer in charge, Medical Supply Depot, New York, to the Surgeon General, June 15, 1918, relative to numbering of contents and purchase orders. On file, Finance and Supply Division, S. G. O., $\frac{750-198 \text{ D. of P.}}{87}$.
- (13) Letter from officer in charge, Medical Supply Depot, New York, to the Surgeon General, July 30, 1917. Subject: Inspector for medical supply depot. On file, Record Room, S. G. O., 181000 K (Old Files).
- (14) Letter from Henry W. Haynes, M. D., formerly captain, Medical Reserve Corps, to Col. Edwin P. Wolfe, M. C., June 22, 1926, relative to organization, operation and function of inspection department, Medical Supply Depot, New York, while under his charge, 1917-18. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{1233}$.
- (15) Letter from Frederick S. Deacon, formerly First Lieut., Sanitary Corps, 4511 Pine Street, Philadelphia, Pa., to Col. Edwin P. Wolfe, M. C., March 20, 1927, relative to his service in laboratory division, Medical Supply Depot, New York, 1917-18. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{1235}$.
- (16) Letter from Capt. Daniel W. Fetterolf, M. C., Army Medical Center, Washington, D. C., to Col. Edwin P. Wolfe, M. C., March 25, 1927, relative to the organization and operation of the laboratory division, Medical Supply Depot, New York, 1917-18. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{1239}$.
- (17) List of assignments of inspectors, Appraisers Department, October 24, 1918, furnished by Inspector Henry F. Bush, U. S. Customs Service, April 27, 1927. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{1248}$.
- (18) Letter from Inspector Henry F. Bush, U. S. Customs Service, Customs House, New York, to Col. Edwin P. Wolfe, M. C., April 27, 1927, relative to inspection of medical supplies. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{1248}$.
- (19) Data compiled from retained copies of accounts current, 1917-18. On file, medical section, New York General Intermediate Depot, Brooklyn, N. Y.
- (20) Letter from Joseph Rubenstein, formerly sergeant, first class, Medical Department, 437 Bergenline Avenue, West New York, N. J., to Col. Edwin P. Wolfe, M. C., April 1, 1927, relative to development, organization and operation of the finance department, Medical Supply Depot, New York, 1917-18. On file, Finance and Supply Division, S. G. O., $\frac{713-539 \text{ N. Y.}}{1246}$.

- (21) Letters from H. L. Grenier, formerly sergeant, Medical Department, 84 Market Street, New York, N. Y., to Col. Edwin P. Wolfe, M. C., May 7 and 19, 1927, relative to organization and operation of dental department, Medical Supply Depot, New York, 1917-18. On file, Finance and Supply Division, S. G. O., 713-539 N. Y.
1250
- (22) Letter from Howard W. Dunk, formerly sergeant, first class, Medical Department, 604 West One-hundred-twelfth Street, New York, to Col. Edwin P. Wolfe, M. C., May 7, 1927, relative to the X-ray department, New York Medical Supply Depot, 1917-18, while under his charge. On file, Finance and Supply Division, S. G. O., 713-539 N. Y.
1243
- (23) Based on statements made by Capt. L. Wettenur, O. R. C., Brooklyn, N. Y., related August 2, 1927, to Col. Edwin P. Wolfe, M. C., relative to the organization and operation of the instrument department, Medical Supply Depot, New York, 1917-18.

CHAPTER XLI

MOTOR AMBULANCE SUPPLY DEPOT, LOUISVILLE, KY.

In the procurement of motor ambulances it proved necessary to purchase the chassis from one manufacturer and the bodies from another. Before the vehicle was ready for use the body had to be mounted on the chassis and the machine tuned up and made ready for immediate use. The chassis were to be manufactured at Pontiac, Mich., and the bodies at Watertown, N. Y. The finished ambulances were required in all parts of the United States. Therefore, it was desirable that the place selected for the assembly of these vehicles be located centrally and have ample railroad facilities for distribution. Louisville, Ky., possessed these qualifications. It had the additional advantage of a large quartermaster depot just across the Ohio River at Jeffersonville, Ind. It was at first contemplated establishing this assembling point at the Jeffersonville quartermaster depot. An investigation showed that the area within the compound of that depot was too small to provide for motor ambulance assembly. It was necessary, therefore, to look elsewhere for space and facilities.

A very advantageous offer was submitted by the Kentucky Wagon Co., of Louisville, Ky., for the lease of a part of their plant.¹ The fact that this company was a builder of both animal-drawn and motor vehicles and had trained crews in both sections of its plant was a factor which strongly recommended the selection of this plant for the motor ambulance depot.²

The offer was investigated and accepted.² A building was turned over, renovated, and converted into offices and warehouses for spare parts stock. Another building, with loading platform and electric hoist, was erected for the work of mounting the bodies on the chassis and the inspection and tuning of engines. A second building was later erected for spare parts bin stock. There was also space for the storage, in the open immediately in the rear of this second building and within the factory compound, of a number of assembled ambulances.² Since there was considerable expense involved in the construction and modification of buildings, some time was consumed in the negotiations. It was necessary to absorb this expense in the rental. Satisfactory agreement having been reached, the lease was consummated and construction began June 16, 1917. Officers were in readiness and the office force was organized by June 27.²

In July, 1918, the major part of the Ford Building in Louisville was leased for the use of this depot.³ It was intended primarily for the development of a motor ambulance mechanics' school for the training of motor mechanics. Such mechanics were badly needed by all motorized ambulance companies. The delay in the establishment of such a school was a serious

handicap in the handling of ambulance repairs in camps and overseas. More pressing work on body designs and production of both bodies and chassis had served for a time to relegate to the background the training of mechanics.

PERSONNEL

COMMISSIONED

When this depot was established in June, 1917, only one officer of the Medical Department, a captain in the Medical Corps, was assigned to it. After the Sanitary Corps was authorized, technical experts were commissioned in that corps and assigned to the depot as the needs required. At the height of its activities, in August and September, 1918, the commissioned force of the depot and its adjunct, the Medical Department motor mechanics' school numbered seven, one lieutenant colonel, Medical Corps, in command, with six officers of the Sanitary Corps as assistants.⁴ Another officer of the Medical Corps was assigned to the school as its surgeon. A few changes in the composition of the depot personnel occurred after the functions of the depot and school were absorbed by the Motor Transport Corps in September, 1918, under the provisions of General Orders, No. 75, War Department, August 15, 1918. The commissioned personnel who remained on duty after the change had been effected were attached to the Motor Transport Corps, but retained their places and designations in the Sanitary Corps.⁵

ENLISTED

The first enlisted man reported for duty at the depot in August, 1917.⁶ Men with qualifications especially suitable for the various duties required were carefully selected and enlisted or inducted into the service at the depot.⁷ Additional men were transferred from Camp Taylor, Ky., and other stations to this depot when occasion required. All members of the detachment were given training in their military as well as technical duties. As they became proficient and showed the proper qualities, they were promoted to appropriate noncommissioned grades. As they qualified, some of the noncommissioned officers were transferred to other stations for duty.⁸

By the time the mechanics' school was started in August, 1918, the number of enlisted personnel in the permanent detachment of the depot and school had reached 45.⁴ With the opening of the school 60 students were added and, for administrative purposes, became a part of the detachment, being so reported.⁹ Thereafter, until the end of November, 1918, the aggregate strength of the detachment varied between 103 and 120. After the transfer of the functions of the depot and school to the Motor Transport Corps these men were temporarily attached to that corps for duty but remained and were reported as Medical Department personnel. After November the strength of the detachment rapidly declined by transfer and discharge until it finally ceased to exist about the middle of April, 1919.⁹

Prior to the lease of the Ford Building in July, 1918, the members of this detachment were on a commutation status. With the increase in the strength of the detachment it became increasingly difficult to find boarding places for

them within a reasonable distance of the depot where board and lodging could be had for the commutation allowances. After the lease of the Ford Building for school purposes, the fourth floor was converted into barracks for the detachment. These barracks were occupied during the school period and for a short time thereafter. Mess was started July 31, 1918.⁴

It was intended that this depot should be not only an assembly point and an issuing depot for ambulances, motor cycles, and spare parts, but a repair shop as well where major repairs would be made; consequently the personnel of the detachment were selected with that in view. As new classes of repair work were started, men were selected from the detachment for that work and were given special courses of instruction, both in the shop and in the shops of representative large firms in the city doing that class of work.⁴ After the initial issue of ambulances and motor cycles, the repair work on such vehicles as were turned in for repairs gradually increased. The large vulcanizing plant in the Ford Building was adapted to the standard ambulance tires, and unserviceable tires and tubes were turned in to the depot by various organizations for salvage or repair.¹⁰ This work was done by members of the detachment.

In June, 1918, field service and roadside instruction was started. The detachment was divided into two groups which were taken out alternately. Practical instruction was given in making and breaking camp, camp sanitation, personal hygiene, cooking of rations in individual mess kits, etc. Regular military drills and instruction were also conscientiously carried out.⁴ After the school was started two road companies were organized out of the students and trained accordingly.⁴

CIVILIAN EMPLOYEES

The plans for this depot contemplated that the work of the unloading of chassis and bodies from freight cars, the mounting of the body upon the chassis, and the loading and blocking of the completed ambulance on freight cars preliminary to shipment, would be done by the Kentucky Wagon Manufacturing Co. under contract. But there would still be need for watchmen, a chauffeur, a packer for spare parts, an inspector of ambulances, and such number of laborers as might be required. Authority for the employment of these persons was granted June 28, 1917.¹¹ The employment of clerks and stenographers was authorized, from time to time, as increase in the work of the depot made this necessary. Some delay was experienced in securing the requisite personnel, due both to rates of pay offered and to the failure of the United States Civil Service Commission to have on the roster of eligibles in that district persons having the special qualifications desired. These difficulties eventually were overcome. Men with the qualifications desired were given temporary employment pending their taking special examinations and certification by the local district secretary of the Civil Service Commission.¹²

The location of the depot within the compound of the Kentucky Wagon Manufacturing Co. was fortunate. That company built both animal-drawn and motor vehicles. It numbered among its employees expert body builders and motor mechanics. It appeared to be more advantageous to the Government to have the assembly of motor ambulances and their preliminary testing done

by this company under contract than for the depot to develop its own crew of experts for this purpose. The Kentucky Wagon Co. was willing to undertake the assembly and testing of motor ambulances. A contract was entered into whereby that company unloaded the chassis and bodies from the freight cars on which shipped, mounted the body on the chassis, gave the assembled job a test for efficiency, and loaded the finished jobs on freight cars for shipment, all for the sum of \$20 per completed ambulance.¹³ This contract remained in force so long as ambulances continued to be assembled at this depot. The last payment thereunder was made September 27, 1918.¹³

FINANCE DEPARTMENT

The remaining activities of the depot were not numerous or complex. The officer in charge was made a disbursing officer in September, 1917.¹⁴ Disbursements continued to be made by him until his relief from duty at the end of September, 1918.¹⁵ The funds then remaining to his credit were deposited in the Treasury to the credit of the proper appropriation and disbursements at the depot thereupon ceased. A finance department was necessary, therefore, and was organized shortly after funds were placed to the credit of the disbursing officer.¹⁶ The usual papers required by regulations were prepared and the customary records kept.

PURCHASING AND MISCELLANEOUS DEPARTMENTS

The depot was early designated to procure spare parts and accessories for both ambulances and motor cycles.¹⁷ A purchasing department was organized in August, 1917. The other departments were, ambulance assembly, spare parts assembly, receiving, shipping, warehouse records, property returns, experimental, and repair. Only a small force was employed in each department. The organization was sufficiently flexible to permit one department to assist another in time of stress. The organization was small and the officer commanding the depot had opportunity to supervise all departments.

The routine of handling requisitions in force in other depots and as prescribed in regulations was observed at this depot. As the requisitions came in, they were stamped with date of receipt, given a serial number, were recorded, and placed in the pending file. As the supplies called for on the requisition became available for distribution, they were prepared for shipment, invoiced, the proper shipping papers prepared, and the shipment was delivered to the carrier. The original of the invoice was sent to the Surgeon General. The duplicate invoice, together with duplicate receipts, was sent to the consignee. The articles in the shipment were posted on the standard form of return, M. D. Forms 17a and 17b. The return was rendered at the periods prescribed by the Surgeon General.

Routine correspondence was kept in vertical filing cases¹⁸ with card indices and filed in accordance with the duodecimal system prescribed by the War Department.¹⁹

A record was kept of the number and date of receipt of each motor chassis and ambulance body, of the chassis and body numbers of each assembled ambulance, of dates of shipment and freight cars (numbers and initials) on

which shipped, the spare parts equipment sent with each ambulance, dates of testing of chassis and name of inspector, and such other information as experience and judgment indicated.¹⁹

FORD AMBULANCES

The first receipt of Ford ambulances, 100 of which had been ordered near the end of June, arrived at Louisville July 19, 1917. There were 50 ambulances in the shipment. The bodies were knocked down and shipped 2 in a crate; the chassis likewise, were shipped 2 in a crate.²⁰ The remaining 50 ambulances were received later in the month.²¹ With the arrival of these Ford ambulances the real work of the depot began. Instructions received from the Surgeon General directed the shipment of 18 of them to newly organized Engineer regiments, 2 per regiment.²² These 18 ambulances were reshipped to the designated regiments in original crates as they came from the factory. Shipments of unassembled ambulances were also made to some aviation stations.²³ Considerable difficulty was experienced by the organizations to which the ambulances had been shipped in assembling the bodies, due to incorrectly placed holes for bolts and screws in the various parts of the body, and in starting the motors which, apparently, had never been turned over.²¹ For this reason the remaining ambulances were assembled at the depot and tested out before shipment, for it was desired that they be ready for use immediately upon arrival at their destination.²⁴ By the middle of August, 47 of the Ford ambulances had been issued, 21 had been completely assembled and tested, and 32 were in original packages.²⁵ Thereafter they were distributed slowly, the last one being issued February 19, 1918.²⁶

Another purchase of 100 Ford ambulances arrived in Louisville May 24, 1918. The assembly and delivery of these ambulances were handled by the Louisville branch of the Ford Motor Co.²⁷ It had been decided to extend the wheel base of the chassis of these ambulances by means of the Hay Dee extension device. This device was purchased by the depot and was attached to the chassis at the local Ford branch by personnel from the depot before the body was mounted upon it.²⁸ Difficulties, similar to those encountered on the lot assembled at the depot during the previous year, were experienced by the local branch of the Ford Co. in assembling this lot of ambulance bodies. These difficulties were eventually overcome and the machines completely assembled, were delivered to the depot. Some difficulties were experienced, too, in attaching and adjusting the Hay Dee extensions.^b These were overcome in a satisfactory manner. Complete sets of Ford spare parts A were issued with each Ford ambulance. During June, 1918, 94 of these ambulances were received at the depot and 85 were issued. During July, 6 were received, completing the order, and 15 were issued, completing the distribution.²⁹

G. M. C. AMBULANCES

The General Motors Truck Co. was instructed by wire August 16, 1917, to begin shipping chassis at the rate of 5 carloads per day.³⁰ Chassis began to arrive at the depot August 27,³¹ and came in rapidly thereafter. Bodies began to arrive August 17,³² and continued to come in rapidly. Many minor

^bA more extended account of this extension will be found in Chap. XXIII.

difficulties were encountered in mounting the bodies on the chassis, but these were rapidly overcome.³³ One of the most aggravating causes of delay was the manner of shipping the chassis. They arrived on flat cars, two chassis per car, but stripped of all readily removable parts. These parts were packed in boxes, one box for each chassis, and shipped separately in box cars. Failure to receive them prevented the shipment of the ambulance having the chassis to which they belonged.³⁴ Some minor defects were found in the motors, which were early discovered, but necessitated a very careful inspection of the completed vehicle before blocking it on the car for shipment.³⁵ All vehicles were tested out under their own power and demonstrated to be in perfect running order before they were shipped. After this test the following card, properly filled out and inclosed in a manila envelope, was attached to the steering wheel of the ambulance. No ambulances were shipped without the card and no card was attached without the requisite test.³⁶

MOTOR AMBULANCE SUPPLY DEPOT, UNITED STATES ARMY, LOUISVILLE, KY.

Car name	Model	Number	Shipping date

To the Officer Receiving This Ambulance:

This ambulance has been thoroughly tested by being actually driven under its own power by _____ on _____
It was in perfect condition when delivered to the transportation company,

(_____)
(Initial carrier)

Claims for damage and shortage should be adjusted with the transportation company.
This card is evidence for a survey.

Medical Corps, U. S. Army, In Charge of Depot.

Another tag was devised for the more systematic assembly and inspection of ambulances. This tag was attached to the chassis as soon as it came on the floor for assembling and remained with it until the test card, mentioned above, was attached, the last thing before shipment. This assembly tag was divided into three sections: Chassis operations, body operation, and shipping. On the first section was entered the chassis number, the body number, and the name or initial of the employee attaching the toe board filler, blocks in the channel of frame at points of attachment of U bolts, head lamps, side lamps, tail lamps, and Prest-o-Lite tank. On the second section—body operations—were entered the names or initials or clock numbers of the employees performing the following operations: Setting U bolts; attaching fenders, tire carriers, tail gate, horn, and curtains; cleaning gas tank; oil inspection; filling with oil (if necessary), gas, air, and water; test, and date. The third section—shipping—received the following entries; Car initial, car number, whether box car or flat car; water drained from cooling system, gas drained, tires inflated; name of

employee by whom the body was stripped, hoods sealed, tank box wired, and tools checked; date. This tag served to fix the responsibility whenever any defect or maladjustment was found on final test, and as the basis for the elimination of careless employees from the work.³⁷

This methodical procedure and the careful inspections made at the depot disclosed many defects in the earlier shipments, due probably to carelessness in assembly, lack of careful inspection at the factory, and haste in shipment. These defects covered a wide range—broken headlight lenses, defective clutches and transmissions, broken springs, faulty carburetors, leaking pumps, defective oil indicators, loose gasoline lines, gasoline lines not plugged to prevent being filled with dirt, and defective blocking on the cars.³⁸ After the Medical Department personnel assigned to duty at the factory had organized and begun inspections there, these defects rapidly diminished and soon ceased entirely.³⁹

After the issue of G. M. C. motor ambulances to all organizations in the United States entitled to them had been completed, it was contemplated, for a time, to utilize the assembly room at the depot for the storage of boxes, chassis, and bodies. While it was intended to ship chassis and bodies overseas as rapidly as tonnage could be had for them, it was anticipated that deliveries would exceed this rate. Temporary storage for this surplus was necessary. A contract was entered into February 11, 1918, with the Kentucky Wagon Manufacturing Co.⁴⁰ to unload chassis and bodies from the cars, place them in storage, and reload them on cars for shipment at a fixed price per unit (1 chassis and 1 body). The plan for stowing the chassis and bodies in tiers was developed by the depot personnel.⁴¹ By the time the production of chassis had reached a point where storage became necessary the situation in the combat zone called for all the ambulances which could be supplied. Only 84 chassis and a like number of bodies were sent to the depot for storage.⁴²

SPARE PARTS TRAILER

Work on the development of a suitable spare parts trailer was undertaken at the depot in January, 1918.⁴³ A satisfactory design had been worked out by the end of March. Contracts for trailer chassis and the special bodies were signed April 17 and April 13, 1918, respectively.⁴⁴ Deliveries and issues of these trailers are included in the table of receipts and issues of ambulances given above.

It was contemplated that both the ambulance spare parts set B and the motor cycle repair parts set B would be packed in the trailer at the depot and the whole shipped as a complete unit to the organization to which consigned. This was especially desirable in securing uniformity in equipment and methods of carrying it. It was advantageous to have exactly the same equipment and methods at home and abroad. The trailer was considered the best sort of carrier and container under all circumstances. Future operations would be facilitated by having the equipment complete, uniform, and standard.⁴⁵

Because of the large number of parts carried in the spare parts trailer and the number of compartments in which they were packed, it was foreseen that it would be difficult for the mechanic to know what parts were in the trailer

and where they were carried. To simplify the finding of the parts needed, a simple index was devised. This index consisted of two printed sheets of parts covered with sheets of pyralin and carried in metal frames, 10 inches by 14 inches, attached to the rear door of the trailer. The parts were arranged by divisions and each division carried together in a separate compartment so far as sizes of the parts would permit. Tools and accessories were assembled in groups in the manner in which they would be used—hammers, punches, and chisels in one bin, wrenches in another, drills and brace bits in another, and tire repairing materials in still another. The index was arranged with this distribution of parts in view. All factory parts were grouped on the index in accordance with their numbers. These numbers consisted of two series separated by a hyphen, thus: Knuckle arm nuts, 13-278. When the mechanic desired to find this nut he would look at the index, run down the list of 13's until he came to the 278. Opposite this number would be the number of the compartment and bin in which the part was carried.⁴⁶ This index proved most convenient. The dates of distribution of these trailers are shown below.

DISTRIBUTION

The depot distributed assembled motor ambulances, motor cycles, and spare parts to all organizations within the continental limits of the United States. It received and stored a number of boxed chassis and knocked-down bodies and later put them in transits to ports of embarkation for shipment overseas. Spare-parts trailers were distributed to camps at home and forwarded overseas for distribution to organizations which had left without them.

Distribution of standing or completely assembled ambulances began August 28, 1917, with shipment of two machines to the base hospital at each National Army and National Guard training camp. This distribution was completed September 7, 1917. Distribution of motor ambulances to ambulance companies of the Regular Army not already equipped began September 11, 1917, and was completed September 15, 1917—five companies.⁴⁷ Distribution of ambulances for the equipment of one motor ambulance company at each of the National Army cantonments began September 10 and was completed except for spare-parts cars October 26. Distribution of ambulances for one motorized ambulance company at National Guard camps began September 24 and was completed October 30. Camp Mills, Garden City, Long Island, N. Y., not one of the original 16 National Guard Camps, was equipped November 8. Distribution of ambulances for the second motorized company at all divisional training camps began October 30, 1917, and was completed March 27, 1918.⁴⁷

There was material delay in securing spare parts for distribution. The sets of spare parts were finally assembled and distribution began early in April, 1918. All camps had been supplied by the end of June of that year. Spare-parts trailers were distributed to the several camps in June and July, 1918. One spare-parts trailer, 1 set of motor ambulance spare parts B, and 12 sets motor ambulance spare parts A were issued to every camp for each motorized ambulance company equipped with motor ambulances. One set of ambulance

spare parts A was issued for each General Motors Co. ambulance sent to stations and not part of an ambulance company. One set of motor cycle spare parts B was also issued to each ambulance company at home and abroad.⁴⁷ Some delay was experienced in the issue of motor cycle spare parts due to the slowness of the manufacturers in making deliveries.

Receipts and issues of standard ambulances, spare-parts cars, spare-parts trailers, and sets of ambulance spare parts A and B are given, by months, in the following tabular statement:⁴⁸

Ambulances and parts

Month	Receipts					Issues									
	G.M.C. chassis	Ambulance bodies	Spare parts bodies	Spare parts trailer chassis	Spare parts trailer bodies	Ambulances	Spare parts cars	Spare parts trailers, domestic	Spare parts trailers, export	Ambulance spare parts A	Ambulance Spare parts B				
1917															
August.....	} 500	398	{ 12			29									
September.....						251	11								
October.....						150	248	19		300	23				
November.....						122	153	30		131	18				
December.....						140	2	7		101	8				
Total.....	912	801	68			812	60								
1918															
January.....	a 10					10	1								
February.....	b 6	{ c 57 b 84		1		23	2								
March.....	a 68	c 76			1	47	2								
April.....	a d 1	{ a 25		36		29				346	18				
May.....	{ a 100 b 72	c 56		74	50	{ d 1 2			1	430	30				
June.....	b 6				186	2		32		499	42				
July.....		3		152	64	32		31	6	637	3				
August.....	325	b 45	c d 25	38		35		4	75	403	4				
September.....	a 8		k 8			51		5	30	511	2				
October.....	a 1		e 1					3	30	178					
Total.....	{ b 84 a 213	{ c 217 b 129		34	301	301	{ e 84 236	5	75	142	3,004	99			
Aggregate.....	1,209	1,147	102	301	301	1,043	65	75	142	{ f 2,057 e 947	3,004	{ g 69 f 30			

a Standing.
b Boxed for export.

c Assembled.
d Paige Ambulance. Donated.

e Domestic.
f Export.

MECHANICS' SCHOOL

As stated previously, the need for a school for the training of ambulance chauffeurs and mechanics made itself known at an early date. The actual work on the development of such a school was delayed by that necessary to the development of organizations at the producing plants and to body design. It was at first contemplated that such a school would be developed at the Louisville depot. A central shop for the repair of motor ambulances and motor cycles appeared to be necessary. It was believed that this repair shop might very profitably be run in conjunction with such a training school and the ambulance supply depot.¹⁰ The policies of the War Department, however,

limited the number of places at which special training could be given and required the establishment at Fort Oglethorpe, Ga., of the school for the training of ambulance chauffeurs.

Authority was granted June 27, 1918, for the establishment of the school for mechanics at Louisville. This authority covered also the lease of the major part of the Ford Building in that city.⁴⁹ Lease was effected July 19, 1918.⁵⁰ This building was converted so as to provide comfortable barracks on the fourth floor, spare-parts stock on the third floor, school on the second floor, and offices, utilities, and receiving and shipping departments on the first floor.

The purpose of the school, its equipment and facilities are given in the following extract from a letter from the officer in charge:⁵¹

The Medical Department Mechanics' School is arranged to furnish two distinct courses of instruction, (a) the inside instruction including shopwork, and (b) the road course. For the purpose of the inside instruction we have, at present, laid out on the third floor of the Ford Building:

- 3 complete model 16 G. M. C. chassis;
- 1 frame complete with springs;
- 3 motors complete;
- 3 clutch and transmission assemblies, complete;
- 3 rear axles, complete;
- 3 front axles, complete;
- 3 universal drive shafts, complete;
- 3 steering gears, complete;
- 3 water pump assemblies, complete;
- 3 radiators;
- 3 magnetos; and
- 2 complete Indian motor cycles with side cars.

This material is mounted on horses or blocks for ready disassembly and assembly. All disassembly and assembly work is done with the tool equipment carried in two spare-parts trailers equipped with complete sets of spare parts B, which are installed on this floor. For the contents of the spare-parts trailer, including its tool equipment, attention is invited to the pamphlet of information and instructions published in the Office of the Surgeon General under date of May 1, 1918.

On the second floor of the Ford Building which is intended to be used as an overhauling shop for ambulances sent in from time to time from the different camps, is located a tire repair shop equipped with an Akron-Williams steam vulcanizing outfit for which material has been ordered to remodel it to take care of 35 by 5 tires; a radiator repair shop with furnaces, test tank, and compressed air; a blacksmith's forge and anvil; 2 arbor presses; 1 drill press; lathe; 1 universal grinder, and 1 dry grinder. In addition to this there are some special Ford equipments, including an electrically driven machine for running in motor bearings and another electrically driven machine for testing rear axles.

This second floor is also equipped with a lecture room, provided with blackboards, seating 150 men, and is at present supplied with a cut-out motor-cycle motor, a cut-out motor-cycle transmission, a cut-out motor-cycle clutch, a cut-out carburetor and governor for ambulance, and a cut-out Pyrene fire extinguisher. This material will be added to from time to time.

For road training it is intended to equip motorized ambulance companies complete, and for this purpose we now have on hand 24 standard model 16, G. M. C. $\frac{3}{4}$ -ton ambulances, 6 motor cycles, and 2 spare-parts trailers, and it is our understanding that shipment has been made, by the various general depots of the Quartermaster Corps, of 6 class A trucks, 2 Dodge touring cars, 2 trailmobile-type rolling kitchens, and 2 trailmobile-type water carts. We also have on hand the complete medical, quartermaster, and ordnance equipment for two ambulance companies which will be carried on this transportation, per paragraph 874, Manual for the Medical Department, 1916.

The fourth floor of the Ford Building is used as a barracks, in which are now housed 52 men attached to the motor ambulance supply depot. The capacity of the main squad room in this barracks is 110 men. The mess room will seat 150 men at one time. The kitchen arrangements are ample for a mess for 500 men.

The school detachment consisted of 8 officers, including the commanding officer, 10 nonecommissioned officers, 3 cooks, and a small number of privates, first class.⁵² This personnel was grouped into administrative, detachment commander, and instructors, commissioned and enlisted.⁵³

The first class comprised 60 men selected from among those who had taken the chauffeurs' course at Camp Greenleaf, Fort Oglethorpe, Ga. They were given practical work in finding trouble in the motors and in making roadside repairs. Some 40 members of the class qualified as mechanics, of whom 6 were proficient motor-cycle mechanics.⁵⁴

The school was discontinued at the end of December, 1918. All Medical Department equipment was transferred to the medical supply depot, St. Louis, Mo. The building was released to the Ford Motor Co. in January, 1919.⁵⁵

REFERENCES

- (1) Letter from Col. H. C. Fisher, M. C., S. G. O., to Mr. Robert V. Board, President, Kentucky Wagon Manufacturing Co., Louisville, Ky., May 23, 1917. Subject: Motor ambulance supply depot. On file, Finance and Supply Division, S. G. O., 11,220-247.
- (2) Correspondence between Maj. Edwin P. Wolfe, M. C., S. G. O., and Capt. John P. Fletcher, M. C., motor ambulance supply depot, Louisville, Ky., during June and July, 1917, relative to establishment of Motor Ambulance Supply Depot. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{1}$.
- (3) Correspondence between Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., and Col. Edwin P. Wolfe, M. C., S. G. O., during July, 1918, relative to establishment of motor ambulance mechanics' training school. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{337}$.
- (4) Weekly report of the Motor Ambulance Supply Depot, Louisville, Ky., for the period ending July 31, 1918, to the Surgeon General. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{398}$.
- (5) Correspondence between the Surgeon General and The Adjutant General, U. S. Army, during August and September, 1918. Subject: Motor Transport Corps. On file, Finance and Supply Division, S. G. O., $\frac{750-751 \text{ M. T. C.}}{1}$.
- (6) Return of enlisted personnel, Medical Department, August, 1917. On file, Enlisted Section, Personnel Division, S. G. O.
- (7) Correspondence between Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., and Col. Edwin P. Wolfe, M. C., S. G. O., during July to December, 1917. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{\text{(various numbers)}}$.
- (8) Weekly reports of the Motor Ambulance Supply Depot, April to August, 1918, to the Surgeon General, U. S. Army. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{398}$.
- (9) Return of enlisted personnel, Medical Department, August, 1917, to April, 1919, inclusive. On file, Enlisted Section, Personnel Division, S. G. O.

- (10) Par. 4 (a). 4, Supply Letters, Nos. 1 to 23, inclusive (consolidated and revised), Medical Department, U. S. Army, Surgeon General's Office, December 5, 1917.
- (11) Letter from the Surgeon General to the Officer in Charge, Motor Ambulance Supply Depot, Louisville, Ky., June 28, 1917. Subject: Civilian employees. On file, Record Room, S. G. O., 182,301-A-1.
- (12) Letters from Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., July 2, July 19, and August 17, 1917, relative to civilian employees and other depot matters. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{1}$.
- (13) Contract between Capt. John P. Fletcher, M. C., representing the United States, and the Kentucky Wagon Co., July 17, 1917. On file, Finance and Supply Division, S. G. O., Motor Transport files, Contract No. 613.
- (14) Letters from Col. Edwin P. Wolfe, M. C., S. G. O., August 31, 1917, to Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky. Subject: Depot affairs. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{23}$.
- (15) First indorsement of the Surgeon General, U. S. Army, to the officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., September 24, 1918. Subject: Commissioned personnel. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{388}$.
- (16) Letters from Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., August 27 and 30, 1917. Subject: Depot affairs. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{23, 58}$.
- (17) Letter from Maj. Edwin P. Wolfe, M. C., S. G. O., to Capt. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., July 25, 1917. Subject: Ford ambulances. On file, Finance and Supply Division, S. G. O., 14,842-1.
- (18) Letter from Capt. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Maj. Edwin P. Wolfe, M. C., S. G. O., July 2, 1917. Subject: Correspondence filing system. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{1}$.
- (19) Correspondence between Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., and Col. Edwin P. Wolfe, M. C., S. G. O., August, 1917, to December 31, 1917. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{1 \text{ to } 133}$.
- (20) Telegram from the officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., to the Surgeon General, U. S. Army, July 19, 1917. Subject: Ford ambulances. On file, Finance and Supply Division, S. G. O., 14,842-L-1.
- (21) Letter from Capt. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Maj. Edwin P. Wolfe, M. C., S. G. O., July 31, 1917. Subject: Depot matters. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{1}$.
- (22) Letter from the Surgeon General, U. S. Army, to the Chief of Engineers, July 21, 1917. Subject: Motor ambulance for Engineer regiments. On file, Finance and Supply Division, S. G. O., 15,573-G-1.
- (23) Letter from the Surgeon General, U. S. Army, to the officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., July 16, 1917. Subject: Motor ambulances. On file, Finance and Supply Division, S. G. O., 14,842-R.
- (24) Letter from Maj. Edwin P. Wolfe, M. C., S. G. O., to Capt. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., August 4, 1917. Subject: Motor ambulances. On file, Finance and Supply Division, S. O., $\frac{713-440}{1}$.
- (25) Letter from Capt. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Lieut. Col. Edwin P. Wolfe, M. C., S. G. O., August 21, 1917. Subject: Motor ambulances. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{23}$.

- (26) Louisville weekly reports for the week ending February 23, 1918. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{398}$.
- (27) Letter from Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., May 30, 1918. Subject: Spare parts and Ford ambulances. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{340}$.
- (28) Letter from Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., June 20, 1918. Subject: Motor ambulances and spare parts. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{351}$.
- (29) Louisville weekly reports, June 8, 1918, to July 20, 1918. On file, Finance and Supply Division, S. G. O., $\frac{13-440}{398}$.
- (30) Telegram from the officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., to General Motors Truck Co., Pontiac, Mich., August 16, 1917. Subject: Shipment of chassis. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{13}$.
- (31) Letter from Capt. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Lieut. Col. Edwin P. Wolfe, M. C., S. G. O., August 27, 1917. Subject: Labor difficulties. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{23}$.
- (32) Letter from the officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., to the H. H. Babcock Co., Watertown N. Y., August 18, 1917. Subject: Ambulance bodies. On File, Finance and Supply Division, S. G. O., $\frac{713-440}{23}$.
- (33) Letter from Capt. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Lieut. Col. Edwin P. Wolfe, M. C., S. G. O., August 30, 1917. Subject: Ambulance assembly. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{58}$.
- (34) Letter from Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Lieut. Col. Edwin P. Wolfe, M. C., S. G. O., September 5, 1917. Subject: Shipments of G. M. C. chassis. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{47}$.
- (35) Letter from Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Lieut. Col. Edwin P. Wolfe, M. C., S. G. O., September 4, 1917. Subject, Motor ambulance chassis. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{46}$.
- (36) Letter from Capt. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Maj. Edwin P. Wolfe, M. C., S. G. O., August 16, 1917. Subject: Ambulance assembly. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{13}$.
- (37) Letter from Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., September 20, 1917. Subject: Depot affairs. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{105}$.
- (38) Letter from officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., to the General Motor Truck Co. Pontiac, Mich., September 20, 1917. Subject: Defective chassis. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{105}$.
- (39) Letter from Col. Edwin P. Wolfe, M. C., S. G. O., to Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., October 22, 1917. Subject: Spare parts and ambulances. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{22}$.

- (40) Contract between Maj. John P. Fletcher, M. C., and the Kentucky Wagon Manufacturing Co., February 11, 1918. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, No. 3985.
- (41) Correspondence between Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., and Col. Edwin P. Wolfe, M. C., S. G. O., during December, 1917, and January, 1918, relative to storing ambulances and other depot matters. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{133}$.
- (42) Louisville weekly reports, February, 1918, to June, 1918, inclusive. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{398}$.
- (43) Letter from the officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., to Maj. W. T. Fishleigh, San. Corps, S. G. O., January 16, 1918. Subject: Spare parts. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{164}$.
- (44) Contract between Maj. John P. Fletcher, M. C., and the Trailmobile Co., of Cincinnati Ohio, April 17, 1918. On file, Finance and Supply Division, S. G. O., Motor Transport Contracts, No. 4669.
- (45) Letter from Maj. W. T. Fishleigh, San. Corps, N. A., to Col. Edwin P. Wolfe, M. C., S. G. O., March 22, 1918. Subject: Spare parts "B" equipment, body and trailer chassis. On file, Finance and Supply Division, S. G. O., $\frac{750-714}{284}$.
- (46) Letter from the officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., to Maj. W. T. Fishleigh, San. Corps, N. A., April 26, 1918. Subject: Index of spare parts. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{290}$.
- (47) Louisville weekly reports of Motor Ambulances received and Issued. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{398}$.
- (48) Compiled from the following reports on file, Finance and Supply Division, S. G. O.:
 Louisville weekly reports, August, 1917, to September 30, 1918, file number $\frac{713-440}{398}$,
 Louisville daily shop report, September 28, 1917, to October 22, 1918, file number $\frac{713-440}{399,401}$, and Louisville daily spare parts report, July 6, 1918, to October 22, 1918, file number, $\frac{713-440}{402}$.
- (49) Letter from Col. Edwin P. Wolfe, M. C., S. G. O., to Maj. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., February 26, 1918. Subject: Training school for mechanics. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{195}$.
- (50) Memorandum from Director of Purchases and Supplies, to Chief of Staff, Director of Operations, June 27, 1918. Subject: Lease of building owned by Ford Motor Co., Louisville, Ky.; and the indorsement of the third Assistant Secretary of War thereon. On file, Finance and Supply Division, S. G. O., $\frac{750-714}{564}$.
- (51) Letter from the officer in charge, Motor Ambulance Supply Depot, Louisville, Ky., to the Quartermaster General, attention "Burnett," August 20, 1918. Subject: School equipment. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{382}$.
- (52) Letter from the Surgeon General, U. S. Army, to The Adjutant General of the Army, August 30, 1918. Subject: Motor Transport Corps. On file, Record Room, S. G. O.

- (53) Letter from the Surgeon General's Office to Lieut. Col. John P. Fletcher, M. C., Motor Ambulance Supply Depot, Louisville, Ky., July 18, 1918. Subject: Organization and personnel. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{347}$.
- (54) Letter from Lieut. Col. John P. Fletcher, M. C., Medical Department Mechanics' School, Louisville, Ky., to Col. Edwin P. Wolfe, M. C., S. G. O., September 24, 1918. Subject: Progress of school. On file, Finance and Supply Division, S. G. O., $\frac{713-440}{395}$.
- (55) Letter from the Surgeon General, U. S. Army, to the Director of Purchase, Storage and Traffic Division, January 10, 1918. Subject: Discontinuance of mechanics' school. On file, Record Room, S. G. O., 440 (Louisville, Ky.) F.

SECTION IX
**ACTIVITIES CONNECTED WITH THE OVERSEAS TRANS-
PORTATION OF SUPPLIES**

CHAPTER XLII
PORT MEDICAL SUPPLY DEPOTS

NEW YORK

Early in June, 1917, representations ¹ of the need of the Medical Department for space at ports of embarkation were made to the Quartermaster General, who promptly gave instructions to the depot quartermaster, New York City, to obtain a suitable storehouse for medical supplies on the water front at that port. On June 19, 1917, an officer from the supply division, Surgeon General's Office, was sent to New York City to investigate the port facilities and to ascertain whether a suitable pier could be obtained and at what price.² After consultation with the depot quartermaster in that city, the city pier at the foot of Thirty-third Street, Brooklyn, was inspected and found to be ideal for the purpose. It was a covered pier of practically fireproof construction and connected with the Long Island Railway through the Bush Terminal and the Brooklyn rapid transit system. Its lease was recommended by the Surgeon General on June 20, 1917, in the following indorsement setting forth the needs for it:³

1. Continued developments of the problem of furnishing medical supplies to the troops abroad emphasizes the necessity for liberal supply of storage accommodation at the point of embarkation much greater than suggested within this letter. The Medical Department is becoming acutely embarrassed, especially at the point of embarkation, for storage space. The President and Secretary of War have approved the accumulation of 2,400 automobile ambulances, to be shipped to France, in addition to other great quantities of material that must be stored ready for shipment.

2. As the result of personal conferences and cooperation between the Quartermaster Department and the Medical Department, the depot quartermaster, New York City, has located a satisfactory wharf upon the Brooklyn water front which can be obtained at a lease of \$120,000 per year. An officer of the Medical Department has inspected this wharf and reports it as nearly ideal for the need of the Medical Department.

3. It is most urgently requested that the depot quartermaster, New York, be authorized to lease this wharf for the use of the Medical Department, as indicated, and that authority be communicated by telegraph and that this matter be made special to expedite it as soon as possible.

It was found upon further investigation that the Thirty-third Street, Brooklyn, pier, had already been leased by the city authorities to a local shipping firm and could not be secured.

A substitute was found at Pier 45, North River. This pier at that time was approximately 835 feet long by 82 feet wide, covered with a one-story

shed of steel and sheet-iron construction, with one-story bulkhead sheds on each side, berth on each side, water approximately 25 to 30 feet in depth. It was the second pier north of Christopher Street ferry and was almost directly opposite the Hoboken piers taken over by the Government. It was within a block and a half of the entrance to the Hudson subway to Hoboken and within one-third of a mile of the medical supply depot at Greenwich and Morton Streets. This pier had been under lease to the Clyde Steamship Co. at a monthly rental of approximately \$5,000. Upon the recommendation of the general superintendent, United States Army Transport Service, New York, the Quartermaster General, July 20, 1917, authorized the lease of this pier for use of the Medical Department.⁴

It was estimated at the time the pier was secured that the medical and hospital supplies required for the equipment and maintenance of an Army of 1,250,000 men overseas would involve a daily shipment of 1,200 or more cubic tons. Daily shipments could not be expected. If weekly shipments could be counted upon, and an 8-foot stack could be maintained, approximately 46,000 square feet of floor space, in addition to aisles and passageways, would be required. Since even weekly shipments could not be counted upon, it was regarded as inevitable that additional dock space would be required to provide for unexpected influxes of large quantities of supplies destined for overseas.⁵

The only ships actually loaded at Pier 45, North River, were those taking the equipment of the sections of the United States Ambulance Service to Italy in the spring of 1918. Practically all the motor ambulances for that contingent, 430, in number, passed over this pier. An endeavor was made at one time to secure the unfinished Lamport & Holt Pier in Hoboken, but the need for it, in addition to Pier 45, North River, did not materialize, due to extensive light-erage service and to the routing of large quantities of supplies through other ports—Newport News and New Orleans. In so far as the Medical Department was concerned, the port of New York was used in the main as a port of embarkation for hospital supplies, whereas the port at Newport News was used for field supplies and motor ambulances.

A medical supply depot for the port of embarkation, Hoboken, N. J., was established on Pier 45, North River, and the assembling of medical and hospital supplies for overseas shipment began in July, 1917.⁶ An officer of the Medical Corps was placed in charge of this depot with the title of medical supply officer, port of embarkation, Hoboken, N. J.⁷ A small depot foree was secured and offices were opened on the pier. This depot was given a definite status in the port organization by the following letter from the chief of embarkation service to the commanding general, port of embarkation, Hoboken, on August 31, 1917:⁸

1. The Medical Department, United States Army, has established a medical supply depot at Pier 45, North River, from which medical supplies and equipment are to be collected and forwarded overseas.

2. You are authorized to communicate directly with the officer in charge of this medical supply depot as to shipments, and to allot him cargo space for same.

3. Priority of shipments of medical supplies should be given on recommendation of officer in charge of the medical supply depot.

Additional officers were assigned to duty at this depot as the volume of supplies received and shipped increased, its activities expanded, and the reports and restrictions multiplied.⁹ Enlisted personnel were assigned to duty from time to time, and additional civilian employees were added as the increasing requirements and dispersion of activities made necessary.

PERSONNEL

By the end of May, 1918, the requirements of personnel for the proper operation of this depot had grown to 4 officers, 20 enlisted men, and 56 civilian employees.¹⁰ The fire hazard at Pier 45 was considered so great that the number of watchmen required there was fixed at 15 by the commanding general of the port.¹⁰ The depot activities were then carried on at Pier 45, North River; Bush Terminal, Brooklyn; and 45 Broadway, New York City.¹¹ Bush Terminal previously had been used by the medical supply depot, New York City, for storage of excess supplies ultimately destined for overseas shipments for which no space was available in the buildings then occupied by that depot. All available storage space on the water front was taken over April 8, 1918, by the port commander. The section in the Bush Terminal devoted to medical and hospital supplies was placed under the medical supply officer of the port.¹⁰ The office at 45 Broadway, New York City, also was a port facility and had to do with the transportation of supplies. The representative of the Medical Department on duty there became likewise an assistant to the medical supply officer of the port.¹⁰

The peak load of personnel at this depot was reached in October with the establishment at Port Newark Terminal, N. J., of a section devoted to the assembling of equipment for base hospitals to be sent to France.

ORGANIZATION

The organization of a medical supply depot at a port of embarkation differed considerably from the purchasing and distributing depots. It was charged only with receiving supplies destined for ocean transportation, the temporary storage of such supplies until shipping should become available, the selection of supplies for shipment, their delivery to lighters or docks for loading on board ship, and the keeping of such records and the rendering of such reports as were required by higher authority. Consequently it had neither purchasing, finance, nor packing activities. Its business was to accept such supplies as were delivered to it and to get them on board the transports as expeditiously as possible. Records of receipts and deliveries to ship side were essential in order that losses at sea might be checked promptly and a knowledge had of the supplies forwarded. The organization, then, consisted essentially of records, receiving, and shipping departments.¹⁰

RECORDS DEPARTMENT

The records department received, numbered, indexed, and recorded all information concerning incoming supplies, checked the "tally-in" sheets from the receiving department against the supplies expected, and the "loading sheets" against the various instructions to ship. The reports of receipts, shipments, and tonnage of supplies awaiting shipment were prepared and forwarded

to the proper authorities. Deliveries on contracts were promptly reported to the respective contracting officer. Acknowledgments were made to the several depots of the receipt of supplies on depot shipments.¹⁰ Receipts were required from the Quartermaster Corps for supplies delivered to the ships. This required that a record be kept, by items, of the articles received and shipped. This record was kept on appropriate cards and balanced with every change in the stock.¹⁰ A car record was kept in a loose-leaf ledger ruled with appropriate columns to show for every carload of supplies routed to the depot, the bill of lading number, date, point of origin, car number, car initial, routing, date of arrival, date unloaded, name of manufacturer, consignee, contract or order number, depot or office directing shipment, commodities, numbers of packages in car, quantities of articles, tally-in sheet number, and point of delivery, Pier 45, or other pier, shipside, etc.¹⁰ Under existing instructions from the Surgeon General, the original and memorandum copies of the bills of lading for shipments to this depot were sent to the medical supply officer of the port. After the organization of the vast hospital equipment section at Port Newark Terminal, the bills of lading for the supplies routed directly to that point were sent to the officer in charge of that section.

As the tally-in sheets were received in the records office they were copied into a permanent register. The original tally-in sheet was then sent to the contracts clerk, who compared it with the copy of the order or contract furnished by the purchasing officer, and prepared an acknowledgement of the receipt of the goods, which receipt was sent to the purchasing officer. This clerk also prepared daily tonnage reports for the surgeon, port of embarkation, and the Surgeon General. This report showed, by commodity groups, the supplies on hand, received, shipped, and remaining at the close of the day's business, and such other special data as might be required. The contracts clerk also looked up references concerning correspondence, tracing shipments, etc., and connected the correspondence with the contract and files. After all pertinent data had been extracted from the tally-in sheet it was filed.¹⁰

The duplicate tally-in sheet was routed to the section in charge of shipments. Direct shipments from manufacturers were separated from shipments by medical supply depots. Packages and boxes were numbered. A packer's list was prepared for every lighter load sent out. This list was an itemized statement of each transportation invoice, from which the ship's manifest was prepared. A daily report was prepared in this section for the embarkation branch, storage and traffic division, General Staff, showing what freight had arrived and what had been loaded. Six copies of the transportation invoice were required. Three of these copies were delivered to the captain of the ship, one was delivered to the captain of the lighter, one was sent to the office at 45 Broadway, and one was retained. Attached to the retained copy was a copy of the transportation receipt by the quartermaster for the supplies. A report of tonnage on hand was made by telephone to the Shipping Board at 45 Broadway for its consolidated tonnage report. A daily report was made to the Medical Department representative at 45 Broadway of the cars received and unloaded.¹⁰

After the required data had been obtained by the shipments section, the duplicate tally-in sheet was sent to the stock record clerk and posted to the stock records, item by item. The transportation receipt of every lighter load shipped also found its way to the stock records desk and was likewise posted, which completed the transaction.¹⁰

RECEIVING AND SHIPPING DEPARTMENTS

These two departments, for a number of months, were combined under the supervision of one office but with a separate clerk for receiving and shipping. When the business reached sufficient magnitude and the added requirements made it necessary these functions were separated and an officer was assigned to each. The activities of the shipping department reached such magnitude before the armistice that the services of two officers were required.¹²

The receiving department maintained an adequate force of checkers to receive and check all incoming shipments, whether delivered to Pier 45, the ship side, or other point. For every such delivery, whether by car, truck, or messenger, a tally-in sheet was prepared in duplicate. These sheets showed for every delivery received the names of the consignor and consignee, commodity, cubic measurements, weight, contents, car number (including initials), truck delivery, and marks. Transportation invoices were prepared and distributed, and a record of outgoing supplies was maintained.¹²

As an outgrowth of the establishment of the inland transportation service the Medical Department maintained liaison officers in such of the regional offices of that service as the needs required. One of these liaison officers was assigned to the office at 45 Broadway. This representative checked arrivals and locations of cars, secured space for medical and hospital supplies on the transports, secured lighters and tugboats for the transfer of supplies from Pier 45 to ship side, and kept the medical supply officer of the port informed of the names and locations of the ships upon which the supplies were to be loaded and the approximate time the lighter was to be alongside the ship. The day and hour of loading and the vessel upon which the supplies were to go could never be determined until the last moment. This was due to delays in arrival of the vessel in port upon which space had been assigned the Medical Department, delays in making repairs when needed, the loading of a greater or lesser quantity of supplies upon a ship than had been originally allotted.¹² A lighter load of supplies destined, when it left the pier, for a specified ship might be loaded wholly or in part on some other ship. It was never known at the depot what vessel would actually carry the supplies until a copy of the loading report or ship's manifest had been received. The final determination appeared to have been made by the chief stevedore loading the ships.¹² Many difficulties and inconveniences arose from this method of loading. Parts of the same shipment would be unloaded at different ports in France. Units would be separated from their equipment. The chief surgeon, A. E. F., in France never knew until reports of unloading had been received from the ports where the supplies were which had been listed in replenishment lists sent him previously. A vessel expected to unload at Brest might discharge her cargo at Marseille. These

things, however, were beyond the jurisdiction of the port medical supply officer and of the Medical Department.¹³

The movement of medical and hospital supplies to this port began in July, 1917, and continued without interruption until the signing of the armistice. During 1917, supplies were routed to Pier 45, for the initial equipment and stock of the medical supply depot in France, for the initial equipment of the early divisions ordered overseas, and 2,350 Ford ambulances. Due to the lack of ocean tonnage at the port of New York and to higher priorities assigned to the shipment of supplies of bureaus other than the Medical Department, the movement of medical property overseas did not proceed as rapidly as had been expected. Unprecedented weather conditions during December, 1917, and January, 1918, materially hindered not only the movement of supplies to the ports but bunker coal for the transport fleet as well.

By the middle of January, 1918, the accumulation of supplies at Pier 45, North River, New York, had reached 2,037 short tons, occupying 341,406 cubic feet of space. Very little relief as to this condition was in sight, for medical supplies had been removed from the priority list. Supplies on the priority list had accumulated at the port of New York in vast quantities and there were not sufficient ships in port to receive them. The quantities of the supplies on priority required all the space on prospective loadings and left little if any space for medical supplies.¹⁴ The chief of embarkation service could offer no relief through other ports at that time because of lack of transportation. While these supplies were not on the priority list, it was the intention to move a fair proportion of them every week.¹⁵

As the rigors of the winter subsided and more cargo space became available, medical property began to move in increasing volume. It reached its height in October.

The keeping at this depot of accurate loading records of shipments overseas was always a difficult task. Vessels were loaded at so many different points and the secrecy maintained over their loadings and sailings were such as to require constant watchfulness on the part of the medical supply officer to obtain needed information concerning the floating of medical property.

The commanding general, port of embarkation, Hoboken, N. J., forbade the giving out of the names of the transports on which supplies were shipped,¹⁶ so, in order to secure information concerning the articles and quantities on the respective transports, arrangements were made by the medical supply officer, Pier 45, to abstract the information from the file of ships' manifests kept in the office of the receiving clerk, Pier 1, Hoboken, N. J. The marine freight director required the lighters of medical property to be checked by package numbers, by which the shipments could be traced. The data obtained from the ships' manifests were kept in the confidential files at Pier 45. The quantities of each article were simply reported as delivered to the transport service for shipment.¹⁶

A port storage officer was appointed October 2, 1918, to have exclusive control of all port storage at the port of Hoboken.¹⁷ All officers at that port, except the depot quartermaster, having charge of the storage or distribution of supplies for shipment overseas for any department, bureau, corps, or other

agency of the War Department, and generally known as port supply officers, were placed under the immediate orders of the port storage officer. No officer was permitted to relinquish the functions previously assigned to him until some other officer or official was prepared to assume such functions.¹⁸ It was the purpose of the port commander to relieve the port supply officers as such as rapidly as the reorganization of the activities of the port would permit.¹⁹ The proposed reorganization had not been effected, in so far as it applied to the Medical Department, at the signing of the armistice.

In spite of repeated instructions from the Surgeon General concerning the routing of supplies through the port of embarkation, Hoboken, N. J., difficulty continued to be experienced by the medical supply officer at that port in securing copies of bills of lading. This was due primarily to the incorrect terminal address given on them. Some of them contained the notation "Care of Depot Quartermaster, Pier 12, East River," others "Care of Director of Shipping," and still others "Care of Army Transport Service." This led to aggravating delays in receiving the bills of lading and arrival notice, and gave rise to unnecessary correspondence.²⁰ At that time these bills of lading were issued by local quartermasters, whose personnel not only lacked familiarity with consignment points but were overburdened with the number of such bills to be written. This difficulty was eventually overcome by the appointment, June 22, 1918, of the medical supply officers, at the several depots, acting quartermasters for the purpose of issuing bills of lading.²¹

NEWPORT NEWS

The organization of the port of embarkation at Newport News, Va., began early in July, 1917. The participation of the Medical Department in the activities of this port began July 13, 1917, with the arrival of its representative for duty as port medical supply officer.²²

The commanding officer of the port advised the Surgeon General, July 19, 1917, that the port would be ready to receive supplies August 1, and requested information at the earliest practicable date of the weight and cubic contents of medical property intended for shipment through that port on the next convoy. No property could be received at that time except such supplies as were to be shipped on that convoy. Housed storage space of 10,000 square feet on the pier and 18,000 square feet in freight cars in the Chesapeake & Ohio Railroad yards were allotted to the Medical Department as its share of the existing port facilities. This space was intended simply as a rest station for supplies in transit during the few days which intervened between their arrival and their loading on board ships. In addition to the closed storage, 5 acres of open-air space was allotted for the reception of bulky equipment such as motor and other vehicles which could be parked in the open. There were neither unloading platforms, cranes, nor other machinery available for unloading heavy equipment except that on the pier.²³

Request was made that medical property for overseas shipment be invoiced to the proper officer with the American Expeditionary Forces and billed to the medical supply officer, port of embarkation, Newport News, Va., each package

to be marked with the invoice number, the total number of packages in the invoice, the serial number of the package, the depot making the shipment, and the weight and cubic contents. It was considered essential that a copy of the invoice, with notations thereon of the weight and cubic contents of the shipment and the numbers and designations of the cars in which the packages were loaded, be furnished the medical supply officer of the port.²³

Upon notification that there would be a primary port of embarkation established at Newport News or Norfolk, Va., the Surgeon General decided to use it for the shipment of field medical equipment and supplies, including motor ambulances, destined for the American Expeditionary Forces in France. It was estimated that the volume of such supplies going forward monthly would approximate 36,000 cubic feet on the assumption that four divisions per month would be embarked.²⁴

On the basis of this expected movement of supplies and equipment the chief of the construction division, War Department, was requested, August 2, 1917, to provide 60,000 square feet of warehouse floor space for the Medical Department at this place.²⁴ Since motor ambulances were not only bulky but very heavy, a boxed chassis weighing 4,000 pounds, it was requested that the warehouses to be constructed be provided with suitable cranes, derricks, or other machinery for handling heavy weights.²⁴ Of the storage space requested, 50,000 square feet were required for embarkation purposes and 10,000 square feet for use as an issuing medical supply depot to troops.²⁵

It was foreseen that organizations arriving at that port, especially during the early movements overseas, would be without complete equipment, in spite of all instructions that troops be completely equipped before leaving their stations. The medical supply depot at Newport News must be ready at all times, day or night, to supply the sanitary materials required by organizations passing through. Issues to such organizations were to be made on the approval of the surgeon of the port of embarkation and without any special formality.²⁵

When the medical equipment of any organization arriving at the port was found upon inspection to be unserviceable or obsolete, it was turned in to the depot for renovation or salvage and new equipment issued in its stead. All articles of equipment which could be utilized were salvaged.²⁶

These issues included not only those to troops themselves but also the equipment and replenishments required by the troop ships upon which they were transported. A list of initial equipment for troop ships was prepared by the surgeon of the port and furnished the Surgeon General August 7, 1917.²⁷ This list was revised and somewhat modified. Instructions were issued to the medical supply depots at New York and Washington to issue the supplies required for 24 transport unit equipments in accordance with the revised list.²⁸

A sufficient number of overseas warehouses had been completed by the end of January, 1918, to permit the assignment to the Medical Department of the 50,000 square feet of space requested in the previous August. Buildings Nos. 9, 10, and 11 were so assigned. Buildings 9 and 10 were 200 feet long by 100 feet wide. Building No. 11 was 100 feet long by 100 feet wide. These warehouses had suitable fire walls and were equipped with the Grinnell sprinkler

system to prevent fire. These buildings were used entirely for storage. The offices assigned to the port medical supply officer were located in the overseas warehouses office building. A detachment of Medical Department enlisted men for the operation of the medical supply activities at the port was organized in January and trained as rapidly as practicable in their duties. Men originally assigned who proved unsuitable were replaced by others with suitable qualifications as rapidly as the opportunities permitted.²⁹ Adequate warehouse handling machinery such as hand trucks, electric trucks with extra platforms, and gravity conveyors for boxes, were provided for each warehouse by the port quartermaster upon request of the medical supply officer.³⁰

As might have been expected, the early shipments to this depot were improperly marked and much effort and extra labor were required to locate the property, determine where it belonged, and send it to the proper place. The shipping depots at first failed to appreciate the dual function of this depot, and it was often difficult to determine from the markings on the packages whether they were intended for overseas shipment or for local use. Oftentimes the shipment arrived before the packer's list or invoice. Sometimes the mark "Medical Supply Officer, American Expeditionary Forces, France," was omitted from packages intended for overseas shipment. By the middle of September, 1917, a deplorable state of confusion existed in freight handled by railroads and steamships coming into that port and Norfolk. Much medical property was secured only after personal search of docks, freight cars, and express offices.³¹ The necessary instructions to remedy these defects were promptly issued by the Surgeon General. Very little complaint on this subject thereafter was received from this port.³²

For various reasons, but principally lack of cargo vessels, medical property destined overseas accumulated at this port. By the end of November, 1917, the accumulation exceeded 235,000 cubic feet and 660 short tons. Much of the equipment was quite bulky, being assembled motor and animal drawn vehicles.³³

By Christmas, 1917, the situation had become sufficiently acute to call for relief and an embargo was placed by the chief of embarkation service against the shipment to that port of all supplies destined for overseas except subsistence, forage, troop baggage, until January 4, 1918.³⁴ On January 3, 1918, this embargo was extended by the director of storage and traffic until further notice.³⁵

With the advent of the year 1918 and the increasing number of cargo vessels, the congestion at the port cleared rapidly. On January 30, 1918, the medical supply officer reported that supplies were arriving in quantity and that all medical property had been unloaded, was on the pier awaiting shipment, and had been allotted cargo space, but that ships had not been loaded on account of lack of bunker coal and nonarrival.³⁶

About the middle of February, 1918, however, the situation was clearing rapidly. The supply depot was now in permanent quarters and ready for rapid work; all medical supplies were being delivered to organizations.³⁷

With adequate storage and warehouse facilities at this port the Medical Department organization there was prepared to handle rapidly and efficiently

the movement of medical property overseas. In view of this condition the Surgeon General requested, March 4, 1918, that the chief of embarkation service permit shipments of medical supplies for overseas to Newport News as these became available. It was desired to fill the warehouses with the supplies then awaiting shipment. Such supplies were to be cleared by the medical supply officer at the port in the same manner as they were then being cleared at the port of embarkation, Hoboken.³⁸ Authority was granted March 13, 1918, by the chief of embarkation service to the Surgeon General to release for shipment, without reference to his office, supplies to the warehouses assigned to the Medical Department at Newport News in such quantities as could be properly unloaded upon arrival and not to exceed the working capacity of the storage space.³⁹

The personnel on duty at this depot, January 1, 1918, consisted of three officers and four civilian employees. The civilian employees were concerned primarily with administrative duties. With the developement of Camp Stuart as an embarkation activity and the more active duties thrown upon the issue branch of the medical supply depot, enlisted personnel were assigned to duty thereat.⁴⁰ Various departments, warehouse, shipping, and dock, were organized and trained. By the end of April the enlisted strength of the medical supply detachment (including the issue branch) had reached 200.⁴¹ The strength of the detachment, by months, appears below, the large variations in numbers being due to the presence of medical supply depot companies forming for overseas service:⁴²

1918		1918	
February.....	29	July.....	225
March.....	89	August.....	157
April.....	198	September.....	145
May.....	160	October.....	219
June.....	318	November.....	133

Originally, it was not intended by the Surgeon General to require the medical supply officer at this port to assume accountability for medical property consigned to the American Expeditionary Forces, or to render a return therefor. Copies of invoices and packers' lists of such property were required to be furnished to the port medical supply officer. It was contemplated that a complete record of all articles of medical property loaded on transports would be kept by the medical supply officer and a list furnished the Surgeon General whenever called for.²⁵

In order to secure accurate information concerning medical property shipped overseas, port medical supply officers were directed, May 7, 1918, to furnish the Surgeon General monthly a consolidated statement of the supplies, by items, forwarded from the port during the month.⁴³ From these consolidated statements a single list was compiled showing total shipments from all ports and forwarded to the chief surgeon, A. E. F., France.

As the shipments increased and supplies were received directly from contractors, it became increasingly difficult to keep an accurate check on supplies placed in transit by the purchasing depots, received at the port, and forwarded overseas. The segregation of the different shipments required extra space;

separate shipping invoices to transport quartermasters had to be prepared for shipments coming from different depots. This gave rise to a recommendation from the medical supply officer at this port that all Medical Department supplies passing through the port be invoiced to the medical supply officer thereof; that he receipt from them and invoice them to the medical supply officer, A. E. F., whenever cargo space became available; and that the receipt from the transport quartermaster be accepted as a credit voucher to the return.⁴⁴ A similar procedure under consideration by the War Department at the time was later published in General Orders, No. 54, W. D., June 3, 1918. Instructions for putting the plan into effect were sent to this depot in the following letter:

AUGUST 5, 1918.

From: The Surgeon General.

To: The port medical officer, Newport News, Va.

Subject: Shipments destined for overseas.

1. Beginning with the month of August, all supplies pertaining to the Medical Department shipped overseas through the port of Newport News will be invoiced to you. These supplies will be marked "For the Officer in Charge, Medical Supply Depot, American Expeditionary Forces, France," "England," or elsewhere as service conditions may require. Packages and invoices both will contain sufficient and definite numbers and marks to enable you to identify them.

a. As these supplies are delivered to you, receipt will be accomplished promptly as required in paragraph 496, Manual for the Medical Department, 1916. The face of the receipt may be stamped "In original packages, contents not verified." Duplicate copies of packers' lists will be furnished by the shipping officers. Against these packers' lists you will check the number of boxes received and forward one copy of the packers' lists to this office, attention Lieut. F. A. Dagit, S. C. This list should show thereon the dates of receipt of the several packages.

3. When these supplies are turned over to the Transport Service, and itemized shipping invoice made out on Form 600, War Department, or similar blank, will be delivered to the shipping authorities. Such number of copies as may be required by the transport (embarkation) service will be furnished that service. Three additional copies will be prepared, one of which will be forwarded to this office, attention Lieutenant Dagit, one to the finance and supply division, chief surgeon's office, A. E. F., France (England, or elsewhere) and one to the officer in charge, medical supply depot A. E. F., France (England, or elsewhere).

4. The receipt on the copy of invoice sent to this office should bear the signature of an authorized representative of the transport service. This invoice will be accepted as a credit voucher to your return of medical property. These shipping invoices will be numbered serially beginning with the first supplies turned over during the month of August, and continue in consecutive numbers thereafter. These numbers will be preceded by the letter "S"; for example, S-1; S-85; S-162, etc.

5. Your receipts for the property will bear a serial number preceded by the letter "R"; for example, R-1; R-45; R-143, etc. Your first receipt during the month of August will be No. 1 irrespective of the date when the supplies were shipped.

6. These two series of numbers are necessary in order to enable this office to determine definitely whether all copies of both series have been received. Previous instructions to the contrary are modified accordingly.

7. Accomplished receipts and shipping invoices should be forwarded to this office as promptly as possible.

8. Submit with the least practical delay your estimate of the additional personnel required by you to put these instructions into effect.

As at the port of Hoboken, the operating agencies of the port of Newport News were organized, pursuant to instructions from the port commander, early in September, 1918,⁴⁵ to conform to the requirements of General Orders, No. 54,

War Department, June 3, 1918. A port storage officer was appointed, with executive control of all storage facilities at the port operated for the joint use of the several supply bureaus. The representatives of these bureaus were designated port supply officers. The representative of the Medical Department became the port medical supply officer.

OTHER PORTS

Embarkation depots were established at Boston, Mass.; Philadelphia, Pa.; Charleston, S. C.; and New Orleans, La.⁴⁶ Supplies were also shipped from several other southern ports, Galveston, Tex., Mobile, Ala., and Brunswick, Ga., but no definite embarkation depots were established at them.

While the Medical Department had not requested storage space at Boston, Mass., the manufacturing problem in that area early in 1918 had developed a need of a warehouse there for the storage of finished products, such as surgical dressings, bedsteads, mattresses, hospital furniture, and other hospital equipment. The director of storage and traffic was informed March 8, 1918, that the Medical Department could use at the port of Boston approximately 50,000 square feet of inclosed heated storage space for such supplies destined overseas. The port of Boston, however, was never extensively used by the Medical Department as an embarkation depot.

At the port of Charleston, S. C., 100,000 square feet of inclosed storage space was requested in March, 1918. It was considered a desirable point to receive supplies manufactured west of the Allegheny Mountains because they could be shipped there without passing through any of the congested districts. The congested traffic centers for the most part were Buffalo, N. Y., Pittsburgh, Pa., Baltimore, Md.; and Norfolk and Newport News. There were ample railroad facilities entering Charleston which connected with all points in the Mississippi Valley. This depot had been completed, space allotted to the Medical Department, a medical supply officer assigned and on duty, and some medical and hospital supplies received before the need for such a depot terminated. No considerable quantity of such supplies was ever shipped from that port.

Because of the change of location and the increase in the storage space in the Philadelphia medical supply depot in the summer of 1918, not much space was required at the embarkation depot, Pier 38, in that city. An officer of the Medical Department was stationed at the pier to look after medical property loading there for overseas.

It was found advisable in the latter months of 1918 to have an officer of the Medical Department assigned to duty at the embarkation depots at Baltimore, Md., and New Orleans, La., to look after the medical property passing through these ports and to keep the Surgeon General advised of the arrival and shipment of such property.

REFERENCES

- (1) Letter from the Surgeon General to the Quartermaster General, June 4, 1917. Subject: Storage accommodations at ports of embarkation. On file, Finance and Supply Division, S. G. O., 11,231-18.
- (2) Special Orders, No. 141, W. D., June 19, 1917.

- (3) Fourth indorsement from the Surgeon General to The Adjutant General, June 20, 1917, on letter from the Surgeon General to The Adjutant General, June 9, 1917. Subject: Storage accommodations at ports of embarkation. On file, Finance and Supply Division, S. G. O., 14,690-J.
- (4) Letter from the General Superintendent, Army Transport Service, to the Quartermaster General, July 18, 1917. Subject: Pier 45, North River, New York, N. Y., and first indorsement of the Quartermaster General thereon. Copy on file, Finance and Supply Division, S. G. O., 738.
- (5) Third indorsement from the Surgeon General to the Quartermaster General, July 21, 1917, relative to the lease of Lamport & Holt Pier, Hoboken, N. J. On file, Record Room, S. G. O., 192,247.
- (6) Memorandum from the Surgeon, Port of Embarkation, Hoboken, N. J., to the commanding general of that port, August 7, 1917, relative to the dock space assigned to the Medical Department, and a medical supply officer for that port. Copy on file, Finance and Supply Division, S. G. O., $\frac{583-340}{1}$.
- (7) Confidential Orders, No. 12, W. D. July 9, 1917, par. 6. On file, Personnel Section, S. G. O.
- (8) Letter from Chief of Embarkation Service to the commanding general, Port of Embarkation, Hoboken, August 31, 1917: Subject: Medical supply depot at New York. Copy on file, Historical Division, S. G. O.
- (9) Ninth indorsement from the Surgeon General to The Adjutant General, June 14, 1918, on a report of an inspection of the medical supply depot, Pier 45, North River, New York, N. Y., May 7, 1918. Copy on file, Finance and Supply Division, S. G. O., $\frac{583-539 \text{ N. Y.}}{104}$.
- (10) Fourth indorsement from the medical supply officer, Pier 45, North River, New York, N. Y., to the Surgeon, Port of Embarkation, May 23, 1918, on report of an inspection of medical supply depot, Pier 45, North River, New York, N. Y., made May 7, 1918. Copy on file, Finance and Supply Division, S. G. O., $\frac{583-539 \text{ N. Y.}}{104}$.
- (11) Report of an inspection, medical supply officer, Pier 45, North River, New York, N. Y., May 7, 1918. Copy on file, Finance and Supply Division, S. G. O., $\frac{583-539 \text{ N. Y.}}{104}$.
- (12) Verbal statements made to the author by Maj. Paul W. Gibson, M. C., the medical supply officer at Pier 45, North River, New York, N. Y., July 9, 1917, to November 30, 1918.
- (13) Verbal reports made at various times to the author by representatives of the Finance and Supply Division, Chief Surgeon's Office, A. E. F., France.
- (14) Letter from the surgeon, Port of Embarkation, Hoboken, N. J., January 17, 1918. Subject: Supplies, Pier 45, North River, New York, N. Y. On file, Finance and Supply Division, S. G. O., $\frac{583-340}{80}$.
- (15) First indorsement of Chief of Embarkation Service, January 25, 1918, to the Surgeon General, concerning shipment of supplies on Pier 45, North River, New York, N. Y. On file, Finance and Supply Division, S. G. O., $\frac{580-340}{80}$.
- (16) Letter from the medical supply officer, Pier 45, North River, New York, N. Y., to the Surgeon General, January 28, 1918. Subject, Freight reports. On file, Finance and Supply Division, S. G. O., $\frac{583-539}{72}$.
- (17) Circular No. 94, Storage and Traffic Division, General Staff, September 29, 1918.
- (18) General Orders, No. 119, Headquarters, Port of Embarkation, Hoboken, N. J., October 2, 1918. Copy on file, Finance and Supply Division, S. G. O., $\frac{750-138 \text{ Ch. of Staff}}{99}$.

- (19) Letter from Lieut. Col. P. W. Gibson, M. C., Pier 46, North River, New York, N. Y., to Col. C. R. Darnall, M. C., S. G. O., October 5, 1918, relative to the reorganization, Port of Embarkation, Hoboken, N. J. On file, Finance and Supply Division, S. G. O., 750-138 Ch. of Staff.
99
- (20) Letter from the medical supply officer, Pier 45, North River, New York, N. Y., to the Surgeon General, May 6, 1918. Subject: Bills of lading and markings. On file, Finance and Supply Division, S. G. O., 583-539.
90
- (21) Special Orders, No. 146, War Department, June 22, 1918.
- (22) Confidential Orders, No. 12, War Department, June 9, 1917. Also: Personal report of Capt. Edwin C. Jones, M. C., July 13, 1917, reporting his arrival for duty. On file, Personnel Division Records, S. G. O.
- (23) Letter from the commanding officer, Port of Embarkation, Newport News, Va., to the Surgeon General, July 19, 1917. Subject: Medical supplies for overseas shipment. On file, Finance and Supply Division, S. G. O., 583-538 N N.
1
- (24) First indorsement from the Surgeon General to The Adjutant General, August 2, 1917, on a letter from the Chief, Construction Division, Quartermaster General's Office, July 19, 1917, for the amount of storage accommodations required by the Medical Department at Newport News, Va. On file, Finance and Supply Division, S. G. O., 583-538 N N.
1
- (25) Letter from Maj. Edwin P. Wolfe, M. C., S. G. O., to Captain E. C. Jones, M. C., Newport News, Va., August 4, 1917, relative to medical supply Division, S. G. O., 583-538 N N.
2
- (26) Letter from medical officer, Newport News, Va., to the Surgeon General, January 18, 1918. Subject: Partly unserviceable and obsolete equipment turned in. On file, Finance and Supply Division, S. G. O., 583-538 N N.
90
- (27) Letter from the surgeon, port of embarkation, Newport News, Va., to the Surgeon General, August 7, 1917. Subject: Tentative list of supplies for Army transports. On file, Finance and Supply Division, S. G. O., 583-538 N N.
1
- (28) Letter from the Surgeon General's Office to the medical supply officers, New York, N. Y., and Washington, D. C., August 20, 1917. Subject: Issue of supplies to Newport News, Va. On file, Finance and Supply Division, S. G. O., 583-538 N N.
1
- (29) Letters from the port medical supply officer, Newport News, Va., January 29 and February 6, 1918, to the Surgeon General. Subject: Conditions at that port. On file, Finance and Supply Division, S. G. O., 583-538 N N.
91
- (30) Memorandum from the medical supply officer, Newport News, Va., to the assistant quartermaster, February 13, 1918. Subject: Request for equipment. Copy on file, Finance and Supply Division, S. G. O., 583-538 N N.
96
- (31) Letter from the medical supply officer, Port of Embarkation, Newport News, Va., to the Surgeon General, September 21, 1917. Subject: Errors in packers' lists and marking packages. Also: First indorsement thereon by the surgeon of the port, September 21, 1917. On file, Finance and Supply Division, S. G. O., 583-538 N N.
20
- (32) Letter from the Surgeon General, to the medical supply officers, New York, N. Y., Washington, D. C., and St. Louis, Mo., September 28, 1918. Subject: Errors in packers' lists and marking packages. On file, Finance and Supply Division, S. G. O., 583-538 N N.
20

- (33) Letter from Maj. E. C. Jones, M. C., medical supply officer, Port of Embarkation, Newport News, Va., to Col. Edwin P. Wolfe, M. C., S. G. O., November 24, 1917, reporting medical property on hand at Newport News. On file, Finance and Supply Division, S. G. O., $\frac{583-538 \text{ N N}}{63}$.
- (34) Letter from the Chief of Embarkation Service to the Surgeon General, December 26, 1917. Subject: Embargo on overseas freight. On file, Finance and Supply Division, S. G. O., $\frac{583-130}{27}$.
- (35) Letter from the Director, Storage and Traffic, to the Surgeon General, January 3, 1918. Subject: Embargo on overseas freight. On file, Finance and Supply Division, S. G. O., $\frac{583-130}{27}$.
- (36) Letter from Capt. R. A. La Grinder, San. Corps, port medical supply officer, Newport News, Va., to Col. Edwin P. Wolfe, M. C., S. G. O., January 30, 1918. Subject: Conditions at that port. On file, Finance and Supply Division, S. G. O., $\frac{583-538 \text{ N N}}{91}$.
- (37) Letter from Capt. R. A. La Grinder, San. Corps, to Col. Edwin P. Wolfe, M. C., S. G. O., February 16, 1918. Subject: Report on conditions at port of Newport News, Va. On file, Finance and Supply Division, S. G. O., $\frac{583-538 \text{ N N}}{98}$.
- (38) Letter from the Surgeon General to the Chief, Embarkation Service, March 4, 1918. Subject: Storage space at Newport News, Va. On file, Finance and Supply Division, S. G. O., $\frac{583-538 \text{ N N}}{91}$.
- (39) Letter from the Director, Embarkation Service, to the Surgeon General, March 13, 1918. Subject: Storage space, Newport News, Va. On file, Finance and Supply Division, S. G. O., $\frac{583-538 \text{ N N}}{91}$.
- (40) Letters from the medical supply officer, Newport News, Va., to Col. Edwin P. Wolfe, M. C., S. G. O., January 30, 1918, and February 16, 1918. Subject: Report of conditions at Newport News, Va. On file, Finance and Supply Division, S. G. O., $\frac{583-538 \text{ N N}}{91 \text{ and } 98}$.
- (41) Letter from the medical supply officer, Newport News, Va., to Col. Edwin P. Wolfe, M. C., S. G. O., May 7, 1918. Subject: Personal requirements. On file, Finance and Supply Division, S. G. O., $\frac{583-538 \text{ N N}}{123}$.
- (42) Returns of enlisted personnel, Medical Department, for months stated. On file, Enlisted Personnel Section, S. G. O.
- (43) Letter from the Surgeon General to medical supply officer, port of embarkation, Pier 45, New York, N. Y., and Newport News, Va., May 7, 1918. Subject: Monthly report of shipments. On file, Finance and Supply Division, S. G. O., 583-Miscel.
- (44) Letter from the medical supply officer, Newport News, Va., to the Surgeon General, April 20, 1918. Subject: Invoicing and handling supplies for overseas. On file, Finance and Supply Division, S. G. O., $\frac{583-538 \text{ N N}}{105}$.
- (45) General Orders, No. 325, Headquarters, Port of Embarkation, Newport News, Va., September 4, 1918. Copy on file, Finance and Supply Division, S. G. O., $\frac{750-138 \text{ G. S.}}{92}$.
- (46) Annual Report of the Chief of the Transportation Service, 1919, 94.

CHAPTER XLIII

SHIPPING REGULATIONS

The early shipments of Medical Department equipment and supplies to the American Expeditionary Forces in France were made in precisely the same manner as those consigned to troops in our insular possessions or other domestic distribution. The packages, marked for the medical supply officer, A. E. F., were turned over to the local quartermaster with the necessary shipping papers; i. e., invoice of medical property, delivered to the Quartermaster Corps for transportation. There were no restrictions. The custody and destiny of the supplies were thereafter a responsibility of the Quartermaster Corps until finally delivered to the consignee. The depot quartermaster at Washington forwarded the supplies from the field medical supply depot to the port of embarkation indicated in his instructions. The depot quartermaster in New York City did likewise for the New York medical supply depot.

The application of this principle to the movement of supplies and equipment of all the supply bureaus of the War Department resulted in placing in transit greater quantities of supplies than the facilities of the Army at the port could handle. The majority of these early shipments were routed through the port of New York. Ships were not available to receive them. Storage facilities, even after the taking over of the North German Lloyd Docks, were inadequate to care for them. To facilitate the unloading of cars and the delivery of the supplies to the transports the general superintendent, Army Transport Service, submitted to the Quartermaster General in July, 1917, certain recommendations.¹ These recommendations were, in substance, that all shipments exceeding 15,000 pounds, destined for the American Expeditionary Forces in France and going through the port of New York, be routed in care of the general superintendent, Army Transport Service, 42 Pearl Street, New York Lighterage, and bills of lading made to read accordingly. Shipments of supplies of less than 15,000 pounds should be forwarded to the general superintendent, Army Transport Service, Pier No. 1, Hoboken, N. J., and bills of lading drawn accordingly.

Soon after the establishment of the embarkation service instructions governing the shipment of supplies to ports of embarkation were issued by the chief of that service. These instructions required that a formal release or authority to ship and designation of the port be obtained from the chief of embarkation service for all shipments exceeding 20 tons. For the reception of such shipments a limited amount of storage space at both of the primary ports of embarkation was allotted to each of the supply bureaus. The space so allotted varied according to the volume of supplies expected to be furnished by the respective supply bureaus. The space so provided was intended for

the reception of supplies for immediate loading for shipment overseas. The covered storage allotted the Medical Department for this purpose was 15,000 square feet at Hoboken, N. J., and 7,000 square feet at Newport News.²

Some of the supply bureaus had already acquired storage space at the port for their own use in addition to that allotted to them from the general or common storage space already mentioned. In such cases the supply bureau having its own storage space was authorized and urged to keep a reasonable amount of it filled at all times with supplies available for immediate loading. Releases, nevertheless, were required for all shipments to such storage where the quantities exceeded 10 tons. These releases were granted with the understanding that the freight cars in which shipped would be promptly unloaded to avoid congestion at the port.²

Shipments of less than 10 tons could be placed in transit to the port without obtaining a release from the chief of embarkation service. Small amounts of storage space at each of the ports of embarkation were set aside for the reception of such shipments. To the Medical Department there were allotted for this purpose at Hoboken 2,000 square feet and at Newport News 2,000 square feet. Such shipments were to be routed to the nearer of the two ports at which space was available. This space was to be kept filled with supplies.²

The weight and volume in cubic feet calculated on outside measurement was required to be stenciled on the outside of every box, bundle, crate, or package placed in transit for overseas shipment. The same information was required to appear on all bills of lading, whether Government or commercial, on which such shipments were made.²

Daily reports were required by the chief of embarkation service of freight ordered overseas but not actually placed in transit, in transit to ports of embarkation, at ports of embarkation, and loaded on ships at ports of embarkation. Daily abstracts of this information compiled separately for each port were also required.² These instructions were revised and published in circular form by The Adjutant General, November 12, 1917.

Upon representation by the Surgeon General that the Medical Department was operating supply depots at both of the primary ports of embarkation, shipments of medical and hospital supplies to those ports were exempted from the requirements of a transportation order, as appears in the following correspondence:

In reply refer to E. S. No. 541.2 Medical Supplies.

WAR DEPARTMENT,
CHIEF OF EMBARKATION SERVICE,
OFFICE OF THE CHIEF OF STAFF,
Washington, March 16, 1918.

From: Embarkation branch, storage and traffic division of the General Staff.

To: Director of inland transportation.

Subject: Release of medical supplies.

1. Authority has been given to the Surgeon General to release until further notice medical supplies to Pier 45, North River, New York.

2. This pier is in the entire charge of the Medical Department and the release of freight to that pier has been authorized, provided it can be promptly unloaded and held on the pier awaiting shipment overseas.

3. This office maintains a check on the movement of freight by securing from the Surgeon General a report each day of freight released, put in transit, and the amount of storage space available and cars on hand at Pier 45.

4. It will not, therefore, be necessary to pass requests for transportation orders through this office for freight destined to Pier 45.

By authority of the Director of Embarkation:

(Signed) R. C. MORSE, Jr.,
Major, Q. M. R. C.

No. 531.71-In. Tpn.

MARCH 18, 1918.

From: Director of inland transportation.

To: Surgeon General, United States Army, Washington, D. C.

Subject: Exemption from embargo, medical supply depot, port of embarkation, Pier 45, North River, New York, and Newport News, Va.

1. Acknowledging receipt of your 750-719 25, of March 18, attached hereto is copy of letter which this division has to-day received from the embarkation branch of the storage and traffic division of the General Staff, in which a blanket release is given for the movement of medical supplies until further notice, consigned to Pier 45, North River, New York.

2. We are also to-day in receipt of copy of letter addressed to yourself by the embarkation branch of the storage and traffic division of the General Staff, assigning to the Medical Department at Newport News 50,000 square feet of storage and stating that this will be proper authority to release, without further reference to the embarkation bureau, of supplies consigned to this warehouse in such quantities as can properly be unloaded on arrival and not to exceed the working capacity of the storage space.

3. This division will therefore arrange as early as possible for the free movement of medical supplies to New York and Newport News, as indicated in the above referred to communications.

H. M. ADAMS,
Director of Inland Transportation, War Department,
By O. H. PARSLEY.

This exemption was published in supplement No. 1, May 1, 1918, to Order No. 2, inland traffic service, and in each of the succeeding supplements of August 10, 1918, and October 1, 1918, to that order. This exemption, together with the presence in medical supply depots of Medical Department personnel acting as field representatives of the inland traffic service, gave the Surgeon General practically a free hand in the movement of medical property to the ports for transportation overseas. There was close cooperation between the transportation branch, finance and supply division of the Surgeon General's Office, and the Car Service Bureau of the American Railway Administration, through regional directors.

Through its close liaison with the office of the chief of embarkation service and close cooperation with that office, the transportation branch of the Surgeon General's Office was permitted to write the releases for shipments consigned to the American Expeditionary Forces without reference to the embarkation service.³

In issuing supplies the custom had grown up at the several medical supply depots of numbering outgoing packages of each shipment to any destination beginning with the number 1 and using consecutive numbers until all packages in that shipment had been numbered. Beyond the name of the issuing depot and the number of the package, there were no marks by which the packages in any shipment could be identified with the invoice or packer's list to which

it pertained. This gave rise to considerable confusion in the medical supply depots in the American Expeditionary Forces, because several shipments would arrive there at the same time, having many packages with the same number on them. Original packages could be fairly readily identified because the contents were marked on the outside by the manufacturer in compliance with the terms of the contract. But there was no way of identifying boxes with miscellaneous contents which had been packed at the depots.

At our overseas ports of debarkation, too, confusion arose in the segregation of incoming supplies belonging to the several supply bureaus. The stevedores and freight handlers, many of them Portuguese and Chinese, could not read the markings on the various packages and, consequently, could not sort them. They could learn, however, to recognize the symbols of the several supply bureaus and sort the property in accordance therewith. Medical property was not so marked. This gave rise to the recommendations from headquarters, September 20, 1917, that, to facilitate identification of property, boxes containing medical supplies be marked with one red cross; that boxes containing dental supplies be marked with two red crosses; and that boxes containing veterinary supplies be marked with three red crosses.⁴

On September 24, 1917, General Pershing made the following further recommendations to War Department concerning the shipment of supplies to the American Expeditionary Forces:⁵

* * * Request that instructions be given to all bureaus and agencies of the War Department to have their property marked as follows:

“General Superintendent, Army Transport Service, giving port of embarkation.”

This address to be followed by marking indicating the particular corps or department of the Army for which intended, including the words “American Expeditionary Forces, France.” If not intended for general supply, marking should be included in (thus, for Quartermaster Corps, American Expeditionary Forces) “For laundry plants” or “For shoe repair shops” or “For motor transport repair shops” or “For base depot ———, if known. There should be also * * * included in * * * the marking a general statement of contents of each package; thus, “Toilet soap, carbon 30-inch searchlight, telegraph sounder,” and the shipment numbered, the number of packages in the shipment, the particular number of each package, the weight of each package, and the volume of each package in cubic feet.

In conformity with this cablegram the following method of marking Medical Department packages for overseas was prescribed by the Surgeon General, October 4, 1917:⁶

Until further orders it is directed that all supplies for overseas shipment be marked as follows:

- (a) Officer in charge, medical supply depot, American Expeditionary Forces, France.
- (b) Care of medical supply officer, port of embarkation.
- (c) Name of port of embarkation.
- (d) Contents of package.
- (e) The number of each package.
- (f) The number of packages in the shipment.
- (g) The weight of the package.
- (h) The volume of each package (cubic feet).
- (i) Red cross.
- (j) Name of depot making shipment.

For example, a package shipped by the field medical supply depot, by way of New York, to the medical supply depot in France should be marked as follows:

"Officer in Charge, Medical Supply Depot, American Expeditionary Forces, France.

"Care of Medical Supply Officer, Port of Embarkation, Pier 45, North River, New York, N. Y. (lighterage free).

"Surgical Dressings.

"No. 17 of 874.

"Weight 142 pounds—6½ cubic feet.

"(From Field Medical Supply Depot, Washington, D. C.)."

This method of marking is suggested in a cable from the commander of the American forces in France, who states that there has been much difficulty in identifying supplies.

Bills of lading should be made out to the general superintendent, American transport service, port of embarkation, and a copy of each bill of lading should be sent to the medical supply officer, port of embarkation.

These instructions, while facilitating the segregation of supplies at the ports of debarkation, failed to improve, materially, the situation at the medical supply depots. Complaints of inability to determine readily the shipment to which any package pertained continued to be received. The foregoing instructions were amended December 19, 1917, as follows:⁷

Referring to letter from this office dated October 4, 1917, in regard to the marking of packages of supplies for shipment to France, you are advised that beginning January 1, 1918, the instructions contained therein will be superseded by the following:

Until further orders it is directed that all supplies for overseas shipment be marked as follows:

- (a) Officer in charge, medical supply depot, American Expeditionary Forces, France.
- (b) Care of medical supply officer, port of embarkation.
- (c) Name of port of embarkation.
- (d) Contents of package.
- (e) Number of each package.
- (f) Date of packer's list.
- (g) Weight of package.
- (h) Volume of each package (cubic feet).
- (i) *One* red cross (for *New York* depot). *Two* red crosses in juxtaposition (for *Washington* depot) *Three* red crosses in juxtaposition (for *St. Louis* depot).
- (j) Name of depot making shipment.

For example: A package shipped by the field medical supply depot by way of New York to the medical supply depot, France, should be marked as follows:

"The Officer in Charge, Medical Supply Depot, American Expeditionary Forces, France.

"Care of the Medical Supply Officer, Port of Embarkation, Pier 45, North River, New York, N. Y. (Lighterage free).

"Surgical dressings. No. 17———. Jan. 24, 18. Weight, 142 lbs.—6½ cu. ft. From Field Medical Supply Depot, Washington, D. C."

There has been difficulty overseas in identifying packages bearing numbers only, because of the fact that parts of several shipments may arrive at the same time at the depot, and consequently there may be several packages bearing the same numbers. In order to overcome this difficulty, each package will be marked with the date of the packer's list. It is suggested that, if practicable, the invoices sent be given the same date as the packer's list.

Bills of lading should be made out to the general superintendent, Army Transport Service, port of embarkation, and a copy of each bill of lading should be sent to the medical supply officer, port of embarkation.

Arrangements should be made to put this system of marking into effect on the first shipment from your depot after January 1, 1918.

To facilitate the marking with the red crosses, pasters were printed and furnished the several depots in sufficient numbers to permit the application of

two, one at each end, to every box shipped. Since the American Red Cross also was shipping supplies in considerable quantities, having a red cross upon them, a design consisting of a combination of the red cross and the caduceus was adopted as the insignia for Medical Department supplies.

The foregoing instructions remained in force until April, 1918, when they were superseded by those prescribed in General Orders, No. 34, War Department, April 11, 1918. In order that this system of marking might be fully understood and observed, the following adaptation of General Order No. 34, as amended June 10, 1918, to the marking of medical property, was printed in June, 1918, and distributed to all persons furnishing supplies to the Medical Department, and continued in force until the end of the war:

Compiled from General Order No. 34.

Received April 18, 1918. Revised June 10, 1918.

WAR DEPARTMENT,
Washington, April 11, 1918.

1. The following standard markings shall be used on all freight packages intended for oversea shipment to the United States forces in Europe, including packages accompanying troops.

STANDARD MARKINGS

(1) *Country of debarkation.*—All packages to be shipped overseas to the American Expeditionary Forces in Europe shall before shipment be marked in the center of the face of package or tags with the letters "A. E. F." in an equilateral triangle, thus:



Each side of the triangle shall be approximately one-fourth the width of the marking surface, but shall not, on any package, exceed 24 inches—pasters furnished by Medical Department.

(2) *Port of embarkation.*—This shall be the name of the United States port through which the supplies are to be shipped overseas. Indicate by marking above the triangle, thus: ("Via New York, Pier 45"), or ("Via Philadelphia, Pier 38").

(3) *Shipments to specific depots or organization units.*—This shall be the name of the depot or organization unit to which the supplies are to be delivered overseas, and shall be used only when a package is intended for a specific organization or is assigned to a port of debarkation for a specific purpose. Indicate by marking below the triangle, thus: ("Medical Supply Depot, France"), or ("Surgeon Base Section No. 3, England").

(4) *U. S. number.*—This shall be the number officially assigned to a shipment by the embarkation service or such other agencies as may be empowered by the Embarkation Service to designate such numbers. The U. S. number shall consist of five parts:

- (a) The letters U. S. indicating United States property.
- (b) Figures representing the month and day of month.
- (c) A code letter (or letters) indicating the organization unit originating such number.
- (d) Three figures indicating the number of the shipment authorized during a day, each day's designations commencing with "001."
- (e) A package number—separated from preceding figures by a dash—the packages in each shipment being numbered from 1 up.

For example, U. S. 601-M-327-14 would represent the three hundred and twenty seventh shipment authorized by the Medical Department (indicated by "M") on June 1 and the fourteenth package of that shipment. If the first part of number were U. S. 1214, etc., it

would indicate a shipment authorized on December 14. This number need not be marked on packages containing subsistence supplies, but shall appear on all transportation papers relating to such commodities. Indicate by marking this number, in its entirety, in upper right-hand corner of face of package or tags.

(5) *Group (lot) shipment and package numbers.*—These shall be used only when it is necessary or desirable that a number of packages, all forming a part of the same group shipment, should be forwarded together, such as base hospital or X-ray unit. The group shipment number shall be assigned by the Surgeon General and shall definitely identify the particular group shipment. Indicate by marking in the lower right-hand corner of face of package or tags the words "Group shipment," and immediately thereunder the group shipment number followed by the package number and the number of packages. All packages included in a group shipment shall be given a consecutive package number which shall be marked above the total number of packages in the group, thus:

Group shipment
14
1201—18

which indicates package number 14 of 18 packages included in group shipment No. 1201. Group (lot) number may, in addition, be placed on the ends of the cases if desired.

(6) *Weight.*—This shall be the total weight in pounds when package is complete for shipment. Indicate by marking in the lower left-hand corner of face of package or tags, thus: "226 lbs." Weight need not be marked on packages containing subsistence supplies.

(7) *Cubic volume.*—This shall be the cubical contents of package when complete for shipment. Indicate by marking the nearest whole number of cubic feet in the lower left-hand corner of face of package or tags, immediately beneath the weight of package, thus: "64 cu. ft." Cubic volume need not be marked on packages containing subsistence supplies.

(8) *Corps number.*—This is the requisition, item, contract, order, invoice, or manifest number, or such combinations thereof as may be designated by the respective corps. Indicate by marking such numbers in the upper left-hand corner of face of package or tags.

9. *Corps insignia or symbol.*—This is the insignia of corps to which the shipment is to be forwarded. Indicate by marking such insignia on both ends of package or on reverse side of tags (furnished by Medical Department).

(10) *Description of Contents.*—This is the quantity and description (name, size, style, etc.) of each article contained in package. Indicate by marking on both ends of package at top or on reverse side of tags, thus: "Field chest," "Bandages—gauze—20 boxes," etc.

(a) When there are, in one package, a number of different articles or a number of different sizes of the same kind of article, the contents must be listed on a "packers list," which shall be either (b) pasted on both ends of package and then varnished, or (c) placed in moisture-proof envelopes attached to both ends of package, securely fastened with five large head tacks.

(11) *Name of shipper.*—This is the name of depot, contract, or other person by whom the supplies are forwarded. Where supplies are shipped by a United States inspector at point of production, the name of producing contractor shall be shown as shipper. Indicate by marking below insignia or symbol on both ends of package or on reverse side of tags, thus: "From John Doe & Co."

(12) *Date of delivery.*—This is the date of original delivery to the United States Government. It shall be used only on packages of perishable supplies. Indicate by marking day, month, and year of such delivery immediately above the name of shipper on both ends of packages or on reverse side of tags.

General supplies.—Parts of machinery, structural shapes, and similar material will be marked as prescribed in each particular instance according to prearranged schedules of packing. Metal tags containing information necessary for the rendering of proper reports of loading and arrival at docks will be attached invariably to such commodities.

Duplicate markings.—There shall be inclosed within each package a card of sufficient size on which shall be recorded in legible characters all the standard markings, established by this general order, appearing on the face and ends of the package, so that if all or any

of the exterior markings are obliterated or defaced the package will contain ample direction which will insure the required delivery to its destination.

General instructions relating to marking.—No advertising matter shall appear on packages.

Stenciling is preferable to hand marking. The height of letters shall conform to the size and character of package, but shall not be less than one inch, except on very small packages. Use only United States standard stencil black. For marking machinery parts, structural steel or similar commodities use paint either white or of the corps color. All markings shall be protected by a coating of clear spar varnish.

Where bales or crates are used, the standard system of marking shall prevail. At least two tough cloth or metal shipping tags, provided by Medical Department, giving the required standard information shall be attached by wire to such packages so as to prevent loss in transit. If nature of article or covering permits, or special facilities are provided, such as a square white cloth held in place by baling straps, the marking shall appear thereon. Cloth or metal tags, as designated above, shall be used when tags are attached to the face of packages in the place of the use of stenciling.

Where no containers are used for shipment of commodities, as in the case of a chassis or body of an automobile or a complete automobile, at least two shipping tags, conforming to the above requirements, shall be attached in such manner as to prevent loss in transit. Entries shall be made on such tags in accordance with the standard markings. These shipping tags are required in addition to any corps, section, or service, name or other data painted, perforated, or otherwise marked on motor vehicles or similar equipment.

Copies of the foregoing instructions shall be furnished each shipper in ample time for use in making his initial shipment.

REFERENCES

- (1) Letter from General Superintendent, Army Transport Service, New York, to the Quartermaster General, July 16, 1917. Subject: Overseas shipments. Copy on file, Finance and Supply Division, S. G. O., $\frac{583-340}{2}$.
- (2) Circular letter. Chief of Embarkation Service, September 11, 1917. On file, Record Room, S. G. O., 188,699.
- (3) Statement of Maj. F. W. Lennox, San. Corps, March 14, 1921, to Col. E. P. Wolfe. On file, Finance and Supply Division, S. G. O., unnumbered.
- (4) Cablegram from Maj. Gen. John J. Pershing, to The Adjutant General, Washington, September 20, 1917. On file, Finance and Supply Division, S. G. O., $\frac{250}{41}$.
- (5) Cablegram, signed Pershing, to The Adjutant General, Washington, September 24, 1917.
- (6) Letter, containing instructions for Medical Supply Officer, Port of Embarkation, Pier 45, North River, New York and Newport News, Va., etc., from Office of the Surgeon General to the Medical Supply Officer, October 4, 1917. Subject: Marking for overseas shipments. On file, Finance and Supply Division, S. G. O., $\frac{250}{47}$.
- (7) Letter from the Surgeon General to the Officer in charge, Field Medical Supply Depot, 21 M St., N. E., Washington, D. C., December 19, 1917. Subject: Marking packages. On file, Finance and Supply Division, S. G. O., $\frac{250}{47}$.

CHAPTER XLIV

TRANSPORT UNIT EQUIPMENT

The need of medical equipment for chartered transports and other vessels taken over by the embarkation service as troop ships early made itself known. The combat equipment of the organizations generally was shipped with troops property and stowed in the hold where it could not be used. Sometimes organization equipment was forwarded on a ship other than the one on which the troops were transported. These conditions not infrequently resulted in hardships and complaints.¹ In the early days of our participation in the War, surgeons with organizations of the Regular Army and National Guard were expected to anticipate the needs of their units in medical equipment and supplies while en route and to submit requisitions for whatever was necessary. Many of them, in shipping their combat equipment, doubtless assumed that such needs, while on the transport, would be met from ship's supplies. In embarking troops at New York, the medical officers with them seldom had either time or opportunity to report their needs to the port surgeon or to secure supplies before the ship on which they embarked sailed. To meet such needs there had been kept at the medical supply depot, New York, a limited number of modified regimental hospital equipments for transport use. These were issued to the first convoy.

The need of a definite transport unit equipment had not been sufficiently great prior to the movement of the first convoy to France to receive much consideration. It became acute at once upon the request of the commander of the port of embarkation, Newport News, Va., early in August, 1917, for unit equipment for 24 transports.² The surgeon of that port, upon instructions from the Surgeon General, submitted a list of equipment in quantities thought to be sufficient for 1,000 troops or a lesser number. For larger vessels the quantities could be augmented as necessary.³ The transport unit equipment as adopted for this port is quoted below.⁴ Instructions were issued by the Surgeon General, August 20, 1917, to the medical supply depots at New York and Washington, to forward to the medical supply officer at Newport News the required quantities of the articles enumerated in the list for 24 transports.⁵ Smallpox vaccine, triple typhoid vaccine, and other biologicals were added in such quantities as the surgeon, port of embarkation, Newport News, deemed necessary.

MEDICINES, ANTISEPTICS, AND DISINFECTANTS				
Aether, ¼ pound in tin	tins..	24	Dakin's solution tablets.....	number.. 500
Alcohol, denatured, 2 quarts in tin.....	do....	8	Liquor cresolis compositus, 1 quart in bottle	bottles.. 3
Argyrol (or equivalent), 1 ounce in bottle...	bottle..	1	Liquor formaldehydi (37½ per cent) 1 quart bottle	bottles.. 12
Chloroform, ¼ pound in tin	tins..	24	Magnesii sulphas, 4 pounds in tin.....	tins.. 4

Normal saline solution tablets (par. 902), 100 in wide-mouth bottles.....bottles..	1	Litters with slings.....number..	4
Protargol (or equivalent), 1 ounce in bottle..do....	6	Mattress covers.....do....	24
Sodii carbonas monohydratus, for surgical use, 1 pound, in wide-mouth bottles.....bottles..	1	Mattresses, hair in three equal parts.....do....	24
Spiritus ammoniæ aromaticus, ½ pound in glass-stopper bottle.....bottles..	4	Medicine glasses.....do....	12
Unguentum hydrargyri, ½ pound in wide-mouth bottle.....bottles..	2	Mops:	
Unguentum hydrargyri chloridi mitis, 30 per cent, 2 pounds in jar.....jars..	1	Handles for.....do....	3
MISCELLANEOUS SUPPLIES		Heads for.....do....	6
Applicators for throat, wood.....gross..	2	Muslin, unbleached.....yards..	24
Bags, rubber:		Pails, white enamel.....number..	3
Hot-water.....number..	6	Pajamas:	
Ice, for head.....do....	3	Coats.....do....	60
Basins, hand, white enamel.....do....	6	Trousers.....do....	60
Blankets, rubber.....do....	48	Pans, dust.....do....	1
Do.....do....	12	Pillowcases, cotton.....do....	48
Brooms:		Pillows, hair.....do....	24
Corn.....do....	2	Pus basins.....do....	3
Hair, long handle, for floors.....do....	1	Sheets, cotton.....do....	72
Brushes:		Soap, Ivory.....cakes..	72
Hair, counter (brushes, hair, for floors)..do....	1	Stoves, alcohol.....number..	1
Scrubbing.....do....	6	Surgical dressings (par. 955).....boxes..	2
Buckets, galvanized-iron.....do....	3	Sutures:	
Case:		Catgut—	
Emergency (par. 913).....do....	1	Chromicized, sterilized, 18 inches, in tube, assorted sizes.....tubes..	50
General operating (par. 916).....do....	1	Plain, sterilized, 18 inches, in tubes, assorted sizes.....tubes..	50
Chests:		Silk, braided, sterilized, 18 inches, 3 sizes, in package.....packages..	50
Medical and Surgical (par. 932).....do....	1	Silkworm gut, 100 in coil.....coils..	10
Supplementary (par. 933).....do....	1	Silver wire, in yard lengths.....yards..	10
Chest, sterilizer (par. 935).....do....	1	Syringes:	
Cotton, absorbent, in roll.....pounds..	20	Glass, Luer type, 2 c. c. (for antityphoid vaccination).....number..	4
Cups:		Luer 30 c. c., with 2 steel needles and 1 spinal puncture needle.....number..	2
Feeding.....number..	3	Extra needles for.....dozen..	1
Spit, white enamel.....do....	24	Penis, glass, in case.....number..	63
Desk, field, No. 1 (par. 940).....do....	1	Thermometers, clinical.....do....	12
First-aid packets for shell wounds (par. 946).....do....	100	Towels;	
Gauze, plain.....yards..	500	Bath.....dozens..	6
Gowns, operating.....number..	6	Hand.....do....	12

A somewhat more elaborate equipment, including a combination water, instrument, dressing, and utensil sterilizer set, was adopted at the port of embarkation, Hoboken, N. J.⁶

After varying experiences in providing the different transports and types of transports with initial equipment and replenishments, the surgeon of the port appointed a board of medical officers in the fall of 1918 to study the situation and compile a list of medicines and other supplies and equipment for transports. The situation by this time had materially changed. The wounded and sick with the American Expeditionary Forces were beginning to return to the United States in ever-increasing numbers. To the equipment required for the minor ailments arising among troops embarking for the front was added equipment and supplies to care for the wounded returning from the front. The equipment was sufficient to provide sterile dressings and to permit such operations as might be required among that class of patients.⁷ The list of equipment and supplies finally adopted appears below.

It may be stated here, in passing, that there were three types of troop transports in use: Vessels belonging to the Army Transport Service, manned by Army (military and civilian) personnel; vessels taken over or furnished by

the Shipping Board and manned by naval crews; private vessels chartered, as obtainable, for one or more trips, manned by private crews, or personnel who manned them while in commercial trade.

Medical and surgical supplies for the sick and injured of the troops in transit on ships of the Navy admitted to the sick bay or hospital of the ship were furnished by the Bureau of Medicine and Surgery of the Navy. Medical and surgical supplies required by medical officers of the Army in holding sick call and caring for minor ailments not requiring hospitalization were furnished by the Medical Department of the Army. In case a deficiency of Army medical supplies developed en route, the necessary supplies to make up the shortages were issued from the ship's stores.⁸

Transport unit equipment, medical, 1918

SURGICAL UNIT	STATIONERY
Acidum boricum, 324-mgm. tablets, 500 in bottle bottles.. 1	Bands, elastic .....dozen.. 2
Acidum nitraicum, ½ pound in bottle..... do.... 1	Books, blank:
Adrenalin chloride, 1 mgm. tablets, 20 in tube tubes.. 5	Crown (cap), 250 pages.....number.. 1
Ether, ¼ pound in tin.....tins.. 10	8vo, 150 pages.....do.... 1
Ethylis chloridum, 3 ounces in metal tube.....tubes.. 5	Envelopes, official, letter, .....do.... 100
Aleobol, 1 quart in bottle.....bottles.. 3	Ink, black (powder or tablets), sufficient in box for 1 quart of fluid.....boxes.. 1
Amylis nitrus, 5-drop spirets, 12 in box.....boxes.. 1	Pads, prescription.....number.. 1
Aqua hydrogenii dioxidii, 1 pound in bottle.....bottles.. 2	Paper:
Argenti nitras fusus, 1 ounce in bottle.....do.... 1	Blotting, for desks.....sheets.. 2
Argyrol, 1 ounce in bottle.....do.... 1	Writing, letter.....quires.. 2
Balsamum Peruvianum, ¼ pound in bottle.....bottles.. 1	Penholders.....number.. 2
Chloroformum, ¼ pound in tin.....tins.. 5	Pens, steel.....do.... 12
Cocaine hydrochloridum, 10-mgm. hypodermic tablets, 20 in tube.....tubes.. 5	MISCELLANEOUS
Collodim, 1 ounce in bottle.....bottles.. 3	Applicators, for throat, wood.....gross.. 1
Emplastrum belladonnae, 2 yards by 6 inches, in tin.....tins.. 1	Atomizers, hand.....number.. 1
Foot powder (par. 902), ¼ pound in tin.....do.... 3	Bags, rubber, hot water.....do.... 2
Glycerinum, 1 pound in bottle.....bottles.. 2	Bandages:
Hydrargyri chloridum corrosivum tablets, 250 in bottle.....bottles.. 2	Gauze, roller, assorted, 6 dozen in box.....boxes.. 2
Hydrargyri chloridum mite, 2 ounces in bottle.....bottles.. 1	Plaster of Paris.....number.. 12
Iodum potassii iodidum, in tube.....tubes.. 20	Suspensory.....dozen.. 1
Liquor cresolis compositis, 1 quart in bottle.....bottles.. 1	Basins, white enamel, for operating room.....number.. 2
Liquor formaldehydi (37½ per cent), 1 quart in bottle.....bottles.. 1	Bath robes (gowns, convalescent).....do.... 25
Normal saline solution tablets, 100 in bottle.....bottles.. 2	Bedpans, white enamel.....do.... 1
Petrolatum, 3 pounds in tin.....tins.. 1	Boilers, instrument.....do.... 1
Petrolatum liquidum, 1 pound in bottle.....bottles.. 1	Brushes, hand, fiber.....do.... 3
Phenol, ½ pound in bottle.....do.... 1	Cases, general operating (par. 916).....do.... 1
Sapo mollis (green soap), 1 pound in jar.....jars.. 2	Cotton, absorbent, in roll.....pounds.. 10
Sodii carbonas monohydratus for surgical use, 1 pound in bottle.....bottles.. 1	Cotton bats.....do.... 1
Spiritus ammonia aromaticus, ½ pound in bottle.....bottles.. 1	Crinolin (stenta-book), 6 yards in piece.....pieces.. 1
Spiritus frumenti, 1 quart in bottle.....do.... 1	Crutches.....pairs.. 1
Sulphur lotum, ½ pound in bottle.....do.... 1	Rubber tips for, size No. 18 (¾-inch).....number.. 4
Talcum, 2 pounds in tin.....tins.. 1	Cnps:
Unguentum hydrargyri chloridi mitis, 2 pounds in jar.....jars.. 1	Feeding.....do.... 1
Zinci oxidum, ¼ pound in bottle.....bottles.. 1	Spit, paper.....do.... 100
	Metal frames for.....do.... 6
	Cushions, surgical, Kelly's.....do.... 1
	Gauze, plain.....yards.. 250
	Gloves, rubber.....pairs.. 4
	Gowns, operating.....number.. 6
	Graduates, glass, 250-c. e.....do.... 1
	Inhalers, ether.....do.... 1
	Litters, with slings.....do.... 2
	Medicine droppers.....dozen.. 1
	Medicine glasses.....number.. 1
	Pajamas:
	Coats.....do.... 25
	Trousers.....do.... 25

Pillowcases, cotton.....	number.....	12
Pins, safety.....	dozen.....	3
Pitchers, white enamel.....	number.....	1
Plaster, adhesive, zinc oxide, 5 yards by 2½ inches.....	spools.....	12
Plaster of Paris, 4 pounds in tin.....	tins.....	1
Pus basios.....	number.....	1
Sheets, cotton.....	do.....	12
Shirts, cotton.....	do.....	6
Slippers.....	pairs.....	25
Soap, Ivory.....	cakes.....	6
Sterilizers, for dressings.....	number.....	1
Stethoscopes, double.....	do.....	1
Stoves, coal-oil.....	do.....	1
Extra wicks for.....	do.....	1
Sutures, catgut, chromicised, 1 suture in tube.....	tubes.....	24
Syringes, glass, Luer type, 10-c. e.....	number.....	1
Tables, operating, field-folding.....	do.....	1
Tongue depressors, wood.....	gross.....	2
Towels, hand.....	number.....	36
Trays, instrument, white enamel.....	do.....	1
Tubes, drainage, rubber, in yard lengths, 3 sizes.....	yards.....	3
Tubes, stomach.....	number.....	1
Urinals, glass, graduated.....	do.....	1
Paper, litmus;		
Blue, 100 strips, in vial.....	vial.....	1
Red, 100 strips, in vial.....	do.....	1
Test tubes.....	dozen.....	1
Urinometers.....	number.....	1

ADDITIONAL (FIELD)

Chest, medical and surgical (par. 932) (less case, operating, small; case, forceps hæmostatic).....	number.....	1
Head mirror in case (par. 933).....	do.....	1
Speculum, ear, 3 in set.....	set.....	1
Acidum borieum powder, ½ pound in bottle.....	bottles.....	1
Adrenalin chlorid, 1-mgm. tablets, 25 in tube.....	tube.....	1
Aether, ¼ pound in tin.....	tins.....	8
Alcohol, 1 quart in bottle.....	bottles.....	2
Apomorphinæ hydrochloridum, 6-mgm. tablets, 20 in tube.....	tube.....	1
Argyrol, 1 ounce in bottle.....	bottles.....	1
Aspirin, 324-mgm tablets, 500 in bottle.....	do.....	2
Argenti nitras fusus, 1 ounce in bottle.....	do.....	1
Atropinæ sulphas, 0.65-mgm. hypodermic tablets, 20 in tube.....	tubes.....	2
Bismuth subnitras, 324-mgm. tablets, 500 in bottle.....	bottles.....	1
Chloralum hydratum, 324-mgm. tablets, 500 in bottle.....	bottles.....	1
Chloroformum, ¼ pound in tin.....	tins.....	2
Cocaine hydrochloridum, 10-mgm. hypodermic tablets, 20 in tube.....	tubes.....	2
Cocaina, 324-mgm. tablets, 500 in bottle.....	bottles.....	2
Collodium, 1 ounce in bottle.....	do.....	2
Digitalinum, 1-mgm. hypodermic tablets, 20 in tube.....	tubes.....	1
Glycerinum, 1 pound in bottle.....	bottles.....	1
Hexamethyleamonia, 324-mgm. tablets, 500 in bottle.....	bottles.....	1
Hydrargyri chloridi corrosivum, tablets, 500 in bottle.....	bottles.....	1
Hydrargyri chloridum mite, 32-mgm. tablets, 500 in bottle.....	bottles.....	1

Hyoscine hydrobromidum, 0.65-mgm. hypodermic tablets, 20 in tube.....	tube.....	1
Iodium-potassii iodidum, in tube, 10 tubes in box.....	box.....	1
Liquor formaldehydi (37½ per cent) 1 quart in bottle.....	bottles.....	1
Magnesi sulphas, 4 pounds in tin.....	tins.....	4
Misturæ glycyrrhizæ compositæ, tablets, 1,000 in bottle.....	bottles.....	1
Morphinæ sulphas, 8-mgm. hypodermic tablets, 20 in tube.....	tubes.....	4
Nitroglycerin, 0.65-mgm. hypodermic tablets, 20 in tube.....	tube.....	1
Normal saline solution tablets, 100 in bottle.....	bottles.....	1
Oleum caryophylli, 1 ounce in bottle.....	do.....	1
Phenylis salicylis, 324-mgm. tablets, 500 in bottle.....	bottles.....	1
Pilulæ eantharticæ compositæ, tablets, 500 in bottle.....	bottles.....	4
Pilulæ camphoræ et opii, 25 in box.....	box.....	1
Potassii bromidum, 324-mgm. tablets, 500 in bottle.....	bottles.....	1
Potassii iodidum, 324-mgm. tablets, 500 in bottle.....	bottle.....	1
Protargol or equivalent, 1 ounce in bottle.....	do.....	2
Pulvis ipecacuanhæ et opii, 324-mgm. tablets, 500 in bottle.....	bottles.....	1
Quininæ sulphas, 200-mgm. tablets, 1,000 in bottle.....	bottle.....	1
Sodii bicarbonas, 324-mgm. tablets, 1,000 in bottle.....	bottles.....	1
Sodii salicylas, 324-mgm. tablets, 500 in bottle.....	bottles.....	1
Spiritus ammoniæ aromaticus, ½ pound in bottle.....	bottles.....	1
Strychninæ sulphas, 1-mgm. hypodermic tablets, 20 in tube.....	tubes.....	4
Trochisci ammonii chloridi, 100 in bottle.....	bottles.....	4
Unguentum hydrargyri. ½ pound in bottle.....	bottles.....	2
Unguentum hydrargyri chloridi mitis, 30 per cent, ½ pound in bottle.....	bottles.....	2

STATIONERY

Envelopes, official, letter.....	number.....	25
Paper:		
Letter—		
Typewriter.....	quire.....	1
Manifolding.....	do.....	1
Carbon, letter.....	sheets.....	4

MISCELLANEOUS

Medicine droppers.....	dozen.....	½
Pins, safety.....	do.....	1
Sutures, catgut, plain, sterile, 3 sizes in package.....	packages.....	6
Syringes, penis, glass, in wooden box.....	number.....	12
Thermometers, clinical.....	do.....	2
Needles, curved, surgical.....	do.....	4
Brushes, hand, fiber.....	do.....	1
Plaster, adhesive, zinc oxide, 2½ inches by 6 yards, on spool.....	spools.....	4
Cotton, absorbent, 1 pound in roll.....	rolls.....	3
Gauze, plain, 25 yards in roll.....	do.....	2
Bandages, gauze, roller, 6 dozen in box.....	boxes.....	2
Tongue depressors, wooden.....	number.....	100
Tags, diagnosis, in book.....	book.....	1
Applicators for throat, wood.....	number.....	50

DENTAL EMERGENCY OUTFIT B

MEDICINES

Adrenalin chlorid, 1-mgm. tablets, 20 in tube.....tubes.....	1
Cocaine hydrochloridum, ¼ ounce, in wide-mouth bottle.....bottles.....	1
Cresol, 1 pound in bottle.....do.....	1
Eugenol, 1 ounce in bottle.....do.....	1
Phenol, camphorated, ½ pound in bottle.....do.....	1
Tinctura aconiti, 1 ounce in bottle.....do.....	1
Tinctura iodi, 4 ounces in glass-stopper bottle.....bottle.....	1
Novocain, 50-mgm. hypodermic tablets (or equiv- alent).....number.....	10

BLANK FORMS

Register of dental patients card, Form 79.....number.....	150
Report of dental work, Form 57.....do.....	12

INSTRUMENTS AND APPLIANCES

Cases, office, preparation, extra ½-ounce glass- stopper bottles for.....number.....	6
Chisels, 3, 48, of each.....do.....	1
Cleaners, root-canal, Donaldson's or S. S. W., No. 5, all fine, in package.....packages.....	4
Elevators, Knott's type, right and left, metal handle of each.....number.....	1
Elevators, No. 3, metal handle.....do.....	1
Engine instruments for hand piece No. 7: Burs, round 4, 6, 8, 9 of each.....do.....	1
Drills, 100, 103, of each.....do.....	1
Excavators, Black's cutting instruments Nos. 57, 58, 63, 64, 81, 83, of each.....number.....	1
Explorers, L. H., 11, 12, 18, of each.....do.....	1
Forceps, tooth-extracting, 15, 18R, 18L, 65, 150, 151, of each.....number.....	1
Holders, for cotton, Methot's type.....do.....	1
Hones, oil, Arkansas stone, in wooden box.....do.....	1
Lanets, abscess, metal handles, octagon, No. 2.....number.....	1
Mirrors, mouth: Aluminum handles, No. 4.....do.....	2
Extra glasses for, size No. 4, plain.....do.....	2
Pliers, dressing, No. 17.....do.....	2
Pluggers, amalgam, Woodson's 1, 2, 3, of each.....number.....	1
Sealers, L. H. No. 3.....do.....	1
Scissors, gum, curved on flat, No. 22.....do.....	1
Slabs, mixing, glass No. 6.....do.....	1
Spatulas No. 24.....do.....	1
Syringes: Hypodermic-- All metal, dental, 172A.....do.....	12
Extra needles for, straight and curved, of each.....number.....	12
Extra needles for conductive anesthesia (Fisher's type).....number.....	12
Extra hubs for, of each.....do.....	1
Water-- 21A.....do.....	1
21Z, extra bulbs for.....do.....	1

MISCELLANEOUS

Sandarac, gum, varnish, 2 ounces in bottle.....bottles.....	1
Soap, Ivory.....cakes.....	12
Towels, hand.....number.....	6
ADDITIONAL ARTICLES	
Bit (burr) holder revolving head.....number.....	1
Case, dental, emergency "B".....do.....	1
Cement, temporary, Calxino or equivalent.....box.....	1
Tray, white enamel, sterilizing, 9 by 6 by 3, with cover.....number.....	1
SERA AND VACCINE UNIT	
Smallpox vaccine.....units.....	1,000
Lipo typhoid vaccine.....c. e.....	100
Antimeningitis serum.....do.....	480
Diphtheria antitoxin.....units.....	100,000
Tetanus antitoxin.....do.....	15,000

BLANK FORMS

COMMERCIAL TROOP

Form No. M. D.:	
47a.....number.....	4
50.....do.....	2
51.....do.....	4
51a.....do.....	4
51b.....do.....	4
52.....do.....	200
55a.....do.....	50
55e.....do.....	50
55d.....do.....	50
55c.....do.....	50
55g.....do.....	50
55h.....do.....	50
55j.....do.....	50
55m.....do.....	10
56.....do.....	10
57.....do.....	50
71.....do.....	4
75.....do.....	50
76.....do.....	50
77.....do.....	50
78.....do.....	10
79.....do.....	50
81.....do.....	100
48 Q. M.....do.....	50

NAVAL TROOP

Form No. M. C.:	
41a.....number.....	4
51.....do.....	4
51a.....do.....	4
51b.....do.....	4
52.....do.....	200
56.....do.....	10
71.....do.....	2
75.....do.....	50
76.....do.....	50
77.....do.....	50
78.....do.....	10
81.....do.....	100
48 A. M.....do.....	24

ARMY CARGO

Form No. M. D.:	
17.....number.....	4
17a.....do.....	50
17b.....do.....	50
17c.....do.....	4
28.....do.....	12
35.....do.....	6
50.....do.....	6
48 Q. M.....do.....	24

Form No. M. D.:	ARMY TROOP	Form No. M. D.—Continued.	
17.....	number	55d.....	number
17a.....	do	55e.....	do
17b.....	do	55g.....	do
17c.....	do	55b.....	do
28.....	do	55j.....	do
35.....	do	55m.....	do
47a.....	do	56.....	do
50.....	do	71.....	do
51.....	do	75.....	do
51a.....	do	76.....	do
52.....	do	77.....	do
55a.....	do	78.....	do
55b.....	do	81.....	do
55c.....	do	48 Q. M.....	do

REFERENCES

- (1) Paragraph 4, Cablegram 211, Headquarters, American Expeditionary Forces, Chaumont, to The Adjutant General, October 10, 1917. On file, Finance and Supply Division, S. G. O., Cable Files.
- (2) Letter from the commanding officer, Port of Embarkation, Newport News, Va., to the Chief of Embarkation Service, August 2, 1917. Subject: Medical supplies for transports. On file, Finance and Supply Division, S. G. O., 583-538 NN.
1
- (3) Letter from the surgeon, Port of Embarkation, Newport News, Va., to the Surgeon General, U. S. Army, August 7, 1917. Subject: Tentative list of supplies for Army transports. On file, Finance and Supply Division, S. G. O., 583-538 NN.
1
- (4) Medical and Surgical Unit for Transport. On file, Finance and Supply Division, S. G. O., 583-538 NN.
1
- (5) Letters from the Surgeon General, U. S. Army, to the officer in charge, medical supply depot, New York City, and Washington, D. C., August 20, 1917. Subject: Issues of supplies to Newport News, Va. On file, Finance and Supply Division, S. G. O., 583-538 NN.
1
- (6) Correspondence between the surgeon, Port of Embarkation, Hoboken, N. J., and the Surgeon General, U. S. Army, November and December, 1917. Subject: Transport equipment. On file, Finance and Supply Division, S. G. O., 583-340 Emb. H.
48
- (7) Correspondence between the Surgeon General, U. S. Army, and surgeons, Ports of Embarkation, Hoboken, N. J., and Newport News, Va., during October, 1918. Subject: Medical supplies for troop ships. On file, Finance and Supply Division, S. G. O., 583-Misc.
5
- (8) Correspondence between the War and Navy Departments in November, 1917. Subject: Provision of medical and surgical supplies to forces of the Army embarked on ships of the Navy acting as transports. On file, Finance and Supply Division, S. G. O., 530-714.
1

CHAPTER XLV

TERMINATION OF ACCOUNTABILITY FOR SUPPLIES SENT TO THE AMERICAN EXPEDITIONARY FORCES

Accountability for public property and the rendering of formal returns therefor had been a fixed principle in Army procedure for more than a century prior to 1917. In time of peace accountability had been rigidly enforced and returns of exactness required. In the early shipments of supplies to the American Expeditionary Forces in France the question arose concerning the liberality which might be allowed in accounting for medical and hospital supplies and the point at which it should terminate. It was foreseen that, not only would there be the hazards of wastage and loss incident to actual combat, but, because of the distance from the home territory and the length of the water lane the supplies must traverse, there would be the extra hazards of the sea and the ever-present submarine menace. Delays in delivery of the supplies to the supply depots of the Medical Department with the American Expeditionary Forces would be inevitable. If the officers in charge of those depots were to be held to a strict accountability for all the supplies invoiced from the home territory, great waste of time, energy, and effort would result from the multitude of surveys and correspondence incident to the adjustment of discrepancies between the quantities invoiced and received. The overseas depots would be taxed to the utmost in delivering supplies at the time and place, and in the quantities needed. Shipments would arrive at many ports and turn up at unexpected places.

The Surgeon General early decided, therefore, that it was impracticable and unnecessary to extend the peace time requirements of accountability to the American Expeditionary Forces. Such property as was actually received could be taken up by the supply officers and distributed and accounted for as the interests of the service demanded.

This decision to exempt the American Expeditionary Forces from the requirements of peace-time accounting gave rise to the question when, where, and how accountability of the issuing officers in the home territory would cease for supplies sent overseas. The appropriate place appeared to be the port of embarkation, and the time the date of loading on board the issue designated to transport the supplies. The manner did not appear so easy of determination. The surgeon, port of embarkation, Hoboken, on August 13, 1917, proposed that all medical property going to France be consigned and invoiced to the medical supply officer at the port who, in turn, would prepare the necessary shipping invoices, transfer the property to the general superintendent, Army Transport Service, upon notification that cargo space was available, and furnish the Surgeon General a copy of the packer's list or

shipping invoices.¹ This establishment of accountability at the port of embarkation did not appear to be necessary. It added another return to be rendered, examined and settled with all the attendant correspondence, and did not in any wise simplify the procedure. Consequently, the Surgeon General directed, in August, 1917, that the issuing officer was to formally invoice the property to the medical supply officer of the American Expeditionary Forces and distribute the copies of the invoice-receipt in the usual manner. The invoice was to serve as a notice to the medical supply officer of the American Expeditionary Forces of the supplies en route, to be picked up and accounted for in the manner prescribed by the commander in chief, A. E. F. A copy of the packer's list and the original, or memorandum, bill of lading were to be sent to the medical supply officer of the port to which the supplies were forwarded.² Upon arrival of the shipment the invoicing officer was notified.³ When the supplies were loaded on board the ship the Surgeon General was furnished a list of the supplies so loaded and the name and invoice number of the issuing officer.⁴ This report was accepted as a voucher to the issuing officer's return, and the account was closed.

All supply bureaus apparently did not follow the same method in terminating accountability of supplies consigned to the American Expeditionary Forces. Under date of June 3, 1918, the following instructions were issued by the War Department:⁵

* * * * *

3. Supplies intended for shipment overseas will be invoiced to the proper port supply officer, and the accountability for such supplies will cease when they are delivered to the Embarkation Service at the port concerned, port supply officers filing with their returns proper evidence of that fact. Accountability for Engineer supplies may be dropped when turned over to a common carrier, as previously authorized in instructions of December 29, 1917, in which case the Engineer port supply officer will have responsibility only for the property after receipt and until delivered to the embarkation service at the port, or, at the discretion of the supply officer, general Engineer depot, they may be invoiced to the Engineer port supply officer as in other bureaus, in which case they will be accounted for and dropped as specified for other bureaus.

4. Bureau chiefs charged with the administrative examination and settlement of property accounts may accept as proper vouchers to returns certified invoices, accompanied by sufficient evidence from embarkation supply officers that the property enumerated on such certified invoices has actually been shipped overseas.

5. Port supply officers will furnish the chiefs of their respective bureaus overseas with itemized lists of all property shipped abroad. These lists will be used to form the basis for the preparation of such returns and the establishment of such methods of property responsibility and accountability as, in the discretion of the commanding general, A. E. F., may be necessary and practicable in the premises. Chiefs of supply bureaus will empower representatives on the staff of the commanding general, A. E. F., to act in their names in all matters connected with the examination and settlement of property accountability in Europe which, under the Army Regulations, are required to be performed by chiefs of bureaus of the War Department. In like manner the Secretary of War empowers the commanding general, A. E. F., to act in his name in all matters of property accountability in Europe which, under the Army Regulations, are required to be performed by the Secretary of War.

6. Supplies intended for oversea shipment through a port other than a primary port of embarkation will be shipped to the port quartermaster thereof, and accountability therefor

will be dropped by the accountable officer on filing with his return certified invoices accompanied by proper evidence from the port quartermaster that the supplies have been shipped overseas. The itemized lists called for in paragraph 5 will be sent to chiefs of bureaus overseas by the port quartermaster.

7. Supplies turned over to the embarkation service for shipment overseas will be in the hands of that service until delivered to the Government representatives at ports of debarkation abroad, and in case of loss or damage during that time, such proceedings and papers as may be necessary to protect the interest of the Government and to fix the responsibility for such loss or damage will be the duty of the embarkation service. Receipted copy of manifest showing delivery of supplies abroad will be considered sufficient evidence to relieve the embarkation service of further responsibility for such supplies.

These instructions established definitely accountability at the port and imposed upon the port medical supply officer the obligation of rendering periodic returns of medical property passing through the port. The question of how the accountability would terminate at the port was revived and forms of receipts by the embarkation service were worked out. The final result was a combination invoice and receipt form in letter size which was attached to the face of the packer's list of articles in each consignment for loading. One copy was furnished the Surgeon General and the duplicate was retained as credit vouchers to the return of the port supply officer. This method of accounting at the ports of embarkation continued practically unchanged until the cessation of hostilities when the need for it likewise terminated.

REFERENCES

- (1) Copy of a proposed indorsement from the Surgeon, Port of Embarkation, Hoboken, N. J., to the Commanding General of that port, relative to the port medical supply depot, Pier 45, North River, New York, August 13, 1917. On file, Finance and Supply Division, S. G. O., $\frac{583-340}{4}$.
- (2) Letter from Maj. Edwin P. Wolfe, M. C., S. G. O., to Col. J. M. Kennedy, M. C., Hoboken, N. J., August 16, 1917, on policy of handling medical supplies at that port. On file, Finance and Supply Division, S. G. O., $\frac{583-340}{4}$.
- (3) Letter from the medical supply officer, Pier 45, North River, New York, to the Surgeon General, December 19, 1917. Subject: Form letters. On file, Finance and Supply Division, S. G. O., $\frac{583-539}{58}$.
- (4) Various reports of shipments of medical supplies overseas, rendered by the port medical supply officer, Pier 45, North River, New York, August to December, 1917, inclusive. On file, Finance and Supply Division, S. G. O., 583-539, general number.
- (5) G. O. No. 54, W. D., June 3, 1918.

SECTION X

MEDICAL SUPPLIES, AMERICAN EXPEDITIONARY FORCES

CHAPTER XLVI

ORGANIZATION AND ACTIVITIES OF THE SUPPLY DIVISION, CHIEF SURGEON'S OFFICE

On June 13, 1917, the office of the chief surgeon, A. E. F., was established in Paris, the location of General Pershing's headquarters.¹ On the staff of the chief surgeon was a medical officer who was detailed to supervise supply matters. At that time there were practically no American troops in France, and no supplies. The immediate concern of the chief surgeon, A. E. F., so far as supplies were concerned, was to determine the location of a suitable medical supply depot, to establish it, and to determine the possibilities of the European market.

On July 8, 1917, the first depot in France was established at Cosne, and operated under the direct supervision of the chief surgeon, A. E. F.² One of the other assistants of the chief surgeon was detailed to do the purchasing of medical supplies, in addition, however, to other duties.

On July 18, 1917, the office of the chief surgeon, base group and Line of Communications, was constituted.³ To this office certain of the supply functions of the Medical Department were assigned, including jurisdiction of the depot at Cosne.

At this time and until the removal of the chief surgeon, A. E. F., and his office to Chaumont, on September 1,⁴ the two offices were in the same building in Paris so that there was no distinct line of demarcation between them; the chief surgeon, Line of Communications, was, in effect, in addition to his other duties, the supply officer of the chief surgeon, A. E. F.

In August, 1917, the chief surgeon requested the assignment of the six regular medical officers who had been on duty as adjutants in the base hospitals, attached to the British Expeditionary Force. Two of these officers were assigned to the office of the chief surgeon, A. E. F., and four to the office of the chief surgeon, Line of Communications.⁵ Of these latter, one was detailed as supply officer, reporting August 22, 1917.

It will be remembered that at this time there was but one depot in France, that at Cosne, that the American forces were comparatively few in number but that the American activities were beginning to be widespread and that, therefore, many small organizations had to be supplied.

During this period, distribution of medical supplies to the forces was under the immediate jurisdiction of the chief surgeon, Line of Communications. Procurement was under the chief surgeon, A. E. F. It was, however, the

responsibility of the chief surgeon, Line of Communications, to determine and present his requirements to the chief surgeon, A. E. F. The initiation of these requests, he had delegated to the officer in charge of the medical supply depot at Cosne.

Purchases in France were being made by the purchasing officer, Medical Department, who was under the chief surgeon, A. E. F.

On September 1, 1917, the chief surgeon's office, A. E. F., was transferred to Chaumont.⁴ This separation of the two offices prevented that personal conference that had theretofore existed and which had enabled the chief surgeon, Line of Communications, to act on all matters of supply in the Medical Department. The chief surgeon, Line of Communications, was not only separated from the chief surgeon, A. E. F., but also from general headquarters, A. E. F.

Many duties pertaining to supply were retained at general headquarters, A. E. F., under the provisions of General Orders, No. 43, H. A. E. F., 1917, and supervision thereover was assigned by General Orders, No. 8, H. A. E. F., to the members of the general staff at those headquarters. These duties pertained particularly to tonnage, to procurement in France, and from the United States, and those connected with the supply of front line troops.

After the physical separation of the two offices, the delegation to the chief surgeon, Line of Communications, of the entire function of medical supply up to the combat troops, which had been planned in Field Service Regulations and the Manual for the Medical Department, was not possible.

Almost necessarily, the chief surgeon, A. E. F., had to consider and dispose of in his own office, certain questions concerning medical supplies, questions over which the general staff at general headquarters, retained supervision, or questions which by general orders were devolved upon him.

The organization remained as before until shortly after November 8, 1917. On that date, an officer was ordered into the chief surgeon's office at Chaumont, and upon his arrival a supply division was established in that office.⁶

Authority in the function of medical supply was thereafter divided between two offices, and it is apparent that difficulties were encountered. The exact demarcation between the functions assigned to the two offices was probably never clearly understood alike in the two offices. In the matter of distribution and in the matter of procurement from the United States, there was a lack of clear understanding as to the division of responsibility. For example, as regards distribution: Requisitions from units on the line of communications desiring medical supplies came to the chief surgeon, Line of Communications, were acted upon in his office, and sent to the medical supply depot at Cosne for issue.⁷ Requisitions for medical supplies from divisions presumably were to be sent to the respective division surgeon, acted upon by him and sent direct to the depot designated by the commanding general, Line of Communications.⁷ However, requisitions from divisions were sent, not perhaps by order, but possibly because of some indefiniteness in that order, and possibly by reason of the proximity of the divisions to the chief surgeon's office at Chaumont, to that office and there were acted upon, being sent to the depots, or in some cases, to the American Red Cross. Direct correspondence between

the depots and the supply division in the chief surgeons, office, A. E. F., resulted, not only in connection with these requisitions, but in connection with the available stock and prospective needs. Shipping directions were given the depot direct.⁷

The chief surgeon, Line of Communications, being a staff officer of the commanding general, Line of Communications, derived his authority from that commander; however, General Orders, Nos. 8, 43, and 73, H. A. E. F., 1917, removed from the commanding general, Line of Communications, responsibility for the supervision and coordination of certain functions of supply and placed it upon the general staff at general headquarters, A. E. F.^a

In so far as procurement of medical supplies from the United States was concerned, requisitions either written or cabled, had to pass through general headquarters, A. E. F., and necessarily had to have the action of the chief surgeon, A. E. F. Many questions arising in the general staff at general headquarters, A. E. F., concerning Medical Department tonnage or equipment, were referred to the chief surgeon's office and were definitely disposed of there.

On the other hand, notwithstanding the fact that the Medical Department purchasing officer, A. E. F., was under the chief surgeon, A. E. F., more and more that officer depended upon the chief surgeon, Line of Communications, for instructions and authority.⁸ This was occasioned by the removal of the chief surgeon, A. E. F., to Chaumont. Thus gradually, tacitly at first, the purchasing officer came under the jurisdiction of the chief surgeon, Line of Communications.

During this period, however, purchase orders, particularly of new types, developed in France, were placed by direct order of the chief surgeon, A. E. F. The Allies, and even the American Red Cross, which had had some years of experience in the type of warfare to be met, preferred to deal with the staff of the commander in chief, and their recommendations, therefore, were first known to the chief surgeon, A. E. F. There resulted, naturally, some duplication of effort and some confusion.

Apparently, in the chief surgeon's office, A. E. F., Line of Communications, there was an intention and desire to charge the chief surgeon, Line of Communications, so far as possible, with distribution throughout the American Expeditionary Forces, and with procurement from the United States. The difficulties encountered resulted from the departure in practice from the intended precept, and, as has been shown, these practices were the natural result of the orders issued by higher authority.

In the chief surgeon's office, Line of Communications, the understanding was that he was charged with the initiation of requests for medical supplies upon the United States; that procurement was to be handled by the chief surgeon, A. E. F.; that the chief surgeon, Line of Communications, was charged with distribution to Line of Communications units; that requisitions from the combat zone would be acted upon in the chief surgeon's office, A. E. F.

In the matter of the medical supply of combat troops, in training areas near the front, or in line, it was oftentimes essential that action be taken in the

^a See Appendix, for promulgations, General Headquarters, A. E. F., concerning the procurement and distribution of supplies.

chief surgeon's office, A. E. F. It was there that the condition of supply in these units was known; it was there that early information as to prospective changes in equipment or prospective moves was obtainable; and it was there that the necessary authority to move the required supplies was obtainable.

This was of even greater importance in the later period of combat, and as will be seen below, remained an essential after the separation of the chief surgeon, A. E. F., from general headquarters.

On January 13, 1918, the office of the chief surgeon, Line of Communications, was moved from Paris to Tours,² the ultimate location of the office of the chief surgeon, A.E.F.

On March 21, 1918, under the provisions of General Orders, No. 31, general headquarters A. E. F., February 16, 1918, the chief surgeon's office, A. E. F., was moved from Chaumont to Tours, and placed under the jurisdiction of the commanding general, Services of Supply. The office of the chief surgeon, Line of Communications, was absorbed in the office of the chief surgeon, A. E. F. However, under the provisions of the same order, there was retained at general headquarters, A. E. F., supervision over certain matters of exceeding importance in the efficient functioning of the Medical Department supply service. These matters were control of the supply of the combat troops, and tonnage from the United States.

It was essential that the Medical Department should be in a position to make representation of its needs in direct conference and while the matter was still under discussion. Therefore, under the provisions of the order, the chief surgeon designated a deputy to represent him at general headquarters, A. E. F., and designated additional medical representatives on the general staff there. Thus, subsequently, although there was but one supply division in the Medical Department, A. E. F., and although as a result there was much improvement, there still remained an organization with which the supply division had no direct contact, but which supervised and controlled matters which gravely affected the supply division. This even after the establishment at headquarters, Services of Supply, of sections of the general staff to deal with these questions, sections with which the supply division did have direct contact. It was not until August 6, 1918, that the commanding general, Services of Supply, was authorized to deal directly with the United States on matters of supply, not involving policy.⁹

The medical representatives attached to the general staff, general headquarters, later became part of it. Orders prepared in the section to which they were assigned were issued from it by the assistant chief of staff and had the authority of the commander in chief.

These medical representatives on the general staff necessarily, because of the absence of the chief surgeon's office from general headquarters, had two functions: One which related to matters properly classed as general staff work, and the other, the proper and adequate connecting up of the chief surgeon's office with the combatant troops.¹⁰ It was only by virtue of the work of these representatives in connection with the second function that the Medical Department had any representation in matters of vital importance to its mission. Much of this work was in connection with the supply of the combat

troops, and it was the only way in which the functions of the Medical Department could have been carried on. However, proper presentation of the chief surgeon's views on many of the questions involved could be made only after detailed study and thorough knowledge and consideration of the entire supply problem and situation. Such study requires a very considerable personnel, and the undesirability of such a force at general headquarters, A. E. F., was one of the determining factors in the assignment of the chief surgeon to headquarters, Services of Supply. Nevertheless, detailed studies of the Medical Department supply situation continued to be made by the chief surgeon's office, at Tours, sometimes differing therefrom to such an extent as to cause confusion.¹¹

PERSONNEL

The personnel assigned to the supply division was always inadequate for the multiplicity of duties which confronted it. This was especially true as to officers, for few medical officers had had supply training. The situation with respect to enlisted men was different: Enlisted personnel was made available in sufficient number for the depots. Many of these men, after a period of duty at one of the established depots, were given commissioned rank and utilized in medical supply work.

The operating depots were made schools of instruction, and from them, as new depots were established, were detached the personnel required. Since the personnel available did not permit the assignment of permanent and temporary personnel, this meant that the detached personnel had to be taken from the active force of the depot which necessarily interfered with the normal working of the depot. This occurred repeatedly at the medical supply depot at Cosne, from which depot a large part of the personnel for Is-sur-Tille, Gievres, Bordeaux, St. Nazaire, and hospital centers and army parks was supplied. From Is-sur-Tille, also, a considerable number of men were sent to army parks and other depots.⁸

Certain units known as medical supply units, consisting of 3 officers and 45 enlisted men, were organized in the United States and sent to the American Expeditionary Forces. There was no time, however, at which that number of men could be spared for any particular depot; the available personnel had to be allotted to a number of depots.⁸ The situation in France, the method of administration, and distribution were different from that in the United States. These units, therefore, were sent to an active depot and there broken up.⁸

Especially in the office of the chief surgeon was the limited personnel for medical supply work evident. From August 22, 1917, to March 21, 1918, there was one Regular officer in the division; from March 21 to November, 1918, there were but two.

In the fall of 1918, steps were taken by the chief surgeon, A. E. F., to increase materially the number of personnel on this duty, in preparation for the problems which it was expected would confront the supply division in 1919.⁸ Experienced officers who had been on other supply duty, for which understudies had been available, were ordered to the chief surgeon's office for administrative duty. Thus, the Medical Department purchasing officer, who

had so covered the European market with orders for medical supplies as to obviate the necessity of placing additional orders for some time, was detailed to this duty, as was the officer in charge of the medical supply depot at Cosne. The division was well prepared at the time the armistice was signed for the work that had been in prospect.

During the entire period previous to this, however, the supply division was materially assisted by medical officers of the several professional specialties, not assigned to supply work.⁸ Following out the policy of decentralization, which will be referred to at length below, the chief surgeon called upon these officers, not only for estimates of future requirements, but in many cases for active efforts in connection with new development or purchase, and sometimes for distribution. That this reliance upon the specialists is the correct procedure, is believed to have been proven by the success of their efforts. The action taken was truly a functional delegation. The success of their professional work was dependent upon an adequate supply of their technical apparatus, and their interest in such supply was therefore intense.

PROCUREMENT

FROM THE UNITED STATES

As a result of its experiences in the Spanish-American War, the Medical Department had developed the practice of making initial shipments to newly established units without requisitions. These shipments were in the form of combat equipments, field hospitals, or base hospitals, and there were always available at the depots a number of these units packed and assembled available for immediate shipment. These units were not single items, but each comprised an assemblage of several hundred items in a proportion that had been determined upon by experience.

In anticipation of the departure, for France, of General Pershing and his staff, the Surgeon General, on May 17, 1917, had made arrangements for the shipment to France, to be used in the medical care of troops soon to follow General Pershing, 4 evacuation hospitals, 1 base hospital, 3 divisional medical reserve units, and the equipments of 3 division surgeon's offices.¹² At the same time the medical supply officer, New York, was directed to ship 60 ward units to complete the equipment.¹³

The Surgeon General's plan was to send to France with each combat division the following medical units and supplies:¹⁴ 4 base hospitals, with 40 extra ward units; 2 evacuation hospitals; 2 field hospitals and 2 ambulance companies extra; 1 division surgeon's office; 1 divisional medical reserve unit; 50 ambulances; 1,000 litters extra; 6 months' replenishment of field and post supplies for the division.

Thus, ample medical supplies and equipment were assured for the American Expeditionary Forces pending the establishment of the office of the chief surgeon, A. E. F.

On July 3, 1917, the chief surgeon, A. E. F., in a letter to the Surgeon General,¹⁵ requested that, as the command in the American Expeditionary Forces increased in size, ample medical supplies be sent from the United States

without requisition. It seemed to the chief surgeon, at that time, that this arrangement would be necessary on account of the great delay in the transaction of business by mail.¹⁵ This request was but anticipating a system that was soon to be adopted at general headquarters A. E. F., for all the supply departments, A. E. F.

The following letter from the Surgeon General's Office to the chief surgeon's office, August 11, 1917, shows the situation of medical supplies at that time:¹⁴

Your letter of July 22 just received. I have also your letters of July 9 and 15 which were received together a short time ago.

Trying to answer you seriatim, all base hospitals being sent you are equipped with iron beds and mattresses. Instead of being for 500 beds merely, we have added 40 Wolfe ward units to each base hospital, so that there is equipment to accommodate 1,000 with each.

* * * * *

Your depot surgeon has made requisition for six months' supplies for 100,000 men, which will be filled as rapidly as possible. We will try to send you copies of everything affecting supplies, so that you will be better informed in the future. I can not give you at present the exact tonnage that will be required for the supply of 100,000 men for six months. Wolfe says he is working on it and will get it to you as soon as he can. He will also send you some data regarding the tonnage required for the medical supplies of a division.

I note what you say regarding the necessity for plenty of words in a cablegram and appreciate it. I did not send the cablegram asking what proportion of beds to strength you would need, but I would like to know what percentage of your total force should be provided with beds. The general says 25 per cent. I understand the General Staff has authorized us to send beds to accommodate 20 per cent of the command that may be in France. Accordingly, we are sending four Red Cross base hospitals with the additional beds to accommodate 4,000 patients for each division, which will be smaller than our old division, and more nearly the size of the French. Then too, the regular evacuation hospitals come with each division. Wolfe answered the cablegram about iron beds for base hospitals and evacuation hospitals, and we thought we are sending so many base hospitals with increased accommodation that you would not need additional iron beds for the evacuation hospitals. I think you interpreted the cablegram correctly.

We want to give you everything you need, and if after the rather full explanation given above you find you need more than we are sending, let us know. We were sure you did not realize how many beds we had already ordered for you when we sent the cablegram suggesting that it was unnecessary to send additional iron bunks for evacuation hospitals. If you find you need more, do not hesitate to come back and say so.

Mount's requisition included a considerable number of instrument cases, which were approved. It is to be understood of course, that besides the initial equipment that is sent with each division, the medical supply officer should make such requisitions as are necessary. We discussed this quite fully with Whitcomb when he was here, and came to a satisfactory understanding with him.

Meanwhile, two formal requisitions for medical supplies had been prepared by the officer in charge of the medical supply depot, A. E. F., approved and forwarded to the Surgeon General by the chief surgeon. A third was prepared and forwarded about the middle of August, 1917, calling for supplies for 100,000 men for six months. Such then was the situation: Certain supplies, both initial equipment and six months' supply, were to be sent automatically with each expedition. Further replenishment supplies needed were to be asked for by requisition from the American Expeditionary Forces.

AUTOMATIC SUPPLY

On August 20, 1917, General Pershing promulgated instructions concerning supply, which materially changed the manner of procuring medical supplies for the American Expeditionary Forces.¹⁶ Those instructions required that there would be established in France initial stocks for 300,000 men, for 90 days, and the stocks thereafter maintained without requisition. Supplies were to be divided into the following three classes: (1) Automatic supply for articles, whose consumption would be sufficiently regular to permit of automatic supply; (2) replenishment supply for articles of which specified stocks were to be maintained; (3) exceptional supply for articles of which no specified stocks were established.

The commanding general, Line of Communications, was to maintain 45 days' supplies at base depots, 30 days' at intermediate depots, and 15 days' at advance depots, utilizing the same methods as those called from the United States, namely, automatic supply, replenishment supply, and exceptional supply.¹⁶

For shipments from the United States to France, lists were to be prepared in the American Expeditionary Forces of articles or classes of articles of which the consumption was sufficiently constant to warrant provision of an automatic supply. In preparing lists of material for automatic supply from the United States, great care was to be taken not to include articles obtainable in France or in England. Also careful check was to be kept on excesses and shortages so as to adjust the supply to the requirements with the minimum delays and thus economize on shipping.

General Pershing directed the chief surgeon, A. E. F., as well as the other chiefs of supply bureaus, A. E. F., to prepare an estimate, for cabling, under the foregoing system for: First, a list for four months' supplies to accompany each movement of troops from the United States. This was to provide 90 days' reserve and in addition one month's automatic supply for consumption and emergency. Second, a list showing the amounts which had to be shipped for each 25,000 men of the American Expeditionary Forces.¹⁷ These last figures were to be used by the War Department as a basis for automatic shipment of supplies to France for the American Expeditionary Forces.

In compliance with the above-outlined instructions, the chief surgeon, A. E. F., initiated information to the Surgeon General, September 12, 1917, as follows:¹⁸

* * * * * * *

Paragraph 7. Automatic supply. For Surgeon General. Referring cablegram number 145, paragraph 5. Following is our requisition based on this cable. Supplies now on hand sufficient for initial reserve for troops here and now en route. Ship four months requisition in triplicate for all troops hereafter leaving the United States and thereafter ship automatically each month a month's supply for all troops in France and en route. In making estimates for monthly automatic shipments and reserve, the usual supply of alcohol, ether, chloroform, rubber gloves, needles of all sizes, bandages, adhesive plasters and sutures of all sizes, and material should be multiplied 10 times, and the supply of gauze and all surgical dressings should be multiplied 25 times.

Subparagraph 1. Requisition already made, including the one for instruments dated August 27 and forwarded from here September 4, should be filled.

Subparagraph 2. Investigation now in progress to ascertain supplies which can be purchased to advantage in France and England. Any modifications in automatic supply found advisable after this investigation will be promptly reported.

Subparagraph 3. All automatic and reserve supplies to be invoiced to supply officers.

Subparagraph 4. Automatic and reserve supplies to be considered over and above all supplies and equipment usually furnished organizations departing on foreign service.

* * * * *

In explanation of this action of the chief surgeon, it should be said that the number of medical supply personnel in the American Expeditionary Forces at the time in question was too limited to permit of an immediate compilation of a list of all articles upon the supply table. Furthermore, medical supplies can not be computed upon a ration basis, and in respect of many articles there is not, and can not be, an "allowance" to be strictly adhered to. Rates of expenditure depend upon many factors, such as the number of troops and their distribution (concentration or dispersion), climate, condition of shelter, season, incidence of various diseases, character and severity of combat, number of wounds, type of wounds, length of stay of patient in hospital, the training of medical officers in care of supplies, facilities available for such care, and, to some extent, the personal equation as to remedies used. Rates of expenditure must be estimated after careful consideration of all those factors, and must be based upon experience tables for issue under similar conditions or, in the absence thereof, under peace time conditions.

The only experience tables, the only personnel having experience in such computation, were in the Surgeon General's Office, and the desire of the chief surgeon was to utilize such personnel and such experience tables.

On August 20, 1917, the date when General Pershing promulgated his memorandum on automatic supplies,¹⁸ the Surgeon General informed the chief of embarkation service that the Medical Department had the following medical supplies for shipment to France, in addition to the supplies with troops, for the 26th Division: 2 field hospital equipments; 2 ambulance company equipments; 1 division surgeon's office equipment; 26 motor ambulances, boxed for export; 10 motor cycles with side cars, boxed for export; 1 medical reserve unit, aggregating 90 tons and 12,926 cubic feet. There was a like quantity of equipment for the 42d Division. For the Line of Communications; 2 evacuation hospitals; 4 base hospitals, of 500 beds; and 40 ward units, aggregating 563 tons, 126,240 cubic feet. There was a six months' replenishment of supplies for the zone of the army, field supplies, 161 tons, 18,200 cubic feet; and six months' replenishment for the Line of Communications, hospital supplies and equipment, 280 tons, 40,667 cubic feet. Aggregating 1,185 tons, 198,000 cubic feet.

These supplies were sent as replacement for the beginning of automatic shipment of supplies to France. A list of supplies compiled for this purpose was largely used in the preparation of the actual monthly automatic replacement called for by the commanding general, A. E. F., in paragraph 2, cable 145, September 7, and paragraph 7, cable 155, September 11, 1917. A copy of this automatic replacement list for one month was forwarded to the chief surgeon, A. E. F., October 27, 1917, including post supplies, field supplies, dental supplies, veterinary supplies.¹⁹

Thenceforward, the American Expeditionary Forces were supplied automatically both with initial medical equipment and with replenishment medical supplies. Additions to, subtractions from, or modifications in the list of articles desired by the chief surgeon, A. E. F., were to be made upon presentation of his wishes by cablegram or otherwise. The following extracts from cablegrams sent from general headquarters, A. E. F., to The Adjutant General, are examples of such action:

No. 175.

SEPTEMBER 23, 1917.

* * * * *
 Paragraph 3. For the Surgeon General. Request that automatic supply be shipped as described in cable 145 and paragraph 7, 155. Storage facilities being enlarged. Twenty-five additional clerks trained in supply work will be needed before Christmas.
 * * * * *

PERSHING.

No. 194.

OCTOBER 1, 1917.

* * * * *
 Subparagraph 2. Automatic supply. Veterinary instruments, medicines and dressings should be based on 6,600 animals for each division in France. This includes 10 per cent for replacements.
 * * * * *

PERSHING.

No. 237.

OCTOBER 21, 1917.

* * * * *
 Subparagraph A. Automatic supply. After studying, * * * decided that "Silvol" should be substituted protargol for all purposes. Request that 10,000 one-ounce bottles be shipped at once and that 2,000 bottles be added to the monthly automatic supply.
 * * * * *

PERSHING.

No. 357.

DECEMBER 9, 1917.

* * * * *
 Paragraph 1. For Surgeon General. Order placed to-day in France for 50,000 bedside tables of improved pattern. Automatic supply of bedside tables should be reduced by this number.
 * * * * *

PERSHING.

On October 6, 1917, the Surgeon General furnished the medical supply officer, New York, with a list of supplies under the title "Automatic replenishment of medical supplies per month for a division of 26,000 men (expendable articles only)." For the month of October, he directed that three times the quantity of articles on the list be furnished the American Expeditionary Forces.²⁰

On October 13, 1917, the list referred to above was modified by the Surgeon General, in so far as the post medical supplies were concerned,²¹ and on November 8, 1917, he directed the officer in charge of the New York medical supply depot to ship to the American Expeditionary Forces, for November, ten times the quantity on this list.²² In addition, on November 9, 1917, replenishments for the 26th and 42d Divisions were ordered shipped to the American Expeditionary Forces in twice the amount for the month of November.²³

Up to and including the month of November, 1917, the automatic supply of the Medical Department, A. E. F., was in terms of 26,000 men, as indicated above. For December and subsequent months, however, the Surgeon General,

instead of furnishing the New York medical supply officer with a numerator to compute the amounts of medical supplies to be shipped to the American Expeditionary Forces, computed each month the quantities to be shipped and transmitted the result to the medical supply depot for issue.

As to the individual amounts of articles to be furnished the American Expeditionary Forces, the matter was not entirely disposed of in France by the cabled request of September 12, quoted above. Study of the prospective needs in the way of medical supplies for the American Expeditionary Forces immediately was instituted in the office of the chief surgeon, Line of Communications. By September 18, in compliance with General Pershing's instructions concerning automatic supply, previously referred to, the first list of medical and hospital supplies for automatic shipment from the United States, was submitted to general headquarters, A. E. F.⁸ But included on the medical supply table were some articles, which, though highly desirable in themselves, in view of the existing situation, could by reason of their bulk or weight, or by reason of their nonessentiality, be dispensed with. The importance of proper medical attention not only to the individuals concerned, but to the morale of the troops in the American Expeditionary Forces, and furthermore to the people at home, was such that the chief surgeon, Line of Communications felt confident that no request of his for supplies urgently needed could be disapproved. Being of this opinion, he had to assure himself that his requests did not include nonessentials. Acting upon his instructions, the existing supply was carefully scrutinized, and such articles were eliminated.

The following extracts from cablegrams from General Pershing to The Adjutant General, pertain to the elimination of certain articles from the medical supplies sent to the American Expeditionary Forces:

From Paris.

To The Adjutant General, Washington.

No. 232.

OCTOBER 20.

* * * * *

Subparagraph A. Reference paragraph 7 my cable 215, following articles prescribed in Manual for Medical Department can be eliminated in present emergency: Paragraph 844: Baskets, letters and waste paper; cups, sponge; envelopes and paper, official note; inkstands; steel erasers; desk pads and pen racks. Paragraph 845. Apparatus, electric; bags, obstetrical; basins, delft, for office; baskets, laundry; bed cradles; blowers for insect powder; bookcases; boxes, fracture, folding; brushes, weighted for polishing floors; buckets, fiber; cabinets for dressings and instruments; cases, dental; cases, tooth-extracting; chairs; charts, anatomical; clocks; cuspidors; desks, office; fans, palm leaf; floor polish; floor wax; ice cream freezers; step ladders; lawn mowers; linoleum; mats, door, metal; pitchers, delft, for office; pots, water; refrigerators; iron safes; scales and weight platforms; settees for porch; tables, bedside; mouse and rat traps; garden trowels; portable bathtubs; foot tubs; water coolers; only 25 per cent of hospital beds in France will need mosquito bars. It is urged that the committee on standardization to select the minimum number of articles essential to the Nation's medical activities report on the standard medicines to be required. It is believed that many of the medicines now mentioned in paragraph 843 can be eliminated during the time of war without detriment to the medical service.

* * * * *

From HAEF.

To The Adjutant General, Washington.

No. 268.

NOVEMBER 3.

* * * * *

Subparagraph A. * * *

Following list of medicines, par. 843, can be omitted: Acetanilidum; acidum citricum; acidum oxalicum; acidum sulphuricum aromaticum; adeps lanæ hydrosus; aloe, powder; ammonii bromidum; amyli nitris; argenti nitras fusus; arseni trioxidum; asafœtida; bismuthi subgallas; calx ch. orinata; capsicum, powder; cera flava; copaiba; creta preparata; eucalyptol; ferri et quininae citras solubilis; ferri sulphas exsiccatus; fluidextractum colechici seminis; fluidextractum ergotæ; fluidextractum pruni virginianæ; fluidextractum zingiberis; heroini hydrochloridum; both sizes; lithii citras effervescens; magnesii carbonas, powder; oleum aurantii corticis; oleum morrhuae; oleum santali; oleum tiglii; pepsinum; pilocarpinae hydrochloridum; pilulæ copaibæ compositæ; potassii bicarbonas; potas-ii bromidum; resina podophylli; rheum, powder; spiritus ætheris compositus; syrupus ferri iodidi; syrupus hypophosphitum compositus; syrupus scillæ; thymolis iodidum (Aristol); tinctura aconiti; tinctura cantharidis; tinctura capsici; tinctura cinchonæ; tinctura gentianæ composita; tinctura myrrhæ.

* * * * * * *

PERSHING

Copy for Surgeon General.

Before these cabled requests could be acted upon in the Office of the Surgeon General, an automatic supply list of articles for the Medical Department, A. E. F., was prepared in the supply division there, and, on October 27, 1917, sent to the chief surgeon, Line of Communications:²⁴

1. A copy of "Automatic replacements for one division for one month" of (a) post supplies; (b) field supplies; (c) dental supplies; (d) veterinary supplies; is inclosed for your information and suggestion.

2. The officers in charge of the medical supply depots at New York, Washington, and St. Louis will be directed to ship each month as many times this replacement as there are times 25,000 troops in France. These instructions will be issued at the beginning of each month.

3. Furnish this office a copy of any modifications which you think should be made in this list. Any supplies deemed by you not necessary will be omitted. Any quantities which should be increased will be so increased.

4. Inform this office of the quantity of furniture deemed by you expedient to be issued with each base hospital equipment to be sent over. It is the understanding of this office that these hospitals are to serve as general hospitals and not in the strict sense of base hospitals as the term is used in the Manual for the Medical Department. For such hospitals it would appear that equipment more varied and more extensive than that for the ordinary base hospitals would be required.

The chief surgeon, A. E. F., was not in agreement with this arrangement in the Office of the Surgeon General, whereby automatic replacements were to be based on a division for one month; on the contrary, he was of the expressed opinion that medical replacements should be worked out on the basis of the total needs of 25,000 men for one month for all supplies, expendable and nonexpendable that were susceptible of automatic supply.²⁵ Furthermore, he believed that the adopted system of supply necessitated the development, and use, of a rather large exceptional list, which was to include articles not susceptible of an automatic supply. Accordingly, on February 1, 1918, he directed the officer in charge of intermediate medical supply depot No. 3, A. E. F., Cosne, to express an opinion on the subject.²⁵

Prior to the receipt of this letter, several conferences had been held between the chief of the supply division, chief surgeon's office, Line of Communications, and the officer in charge of the medical supply depot at Cosne, and the latter was given the information contained in the letter of February 1, by

telephone, and asked to furnish the comment desired by the chief surgeon. He had a copy of the automatic supply list, which had been sent to him direct by the Surgeon General.

After opportunity for studying the problem had been afforded the medical supply officer, the chief surgeon, Line of Communications, replied to the chief surgeon, A. E. F., on February 15, 1918, as follows:²⁶

1. I concur in the opinion expressed in your letter. I understand that portion of it recommending a unit of 25,000 men is now in effect. I am inclosing a letter from the officer in charge, intermediate medical supply depot No. 3 on this subject. His opinion seems to be the same.

2. I especially invite consideration of his recommendation of an elimination list. I am well aware of the personal indiosyncrasies with which this would interfere and of the probable protests that it would engender, but I believe that it is a matter of necessity and I am convinced that the cooperation of the medical officers could be obtained by a well-conducted campaign of education in which the necessity for economy of effort and tonnage were shown.

3. This elimination list is in my opinion all the more necessary by reason of the necessity of greatly increasing the allowance of certain drugs (as, for example, camphor and opium derivatives) and of the necessity for adding to the list many additional articles to meet new conditions (for example, sodium, camphor, soap, and oxygen in large quantities). I am submitting a supply table with the articles which you have already withdrawn erased in red ink, with articles proposed for elimination shown by an "X" in red ink, with articles the original packages of which are so small that shipments thereof could well be made automatically every three months indicated by a red "3," with articles the supply of which would be controlled by requisitions indicated by the word "Req.;" shipment of all other articles to be made automatically in monthly shipments, and with self-explanatory remarks after certain other articles.

4. In addition to the elimination list, I propose that certain other articles be eliminated from the supply for other units than base hospitals. In fact I believe that mobilization tables similar to those in use in the British Army should be established and rather firmly adhered to. A statement of policy on such articles as desks and filing cabinets is highly desirable. I believe that tables, common, can profitably be substituted for desks. Apparently though the Surgeon General has a different conception, as stated in paragraph 4 of his letter. While highly desirable from the standpoint of a good looking hospital, in view of the tonnage situation I think they might well be dispensed with.

5. I especially invite your attention to the recommendation that all dishware should be enamel ware, cups to be without handles. Breakage of the porcelain has been great.

6. This elimination list was suggested in a recent conference with Major Mount, the officer in charge, intermediate medical supply depot No. 3, and it is recognized that it is tentative only. Medical officers must be taught that this is war, and that our hospitals can not be ideally equipped, and that in order to be assured of the essentials they must forego many desirable things. I believe that tonnage and packing costs could be saved by supplying the more commonly used medicines in two sizes, one for base hospitals, the other for smaller organizations.

7. The list of standard surgical instruments has not been considered because, so far, none of these instruments have been provided, and I am confident that we shall need all that it is possible to ship. Later when a stock has been accumulated the question of automatic supply or supply by requisition can be settled.

8. The veterinary supply I am unable to pass upon with any degree of assurance. I can say, however, that the demands heretofore made have seemed to total considerably larger than this present automatic supply.

* * * * *

The report which the officer in charge of the medical supply depot at Cosne was directed to submit upon the same question is as follows:²⁷

1. In compliance with long-distance telephone request from your office, I herewith transmit report on automatic supply recently furnished by the Surgeon General's Office. It appears that the automatic supply as furnished covers expendable articles only, and applies to all medicines on the post supply table, including those that have already been placed on the elimination list.

It is not believed that the automatic supply should apply to all the articles needed in France; neither should it apply only to the expendable articles. It would seem the most rational procedure, first, to eliminate the articles that are not needed by the Medical Department in France; second, to make up an automatic from the revised list covering only the essential articles; third, to classify the remaining articles under the heading "Exceptional articles," to be covered by timely requisition.

2. At present almost all the medicines on the field supply table that formerly came in tins are furnished in bottles, thus duplicating the post supplies except for the number of tablets in bottle. If this is to obtain during the war, it is believed that all medicines furnished in tablets on our post and field supply tables should come in a standard-size bottle with a specified number of tablets in each. Further, a great many supplies on the dental and veterinary supply tables are exactly the same as our regular post supply articles, the stationery on all four tables being almost exactly the same. If the method advocated of converting into one supply table be followed, the confusion of having automatic supply for stationery on four different tables and for medicines on three tables would be eliminated. The present lists as furnished show automatic on stationery for post, field and dental combined, and a separate list for veterinary.

3. In general, anesthetics, ligatures, dressings, and essential drugs should be automatic; and, in addition, such articles as are used in large amounts could readily be included in the automatic arrangement. Nothing should interfere with the shipment of these automatic articles, and the full shipment should be made at one time, as otherwise a shortage will develop on the very class of articles that are absolutely essential. Amounts should at first be, if anything, overestimated for the above reason.

4. The following increases in the automatic supply as shown on the list furnished by the Surgeon General's Office are recommended:

	Present auto- matic	Recom- mended		Present auto- matic	Recom- mended
MEDICINES AND ANTISEPTICS			STATIONERY		
Ether, in tins	3,000	5,000	Books:		
Aspirin:			Blank—		
Powder	75	300	Cap	25	50
Tablets	90	200	8 vo	38	100
Cocainæ hydrochloridum, ¼ ounce in bottle	20	100	Prescription	5	25
Foot powder, tins	500	5,000	Envelopes, official:		
Iodum, 1 ounce bottles	35	175	Large	900	2,000
Iodine swabs, boxes	3,750	5,000	Letter	5,000	10,000
Liquor creolis compositus, 5-gallon tins	None.	200	Paper:		
Morphine sulphas:			Carbon—		
Powder, ¼ ounce, bottles	13	50	Cap, boxes	5	25
Hypodermic tablets, tubes	560	1,000	Letter, boxes	93	125
Protargol, 1 ounce, bottles	125	1,000	Typewriter—		
Unguentum hydrargyri chloridi mitis:			Cap, package	12	25
2-pound bottles	60	150	Letter, packages	23	80
½-pound bottles	None.	200			
MISCELLANEOUS			DENTAL		
Alcohol, denatured:			MEDICINES		
5-gallon bottles	None.	200	Acidum trichloracetium, 1 ounce, in bottle	1	5
2-quart tins	None.	300	Eugenol, 1 ounce, in bottle	4	8
Cotton:			Novocain suppurenum tablets, tubes	26	50
Absorbent, 1-pound rolls	400	1,500	Sodium and potassium, in tube	26	40
Nonabsorbent, 1-pound rolls	40	1,000			
First-aid packets (par. 944)	None.	5,000	INSTRUMENTS AND APPLIANCES		
Needles, surgical, assorted, dozens	50	100	Bands, fraeture, Angle's, 4 bicuspid and 2 molar, sets	8	20
Syringes, penis, glass	500	1,500	Broach reamers, packages	13	25
Soap:			Cases, office, preparation	4	15
Common, pounds	400	1,000			
Ivory, cakes	850	1,500			
Scouring	350	500			

	Present auto- matic	Recom- mended		Present auto- matic	Recom- mended
INSTRUMENTS AND APPLIANCES—contd.			MISCELLANEOUS—continued		
Engine instruments for hand piece "H" contra-angle:			Floss, silk, waxed.....	56	100
Drills.....	52	70	Outta-percha stopping, high-heat sticks, ounces.....	13	20
Mandrels, Nos. 302 and 303.....	26	70	Modeling composition.....	9	12
Engine instruments for hand piece No. 7:			Strips, polishing, assorted grits.....	26	40
Drills.....	52	70			
Mandrels, Nos. 302 and 303.....	26	70	BASE OUTFIT		
Lancets:			Cups, drinking.....	10	50
Abscess.....	1	5			
Gum.....	1	5	LABORATORY EQUIPMENT		
Pliers, dressing:			Brushes, laboratory.....	2	10
No. 2.....	2	5	Cones, felt.....	1	10
No. 17.....	2	5	Investment compound, tins.....	1	15
Office.....	10	5	Sandpaper, sheets.....	8	24
Strips, celluloid, thin.....	1	25	Rubber, red, pounds.....	2	4
Syringes, hypodermic:					
All metal, extra needles for.....	52	70	ADDITIONAL ARTICLES		
Extra needles for conductive anesthesia.....	5	30	Solder, silver, ounces.....	2	4
Extra hubs for.....	2	15	Zinc, pounds.....	2	4
Wire, ligature, Angle's No. 187, boxes.....	2	5			
MISCELLANEOUS					
Disks:					
Bristle.....	250	320			
Carborundum, knife-edge.....	78	100			

5. This office does not feel competent to pass on automatic furnished for veterinary supplies; but from personal experience with a field hospital, and judging from amounts asked for by veterinarians now in France, the automatic seems greatly underestimated.

Animals seem to be scattered in many places, some detachments having only 40 horses on hand, and the smallest amount one is able to furnish such a detachment is one bottle or tin of a drug, or one tube of hypodermic medication. The veterinarians themselves seem uninformed, judging from their requisitions, as to whether or not to request on the field supply table or post supply table.

After analyzing the information thus made available to him the chief surgeon, A. E. F., on April 2, 1918, transmitted it to the Surgeon General in the following letter:²⁸

1. The data inclosed with this communication^b represent the desires of the Medical Department in France as regards the automatic supply, and in addition thereto there is indicated the equipment for a base hospital as desired for the American Expeditionary Forces, and all in answer to your letter, copy inclosed, of October 27, 1917.

2. New and unusual problems confront our supply division in France, and these questions must be met and solved. The departures from old and established customs that will be found recommended herein are explained by these radical changes in the environment of our forces here in France.

3. The general staff at general headquarters has directed that in the preparation of automatic supply lists all articles be placed thereon that are susceptible of such arrangement. It is the view of the supply division in this office that with few exceptions all articles expendable and nonexpendable should arrive in France automatically and in preparing this work this policy has been followed.

4. The item of first importance here is tonnage and all efforts are directed toward saving all possible ship space for the essentials. Radical elimination has therefore been found necessary and has been practiced. In a further effort to conserve this ship space it is urgently requested that unnecessary boxing material such as would ordinarily come with rubber goods, etc., be eliminated, and that all empty containers in so far as it is practicable be sent filled with such items as may be available for this purpose.

^b The lists referred to have been omitted.

5. The desirability of having a single list of articles used in common by the various divisions of the Medical Department has become more and more apparent, and this consolidated list has been produced. Furthermore, it is considered highly desirable to have medicines furnished in two standard-sized bottles, large for base hospitals and small for smaller organizations. This request, like others that appear above and below, must, of course, be coordinated with the problems of supply that confront your office, but it is hoped that these simplifications may become operative ultimately.

6. A separate list relative to the equipment of base hospitals and in answer to paragraph 4 of your letter quoted above is inclosed. This list is considered complete except for very special equipment and therefore gives you the ideas of those upon this side in relation to this question. Certain of the larger and heavier articles of furniture must, in the interests of economy of tonnage, be eliminated, and this elimination has here and elsewhere been indicated. Minor shortages, if such are found to exist, in such articles as instruments and the like may be supplemented from the depots in France.

7. The various lists have been arranged in accordance with the supply tables and where articles have been added they have been placed in the proper classification and with alphabetical arrangement. The legend used appears at the top of the sheets. The latest supply tables as indicated in changes, Manual for the Medical Department, for dental and veterinary items have been freely consulted, and the amounts and articles asked for are the result of mature consideration of all aspects of the present situation by officers best acquainted with the various special supply problems. The surgical instrument list was prepared from the Catalogue of Standard Surgical Instruments (revised to December, 1917) and the laboratory list follows the one outlined in a proposed change in the Manual for the Medical Department and recently furnished the laboratory division of this office by you.

8. It is contemplated that, from time to time, changes may be required in those tables. Upon the 10th of each month, therefore, a cable will be sent from this office indicating all items for elimination or addition and all amounts of various items where increases or reductions are needed to maintain the reserve in our depots at the proper level.

9. An additional copy of the "surgical dressings" sheet is inclosed, for your information, with this letter. The monthly requests shown upon this sheet represent a fairly large item of tonnage. It is the desire here, however, to have these quantities come so long as the tonnage is available, since at the present time practically no reserve of this class of finished dressings is in stock in France. Later, if necessary, this ship space may be released for other purposes and corresponding increases will be made in items needed to replace the Red Cross dressings here in France, such as gauze, cotton, etc.

(10) The entire study as here presented meets with the approval of the general staff, and G-1 of general headquarters will issue each month an allotment of tonnage to the Medical Department, sufficiently ample, it is hoped, not only to provide for the monthly needs thereof but in amounts sufficiently liberal to provide for an increase in the reserve now in our depots.

(11) A copy of this communication with all its inclosures complete will be mailed to you one week from this date in order to assure its reaching your office and copies of the entire study are on file in the administrative section, general staff, the intermediate medical supply depot No. 3, and this office. Changes requested from time to time that are accepted by your office will reach the United States a sufficient time prior to June 1 to permit of the scheme becoming operative that date. If feasible, an earlier date is desirable and it is requested that you cable this office to the effect that this communication has been received, is acceptable, and the date upon which it is to become operative.

Thus three different automatic supply tables, Medical Department, A. E. F., came into existence: (1) The automatic shipment of initial unit equipment and initial supply, including medical reserve units. (2) The automatic shipment of initial unit equipment and initial supply, and of the replenishment supplies computed by the Surgeon General. (3) The automatic supply list forwarded April 2, 1918, by the chief surgeon, and its subsequent modifications.

These tables differed in no respect in principle. The chief surgeon's list rearranged the supply table, making a single list alphabetically arranged by the functions the supplies were designed to fill.

Automatic shipment of the supplies on the basis of the chief surgeon's list began in June, 1918.⁸ Thereafter there were many changes made in the list by cable. After the armistice had been signed, discontinuance of the automatic shipments was requested, and dependence upon requisitions was had for the comparatively few supplies needed. It is obvious that with the experience which the American Expeditionary Forces had had at the time the tables were prepared the medical supply division in France was no better than, if as well prepared as, the supply division in the Surgeon General's Office to indicate in detail item by item the probable rates of expenditure. However, it was prepared to indicate the number of units and the type desired, to indicate special and nonstandard equipment needed for conditions in the American Expeditionary Forces, and to indicate in a general way increases or decreases in standard items.

At the time the list was prepared (March, 1918), reserve stocks of medical supplies in the American Expeditionary Forces were small.⁸ Rigid dependence upon the automatic was foreseen; therefore, one of the factors in the determination of the amounts considered as the supply of 25,000 men for one month was the necessity of increasing the amounts in reserve. No accurate information as to the amount of each article that would be used was available, so it was thought wise to be on the safe side. The amounts specified were excessive and were recognized as such.²⁹

It was the purpose of the chief surgeon, A. E. F., to modify the automatic list from month to month, and, once adequate reserves were established, to keep pace with the demand. There was overlooked, however, the fact that this building up of the reserve medical supplies in the American Expeditionary Forces would not be as apparent to the Surgeon General as to the chief surgeon A. E. F., and that the imperfect liaison would make it difficult to apprise him of its existence. Also, there was failure of conception in the supply division of the chief surgeon's office, A. E. F., as to the Surgeon General's method of computing total requirements for procurement. It was assumed that American Expeditionary Forces' requirements would come out of existing stocks in the United States, to be replaced by equal amounts procured, and that future curtailments of shipments to France could be compensated by absorption of the quantities in the needs of the troops in the United States.³⁰

The Surgeon General, however, had placed orders for the requirements as he saw them. He considered the automatic list from the American Expeditionary Forces as a definite order to be filled, without change. To meet that requirement, production had to be ordered of the entire amount for a long period in advance. Once, therefore, the automatic list reached the Surgeon General, the momentum of the procurement machinery could not be stopped suddenly, and cancellation of, or reduction in, the quantities called for by the automatic list inevitably was followed by a surplus in the United States.

The situation in the United States with reference to rail and overseas transportation was such that supplies to be shipped in any particular month,

had been ordered shipped and had been assembled sometime before shipment actually was made.

It is apparent that too prompt a reflection of the changes made in the automatic list was expected in the procurement, transportation, and loading of supplies. Cabled changes could not be made effective as promptly as expected.

Another factor of importance in connection with the inclusion in the automatic supply of a factor for reserve is that the rapidly expanded troop movement multiplied many times any error existing, and increased the absolute amount of surplus enormously. It is an axiom in supply that the reserve necessary does not increase in relative proportion to the troops served.

That the Surgeon General's conception of the matter was that outlined above is amply demonstrated in a number of cables and letters. He proposed to fill the orders given, but in a number of instances, he called attention to the apparently excessive amounts, more particularly in connection with equipment rather than with supplies.

PROCUREMENT IN EUROPE

It was apparent very early, that procurement in Europe and particularly in France, would be desirable.³¹ Cost in money was a secondary consideration; time and tonnage were the important factors.

During the stay of General Pershing's party in England, the chief surgeon, A. E. F., had had a study made of the British source of supply. One of the early assignments in the office of the chief surgeon at Paris was that of a purchasing officer. Under the provisions of the General Orders, No. 28, H. A. E. F., August 30, 1917, this officer was detailed for duty with the general purchasing board. The report which follows, gives in detail the activities of his office.

MEDICAL DEPARTMENT PURCHASING AND DISBURSING OFFICE, A. E. F.^c

PURCHASING

The purchasing office, Medical Department, was established as a subdivision of the general purchasing board and commenced its activities about the 1st of September, 1917.

There were three distinct functions of this office, the first two of which were apparent at the beginning, and the third of which became obvious later when shipping difficulties arose.

The most evident need was to provide for emergency purchases—purchases of articles that were perishable, such as serums and vaccines; or they were exhausted at the depots or hospitals owing to unforeseen demands of the service, or to changes in methods.

The second need was to procure special equipment and materials not on the Medical Department supply table. This included such articles as special laboratory equipment and materials for use in the schools of the Medical Department of the American Expeditionary Forces.

^cThe following statements of fact are based on "History of Purchasing and Disbursing Office, Medical Department, A. E. F.," by Col. D. C. Card, M. C. On file, Historical Division, S. O. O.

And, finally, as the tonnage question became acute, it was necessary to purchase supplies of stock material available in France in order to reduce the tonnage from the United States. Purchases falling under the first two categories generally were made on requisitions, approved by the chief surgeon, A. E. F.; in the case of the third class, purchases usually were made in large quantities by direction of the chief surgeon, for the purpose of stocking the depots.

French Government purchases.—At first, purchase orders of a value not exceeding 1,000 francs could be placed in the French open market without authorization of the French Government; but from September, 1918, the limit was raised to 5,000 francs. Orders in excess of those amounts were made through the French or British Governments, passing by way of the office of the general purchasing agent, and also, in the case of the French Government, by way of the French mission. Where the French Government was unable to supply the material needed, the purchasing officer was authorized, subject to the approval of the general purchasing agent, to purchase in the open market.

The orders placed with the French Government were especially for material for stocking depots. The chief reasons for purchasing through the French were to avoid elevation of price by the bidding of one Government against another, and to secure raw material that was under governmental control.

Deliveries of material ordered from the French Service de Santé, were inspected by an officer from the purchasing office in the packing rooms of the Service de Santé. Count was made, and at times samples were taken for testing the quality of the material. This inspection before packing avoided much work and confusion.

Open-market purchases.—When an order was to be placed in the French open market, several firms were invited to submit estimates in writing and samples of the article in question. The invitation was extended personally by an officer of the purchasing office, who could by preliminary investigation judge whether or not the firm was in position to furnish the article desired. This procedure was deemed necessary as this office frequently was besieged by agents and middlemen who were willing to accept any kind of an order and make all kinds of promises as to delivery which they well knew they would be unable to fulfill.

In placing the order, the quality of the article, the time delivery could be made, and the price therefor had to be considered, the relative weight given these elements being governed by the needs of the service.

For some of the larger purchases, contracts were entered into; but, on account of the difficulties confronting the merchants, many were unwilling to sign formal contracts. All orders were placed in accordance either with A. R. 550-1, by contract, or with A. R. 550-3, as emergency purchases. In both cases, bids from several houses were sought, except for named articles of established value which could only be secured from a particular house.

When articles were unobtainable through the French Government, or in the open market in France, recourse was had to the purchasing officer for Great Britain; but this procedure was avoided whenever possible on account of the difficulties of transportation and the element of time.

Five, sometimes seven, copies were made of the order. These were distributed to various services for their information. The original went to the furnisher and one approved copy was retained in the files of this office. A third copy became part of the records of the office of the general purchasing agent. The fourth was delivered to the inspection and shipping section for their information and for the control of deliveries, inasmuch as dates, quantities, etc., of deliveries were given on the face of the order. The fifth was retained to be sent later to the disbursing section with the bill for vouchering and payment. On stock orders, additional copies were sent, one to the depot for which the material was ordered, and one to the chief surgeon A. E. F. for his information.

Many difficulties confronted the office in carrying out its functions. Demands were often urgent, and at times work proceeding in the normal course had to be dropped in the emergency. In France where stocks were depleted by three years of war, it was sometimes extremely difficult to find articles that had been plentiful in times of peace. This was especially true of small quantities of odd articles, for which prolonged search was sometimes necessary. It was seldom that the article on the medical supply table was to be had, and it was necessary in all such cases to select a satisfactory substitute from among articles that were available. Promises were made by the furnishers, oftentimes only to be broken. Many desired articles had as constituents raw material under Government control and it took time to arrange for the release of the raw material for use by the manufacturer. This last mentioned difficulty was one of the group that assailed the merchant and made him unwilling to sign a contract. Another difficulty was the matter of transportation—a problem that everyone in France was facing, but which was particularly difficult for the commercial house inasmuch as the railroads were under Government control. Even with "Certificates of classification of merchandise" it was sometimes impossible to make shipments. The market was unstable, prices were rising constantly, and the supply was uncertain. And perhaps most difficult of all was the question of personnel. The war demanded the able-bodied men, the skilled men, and left the shops and factories short handed.

For some time there was another element that added to the difficulty of purchase in the open market. This was a direct competition between different services of the Army, and also between the Army and the auxiliary organizations such as the American Red Cross and the Young Men's Christian Association. At times the Red Cross and the Army would be searching the market for the same articles for the same place and use. As a result of this competition, the prices suddenly jumped upward. To put an end to this state of affairs, General Orders, No. 41, headquarters, Services of Supply, 1918, was issued, which placed articles in definite categories, and each purchasing office was assigned its categories. This order applied likewise to auxiliary organizations so that they were authorized to purchase in open market only such items as were unprocurable through the Army channels of supply, and after approval by the Army purchasing officers and the general purchasing agent.

Shipping.—By February 1, 1918, the purchases had increased considerably. The Quartermaster Department was crowded with shipping demands, and as a consequence there was a delay in the shipment of medical supplies urgently

needed. To relieve the quartermaster of the burden of Medical Department shipping and at the same time to expedite the shipment of emergency supplies, a shipping department was started in connection with the purchasing office. A warehouse was opened at 15 Avenue Ledru-Rollin, and autotrucks were assigned to it. The warehouse was used for the reception and storage of incoming goods, for inspection, for checking and packing for shipment.

Shipments of small packages were made by registered mail, express, or courier, depending upon the urgency and the value of the shipment. Larger shipments to individual organizations were made by express in less than carload lots. Material in small quantities destined for the depots was held in the warehouse until a carload lot had accumulated, and then was shipped in a car convoyed to its destination. Large amounts of stock material were shipped in a similar fashion. This was not only the safest method of shipment but when, as in busy times, two or three carloads were shipped a week, it was the most rapid.

Results.—A few figures will serve as evidence of results accomplished by the medical purchasing office:

	Francs	Dollars
Value of orders in France placed up to the signing of the Armistice, November 11, 1918:		
French Government.....	48,313,384.28	8,864,841.15
French open market.....	18,539,292.07	3,401,704.96
	66,852,676.35	12,266,546.11
Value of orders placed in England through the medical purchasing office in Paris for the same period: English Government.....	£ 4,981,333 14 0	23,732,941.75
Total placed through the medical purchasing office.....		35,999,487.86
Value of orders of the Medical Department originating in England and placed in England for the same period: English Government.....	214,207 19 14	1,020,567.22
Total Medical Department orders placed in Europe.....		37,020,055.08

The estimated cubic tonnage represented by the Medical Department purchases is another index of the results accomplished by the purchasing office. The medical purchasing office was instrumental in the purchase of 19 hospital trains, of 16 cars each, in England, and 2 similar ones in France, and 14 mobile hospitals, each composed of 27 camions and complete hospital equipment, in addition to miscellaneous material.

Trains and hospitals.....	cubic tons..	40,250
Other materials and supplies.....	do.....	231,805
Total.....	do.....	272,055

DISBURSING

With the commencement of Medical Department operations in France, the disbursing incident thereto was carried on at the base medical supply depot at Cosne. Soon, however, Paris was recognized as a logical location for a medical disbursing office.

The reasons for the selection of Paris might be summed up as follows:
 (1) It was the place in which the greater proportion of the supplies were being purchased, and it therefore put the disbursing officer in close touch

with the purchasing office and with the individuals from whom the materials were procured, thus avoiding the inconveniences and delays incident to mail communication. This enabled the disbursing officer to pay for material with the least possible delay after its delivery to the American Expeditionary Forces. (2) The French Government was furnishing large quantities of material to the American Expeditionary Forces, and it was necessary to be in close touch with the French Government officials in order to facilitate the work of reimbursement.

In a memorandum of September 22, 1917, from the chief surgeon, A. E. F., to the chief of staff, it was suggested that, in view of the trouble experienced and needless delays caused by the transmission of vouchers to and from Cosne, the Medical Department purchasing officer be made disbursing officer. This appointment was made, by cablegram, dated October 5, 1917; however, the office at Cosne continued for some time to do practically all the disbursing of the Medical Department, A. E. F., no disbursing personnel having been assigned to the Paris office. On April 6, 1918, Fcs. 5,000,000 were transferred to the credit of the medical purchasing officer in Paris and, the necessary personnel having reported, work of paying the accumulation of French Government bills was begun.

The chief function of the disbursing office was paying for materials ordered from private individuals and firms by the purchasing office in Paris, and paying for materials obtained from the French Government, whether or not these materials were ordered here.

Payments to private individuals and firms.—Difficulties in paying for purchases from private individuals and firms were avoided by having the material inspected by and shipment made under the supervision of an officer from the purchasing office. It was therefore possible for the purchasing officer to approve bills and execute the second certificate on Form 330 without waiting for receipts from the consignees, thereby facilitating payment.

Payments to French Government—Purchases from the French Government may be divided as follows: (1) Purchases made by this office on written orders or contract. (2) Incidental purchases made by base surgeons, hospitals, and units in the field. (3) Hospital equipment taken over by American hospital organizations. This latter class comprised in many cases fully equipped base, camp, and field hospitals, and ambulances.

Bills were submitted in quadruplicate by the French Government to the liaison office. There they were numbered, the number being prefixed by a letter to indicate the French service furnishing the material, "S-" for "Service de Sante", "A-" for "Service d'Artillerie", etc. They were then distributed by the American liaison officer to the American departments properly chargeable with payment.

At first, these bills were sent out to the organizations receipting for the material, for preparation of the necessary forms, and in order that the material might be taken up on the return of the accountable officer; this procedure was found to be impracticable due to the mixed and complicated character of the bills and also on account of the loss of bills and delay in the mail. Therefore vouchers covering these bills were prepared in this office and the second certifi-

cate thereon executed by the purchasing officer, on the basis of the provisional receipt, after having changed this certificate to read: "Received by the A. E. F." or "Received by the Medical Department," instead of "Received by me." The material was not taken up on the return of the purchasing officer; instead a copy of the Form 12 was sent as an invoice to the officer receiving for the material with the request that he take up the property on his return and send his voucher number to the chief surgeon, A. E. F.

Three main difficulties were encountered: (1) the bills were submitted in the French language and therefore required translation. (2) The supply tables of the different departments of the French Army did not agree in all cases with the supply tables of the respective departments of the American Army; therefore bills often were received covering materials to be paid for by two or more departments. For example a bill from the French Service de Santé, covering the taking over of a hospital, usually included some material to be paid for by the Medical Department and some by the Quartermaster Department, as well as items chargeable against the hospital fund of the new organization. (3) Materials ordered by the purchasing office frequently were furnished by French depots elsewhere than Paris and shipment made direct to American organizations, and this office often received no notification of shipment. In many of these cases, as well as in cases of materials turned over to units in the field on orders other than from this office, proper receipts were not obtained.

In the case of bills covering materials chargeable against hospital funds, checks were obtained from the proper organization in favor of the French Government for the amounts of such supplies. These checks were then submitted to the French Government, together with checks in payment of the medical portions of the bills. In the case of bills containing medical and quartermaster supplies, if the medical portion of the bill were larger, the bill was paid by this department and a bill submitted to the other department for reimbursement, in line with Army Regulations, 671.

In cases falling under the third category, efforts were made to secure proper receipts. If unsuccessful, the matter was submitted to the board of contracts and adjustments for authority to make payment.

Results.—The following table shows the number of vouchers and amount of funds disbursed for each month from December, 1917, to June, 1919:

Year and month	Number of vouchers	Amount disbursed	Year and month	Number of vouchers	Amount disbursed
December..... 1917	3	\$1,186.00	1918—Continued		
January..... 1918	2	96.00	November.....	210	\$274,610.33
February.....	2	1,120.00	December.....	218	671,977.99
March.....	3	40,287.50	1919		
April.....	173	250,453.15	January.....	221	806,512.94
May.....	313	376,425.13	February.....	94	69,582.58
June.....	436	858,620.86	March.....	102	239,899.22
July.....	324	512,838.86	April.....	45	57,726.41
August.....	288	546,909.72	May.....	41	37,865.71
September.....	271	681,737.83	June.....	24	13,722.44
October.....	308	527,645.82	Total.....	3,078	5,969,218.49

STORAGE AND ISSUE DEPOTS

Reference was made above to the shipments, in June, 1917, of medical supplies from the United States, comprising divisional field units, base and evacuation hospital units, and medical reserve units, for the earliest combat divisions of the American Expeditionary Forces. About July 10, 1917, these supplies began to arrive in France, at the port of St. Nazaire.

At this time the extent to which America would contribute troops was probably not realized, and perhaps, also, the exact location of the operations to be performed.

Because the channel ports were overtaxed by the British requirements, the United States was practically limited to ports south of Cherbourg. Among these latter Brest was served by a long rail line, and the acute car shortage in France made service on this line difficult. St. Nazaire was the port chosen as the initial base, and it was, therefore, at St. Nazaire that the initial shipment arrived.³²

There was immediate recognition in the Medical Department, A. E. F., that a depot not only nearer the front than St. Nazaire but also accessible to other ports to which shipments might arrive was required.³³ Selection had been made of a most satisfactory building at Nevers, but just before the shipment of the supplies from St. Nazaire was effected word came that this building had been transferred to another service and that the Medical Department had been assigned space at Cosne. Shipment was made to that point, and upon July 8, 1917, the depot at Cosne was inaugurated.

The site of a medical supply depot was determined, first, by its facility to serve the troops, and, second, by accessibility thereto from the ports. With supplies in small quantities arriving at several ports, it was necessary to establish the first depot at a central point since the supplies received at any one port were not sufficient in quantity nor sufficiently balanced to stock a depot in each port.⁸ Later, another factor affected the matter—the necessity for clearing the ports.

It will be of material assistance if, in reading the history of this development, one will bear in mind the fact that while supplies in large quantities were received, for most of the period the demand was using up the supplies almost as fast as they arrived, and that while, later, certain supplies came in larger quantities than were immediately required, there was never a time during the period of active hostilities when there was such a surplus of all supplies as would enable the complete stocking of a second depot.

The Medical Department was meeting its needs from Cosne, and therefore Cosne had to be kept stocked. It could never divert shipments from Cosne in all articles for such a period as would enable it to transfer its activities to another depot.

General Orders, No. 20, H. A. E. F., August 13, 1917, prescribed the limits of the Line of Communications, A. E. F., and constituted base section No. 1, base section No. 2, and the intermediate section. General Orders, No. 66, H. A. E. F., November 27, 1917, constituted base section No. 4 on the channel ports and base section No. 3 in England, and constituted base section No. 5

at Brest, which had theretofore been part of base section No. 1. General Orders, No. 75, H. A. E. F., December 14, 1917, prescribed the advance section, Line of Communications, and delimited the sections a little more definitely.

As stated above, in General Pershing's memorandum of August 20, 1917, concerning automatic supply, the following distribution of stock in France was prescribed: 45 days at base depots; 30 days at intermediate depots; 15 days at advance depots. So far as the Medical Department was concerned, no immediate change in its practice was required by this order. The problem was not to distribute 90 days' supply in the proportion prescribed. There was not then, and there was not for months afterwards, anything approaching 90



FIG. 43.—Intermediate Medical Supply Depot, No. 2, Gievres; entrance

days' medical supplies. In many articles there was never at any time any such quantity, so that the supply division remained as before, faced with the problem of supplying the ever-increasing needs from an exceedingly small stock that increased little, if any, beyond the demand. However, in certain items the receipts became greater than the current issues and it was possible to begin the stocking of depots other than the one at Cosne.

Since there was practically no unused storage space in France, the American Expeditionary Forces very promptly developed plans for construction to meet its own needs.³⁴ In each of the depots projected the Medical Department was to be assigned space, and the supply division, chief surgeon's office, Line of Communications, was called upon to estimate the amount needed by

the Medical Department and to determine the proportion in which such construction would be needed in the various sections of France.

Aside from the medical supply depot at Cosne, which was not connected with any other depot activity, the first space assigned to the Medical Department under this arrangement was at Gievres, in the intermediate section, where intermediate depot No. 2 was established and where the Medical Department began its activities on October 10, 1917.⁸ Shortly thereafter space was assigned to the Medical Department at Is-sur-Tille in the advance section, where advance depot No. 1 was established. Medical supply personnel arrived at Is-sur-Tille on November 18, 1917, although no supplies reached there, until a month later.² Similar assignment of space was made later at St. Sulpice,



Fig. 44.—Advance Medical Supply Depot, No. 1, Is-sur-Tille; general view

in base section No. 2; at Montoir, in base section No. 1; at Marseille, in base section No. 6; and after the armistice had been signed, at Montierchaume (a duplicate of Gievres), in the intermediate section. A second duplicate was contemplated at Le Mans in the intermediate section.⁸

After the establishment of the depot at Is-sur-Tille, the immediate problem was to establish and maintain a stock at that point to supply adequately the troops in that area. It was not possible to stock every item for, as has been said, there was not sufficient stock in France to provide completely for two depots.

During the winter of 1917-18 many base hospitals either had been established or were being built in the neighborhood of Is-sur-Tille. The supply

requirements of these units were large. Since the primary purpose of the advance depot at Is-sur-Tille was to supply the combat troops, instructions were issued that these permanent installations, except in emergencies, would obtain their supplies direct from the intermediate depot.³⁵

It is obvious that this practice avoided double handling of the supplies and conserved transportation. Later when these base hospital units became enlarged and the available supplies became greater, the practice was to fill their requirements from the base ports, thus doing away with still another shipment and further conserving tonnage. (See "Controlled stores" and "Hospital center depots.")

Is-sur-Tille, therefore, was supplied initially from Cosne with large quantities of those items whose use by troops in the field was to be expected, and a 10-day automatic shipment from Cosne was instituted. This was supplemented, however, by special requisitions made by the officer in charge at Is-sur-Tille, and from time to time modifications in the "automatic" were asked for by him.

Since the supply division was working upon a small balance, the condition of the stock at this depot was always a matter of grave concern. A semimonthly stock report was required, one copy going to the officer in charge at the Cosne depot, another to the chief surgeon's office. Always in both places the stock report was checked carefully, and shipments were made without requisitions, if the stock on hand appeared to be below the minimum.

For a long time, considerable difficulty was experienced in reconciling the requirements of the Is-sur-Tille depot with the available stock in France and the need for this material in the installations not supplied by Is-sur-Tille. It was, necessarily, a hand-to-mouth policy.³⁶ Though Is-sur-Tille had its full share of supplies, even in the early days we had to rely upon small but frequent shipments. In field supplies it was given the major portion, and in such materials as prepared dressings, and splints which were obtained in a large measure from the American Red Cross, Is-sur-Tille was made the main depot. Also, in the later period, Is-sur-Tille was supplied directly from the base ports, the supplies arriving at Marseille being particularly applicable to this method of supplying this depot.

Is-sur-Tille, though a Services of Supply depot, was placed eventually under the jurisdiction of a representative of G-4, general headquarters, A. E. F., and issues therefrom to the troops were made under his direction.

With the establishment of intermediate depot No. 2 at Gievres, and the assignment of space therein to the Medical Department, it was possible for the Medical Department to contemplate the concentration in that depot, of all its supply activities in the intermediate section and the limitation of the activities of the medical depot at Cosne.⁸ The reason for this was: The two depots were in the same general area, were served by the same railroads, and could efficiently make issues only to the same forces. Since Gievres was to have better facilities than Cosne, and it was undesirable that two depots should serve identical forces, the initial assignment of personnel to Gievres was made with the thought that the entire personnel of the Cosne depot would soon follow and

that the supplies would be diverted to Gievres when that depot was ready to function. Pending that time, Gievres was considered, so far as the issue of medical supplies was concerned, as a subsidiary of the depot at Cosne and issues were made only upon the order of the officer in charge of the Cosne depot, transmitted either as extracts of requisitions or by telephone. Shipment in carload lots from Gievres was the rule, issues in detail being made from Cosne.⁸ Requisitions continued to be sent to Cosne; however, the depot at Gievres, within this period, was prepared as an issue depot in order that in an emergency it might replace Cosne.

To summarize, then, early in 1918 there were three medical supply depots in France: Intermediate medical supply depot No. 3, at Cosne, and intermediate medical supply depot No. 2 at Gievres, both in the intermediate section, and one, advance medical supply depot No. 1, in the advance section at Is-sur-Tille. Cosne was in active operation. Gievres was operating as a subsidiary of Cosne. Is-sur-Tille was completely stocked so far as field supplies were concerned, and was depended upon as the source of supply for the divisional troops. These troops were now in training areas in the advance section and were soon to be put into the line.

At this time the chief surgeon was concerned with two situations. One was the distance of Is-sur-Tille from the front line and from the troops it was to supply. It was admirably situated for the supply of items whose rate of usage was fairly constant and the need for which could therefore be anticipated. This was particularly so with supplies used in large quantities. Its location as the most advanced depot was not satisfactory from the standpoint of the supply of items used in small quantities and at an inconstant rate. Such a condition applied to many items of medical supply of great importance; the demand therefor could not be foreseen.

It is impracticable, or at least undesirable, to carry in the equipment of the combat troops even a small quantity of each of such items. The lack of such an item may be of vital importance to the individual needing it. It may even be of importance to the Army as a whole in that the early use of such an item may prevent the development of an epidemic. Repeated failure to furnish the supply might have its repercussion in the morale of the Army. These items can therefore only be supplied as emergency supplies. Adequate service involves proximity to the troops or available transportation for speedy delivery of emergency requirements.

Medical officers of combat troops should have the assurance that such speedy supply will be forthcoming. If they have not that assurance they will attempt to prevent disaster by having in their own possession supplies for all possible emergencies. This results in encumbering the troops. That is exactly what happened in the American Expeditionary Forces. Two divisions in line, early in 1918, were ordered to move; large quantities of medical supplies were necessarily left behind in the area turned over to an ally.⁸ No blame can be attached to this action for it was wise and far sighted, in view of the fact that methods of warfare were new and the equipment and remedial agents to be required uncertain.

ADVANCE DEPOTS AND ARMY PARKS

To obviate the necessity for repeating such a disposal of medical supplies, the chief surgeon, Line of Communications, on February 11, 1918, recommended to the commanding general, Line of Communications, that the Medical Department be authorized to provide itself with one or more small storage warehouses, with a capacity of approximately 5,000 square feet of floor space each, so situated that they could be reached by motor truck from the troops in the field.³⁸ No elaborate system of issue was contemplated; all that was desired was simply a "dump" where the essential articles, such as ether, gauze, dressings, morphine, first-aid packets, and standard Red Cross dressings could be stored and issued in emergencies. Since Is-sur-Tille was too far removed from the front line to be reached by motor truck with advantage and since rail transportation therefrom for less than carload lots was necessarily slow, it was considered as not being suitable for the most advanced medical depot.

As a result of this recommendation a building in Nancy was made available to the Medical Department for the purposes outlined, but before it could be occupied American troops had been moved to a section for whose supply Nancy was not suitable.

On April 12, 1918, this principle of maintaining a small amount of stores sufficiently close to the front-line troops so as to be quickly transportable there by motor truck, for emergency use, was applied by general headquarters, A. E. F., not only to the Medical Department, but to other supply departments as well.³⁷ On that date, the regulating officer was directed to maintain a small supply of stores, at or near the railheads for emergency issue only. To carry out these instructions the assistant chief of staff, G-4, general headquarters, asked the chief surgeon to submit a list showing what Medical Department stores should be maintained by the local supply officer at the railhead.³⁹

On April 25, 1918, the chief surgeon, A. E. F., submitted a list of supplies comprising twice the equipment of a field hospital, less stationery, and extra articles, such as anesthetics, first-aid packages, front-line parcels, splints and splint equipment, muslin bandages, and adhesive plaster.⁴⁰ On May 24, this list was revised downward, both as to the number of articles and the amounts,⁴¹ at the instance of the assistant chief of staff, general headquarters, and again on June 1, 1918.⁴² The final revision comprised the following articles:⁴²

Proposed list of reserve stock of medical supplies at railheads

Aspirin, 324-mgm. tablets, 500 in bottles.....	1	Gauze, sublimated, 2 half-yard lengths in package.....	750
Chloroform, ¼ pound in tin.....	50	----- packages.....	12
Hydrargyri chloridum corrosivum tablets (antiseptic) (Par. 902), 250 in bottle.....	1	Pins, safety, 3 sizes.....	dozen.....
Iodum-potassii iodidum, in tube.....	50	Plaster, adhesive, zinc oxide, 5 yards by 2½ inches, spools.....	spools.....
Morphinæ sulphas:		Splints:	
8-mgm. hypodermic tablets, 20 in tube.....	24	Coaptation, 5 in set.....	sets.....
8-mgm. tablets, 600 in 3-ounce tin.....	1	Wire gauze, for, 1 yard in roll.....	rolls.....
Oleum ricini, 3 pints in tin.....	2	Sutures, catgut, plain sterilized, in tubes.....	tubes.....
Petrolatum, in 12-ounce tin.....	4	Ether, ¼-pound tins.....	number.....
Bandages, gauze, compressed, 3 sizes, 1 gross in box.....	15	Individual dressing packages.....	do.....
----- boxes.....		Shell-wound dressings.....	do.....
Colton, absorbent:		Front-line parcels:	
In roll.....	20	Red label.....	do.....
Sterilized, in 1-ounce package.....	100	White label.....	do.....
		Blue label.....	do.....

SPLINTS AND SPLINT EQUIPMENT			
		Supporting slings, three sizes.....	number.. 20
		Cotton wadding, rolls, 5-inch.....	do.... 50
Thomas full ring extension leg splint.....	number.. 18	Muslin bandages, 4-inch.....	do.... 103
Thomas half ring extension leg splint.....	do.... 18	Sodium bicarbonate.....	pounds.. 100
Thomas hinged extension arm splint.....	do.... 18	Sodium carbonate.....	do.... 100
Thomas straight extension arm splint.....	do.... 2	Oxygen tanks.....	number.. 1
Wood splints, 4-foot lengths.....	do.... 23	Inhalators.....	do.... 1
Triangular bandages.....	do.... 50		

On June 5, 1918, the medical representatives of the chief surgeon in the fourth section of the general staff, general headquarters, were given the problem of developing a list of replenishment medical supplies for an army park, to be located near Paris, as follows:

Memorandum for all divisions of G-4:

1. Colonel Moseley has gone to Paris to-day to select a site at which to locate an "army park" for the supply of the divisions served from the regulating stations at Nantes and Le Bourget. Effort will be made to secure this place in the vicinity of Melun.

2. The park will have for its personnel a commanding officer, representatives of each supply department, and necessary labor. Two or three truck companies will be attached for the purpose of forwarding supplies to the "issue points" of the divisions.

3. Automatic supplies and ammunition supplies for the divisions will be forwarded through the regulating stations by rail as at present. A reserve stock of these supplies will be maintained at the park, available to be forwarded by truck in case of emergency.

4. All class 2, 3, and 4 supplies, except ammunition, will be forwarded from the park.

5. The park will, in the absence of army headquarters, be under direct control of these headquarters through the regulating officer who is a member of G-4.

6. It is desired that each division of this section make a study of this matter and submit recommendations as to the quantity of stores which will be maintained by the departments which they represent.

GEO. VAN HORN MOSELEY,
Colonel, General Staff,
Assistant Chief of Staff, G-4.

Copy to Major Tuttle, medical supplies.

Action was taken thereon by the medical representatives and the following memoranda submitted:

GENERAL HEADQUARTERS,
AMERICAN EXPEDITIONARY FORCES,
G-1 GENERAL STAFF,
France, June 7, 1918.

Memorandum for assistant chief of staff, G-4:

Subject: Medical Department supplies proposed for army dump.

1. The following lists represent Medical Department supplies proposed for maintenance at an army dump. It is the understanding that these will be stored under canvas and that the personnel of a small supply unit will be in charge. The basis used has been one combat division for eight days, issues to be made from these stores direct to division by motor transportation. It has been assumed that all varieties of Medical Department supplies ordinarily required by combat troops for replacement only should be stocked at this depot. The initial equipment of units has, therefore, not been considered.

A. P. CLARK,
Major, Medical Corps, United States Army.

GENERAL HEADQUARTERS,
AMERICAN EXPEDITIONARY FORCES,
G-1, GENERAL STAFF,
June 10, 1918.

Memorandum for Colonel Wadhams:

1. The study indicated in paragraph 6 of Colonel Moseley's memorandum was turned over to me for completion.

2. The lists were rapidly prepared after a careful interpretation of the memorandum had been received and after consultation with Colonel Stark, Colonel Siler, Major Tuttle, and Doctors Barr and Wagener.

3. One copy complete is furnished you for your information and files.

A. P. CLARK,
Major, M. C., Med. Rep. with G-1.

FOURTH SECTION, GENERAL STAFF,

June 9, 1918.

From: Commander in Chief.

To: Commanding General, Services of Supply (C. S.).

Subject: Proposed Medical Department supply table for an army park, on a divisional factor basis.

1. Inclosed herewith is a list of supplies to be maintained at army parks as the occasion requires. This list has been prepared at these headquarters but is subject to such modifications as the chief surgeon may see fit to make. Any changes made by him should be furnished these headquarters in order that the retained lists on file here may be corrected.

2. This list has been arranged upon a divisional basis and represents a supply for eight days. For each park established the supplies to be maintained therein can be readily determined by multiplying this unit by the number of divisions to be served.

3. As mentioned in letter to you from these headquarters dated June 7, 1918, an army park is now in process of establishment at Lieusaint, on the line between Paris and Melun. For the present this park will be called upon to supply the 1st, 2d, and 3d Divisions. Therefore, three times the quantities herein shown should be maintained at that depot. Steps have already been taken to have the chief surgeon recommend for assignment there one officer and such other personnel as may be needed to properly carry on this supply function.

4. Similar parks may be established from time to time. As a result of the experience to be gained in the operation of the park at Lieusaint it is expected that changes in the original list will become necessary. Every effort should be made to reduce it as soon as possible to a practical basis and then adopt a standard supply table which will be applicable in meeting these supply emergencies wherever they arise.

By order of the commander in chief.

GEO. VAN HORN MOSELEY
Colonel, General Staff,
Assistant Chief of Staff, G-4.

In the meantime, the need for the supplies had become acute. The chief surgeon, A. E. F., by telephone, directed the medical supply officer at Cosne to make an emergency shipment, using his own judgment as to the items and quantities to be shipped, and stating that the list would be furnished him later. The supplies, accompanied by a detachment, were sent forward by truck, and the first army medical park was established at Columniers where there was also an evacuation hospital. Later it was moved to Lieusaint, where an army park had been established.

To representatives of the chief surgeon, who visited the depot at Lieusaint, it became apparent that a complete stock could not have been supplied under the conditions set forth. Furthermore there were difficulties connected with replenishment. Requests therefor could not be sent direct to the intermediate depot by the medical supply officer, but had to go through G-4 and the regulating officer. There was an apparent shortage in the depot stock in certain essential items, such as ether, and blankets. Accordingly a conference with the assistant chief of staff, G-4, was asked for and obtained. The opinion

was expressed by him that the supplies the army called for must be furnished, and that the Services of Supply must not be in a position to veto supplies asked for. The chief surgeon's representatives pointed out that far from vetoing requisitions, the Medical Department was extremely desirous of getting supplies forward and keeping the stock adequate, that they were there for the furtherance of that purpose, but were stopped from sending supplies without authority of the army.

As a result of the conference, the representatives of the chief surgeon were authorized to use the chief of staff's name on telegrams asking for immediate replenishment and were requested to prepare a list of the minimum stock to be carried at the depot and to stock the depot with the material so listed. The immediate needs were shipped and the list prepared.

For the operations of the Paris group, the depots at Cosne and Gievres functioned as advance depots.⁴³ Frequently, shipments were made by truck train, notwithstanding the distance. Following the operations of June, and July, 1918, the progress of the First Army was so fast that no further permanent establishments were made, the need being met by the establishment of army parks and dumps.

As stated above, the original basis for the stock to be carried in these dumps was the replacements necessary for one combat division for eight days, and the officer in charge was authorized to maintain in storage, as many times this amount as there were divisions in his sector. However, a policy was developed gradually of establishing corps or army dumps for which there was authorized a fixed stock maximum without reference to the number of combat units to be supplied, but based more upon the number of dumps established in relationship to the known number of divisions to be employed in the operation.²⁹

The logical stock for army or corps dumps included only items of combat equipment and supplies and trench stores, and divisional units would naturally requisition such articles only, but in the early days of the development of the corps echelon, it was necessary for these dumps to carry limited replacements for such units as mobile and evacuation hospitals. This produced a useless dispersion of equipment difficult to obtain and quickly rendered immobile a unit which of necessity must remain mobile.

It became the policy to confine items on the fixed stock maximum of such dumps to those of combat material and trench stores alone. This necessitated the establishment of a new echelon, inasmuch as large hospitals in the advance zone were required to replenish their stock from an advance supply unit.²⁹

The establishment of fully stocked army advance medical supply depots, on the basis of one per army, was contemplated.²⁹ So far as quantities were concerned, the depot was to be upon a very limited time basis. The functions of this larger army unit were to be, primarily, to fill the calls of the army or corps dumps, and, secondarily, to fill requisitions from medical units in the advance zone. So far as possible, it was to be relieved of the latter function by direct shipments to the unit from the Services of Supply. The limits of the fixed stock maximum for both of these units were to be fixed by the army G-4, upon the recommendation of the army chief surgeon, and were to be modified only by the same authority. The army advance medical supply

depot was essentially an army unit and under the direct control of the army commander through his chief surgeon.

The method of requisitioning upon dumps was necessarily informal, by requests sent direct to the dumps. The method contemplated for replenishment of dumps from army advance depots was also an informal call, showing shortages in authorized stock.²⁹

The contemplated procedure for replenishment of army advance depots was the automatic shipment of the differences between the stock maximum and the amounts shown on stock reports to be rendered periodically by the army advance depots direct to the forward Services of Supply unit.²⁹

BASE STORAGE DEPOTS AND BASE SECTION DEPOTS

Conditions at the base ports were such as to make efficient handling and speedy despatch of medical supplies difficult. This difficulty was common to all services, but in view of the lack of reserves of medical supplies in France, was a matter that gave much concern to the chief surgeon.

For a considerable length of time equipment at these ports was inadequate; dock capacity was inadequate; in some instances the depth of channel was insufficient for many of the ships used; personnel was limited; railroad equipment was scarce. But because of the lack, entire lack in some ports, of warehouse space, it was necessary to keep the ports clear, so ships were unloaded directly into freight cars. As stated above, representatives of the Medical Department were from the very first, assigned to the duty of sorting the cargo as it was unloaded, claiming Medical Department material, assembling it, and despatching it to the intermediate depots. After the entire responsibility for this work was devolved upon the newly created transportation department, these representatives of the Medical Department remained as a necessary aid to that service in the identification and disposition of Medical Department material.⁸

From the first, classification warehouses were a pressing need. In a memorandum to the commanding general, Line of Communications, on January 24, 1918, the chief surgeon, Line of Communications, stressed the importance of establishing at the base ports classification warehouses for medical supplies so as to obviate the indiscriminate loading of such supplies into freight cars because of the nonavailability of warehouse space.⁴⁴ General headquarters, A. E. F., on February 2, 1918, approved the recommendation, and left its adoption to the commanding general, Line of Communications.⁴⁵ Accordingly, instructions were sent by the commanding general, Line of Communications, on February 6, 1918, to the base ports then being used, to provide such space if possible.⁴⁶ Since all supply departments were making like insistent requests, however, no suitable warehouse space could be set aside for the exclusive use of the Medical Department, until after the construction of classification yards, then in progress, had been accomplished.⁴⁷

In base section No. 1, on April 23, 1918, 20,000 square feet were made available to the Medical Department in the base storage depot at Montoir, 3 miles from St. Nazaire. On May 1, 1918, the medical depot at this point was established. Under date of May 27, 1918, 100,000 square feet of the projected

construction was allotted to the Medical Department. On October 1, 1918, space was secured in Nantes.

In base section No. 2, on July 6, 1918, space was made available to the Medical Department at St. Sulpice, just outside Bordeaux.

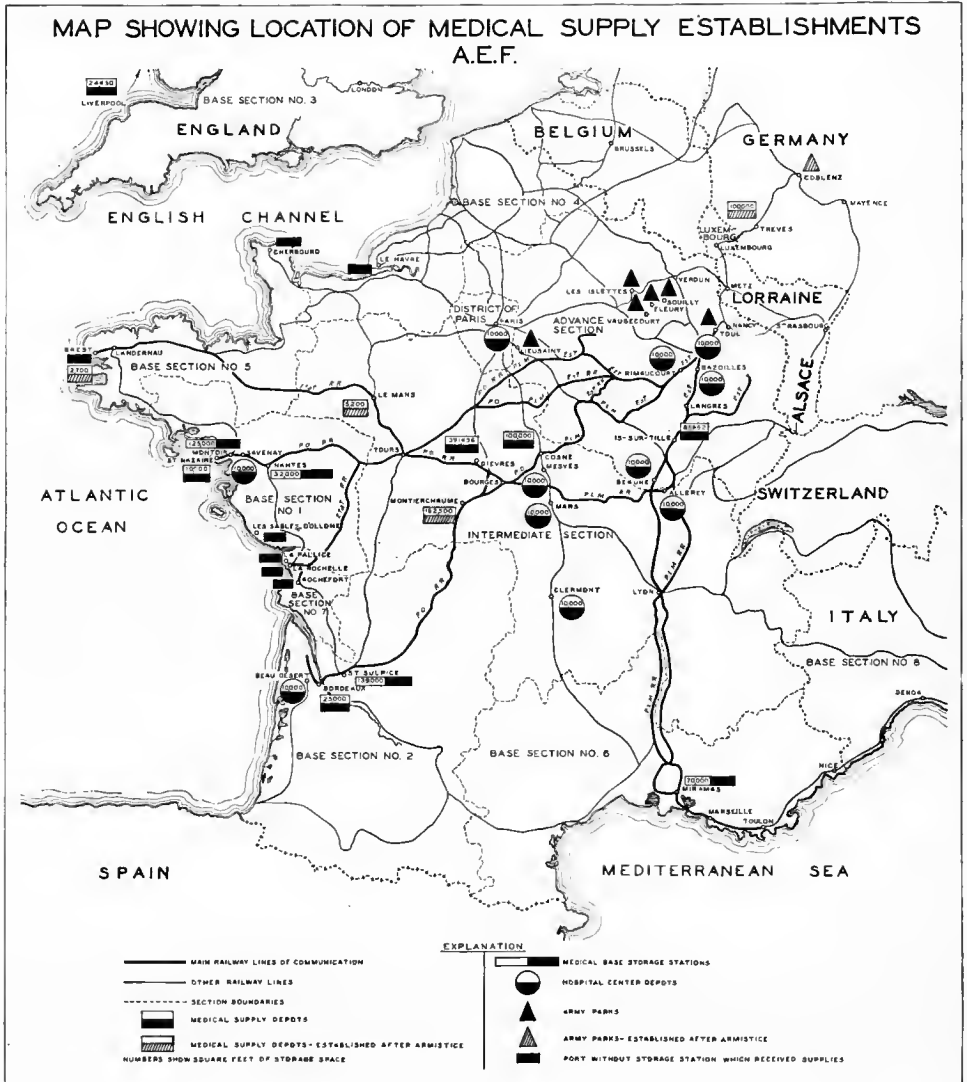


FIG. 45.

In base section No. 6, on July 8, 1918, space was assigned in the warehouses taken over from the Allies, at Marseille.

In base section No. 5, on December 21, 1918, a depot was established at Brest.

The development of these depots will be discussed in greater detail under "Controlled stores."

HOSPITAL CENTER DEPOTS

Upon the adoption of the plan of concentrating beds in hospital centers, there was need in each center of more than 5,000 beds for an issuing medical supply depot. The original plans called for storage space—one building 20 by 150 feet—for each component base hospital, and, in addition, there was to be a sorting warehouse 24 by 50 feet for all supplies for each hospital.⁴⁸ These facilities, the chief surgeon believed would not meet the supply needs of the Medical Department. Accordingly he recommended on April 23, 1918, that an issue depot be established at each hospital center, to replace the separate storage buildings mentioned above, thus affording opportunity for direct shipment thereto from the base ports of carload lots, economy of use, and elimination of the possibilities of an embargo in times of railroad stress.

The recommendation of the chief surgeon was approved forthwith by the commanding general, Services of Supply, action to be taken in individual cases as supply of labor and materials became available.⁴⁹

CONTROLLED STORES

During the long period in which intermediate medical supply depot No. 3 at Cosne, was the only completely stocked medical depot in France, and the only issue depot, American forces were being located in increasing numbers, at widely scattered points and frequently in small detachments.

The chief surgeon attempted to effect the prompt supply of these troops and in the case of those located near the base ports, to avoid back shipments from Cosne by authorizing the larger medical units in the areas to carry a reserve beyond their own needs, and by directing them to supply the material needed by the smaller unit in an emergency. This was done in both the advance section⁵⁰ and the base ports.⁵¹

Continued efforts to speed up the establishment of medical supply depots in the advance section and at the base ports were made. However, these projects were but part of the construction program of the American Expeditionary Forces, and but part of the construction for the Medical Department. The departments having such construction in charge were confronted by an Herculean task and were working to maximum capacity.

It was particularly desirable to avoid, so far as possible, back shipments from Cosne of bulky articles such as beds and mattresses. It was not yet possible to avoid such back shipment of the smaller items, of which the full supply for France came in "packed boxes."

The following correspondence shows what was done in base section No. 1. The action in this base section was followed by similar action for the others.

SERVICES OF SUPPLY,
OFFICE OF THE SURGEON, BASE SECTION NO. 1,

France, March 26, 1918.

From: Surgeon.

To: Chief Surgeon, Services of Supply.

Subject: Medical supplies.

1. New camps are constantly being established in this base section on short notice, and it is necessary frequently to provide such camps with medical supplies for immediate use until they can be obtained from the depots on requisition.

2. In order to meet these emergencies, authority is requested to obtain and keep on hand at the medical property warehouse, at these headquarters, a moderate number of medical and surgical chests, M. and S. (supplementary), venereal prophylaxis units, the drugs needed to renew those in the chests, and blank forms, until such time as an issue depot may be established in or near the city where these headquarters are located.

CHAS. L. FOSTER,

Lieut. Colonel, Med. Corps, United States of America.

[First indorsement]

C. S. O., A. E. F., Hdqrs. S. O. S., March 29, 1918. To the surgeon, base section No. 1.

1. You are authorized to divert and keep on hand in the medical property storehouse a reasonable amount of medical supplies, the number to be determined by you, for distribution to the units coming into your section. The necessity for an issue depot at the base ports is realized by the chief surgeon. He has, however, learned from experience that difficulties arise with two depots furnishing supplies and he therefore desires that all units in your section receiving supplies from you in this manner forward their requisitions for other supplies made upon the intermediate medical supply depot through you, in order that you may exercise some control.

2. It is desired that in all cases where boxes are diverted, the number of the box, the shipping direction, and the contents thereof, be reported to the O. I. C. intermediate medical supply depot No. 3.

By direction of the Chief Surgeon:

N. L. McDIARMID,

Major, Medical Corps, United States Army.

AMERICAN EXPEDITIONARY FORCES,
HEADQUARTERS SERVICES OF SUPPLY,

March 30, 1918.

Memorandum to the officer in command intermediate medical supply depot No. 3, A. E. F.

1. The surgeon, base section No. 1, has been authorized to divert to storehouse at that port a reasonable amount of medical supplies for distribution to troops in that vicinity and to incoming troops. He has been directed to furnish you with a complete list of markings on the boxes and their contents and has been instructed to have all requisitions from organizations who are supplied in this way come through his office.

By direction of the Chief Surgeon:

N. L. McDIARMID,

Major, Medical Corps.

[First indorsement]

A. E. F., intermediate medical supply depot No. 3, France, April 6, 1918. To the chief surgeon, A. E. F.

1. Returned. Request that the surgeon, base section No. 1, transmit a copy of his bimonthly stock report to this office, and that he be directed to ship, upon telegraphic request from this depot, any stock needed in emergency.

2. Request to be informed if stock so diverted at the base will be invoiced to the the surgeon, base section No. 1.

J. R. MOUNT,

Major, Medical Corps.

[Second Indorsement]

C. S. O., A. E. F., Headquarters S. O. S., France, April 9, 1918. To the surgeon, base section No. 1, A. E. F.

1. It is believed that the bi-monthly stock report required by general headquarters of all supply depots should be made by the depot at your port. A copy is to be furnished this office and to the intermediate medical supply depot No. 3, and to the coordinating section of the general staff, general headquarters. It is assumed that shipments upon tele-

graphic request from the officer in command, intermediate medical supply depot No. 3, will be made. Your recommendation concerning the second paragraph is requested.

By direction of the chief surgeon:

N. L. McDIARMID,
Major, Medical Corps.

[Third Indorsement]

S. O. S., office of surgeon, base section No. 1, France, April 16, 1918. To the chief surgeon, A. E. F., S. O. S.

1. Returned. It is believed that for the present, while maintaining only a small emergency stock of supplies, that the stock diverted should be invoiced to the intermediate medical supply depot No. 3, as at present, and that depot kept informed of supplies diverted and issued on bi-monthly reports.

CHAS. L. FOSTER,
Lieutenant Colonel, Medical Corps, United States of America.

The plan of the chief surgeon for the distribution of supplies and the methods actually used in the period of development of the American Expeditionary Forces have been sufficiently outlined above so far as the organization on the Line of Communications was concerned. The plan was to decentralize, but the execution of this plan had been delayed because of two necessities: The shortage of stock in France; the absence of depots in the base sections, thus further necessitating awaiting construction before their establishment could be effected.

The status of early June is shown by the following letter sent in response to a memorandum of June 6, calling for the scheme or system of supply for units and stations in the intermediate and base sections.

OFFICE OF THE CHIEF SURGEON,
AMERICAN EXPEDITIONARY FORCES,
HEADQUARTERS SERVICES OF SUPPLY,
France, June 11, 1918.

From: The chief surgeon, A. E. F.

To: The assistant chief of staff, G-4, Services of Supply.

Subject: Your file No. 1499—G-4.

1. As inclosures hereto there are two copies of Circular No. 12, chief surgeon's office, showing the procedure now in force for the supply of troops in the intermediate and base sections.

2. In addition, base hospitals in the advance section have been directed to forward their requisitions to Cosne, in view of the fact that their requisitions are sufficiently large to warrant shipments in carload lots and are seldom emergency requisitions. The officer in charge of intermediate medical supply depot No. 3 has been authorized to modify requisitions to meet the needs of his stocks.

3. Heretofore only two depots have been issue depots—Is-sur-Tille and Cosne. It is contemplated that in the near future depots will open at base sections No. 2 and No. 1, and at a number of the large hospital centers. This will necessitate a change in the plan, and the following program is proposed:

(a) Requisitions from organizations within a section to go to the chief surgeon of that section for his action; to be transmitted by him direct to the depot within the section for issue.

(b) Requisitions from depots to come to the chief surgeon's office, A. E. F., for action; to be referred to whatever storage warehouse seems suitable. Storage warehouses containing "controlled stores" to be established at St. Sulpice, Montoir, and Gievres. "Controlled stores" to be subject only to the orders of the chief surgeon.

By direction of the chief surgeon:

N. L. McDIARMID,
Major, Medical Corps, United States Army.

As indicated in the letter quoted, the situation was about to be materially changed. The hospital center depots whose establishment had been asked for in the letter of April 23, 1918, were about ready to function. The construction projects at the base ports were well under way and warehouses were available; finally, supplies were being received in such quantities as to warrant dispersion of stock in at least many items.

Advance depot No. 1 and the two intermediate depots were fairly well stocked; at times, they were pressed for storage of material received. The chief surgeon, therefore, could carry out further his plan of "controlled stores."

This subject is of such importance, and the benefit derived from the operation of the system in France was so great that quotations in extenso of the communications concerning it are made.

The policy of "controlled stores" was actually initiated, although not under that name, late in 1917 when directions were given to all base section surgeons to ship certain designated items to Gievres, all others going to Cosne. From time to time these were modified, additions to, or subtractions from, the list being made in accordance with the stock at Cosne upon the recommendation of the officer in charge of that depot.

It had been continued by the policy of holding the stock at Gievres subject to the orders of the intermediate depot at Cosne, making the latter the only issuing depot in the intermediate section.

In the summer of 1918, however, a more comprehensive system could be initiated, as follows:

OFFICE OF THE CHIEF SURGEON,
HEADQUARTERS SERVICES OF SUPPLY,
France, July 2, 1918.

From: The chief surgeon, A. E. F.
To: The surgeon, base section No. 2, A. P. O. No. 705.
Subject: Operation of base storage stations.

1. Herewith are submitted two copies of instructions governing the operation of base storage stations, together with the list of the supply items to be carried in stock.
2. The storage station of base section No. 1 should proceed to establish these stock balances up to the maximum amounts indicated. When the maximum of these items has been reached at the base storage station the excess should automatically be forwarded to Gievres or Cosne under existing instructions or instructions to be subsequently issued by this office. Likewise, supplies not carried in base storage stations will in the first instance be routed to Cosne or Gievres under instructions of this office.
3. Issues of supplies from the base storage stations to advance medical supply depots or units other than the medical supply depots at Gievres and Cosne will be made only upon specific routing or issue instructions from this office as occasion arises. Specific instructions to ship specified quantities will take precedence over current shipments to Gievres or Cosne.
4. Until further notice all medicines (except those to be carried in base storage) in mixed or original packages will be shipped direct to Gievres as promptly as possible.
5. The object sought in the establishment of base storage stations is to facilitate the shipment direct to advance points of supplies which singly or in combinations of two or three can be made up in carload lots. The maintenance of adequate stores in the intermediate section is of primary importance. The initial list has been selected with these considerations in mind. From time to time items will be added to or subtracted from the list and the maximum amounts increased or decreased as the supply needs dictate.

By direction of the chief surgeon:

N. L. McDIARMID,
Lieutenant Colonel, Medical Corps, National Army.

OFFICE OF THE CHIEF SURGEON,
HEADQUARTERS SERVICES OF SUPPLY,
France, July 3, 1918.

From: The Chief Surgeon, A. E. F.

To: The officer in charge, intermediate medical supply depot No. 3, A. P. O. No. 737.

Subject: Instructions governing the operation of base storage stations.

1. Attached hereto are two copies of general instructions governing the operation of base storage stations, together with the list of items to be stored in the base storage stations. You are requested to forward one copy to intermediate medical supply depot No. 2, with such instructions as you deem appropriate.

2. Pending the further development of the sorting work at the base, these items of supply not carried in base storage stations, and the excess over the maximum of items carried in base storage stations, will automatically be forwarded to Cosne or Gievres, under the instructions in effect at that time. In view of this fact, it is of primary importance that intermediate medical supply depots Nos. 2 and 3 show, on the warehouse receipt slips, whether the supplies were received direct from the docks, or were issued from controlled stores.

3. All issues of controlled stores from base storage stations will be recorded on warehouse issue slips, upon which will be indicated that fact. The warehouse issue slip will also show the car number or car numbers in which the shipments are made. The identification of the car thus furnished you, which will, presumably, reach you in advance of the car itself, will enable you to check out the contents of those cars. The copy of the warehouse issue slip furnished this office will be retained here in suspended file pending the forwarding of warehouse receipt slip furnished by the receiving depot.

4. It is recognized that the present list of supplies and the amounts thereof are only tentative and that in all probability frequent changes therein will be required. You will be furnished with a copy of all changes made. As stated in paragraph 5 of the letter to the section surgeons, the needs of the depots in the intermediate section are of primary importance. This in view of the fact that for some time the supply of depots in the advance section will necessarily be from the intermediate depots.

5. Information concerning such needs can best be supplied by the officer in charge and it is desired that you make any recommendations concerning the present schedule or the future modifications thereof or concerning the needs of your depot as you deem pertinent.

By direction of the Chief Surgeon:

N. L. McDIARMID,
Lieutenant Colonel, Medical Corps, National Army.

INSTRUCTIONS COVERING THE OPERATION OF BASE STORAGE STATIONS OF "CONTROLLED STORES"

AMERICAN EXPEDITIONARY FORCES,
OFFICE OF THE CHIEF SURGEON,
July 3, 1918.

1. The warehouses for the storage of supplies at the several bases are to be operated independently of the issue medical supply depots of the bases. The former will be called base storage stations. Until other formal designation is given by the general staff, each base storage station will be referred to and indicated by the name of the place where located; for example, "Base storage station, Montoir." This title should appear on all warehouse receipts and warehouse issue slips.

2. The issuing depots of the bases will be called base medical supply depots, the official designation of each being as follows: "Medical supply depot, base section ———."

3. The receipt and issues of supplies by the base storage station will be controlled by the chief surgeon's office, A. E. F. Instructions governing the receipt of stores in and the issue of stores from the base storage station will be transmitted direct from this office to

the officer in charge of the base storage station. The list of items to be received and stored in each base storage station and the maximum amount of each item to be carried in each station will be initially prescribed and revised from time to time by this office. Each official list will be given a serial number.

4. Pending the development of adequately stocked base medical supply depots, the officer in charge of base storage station will be given blanket authority to issue to base medical supply depots designated items of supplies within the maximum limits prescribed by this office.

5. Requisitions upon base medical supply depots will be transmitted through the office of the base surgeon for modification and approval.

6. All stores received into base storage stations will be taken up on warehouse receipt slips (medical supply depot Form No. 2). One copy of each receipt slip will be forwarded daily to the chief surgeon's office (property division).

7. All stores issued from base storage stations will be recorded on warehouse issue slips (medical supply depot Form No. 4). These slips will be prepared in triplicate (printed pads will be furnished in triplicate; in the meantime a third copy should be improvised). One copy will be forwarded to the chief surgeon's office (property division), a duplicate copy will be forwarded to the unit to which shipment is made; the triplicate should be retained.

8. The issue of controlled stores from base storage stations as explained in paragraph No. 7 will be indicated on the warehouse issue slip by marking or stamping (stamps will be provided for this purpose) "Issued from controlled stores." The warehouse issue slip will also show the number or numbers of the car or cars in which the shipments have been made and the point of shipping destination if the latter differs from the place where the receiving unit is located.

9. The shipments of supplies direct from the docks to advance supply depots, or to units other than intermediate supply depots Nos. 2 and 3, must be handled as issue of supplies from controlled stores. Such shipments will generally be made from the storage stations, but these shipments, whether actually taken into the storage stations and there assorted and reloaded, or issued direct from the docks, must be taken up on warehouse receipt and issue slips. One copy of each warehouse receipt slip and one copy of each warehouse issue slip also must be forwarded to the chief surgeon's office as prescribed in paragraphs 6 and 7; also one copy of each warehouse issue slip must be forwarded to the unit to which shipment is made as prescribed in paragraph 7.

10. The slip pasted on each car of supplies issued from base storage station will contain the notation in bold type "Control stores."

11. Car shortage at the base may occasionally require that supplies be temporarily taken into the base storage station that should be forwarded direct to intermediate supply depots. This may represent items of supplies not regularly carried in the base storage station or quantities, for items regularly there carried, in excess of the maximum amounts designated for such items. Such supplies will, when cars become available, be shipped without further instructions in appropriate amounts to the intermediate supply depots.

12. Until further notice, supplies which are loaded at the docks and shipped direct to intermediate supply depots Nos. 2 and 3 will not be taken up at the base on warehouse receipt and issue slips. Initial warehouse receipt slips (representing the receipt of these supplies direct from the United States) will be prepared at the particular depot where the supplies are received.

13. All supplies received at the docks will be considered as "controlled stores," subject only to routing instructions published from time to time by this office. Any diversions of supplies, other than as mentioned in paragraph 9, will be made only upon specific authority from this office.

14. Beginning July 1, the chief surgeon's office (property division) will maintain separate records of and account for the "controlled stores" of the base storage stations. These will be posted from the warehouse receipt and issue slips forwarded daily. Each storage station will, however, maintain such current stock records as are necessary for informational purposes. The use of medical supply depot Form No. 5 (revised) is suggested. The storage

station, however, will not prepare or forward quarterly property returns; accountability in this sense reposes in the chief surgeon's office. Returns of medical property received and issued by the base issue depot will be made by the officer in charge.

By direction of the Chief Surgeon:

N. L. McDIARMID,

Lieutenant Colonel, Medical Corps, National Army.

Official list of items to be carried at base storage station

[Period effective until further notice]

No. 1.

July 1, 1918.

Supply item	Class	Unit	Maximum	Supply item	Class	Class	Maximum
MEDICINES, ANTISEPTICS, AND DISINFECTANTS				MISCELLANEOUS SUPPLIES—contd.			
Acidum boricum, 1/2 pound	P	Bottles	10,000	Food:		Boxes	200
Ether, 1/4 pound	P	Tins	40,000	Boxes of	F	do	250
Alcohol	P	Gallons	5,000	Ambulances, boxes of	F		
Chloroform, pound	P	Tins	20,000	Gauze:		Rolls	5,000
Foot powder, 1/4 pound	P	do	15,000	Plain, 5 yards, in roll	F	Packages	40,000
Iodine swabs, 6 in box	F	Boxes	25,000	Sublimated, 2 1/2 pieces in	F	do	100,000
Liquor cresolis compositus, 1 quart	P	Bottles	2,500	Individual dressing packets	F	do	50,000
Magnesi sulphas, 4 pounds	P	Tins	6,000	Gauze, plain sterilized, 2 1/2-yards lengths	F	Number	2,000
Protargol or equivalent, 1 ounce	P	Bottles	2,500	Lanterns, extra globes for, white	P	do	15,000
Spiritus ammoniæ aromaticus, 1/2 pound	P	do	8,000	Mattresses	P	do	2,000
Sugar, white:				Pails, commode (close stools)	P	do	6,000
4 pounds	F	Tins	1,000	Pajamas, suits	F		
12 pounds	P	do	5,000	Paper, toilet, 2,000 sheets in roll		Rolls	20,000
Sulphur:				Pillows	P	Number	15,000
In rolls	P	Pounds	7,000	Pillow cases, cotton	P	do	30,000
In flowers	P	do	7,000	Plaster, adhesive:	P		
Unguentum hydragryi, 1/2 pound	P	Bottles	1,250	5 yards by 1 inch		Spools	75,000
				5 yards by 2 1/2 inches	F	do	35,000
MISCELLANEOUS SUPPLIES				Plaster of Paris, 4 pounds	P	Tins	2,500
Bandages:				Sheets, cotton	P	Number	10,000
Plaster of Paris, 3 in individual packets	F	Dozen	1,500	Slippers	P	Pairs	5,000
Roller, assorted, 6 dozen in box	F	Gross	20,000	Soap, common	P	Pounds	25,000
Gauze, compressed, 1 gross in box	P	Number	5,000	Soup, 1 pound	P	Tins	2,500
Bedsteads, white enamel	F	do	7,500	Splints, wire gauze, 1 yard	F	Spools	2,500
Blaokets, gray	P	do	500	Sterilizers, autoclave, large size	F	Number	75
Boilers, tin, copper bottom	F	do	4,000	Surgical dressings, ambulance (par. 954)	PA	Boxes	3,000
Chairs, field, folding	F	do	200	Tables:			
Chests, medical and surgical, (par. 932)	F	do	150	Bedside, folding		Number	10,000
Supplementary (par. 933)	F	Tins	10,000	Mess, folding	F	do	500
Cocoa, 8 ounces				Towels:			
Cots:				Bath		Dozen	4,000
Field, folding, "Gold Medal"	P	do	10,000	Hand	P	do	10,000
Steel	P	Pounds	10,000	Vials, 3 ounce	P	do	2,500
Cotton, absorbent, in rolls	P	do	10,000	VETERINARIAN SUPPLIES			
Cotton bats	P	Number	50	Petrolatum		Pounds	4,000
Desks, field No. 1	F	do	50,000	Oakum, surgical	P	do	20,000
First-aid packets (par. 944)	P	do	50,000	Covers, mule, blanket lined	PA	Number	4,000
For shell wound (par. 946)	P			QUARTERMASTER SUPPLIES			
				Army ranges		Number	100
				Warming ovens		do	100
				Gauze, plain, yards		Yards	600,000

P means post; F means field; PA means post additional; FA means field additional.

MEMORANDUM

OFFICE OF THE CHIEF SURGEON,
AMERICAN EXPEDITIONARY FORCES,
HEADQUARTERS SERVICE OF SUPPLY,
France, July 10, 1918.

To: The surgeon, base section No. 1, A.P.O. No. 701; the surgeon, base section No. 2, A.P.O. No. 705.

1. In connection with recent correspondence on "controlled stores" and issue depot at your port, it is desired that there be no uncertainty as to the chief surgeon's desires that the section surgeons maintain supervision over the activities of the base storage stations.

2. The instructions stated that issues from the base storage stations would be only upon order, general or specific, of this office and that issues from the local issuing depots would be made only upon the authority of the section surgeons. The reasons for this central control of the storage stations are known to you and received your indorsement in a recent conference.

3. It is believed that your familiarity with and understanding of the reasons for the centralized control of issues from the base storage stations will make it highly desirable that, particularly during the formative period, you maintain close touch with the operation of the base storage station; and I request that you frequently make such recommendations concerning the effectiveness of the instructions issued and changes therein as you deem desirable. It is recognized that the successful operation of these base storage stations will depend largely upon the supervision exercised by you.

By direction of the chief surgeon:

N. L. McDIARMID,
Lieutenant Colonel, Medical Corps, National Army

[Third Indorsement]

OFFICE OF THE CHIEF SURGEON, A. E. F.,
August 10, 1918.

To the chief surgeon, base section No. 6.

1. It is desired that you take steps to establish a base storage station at an early date. For the present, it is not desired to use the storage spaces at Miramis for the purpose of storing a large reserve. It is the intention to have stored there such articles as are available for base storage (that is, such as are at present in France in sufficient amounts to more than meet the needs of the advance and intermediate sections) in such amounts as would be required for the depots on the main line north or in the vicinity thereof. This would include Is-sur-Tille, and the depots at the hospital centers of Beaune, Allerey, Bazoilles, and Rimaucourt. In addition thereto, such a depot would be the logical point from which the American troops in Italy would be supplied from the American Expeditionary Forces.

2. I am of the opinion that the importance of Marseille will increase materially, even though the Italian situation does not in itself demand such an increase; and I suggest that you ask for 30,000 square feet, with a prospective increase to 60,000. Additional copies of the letter of July 11 on the base storage station and of the authorized list of articles to be stored are inclosed.

3. When your report shows an accumulation approaching this amount, shipping directions will be given you from this office for a portion thereof; and as far as possible these articles will be sent to the depots mentioned above. Until further instructed, all other articles should be shipped as heretofore, to intermediate medical supply depot No. 2, at Gievres, or medical supply depot No. 3, at Cosne, according to general instructions, a copy of which has been furnished you.

4. Special supplies, such as disinfectors, should be reported to this office. It has been found advisable to have the base storage and the distribution on the docks under the same control.

5. It is assumed that your present personnel is sufficient to take care of the station. An effort will be made to provide additional personnel upon your request therefor. I request that you make such recommendations and suggestions from time to time as the local situation may render desirable.

By direction of the chief surgeon:

N. L. McDIARMID,
Lieutenant Colonel, Medical Corps, National Army

Facsimiles of warehouse receipt slip and warehouse issue and transfer slip follow:

CONSOLIDATED STOCK CARD

Unit 1 lb. bot.

Item *Acacia powder.*

Auto. Per. Div

Orig. package
No. units: 25
Weight: 80
Cubic feet 2.57

Rep. period		Advance		Intermediate			Base			Total	Receipts	Issue
Mo	Date	No. 1	Other	No. 2	No. 3	Other	1 B. S.	2 B. S.	Depots			
Oct.	15	465		2,500	3,218		580	255	522	7,540	17,000	9,460

A record was maintained also in the central office of the available stock in the several hospital center depots. This was based upon periodical stock reports.

CONSOLIDATED STOCK CARD

Unit 1 lb. bot.

Item *Acacia powder.*

Orig. package-----
No. units: 25
Weight: 80
Cubic feet: 2.57

Rep. period		Hospital centers												Total
Mo.	Date	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	
Oct.	15	31	92	90	100	87	63	156	44	100	92	50	48	953

In addition thereto, two stock cards were maintained for each item, showing a comparison of the expected receipts with the actual receipts. One was for purchases in Europe; the other was for receipts from the United States. Receipts expected in the latter case were based at first upon invoices received; later upon the automatic. A sample follows:

CONSOLIDATED STOCK CARD

Item *Acacia powder*

Unit *1 lb. bot.*

Invoices or packer's list			Receipts from U. S.								
Req. No.	Date	Quantity	Date	B. S. No.	Quantity	Date	B. S. No.	Quantity	Date	B. S. No.	Quantity
1532	6/15	18,400	7/12	1	17,000						

It is to be noted that in connection with the establishment of base storage stations, there were also established medical supply depots for each of the base sections concerned. At some ports the two were in the same building; at others, they were widely separated.

There was, however, in all cases, a clear distinction between base storage stations and base section depots, even though they were operated by the same personnel.

All receipts at the port came immediately under the jurisdiction of the medical supply officer in charge of the base storage sections. The medical supply depot was authorized to stock in limited amounts certain designated items. These were transferred to the medical supply depot upon requisitions approved by the section surgeon and were designed to supply the troops in a given section. The limitations imposed upon the items listed and upon the quantities carried were made necessary by the limited amounts in France and the primary necessity of keeping the depots in the intermediate and advance sections supplied.

The number of items so stocked was gradually increased and in October, 1918, the condition was such as to warrant the following circular:

Circular No. 52:

AMERICAN EXPEDITIONARY FORCES,
October 22, 1918.

* * * * *

X. Requisitions for medical supplies: All organizations in base section No. 1, other than base hospitals and hospital center depots, will submit their requisitions for medical supplies to the surgeon, base section No. 1, A. P. O. No. 701, and will hereafter submit none direct to intermediate medical supply depot No. 3, Cosne.

Upon approval of the section surgeon, the requisitions will be sent to the medical supply depot, base section No. 1, for issue.

WALTER D. McCaw,
Colonel, Medical Corps, Chief Surgeon.

The number of items and the amounts of those items to be retained in base storage stations were increased gradually until practically the entire list, with the exception of "mixed boxes" and surgical instruments, was so retained.

In addition to the base storage stations, it was possible to begin the stocking of the hospital center depots. Necessarily here, too, there was a limitation on

the number of articles available for stock, but the shortage was in technical equipment rather than in expendable articles used in large quantities, so that much of the advantage anticipated from the operation of these depots was gained.

The following instructions from the chief surgeon's office, A. E. F., to the commanding officer, hospital center at Mesves, explains not only the reasons for the establishment of medical supply depots at hospital centers but also the methods by which they could obtain articles on the "controlled stores" list as well as articles not thereon:⁵²

1. The underlying purposes in the establishment of supply depots at hospital centers were as follows:

(a) To have available in the center necessary supplies to meet the immediate requisitions of the individual hospitals.

(b) To enable shipments to be made direct from the ports in bulk of the larger and more extensively used articles, thus avoiding the useless transportation and handling.

(c) Lessened fire risk—in that distribution will be made in a number of depots.

(d) To make unnecessary shipments to hospital centers during a period of activity at the front and consequent car shortage.

2. It is therefore contemplated that eventually a very considerable stock will be maintained at each hospital center. Lists are now being prepared at this office of the material to be carried. These lists necessarily will include in the beginning a comparatively small number of items because of the shortage of stock in France, but they will be increased from time to time as the stock increases. It is probable that there will be always many items, requisition for which will have to be made to the central supply depot. Until the full establishment of these depots it will be necessary for the individual hospitals to make direct requisition upon larger central supply depots such as Cosne.

3. You will be furnished with a list of what is known as "controlled stores"; that is, stock that is contained in the base storage stations. It is desired that your supply depot submit its requisitions to this office, making separate requisitions so far as possible for those items contained on the "controlled stores" list and those articles not thereon in order that shipment may be ordered direct from the ports in the first case and from the intermediate medical supply depots in the second. With the hospitals fully stocked, each hospital having probably a two months' supply, it is probable that the amount of property in the supply depot need not be very large, that the movement in and out will be sufficient to warrant shipment in carload lots only to that depot.

Obviously the car shortage in France was chronic; therefore, railroads were taxed to their capacity and beyond; embargoes were frequent. Obviously also it was desirable for the Medical Department, so far as possible, to avoid the shipment of its supplies during periods of stress. The establishment of hospital center depots and the establishment of several reservoirs at the base ports permitted this. Much of the benefit expected from their establishment was accomplished. In addition, there was given to the individual hospitals such a sense of security that overstocking was avoided, with a resultant conservation.

Requisitions from hospital centers and from depots came to the chief surgeon's office, and orders were sent to one or more controlled stores stations to ship in carload lots. Consideration was given not only to accessibility and available stock, but to the operating conditions of the railroads.

Distribution of initial equipment to incoming units on the lines of communications was made upon the recommendation of the hospitalization section, in advance, at such time as would result in its arrival at about the same time as the personnel. In the event that the unit was to be assigned to a hospital center, or where other Medical Department units were stationed, the initial

equipment was sent well in advance in the care of the unit already established and made ready for immediate utilization by the new unit. This was particularly true during the period of rapid expansion in August, September, and October, 1918, when available hospital beds were just keeping ahead of the casualties and much needed medical personnel was beginning to arrive after a long suspension.¹ Equipment tables for 1,000-bed, 500-bed, 300-bed, and 100-bed hospitals had been prepared and were available at all depots. Shipment of the assemblage was to be made upon telegraphic instructions. An example of such instructions follows:

AMERICAN EXPEDITIONARY FORCES,
HEADQUARTERS SERVICES OF SUPPLY,
March 8, 1918.

Memorandum to the officer in charge, intermediate medical supply depot No. 3.

1. Prepare for shipment and ship the equipment for a 300-bed camp hospital to Meucon, Department of Morbihan; to include approximately post allowance of expendable articles for one thousand men for one year.

By direction of the chief surgeon:

N. L. McDIARMID,
Major, Medical Corps.

These equipments, while by no means complete, enabled the unit to function, particularly in respect of new units in hospital centers, which thus were provided beds and equipment for the nursing of the wounded for whom the strictly surgical procedures could be done at one of the well-established units.

The system of central accountability established under this policy remained in effect until January 1, 1919, when accountability was transferred to the officers in charge of each base storage station.⁵³

On November 12, 1918, the chief surgeon, A. E. F., promulgated the following instructions, concerning the distribution of medical supplies in the American Expeditionary Forces. This circular is a compilation of the orders and practices of the Medical Department, A. E. F., up to that time, and represents the chief surgeon's final plan, based upon the 17 months of experience in operating the medical supply system overseas, under the existing orders.

Circular No. 55:

DISTRIBUTION OF MEDICAL SUPPLIES IN THE AMERICAN EXPEDITIONARY FORCES, OUTLINING
LINES OF SUPPLY AND DECENTRALIZATION OF BOTH REQUISITIONS AND SUPPLIES

AMERICAN EXPEDITIONARY FORCES,
November 12, 1918.

I. The following outline of medical supply department activities from front to rear will obtain in the future operations of this department.

(a) DIVISIONAL MEDICAL SUPPLY DUMPS

On a basis of one to each division.

Activities.—To supply divisional troops and to stock only such items as are needed by combat divisions. Items of stock carried to be identical in all divisional supply dumps, the amount of each item to be carried and controlled by a maximum stock list.

(b) ARMY PARK MEDICAL SUPPLY DUMPS

On a basis of one to each army corps.

Activities.—To supply divisional medical supply dumps and in emergency to surrounding medical units. Stock items to be the same as those carried by divisional medical supply dumps. The amount of stock to be carried on items to be based on the number of combat divisions concerned in the sector supplied.

(c) ARMY MEDICAL SUPPLY DEPOTS

On a basis of one to each army.

Activities.—To supply army park medical supply dumps, evacuation hospital, field hospitals, ambulance companies, mobile hospitals, mobile surgical units, veterinary field units, and such other units as specially designated. Stock items to be carried should meet all the requirements of the units concerned and should also be based on a maximum stock list.

(d) SERVICES OF SUPPLY MEDICAL SUPPLY DEPOTS

Number prescribed by the chief surgeon, A. E. F.

Activities.—To supply army medical supply depots and designated Services of Supply medical units. The stock in these Services of Supply depots in advance positions to fully cover all the items carried at army medical supply depots, as well as the surrounding Services of Supply medical units.

(e) CONTROLLED STORES

Includes all medical supplies in storage at base ports or other designated Services of Supply depots, the issues from which are under the direct control of the chief surgeon, A. E. F.

Activities.—To furnish supplies to the hospitals of the group concerned and to any other units specially designated by the chief surgeon, A. E. F. Hospital centers not having depots should consolidate requisitions and forward same direct to the chief surgeon A. E. F., A. P. O. 717.

DEPOT CONTROL

While the chief surgeon, A. E. F., controls all activities of the Medical Department, the immediate control of the army dumps and army medical supply depots is vested in the chief surgeon of the army concerned. The immediate control of all other medical supply depots being under the chief surgeon, A. E. F.

II. Decentralization of requisitions: Hereafter all requisitions, except those specially exempted below originating in the Services of Supply will be acted upon by the chief surgeon of the section concerned, who will modify the requisitions and forward same to designated depot for issue.

This modification will be final and any question thereto should be taken up by the depot concerned with the surgeon of the section approving the requisition.

Exceptions.—Requisitions from medical supply depots and medical supply depots at hospital centers and for initial equipment of medical units, will be sent direct to the office of the chief surgeon, A. E. F., A. P. O. 717, for his action.

Requisitions for laboratory supplies, except from medical supply depots, will be sent direct to the director, central laboratory, A. P. O. 721, Dijon, for his action, same will then be forwarded to the designated depot.

Requisitions for X-ray supplies covering initial equipment; i. e., base hospital X-ray outfits, portable X-ray outfits and bedside units, will be forwarded to technical consultant, Röntgenology, A. P. O. 702.

Requisitions for veterinary supplies follow the course of medical requisitions except for initial equipment of units, which will be forwarded to the chief surgeon, A. E. F., direct.

Requisitions for dental supplies follow the course of medical requisitions except for initial equipment of base hospitals; i. e., base dental outfits, which will be sent direct to chief surgeon, A. E. F.

III. Pending the installation of additional depots, the following sections will be supplied by medical supply depots as follows:

Base sections 1, 4, 5, by base medical supply depot No. 1, St. Nazaire.

Base sections 2, 6, 7, by base medical supply depot No. 2, Bordeaux.

Intermediate section and Paris district by intermediate medical supply depot No. 3, Cosne.

Advance section, Services of Supply, by advance medical supply depot No. 1, Is-sur-Tille.

Surgeons of sections will take the necessary steps to notify the units now in their sections and new units arriving as to the proper channels for medical supply requisitions as above outlined.

IV. This circular does not modify the method of handling requisitions in combat sectors.

WALTER D. McCaw,

Colonel, Medical Corps, Chief Surgeon.

At the time of the signing of the armistice, with nearly 2,000,000 men in France, the Medical Department had the following storage space allotted:

Location	Designation	Date established	Maximum storage space (sq. ft.)
Cosne-sur-Loire	Intermediate medical supply depot No. 3	July 15, 1917	100,000
Gievres	Intermediate medical supply depot No. 2	Oct. 10, 1917	391,436
Is-sur-Tille	Advance medical supply depot No. 1	Nov. 18, 1917	95,862
Liverpool, England	Medical supply depot	Aug. 7, 1918	24,430
Cristo, Italy	do	July 29, 1918	2,700
Montierchaume	Field medical supply salvage depot	Dec. 13, 1918	162,500
Troves, Germany	Advance medical supply depot No. 2	Dec. 27, 1918	100,000
Montoir	Base storage station	May 1, 1918	186,000
Nantes	do	Oct. 1, 1918	32,000
St. Nazaire	Medical supply depot	July 1, 1918	10,000
St. Sulpice	Base storage station	July 6, 1918	275,000
Bordeaux	Medical supply depot	May 6, 1918	25,000
Brest	do	Dec. 21, 1918	2,700
Marseilles	Base storage station	July 8, 1918	76,000
Le Mans	Medical supply depot	July 20, 1918	10,000

In addition, there was available and in use storage space of over 110,000 square feet at hospital center depots, in the following centers:

	Maximum storage space (square feet)		Maximum storage space (square feet)
Allerey	10,000	Mesves	10,000
Bazoilles	10,000	Paris	8,250
Beau Desert	10,000	Rimaucourt	10,000
Beaune	10,000	Savenay	10,000
Clermont-Ferrand	13,000	Toul	10,000
Mars	10,000		

FORECASTS

From time to time, the supply division of the chief surgeon's office was called upon to furnish estimates of future requirements. These estimates involved the total amount of storage space, covered and uncovered, needed in France for varying numbers of men; the areas in which such space would be needed and of the proportion in each area. They involved the value, the weight, and the cubic contents of the supplies whose delivery from England, from France, from Spain, and from other European countries was expected. These were to be given, by months, for each country and were to be estimated through to six months in advance.⁵⁴

Forecasts were asked for from all departments on forms or tables applicable to one department only. Usually the requirements and records of the Engineer Department were used as a basis for these demands and it was difficult, frequently impossible, to make a Medical Department report of any value correspond to the forms proposed. As a matter of fact, many of the early reports were so roughly estimated as to be without value, and this statement was frankly made at the time. The supply division of the chief

surveyor's office made a sustained effort to furnish the data required, but it was not until the establishment of the statistical section, discussed in greater detail below, that the data furnished were satisfactory or of any value to the Medical Department itself, although the department had previously satisfied the demands made upon it.⁸

Accurate presentation of data of the nature called for presupposed the availability of the results of much prior detailed study. There were required not only accurate and complete mobilization and equipment tables, but also the weight and cubic contents of every item thereon and of every item on the supply table, accurate expenditure tables, intimate knowledge of the European markets, and detailed computation of the raw material requirements. Much of this information was available in France.⁸

Gradually, these requests for forecasts were concentrated upon prospective orders from British and French sources, and upon the tonnage requirements, particularly for overseas shipment from the United States.

The American Expeditionary Forces requirements as to medical supplies had been presented for a considerable period as emergency requirements to meet a specific need. This was particularly true in respect of the French orders. In addition to the requests made upon the French by the Medical Department purchasing agent, many regional Service de Santé organizations were receiving requests from individual American Expeditionary Forces hospitals for emergency supplies. It was obvious that such piecemeal requisitioning disturbed the even tenor of their programs and interfered materially with their own production program. Under the general purchasing agent, A. E. F., efforts were made to improve this situation. (See "Purchases" above.)

On April 29, 1918, the chief surgeon received directions from the commanding general, Services of Supply, requiring a quarterly forecast in detail of the materials which might be obtainable in England, France, Spain, etc., and a separate forecast of the material that must be obtained in the United States with the tonnage required therefor.⁵⁵ These were to be submitted through the general purchasing agent to the Allied Governments with a view to a determination by them of the material that might be supplied in France, with a consequent reduction of the tonnage required from the United States.

Prior to this time there had been some confusion in that these forecasts furnished to the Allies in connection with the search for information as to what could be furnished, had by them been considered emergency requests. At times, supplies had been furnished from their stock, the only source of which was in the United States. It was obvious that this was no saving in tonnage.

The forecasts required eventually were concentrated upon questions of tonnage, particularly in connection with overseas shipments from the United States. In connection therewith, the supply division was better prepared. Some experience in rate of usage had been obtained and a certain amount of statistical data developed and more had been received from the United States.

On April 6, 1918, the first call was made and the Medical Department given the following tentative allotment:⁵⁶ Short tons, 7,500; ship tons, 32,000. The estimate was to be in the following form:

Item No.	Automatic or exceptional supply articles	Short tons	Ship tons	Req. notes to help shipper	Requirements as to why needed

One of the great difficulties experienced by the Medical Department in connection with these allotments was due to the fact that its requirements in ship tons were greater in proportion to weight tons than those of any other service except the Air Service. This was due to the fact that a large proportion of the Medical Department shipments was taken up by initial equipment, much of it bulky, but yet essential. Attempts to secure this equipment in Europe had been made and had failed. Beds and mattresses are examples. Mattresses had a ratio of 1 to 12 in weight to space occupied. Certain technical apparatus, such as X ray, essential to modern treatment, bore a somewhat similar ratio. Other apparatus essential to definitive treatment were also bulky.

Because the proportions that existed in the Allies' shipments of medical supplies had been determined as something less than 1 to 3, in attempting to secure adequate tonnage from headquarters, Services of Supply, it was necessary for the chief surgeon to point out that, whereas with the British most of the patients were promptly transported to England and that there was with them necessity for only a comparatively few completely equipped hospitals in France, there was for the American Expeditionary Forces no such possibility in prospect; therefore the supplies, including the highly technical apparatus needed for definitive treatment, had to be transported to France in large quantity.⁵⁷

In connection with the semimonthly cables giving the supply prospects of the Medical Department, A. E. F., it would appear that they were of little value to the Surgeon General. In their preparation, the attempt to secure conformity with the form prescribed precluded the information that the supply division needed to send. Divisions of the medical supply table can not be compared to "projects." Sufficiency or inadequacy of the supply of any one item of a class is not a criterion by which the status of the stock of other items in the class may be judged. The Medical Department had attempted to solve this problem by its unit assemblages, and in the later cables, information concerning the status of such units was furnished. Either each item on the supply table, or specific information as to the items in which an increased stock is desired, must be given.

STATISTICAL SECTION

It became increasingly evident that the supply division of the chief surgeon's office must develop an organization to compile the vast amount of statistical data from which deductions as to future needs could be drawn. It was evident that not only must a comparison of the actual rate of issue with the receipts on the automatic shipments be made, but those issues must be so correlated with the sick and wounded rates that deductions as to future issues under other morbidity rates could be drawn.

The automatic shipments then being made by the Surgeon General were based upon the best information at that time. They were the result of long experience. The rate of usage of many of the items would not be materially

changed by conditions in France. The primary purpose of the statistical section was to determine what items would be demanded in greater or less amounts and to what extent, so that notification of the changes desired could be transmitted to the United States.

In May of 1918 an officer was assigned to this work and sent at first to the medical supply depot at Cosne to gather some data on tonnage. In June, 1918, he came to the chief surgeon's office and thereafter the section grew rapidly. After the establishment of the section its work formed the basis for all estimates of tonnage required, of cars required, and provided the data upon which revisions of the automatic supply table were made, shipments suspended, decreased or increased.⁸

In this section were kept the consolidated stock records to which reference has been made under "Controlled stores," and it maintained throughout the period of intense hospitalization expansion a record of all movements of initial equipment from depots to centers.

In connection with its primary function, records were established and maintained as shown below.

During the period shown on the first form, a few battle casualties were in hospital, and the sick rate was approximately 4 per cent, so that the influence of the increased hospitalization due to such cause is not reflected in the issues recorded.

Comparison of this record with later charts covering a period with battle casualties would, however, have reflected the increased issues due to such casualties.

AMERICAN EXPEDITIONARY FORCES,
CHIEF SURGEON'S OFFICE (SUPPLY DIVISION),

August 1, 1918.

Statistics of supplies consumed (issued from depots) in relation to automatic supply

[Period July, 1917, to June, 1918 (inclusive)]

Medicines, antiseptics, and disinfectants	Receipts per automatic 25,000 men in France	Monthly consumption per 25,000 men in France, based on actual issues		Monthly consumption according to actual issue. Period July 1, 1917, to Mar. 31, 1918	
		Period July 1 to Mar. 31	Period Apr. 1 to June 30	Per 25,000 men in France (basis percentage sick and wounded)	Per 1,000 patients in hospital
Acacia, powder, 1 pound, in bottle.....bottles.....	18	12	7	12	12
Acidum aceticum, ½ pound, in bottle.....do.....	8	7	6	7	7
Acidum boricum, powder, ½ pound, in bottle.....do.....	300	105	81	105	110
Acidum hydrochloricum, ½ pound, in bottle.....do.....	35	14	6	14	14
Acidum nitricum, ½ pound, in bottle.....do.....	24	13	9	13	14
Acidum salicylicum, 3 ounces, in bottle.....do.....	25	18	18	18	19
Acidum sulphuricum, ½ pound, in bottle.....do.....	23	11	8	11	11
Acidum tannicum, 3 ounces, in bottle.....do.....	18	14	12	14	15
Acidum tartaricum, ½ pound, in bottle.....do.....	10	10	9	10	10
Adrenalin chlorid, 1-mgm. tablets, 20 in tube.....tubes.....	400	49	71	49	52
Ether, ¼ pound, in tin.....tins.....	5, 100	654	679	654	691
Æthylis chloridum, 3 ounces, in tube.....tubes.....	250	32	25	32	34
Alcohol:					
3 pints, in tin.....tins.....	1, 000	38	12	38	40
5 gallons, in tin.....do.....	206	20	7	20	21
Alumen, powder, ½ pound, in bottle.....bottles.....	15	19	7	19	20
Ammonii chloridum, ¼ pound, in bottle.....do.....	40	38	30	38	41
Apomorphinae hydrochloridum, 6-mgm. tablets, 20 in tube.....tubes.....	250	45	26	45	47
Aqua ammonii, 10 per cent, pound, in bottle.....bottles.....	10	42	40	42	45

The following sheet converts the automatic supply list into terms of one day; supply for 1,000,000 men gives the stock on hand, its weight, and the period in days for which it is sufficient on the basis of the automatic supply.

[July 1]

Medicines, antiseptics, and disinfectants	Unit of quantity	1,000,000 men for one day	Stock on hand	Number of days	Weight
					<i>Pounds</i>
Acacia, powder, 1 pound, in bottle	Bottles	24	2,116	88.2	6,771
Acidum aceticum, 1/2 pound, in bottle	do	10 2/3	1,160	108.75	1,856
Acidum boricum, powder, 1/2 pound, in bottle	do	400	20,126	50.31	30,591
Acidum hydrochloricum, 1/2 pound, in bottle	do	46 2/3	2,268	48.62	3,629
Acidum nitricum, 1/2 pound, in bottle	do	32	2,585	89.3	4,573
Acidum salicylicum, 3 ounces, in bottle	do	23 1/2	3,031	90.93	2,273
Acidum sulphuricum, 1/2 pound, in glass-stopper bottle	do	30 2/3	3,176	103.56	5,081
Acidum tannicum, 3 ounces, in bottle	do	24	1,187	49.45	772
Acidum tartaricum, 1/2 pound, in bottle	do	13.333	2,496	183.7	3,669
Adrenalin chlorid, 1-mgm. tablets, 20 in tube	Tubes	533 1/3	57,036	108	18,829
Æther, 1/4 pound, in tin	Tins	6,800	351,325	51.6	228,361
Æthylis chloridum, 3 ounces, in metal tube	Tubes	333 1/3	8,748	26.24	8,311
Alcohol:					
3 pints, in tin	Tins	1,333 1/3	10,028	7.5	40,112
5 gallons, in tin	do	1,373 1/3	31,790	23.1	2,225,300
Alumen, powder, 1/2 pound, in bottle	Bottles	20	1,496	74.8	2,394
Ammonii chloridum, 1/4 pound, in bottle	do	53.333	2,931	54.9	1,475
Aqua ammonii, 10 per cent, 1 pound, in bottle	do	13 1/2	4,092	307	12,276

The next form gives a comparison of the available stock at succeeding periods; also a comparison of the period for which it is sufficient, based upon the automatic supply list and upon actual issue.

Medicines, antiseptics, and disinfectants	Stock on hand				Number of days reserve. Basis: Automatic requirements			Number of days reserve. Basis: Actual issues		
	July 15	Aug. 1	Aug. 15	Sept. 1	July 15, 1,100,000 men	Aug. 15, 1,300,000 men	Sept. 1, 1,400,000 men	Aug. 15, 1,300,000 men	Sept. 1, 1,400,000 men	
	Acacia, powder, 1 pound, in bottle	2,225	2,621	2,368	1,422	42	38	42	114	64
Acidum aceticum, 1/2 pound, in bottle	1,311	1,235	1,063	947	112	77	63	88	73	
Acidum boricum, powder, 1/2 pound, in bottle	19,662	25,316	18,103	13,815	45	35	25	99	70	
Acidum hydrochloricum, 1/2 pound, in bottle	3,014	3,077	2,849	1,913	59	47	29	117	73	
Acidum nitricum, 1/2 pound, in bottle	3,307	3,260	12,329	3,349	94	296	75	547	138	
Acidum salicylicum, 3 ounces, in bottle	3,674	4,117	3,605	4,554	100	83	97	115	135	
Acidum sulphuricum, 1/2 pound, in glass-stopper bottle	2,413	1,749	2,119	1,843	71	53	43	111	89	
Acidum tannicum, 3 ounces, in bottle	5,991	5,796	5,344	7,858	227	171	233	220	300	
Acidum tartaricum, 1/2 pound, in bottle	2,401	2,795	3,823	5,858	164	220	314	220	314	
Adrenalin chlorid, 1-mgm. tablets, 20 in tube	76,818	19,703	61,034	59,994	131	88	80	496	453	
Æther, 1/4 pound, in tins	394,950	474,003	417,114	386,026	53	47	40	357	305	
Æthylis chloridum, 3 ounces, in metal tube	9,103	8,730	7,677	7,225	25	18	16	138	121	
Alcohol:										
3 pints, in tin	13,122	12,847	10,151	19,876	9	6	10	154	280	
5 gallons, in tin	3,204	1,195	712	402	11	2	1	21	10	
Alumen powder, 1/2 pound, in bottle	1,289	2,207	1,707	1,026	58	66	37	52	29	
Ammonii chloridum, 1/4 pound, in bottle	3,644	4,231	3,365	2,713	62	48	37	51	39	
Apomorphine hydrochloridum, 6-mgm. tablets, hypodermic, 20 in tubes	8,967	8,812	1,106	8,484	24	3	18	14	91	
Aqua ammonii, 10 per cent, 1 pound, in bottle	6,434	7,761	7,905	8,135	438	456	436	109	104	

The following estimate was prepared in connection with a forecast of tonnage requirements, and shows the detailed computation required.

Estimate of supply and tonnage requirements

[Period: Third quarter, July, August, September, 1918]

Medicines, antiseptics, and disinfectants	Automatic (monthly for each 25,000)	Automatic computed on troop movement				Tonnage		No. 1, 6 ¹ / ₂		No. 2, 7	
		July	August	September	Total	Pounds	Cubic feet	3 months	1 month	3 months	1 month
		33d Division	37th Division	41st Division							
Acacia, powder, 1 pound, in bottle	18	594	666	738	1,998	6,400	205 ¹ / ₂	117	39	126	42
Acidum aceticum, 1/2 pound, in bottle	8	264	296	328	888	1,400	64 ³ / ₄	50	16	56	18
Acidum boricum, powder, 1/2 pound, in bottle	300	9,900	11,100	12,300	33,300	53,280	3,942 ¹ / ₂	1,950	650	2,100	700
Acidum hydrochloricum, 1/2 pound, in bottle	35	1,155	1,295	1,435	3,885	6,240	288 ³ / ₄	232	74	245	82
Acidum nitricum, 1/2 pound, in bottle	24	792	888	984	2,664	4,200	197	156	52	168	56
Acidum salicylicum, 3 ounces, in bottle	25	825	925	1,025	2,775	2,081 ¹ / ₄	130 ¹ / ₂	157	52	175	58
Acidum sulphuricum, 1/2 pound, in glass-stopper bottle	23	759	851	943	2,553	40,100 ¹ / ₄	189 ³ / ₄	149	49	161	54
Acidum tannicum, 3 ounces, in bottle	18	594	666	738	1,998	1,300	90	117	39	126	42
Acidum tartaricum, 1/2 pound, in bottle	10	330	370	410	1,110	1,668 ³ / ₄	82 ¹ / ₂	65	22	70	23
Acidum tartaricum, 5 pounds, in bottle	4	132	148	164	440	2,756 ¹ / ₄	14	26	9	28	9
Adrenal in chlorid, 1-mgm. tablets, 20 in tube	400	13,200	14,800	16,400	44,400	14,430	692 ³ / ₄	2,600	867	2,800	934
Aether, 1/4 pound, in tin	5,100	168,300	188,700	209,100	566,100	367,965	13,585 ¹ / ₂	33,150	11,050	35,700	11,900
Aethybis chloridum, 3 ounces, in metal tube	250	8,250	9,250	10,250	27,750	26,342 ¹ / ₂	1,221	1,625	542	1,750	583
Alcohol:											
3 pints, in tin	1,000	33,000	37,000	41,000	11,100	444,000	16,650	6,500	2,167	7,000	2,334
5 gallons, in tin	206	6,798	7,622	8,446	22,866	1,600,620	70,884 ³ / ₄	1,339	446	1,442	481
Alumen, powder, 1/2 pound, in bottle	15	495	555	615	1,665	2,660	123	97	32	105	35
Ammonii chloridum, 1/4 pound, in bottle	40	1,320	1,480	1,640	4,440	2,225	191 ¹ / ₂	260	87	280	92

The section had developed, at the time of the signing of the armistice, an active, well-organized force. Its work was of great value, and undoubtedly would have been of inestimable value had the war continued into 1919.⁸

It must be remembered in connection with the apparent delay in the organization of this section that prior to June, 1918, the American Expeditionary Forces had had no great experience in combat, that issues were largely of initial equipment, and, furthermore, that available personnel for the medical supply division was exceedingly scarce.

MEDICAL SUPPLY LIAISON WITH THE UNITED STATES

It was early appreciated by the personnel of the supply division of the chief surgeon's office, A. E. F., that it lacked information, concerning supplies for the American Expeditionary Forces, that was available to supply officers in the Surgeon General's Office.⁸ Contact through military channels was devious and inevitably associated with long delays; furthermore, because of the limitation in shipping facilities, there was the constant necessity for

adherence to methods, of asking for supplies, which were not particularly applicable to the Medical Department. Correspondence by mail was limited, and had to be exceedingly guarded, by reason of the necessity for secrecy; correspondence by cablegram proved unsatisfactory because of the difficulties in making for clarity. Thus, the supply division, chief surgeon's office, was following an unenlightened course along certain lines. To remedy this, an effort was made to exchange conferees; that is to say, to send medical supply officers from the American Expeditionary Forces to the United States, and vice versa. One such officer was sent to the United States in January, 1918.⁸ Although subsequent visits were discussed, never again was it possible to release from duty in France, even for a short period, any of the officers whose experiences in France would have made their services in this connection of any value. Undoubtedly it would have been of inestimable value to the American Expeditionary Forces and of great help to the medical supply service at home, had it been possible for an experienced officer to have visited France during the period when the demands of the American Expeditionary Forces were constantly becoming greater. However, not until after the armistice was this possible, due to the comparatively few officers who had had experience in supply work and to the few who were assigned to it during the World War. It was the conviction of the chief surgeon that for the efficient performance by the supply service of the Medical Department of the mission assigned it, it was essential that the service be operated throughout all echelons as a unit and that the most intimate, direct, and speedy contact be maintained throughout.

The method of automatic supply having been established by General Pershing's memorandum of August 20, 1917, the submission of requisitions thereafter was discouraged. However, in view of the fact that there must necessarily be a period in which a satisfactory automatic could be developed, a period of transfer in methods, it was more or less essential that certain information be sent to the Surgeon General as to our needs. Therefore, the supply division, from time to time, had prepared, by the officer in charge of the medical supply depot, his estimates of future needs for the replenishment of the troops in France and sent them to the United States with the following indorsements:

[First indorsement]

A. E. F., Office of the Chief Surgeon, L. of C., France, January 11, 1918. To the chief surgeon, A. E. F.

1. Forwarded, recommending approval.

F. A. WINTER,
Colonel, Medical Corps, United States Army.

[Second indorsement]

H. A. E. F., C. S. O., January 14, 1918. To the Surgeon General, United States Army, War Department, Washington, D. C.

1. This requisition is forwarded, not with the intention that it be filled but for the information of the Surgeon General.

2. Another copy of this document is being forwarded by mail one week from this date and will be labeled duplicate.

A. E. BRADLEY,
Brigadier General, National Army.

This was merely an attempt to give the Surgeon General advance information. On the other hand, the Surgeon General also tried to give the chief surgeon advance information, particularly as regards shipments to be expected in the American Expeditionary Forces. Copies of the orders for shipment from depots in the United States were sent to France and were of value. Copies of shipping tickets from depots came, but were of little value inasmuch as they frequently arrived after the shipment itself; furthermore, the supplies received could not be identified with any particular shipping ticket. All of these papers, taken together, were of value to the chief surgeon in that they gave him some conception of the status of the medical supply service at home—what articles it had, what it was prepared to ship, and had ordered shipped; however, what he wanted most was information as to what was floated. When this was made known to the Surgeon General early in 1918,⁵⁸ he directed that lists of the supplies actually loaded on transports be prepared and sent to the chief surgeon. This was done.⁵⁹

On June 17, 1918, the same procedure was made effective for all departments following receipt of cablegram from General Pershing.⁶⁰

THE RELATION OF THE SUPPLY DIVISION TO THE RED CROSS

Prior to the World War the American Red Cross, so far as its military activities were concerned, was considered as the medium by which organized voluntary aid might be utilized to supplement the resources and assist the personnel of the Medical Department.⁶¹

In the American Expeditionary Forces, two factors very materially influenced the relations of the Red Cross to the Medical Department: (1) American Red Cross activities there were extended into many fields that were not primarily within the Medical Department sphere of action. Its welfare work, its gifts to troops, while of interest to the Medical Department, primarily concerned other branches of the Military Establishment. (2) The American Red Cross had for some months prior to the entrance of the United States into the World War been rendering assistance to the wounded on European soil. It had in France a strong organization. It was familiar with the sources of supply and with the methods best adapted to securing production. It had established under its own control certain centers of production for some of the material it was furnishing to the French troops. Notably this was the case with front-line parcels and splints.

The first factor named above resulted in the Red Cross occupying a position more or less independent of the Medical Department. The second had a very great effect upon the relations of the supply division of the chief surgeon's office to the Red Cross and resulted in dependence upon it for the production in France of many items which under other conditions the Medical Department would have had produced under its own direction.

Production of the front-line parcels in great number was asked of the American Red Cross in France. That organization was producing them for the French and it was obviously better for the Medical Department to avail itself of the skill and going organization of the Red Cross than to start a new and perhaps competing organization. Large numbers of these front-line parcels

and a very considerable number of made-up surgical dressings were delivered to the American Expeditionary Forces.⁶² It was known, however, that the ultimate requirements would be beyond the capacity of the American Red Cross organization in France and recourse was had to the United States. Specifications for these dressings were sent to the United States and production there reached high limits.

Briefly, the arrangement made in the United States between the Medical Department and the Red Cross for this production was that the Medical Department was to buy and turn over to the Red Cross the necessary materials;⁶³ the Red Cross chapters were to prepare the dressings, which were to be packed and assembled and turned over to the Medical Department. Such of them as required sterilization were then to be sent to a contractor for that process and returned to the Medical Department. The Medical Department made shipment to France of such material. The Red Cross, however, continued to send to France on its own tonnage supplies needed for its own purposes.

At the request of the chief surgeon, A. E. F., the Red Cross undertook to so expand its facilities for the production of splints as to take care of the immediate needs of the American Expeditionary Forces.⁶² This work was done under the immediate supervision of a board of medical officers, A. E. F.⁶⁴ These officers selected the types, determined the numbers wanted, supervised production, and inspected the deliveries. Certain new types were designed by them.⁶⁵ The Red Cross managed the shops and secured the necessary personnel. The Red Cross also undertook the publication of the approved findings of the splint board, in the form of a manual.⁶⁵ This manual was of very great help to the supply service.

By agreement with the chief surgeon, A. E. F., the Red Cross undertook the production of nitrous oxide for anesthesia and made arrangements to establish a plant for that purpose, machinery and trained personnel being obtained by them from the United States.⁶² Pending its establishment, they purchased the gas from a French firm. The Army provided the cylinders for this purpose, and made distribution of the filled tanks from its depots. Empty cylinders were sent to the Red Cross for refilling. The oxygen and tanks therefor were provided by the Army.

In all of these efforts they turned over the products to the Medical Department in large part and distribution was made from the Army medical supply depot.

It is obvious that the purchase by the Red Cross of articles also purchased by the Medical Department interfered with the market in Europe or the market in America.² In so far as purchases of medical supplies by the Red Cross in Europe is concerned, these were eventually coordinated with those of the Medical Department under the authority of the general purchasing agent, A. E. F. It was in procurement from the United States that duplication became most apparent and where there was the greatest possibility of injury to the interests of the American Expeditionary Forces because of the importance of tonnage. With the exception of the surgical dressings referred to above, articles

that were available in the United States were shipped on both Medical Department tonnage and Red Cross tonnage and this duplication resulted in an overstocking for the needs of the American Expeditionary Forces. This double procurement system did not in any way improve the situation in the American Expeditionary Forces when it came to the articles of which there was still a shortage, since that shortage resulted largely from the depletion of the markets at home and in Europe.⁸

Following conferences with the Red Cross executives, representation of this condition was made in the following letter, which presents as well the solution believed to be the logical one.⁶⁶

1. I am informed by the Red Cross that they are receiving from America in their chapter boxes large quantities of certain articles, many of which are on our supply table. It is my belief that an agreement must be reached between the Red Cross and the Medical Department as to the number of such articles needed, and as to the department to supply them, in order to avoid duplication and to conserve tonnage.

2. Doctor Burlingame, of the Red Cross, has suggested that if the production of surgical dressings by the chapters in America as heretofore made is considered excessive, the energies of the women of America might be diverted to the production of these articles which they are now furnishing and the Medical Department purchasing. As he happily expresses it, "The women of America must do something."

3. The articles to which reference is especially made are pajamas, operating gowns, bath robes, convalescent suits, bed shirts (summer and winter), ward slippers. These are articles that require a good deal of hand sewing, and, in my judgment, the labor of the women of America might well be employed in their production. The liaison between the Red Cross and the Medical Department, in my judgment, should exist in the Surgeon General's Office; for there it would obviate the necessity of purchases by the Medical Department and would prevent the duplication of these articles for overseas shipments.

4. The Red Cross is now shipping many other articles—items of Medical Department supply—in which hand labor is not so important a factor; such as sheets, bedspreads, bath, face, and dish towels, and pillow cases, and I believe an agreement as to the number and articles to be shipped should be reached; and in Washington a decision as to the department to supply them should be made.

5. This agreement would mean that the Red Cross would turn over in America these articles for the American Expeditionary Forces hospitals, that the Surgeon General would know that they had been shipped, and that shipment would be made direct to our depots in France, thus avoiding unnecessary delays and reshipments.

6. I am well aware of the necessity for certain publicity for the Red Cross in order to have maintained the support of the American people. I believe that this publicity could be obtained and our debt acknowledged by official announcement from the Surgeon General's Office that the Red Cross had turned over certain amounts of stock.

7. If this meets with your approval, I request that this communication be referred to the Red Cross commissioner for France, for his consideration, and that it then be referred to the Surgeon General.

This letter and a subsequent one dated March 6, 1918, in which the matter was elaborated, resulted in the following letter from the Surgeon General to the director of military relief, American Red Cross, April 8, 1918:⁶⁷

1. This office is in receipt of a letter from the officer of the Medical Corps in charge of supplies, Expeditionary Forces, France, in which he refers to the present method of handling Red Cross supplies intended for American troops. He says that the receipt of such supplies—implies warehouse facilities at the ports. These facilities are extremely scarce. Further than this every time they receive a consignment of property for Red Cross activity, the property to be ultimately distributed to our forces independent of their enormous work with the

French civil population, it must be sent from the base port to their warehouses in the interior and then transshipped to the points where it is to be used. You can readily see how this eats up transportation and warehousing facilities all along the line, and what I would like to do would be to effect an arrangement by which consignments of their property could be made to you in the United States, put in your depots, and sent over here consigned to our depot for issue. There would be an enormous saving of effort, and I think it is very well worth consideration.

2. For considerable time this manner of handling your supplies intended for United States forces has been under consideration by this office, and I would strongly urge that it be put into operation.

3. If you will invoice to the Medical Department the supplies which you desire to distribute to our expeditionary forces, I shall be glad to include them in our shipment, making all arrangements, for their transportation overseas, deliver them to our depot overseas and distributed therefrom, your organization being given credit for the articles so transferred and so issued.

I believe this would solve your transportation problem so far as our forces are concerned, and I am convinced that it would materially facilitate that smooth and equitable distribution of supplies so much to be desired and so difficult to obtain.

No change in methods of shipping Red Cross supplies resulted from this letter.

That there should be, as a result of the separation of the Red Cross from the Medical Department, some considerable duplication of effort and supplies was natural. The Medical Department personnel in organization, for the most part untrained in the methods of obtaining supplies, secured them from whatever source they found most available, and frequently, being without any realization of the dangers of shortage of supplies, duplicated their requisitions and obtained supplies from both the Red Cross and our supply department.⁸ As an example, there was temporarily a shortage of sheets during the period of hospital expansion. The policy was established of issuing six sheets per bed as initial equipment, further issues to be made when additional supplies were received. With this arrangement the Medical Department managed to keep just ahead of the demand. Meanwhile the Red Cross also had sheets and was being called upon to issue to units other than those for whose supply they had accepted responsibility, including some who had already received their allotment of six. This duplication of supply resulted in a shortage in hospitals at a time when these articles were needed. When attention was called to this condition the American Red Cross placed its entire available stock at the disposal of the chief surgeon and distribution was made in bulk to designated hospitals, which were then not supplied by the Army with the initial allowance of six. The result of these demands upon the Red Cross was a financial burden to that organization which they should not have been called upon to bear and which, in fact, the officials of the Red Cross had no desire to bear. If the personnel of the Medical Department was untrained, much of the Red Cross personnel was equally or more so. Being exceedingly desirous of rendering service and being entirely unfamiliar with the normal method of supply, they felt that the burden of supplying hospitals was upon them. In some cases they were even unfamiliar with the existence of the Medical Department supply service; as a result, they not only made issues whenever called upon, regardless of the fact that the articles could have and should have been supplied from Army depots, but they also failed to convey the information necessary to

prevent a repetition of the demand upon them in the future. In an effort to meet this situation, after consultation with the Red Cross, and in full agreement with them, orders were issued permitting issues from the Red Cross only after approval by division, corps, section, or Army surgeon, or by the chief surgeon. As a matter of fact it was believed by the supply department and by the Red Cross officials in Paris that a further restriction would have been better. However, with the extensive unfamiliarity with Army methods and in view of the nonrecognition of the necessity for advance requisitions it was felt unsafe to bar in any manner the way to the prompt securing of supplies.⁸

In October, 1918, the national adviser on surgical dressings, American Red Cross, visited France and made a study of the status of surgical dressings in the American Expeditionary Forces. His report, except the exhibits referred to, follows:⁶⁸

1. The surgical dressings and raw material now available for the use of the American Expeditionary Forces in France are given in detail in the accompanying Schedule A, based on reports received from the Medical Department of the Army and the warehouses of the American Red Cross under the respective dates, Army, September 1, 1918; American Red Cross, September 20, 1918.

2. In addition to this, there is a considerable supply of surgical dressings in transport as shown in Schedule B.

3. A further supply is available in the United States, the amount of which can be fairly computed from the figures given in Schedule C, which represents the number of dressings delivered by the American Red Cross in the United States to shipping points during the month of July. Similar amounts were delivered during August and September.

4. The stock of raw material and dressings included in sections 1, 2, and 3 represents the accumulated stores during the months of preparation since the entrance of the United States into the war, less the issues actually used by the Medical Corps of the American Expeditionary Forces during the same period.

Prior to the July offensive the number of wounded in the American Expeditionary Forces was almost negligible, and it is only during the last month that military operations of any magnitude have taken place. There are, therefore, available no actual data on which to base an accurate estimate of the number of dressings that may in the future be needed. A study, however, of the accompanying schedules demonstrates that no conceivable military operations can exhaust the available supplies for many months.

5. Up to the present time an inspection of hospitals from the advanced zone back to and including the bases shows that practically all surgical dressings are made up from raw material furnished by the Army Medical Department in the organization where they are used, and that only a very minor portion is obtained from the American Red Cross stores. This is true even in the field hospitals.

6. The front-line parcels are used to a certain extent by the regimental surgeons and occasionally in the field hospitals, but even these are overlooked by many of the surgeons, the wounds being covered with plain sterile gauze dressings. The number of these parcels shown in Schedule A, plus those already in the possession of the United States Army (see cable 9479-15772, dated September 30, 1918, Schedule A), will amply meet all requirements for many months.

7. The dressings for "evacuation hospital use" made for the American Red Cross in the United States constitute an exception to all other types of dressings, as the production of these has been relatively small; and under certain conditions a large reserve of these should be held by each evacuation and field hospital.

8. It is therefore recommended that the Army Medical Department in France be requested to hold all their surplus raw material for surgical dressings in reserve and requisition from the American Red Cross in France their made-up surgical dressings for issue to all hospitals.

9. It is further recommended that all surgical dressings from the United States be shipped by the American Red Cross only under priority D, thus giving priority to other supplies, the stock of which in France is not in ample reserve. Exceptions should be made of surgical dressings for evacuation hospital use (see par. 7).

10. It is further recommended that the American Red Cross in the United States be instructed to discontinue making of all surgical dressings except the present monthly allotment of dressings for evacuation hospital use and such surgical dressings as may from time to time be specifically ordered by the French commission.

11. This program shall be continued, subject to monthly study, until such time as data can be obtained whereby a reserve of safety may be determined, and thereafter dressings from the United States shall be ordered and shipped only to an amount necessary to maintain this reserve.

As a result of this the chief surgeon, A. E. F., required that the Medical Department hold in reserve its supply of dressing material and use the made-up dressings prepared by the Red Cross.⁶⁹ Much of this material was in the medical supply depots.

RELATIONSHIPS WITH OTHER SERVICES OF THE MEDICAL DEPARTMENT

Expert assistance was rendered from time to time by the special services of the Medical Department, A. E. F., not only in the selection of new or proper articles of equipment, but also in the determination of adequacy and suitability of supplies in using organizations. A notable example in the selection of equipment was in the case of the laboratory service. An officer from this service was ordered in March, 1918, to London for the purpose of procuring in the British market certain laboratory supplies in a series of transportable laboratory units which he had designed in France. The success which attended this effort and the good results obtained from these transportable units are due to this delegation of authority.

The laboratory service also aided materially in the distribution of special supplies for laboratories and in the distribution of sera and vaccines. Not only did it do the distributing, but it also worked up the plan therefor. Similar assistance was given by the other special services—the X-ray, the surgical, etc.

That there was a certain element of danger in this policy is evident. There was a tendency to depart from the general scheme of supply and to attempt to establish for each service a special method. That such departure would have corrected the difficulties existing in the special service, which it was intended to correct, is problematical. That it would have caused greater difficulties in the supply of other materials is certain.

Much of the information needed by the supply division concerning the adequacy of supplies in the using organization, which information the supply division itself was unable to gather, by reason of lack of personnel, was obtained by professional consultants and transmitted to the supply division. On the other hand, the chief surgeon encouraged these consultants to visit the medical supply depots, acquaint themselves with the stock there, and transmit this information to the man doing professional work. This was particularly applicable because of the unfamiliarity of many of the reserve officers with the supply table and its nomenclature. Desiring equipment for a certain purpose, they would ask for the equipment with which they were familiar. In the

absence of such equipment, their needs were not met. Knowledge of the existence at the depots of certain other equipment designed or usable for the same purpose, was not available to them. It was this knowledge that the consultant could and did convey.

That this was properly a function of the supply service was recognized, and it was planned to have medical supply personnel traveling out from the office of the chief surgeon.⁸ It was intended they should inquire into the adequacy of supplies, to instruct in the method of requisitioning, to meet incoming organizations and to advise them of the location of depots and the methods followed in the American Expeditionary Forces, the local situation, etc.; to acquaint them with the shortage of supplies and the necessity for economy; to assist in the establishment of storeroom hospitals wherein supplies could be adequately cared for and conserved; to arrange for the return to the proper depot of excess supplies; to receive criticisms, and to make suggestions following their investigations, as to the manner in which distribution of supplies could be better accomplished. Such personnel it was never possible to obtain. Officers of the Sanitary Corps, formerly noncommissioned officers, were thought to be best prepared for this work, but their services were in demand elsewhere and it was difficult to secure them in sufficient numbers even for the purposes of medical supply depots. It is believed that in this respect the Red Cross had the advantage of the Medical Department. They had men attached to each base hospital, to each division, and to each territorial section, working directly under the American Red Cross central office in Paris, privileged to travel to and fro, having available transportation never allotted the medical supply service of the Army, and it is probable that many supplies were asked for of the Red Cross because those officers would obtain them even at great expense of time and money without trouble to the medical officer making the requisition.⁸

MISCELLANEOUS ACTIVITIES

In addition to the matters which have been discussed, many of comparatively minor or of temporary character were handled in the supply division of the chief surgeon's office.

AUTHORIZATION FOR EMPLOYING CIVILIANS

Until the arrival of the finance and accounting unit in February, 1918, the activities of which are described in the following chapter, the authorization of civilian employees by the Medical Department was handled in the supply division.⁸ Usually blanket authority to employ not to exceed a certain number at the prevailing French rates was the method pursued. Many of the early hospitals took over old buildings, oftentimes cut up into many small rooms and therefore not particularly satisfactory for hospital purposes. The number of personnel assigned to the units was insufficient, and due to the critical shortage of enlisted personnel, Medical Department, it was impossible to supply reinforcements. Camp hospitals were established in large numbers with a skeletonized force from casuals, since these organizations were not provided for in War Department Tables of Organization. Therefore, a liberal policy was established in the employment of civilians, and realization of this assistance to

the Medical Department was made to the fullest extent possible at each location. The maximum of such civilians under employment at any one time was 4,273. With the establishment of territorial sections this function was delegated to section surgeons.⁸

UNIT EQUIPMENT PURCHASED FROM PRIVATE FUNDS

Elsewhere,^a reference has been made to the purchase of base hospital equipment from private funds and by the American Red Cross.

Though the attempt was made by the Medical Department to send these units to France as complete assemblages, the difficulties of such overseas transportation made this impossible. The property arrived, split among several convoys and at different ports. Meanwhile, the personnel usually had arrived and been supplied with equipment from the depots in France. It was obviously unnecessary to ship much of the equipment belonging to the unit. Such things as beds and bedding were placed in the general stock. However, in view of the personal interests which these units had in the equipment selected by them, the chief surgeon did attempt to send to them the additional special and technical equipment which they had included. In some cases, numbers of the unit were sent to the base depots to pick out what they wanted.² However, the efforts of the chief surgeon along these lines were not productive of the desired results as was natural under the conditions existing. The matter is worthy of mention because the failure to get the equipment which they had so carefully selected and so patriotically stored for many months was undoubtedly a disappointment to these men and difficult for them to understand. They had to be reconciled by the fact that undoubtedly it was of service somewhere in France even though they were not privileged to use it.

HOSPITAL FUND

Hospital fund statements were credited in the supply division and the central hospital fund administered until September 13, 1918, when these duties were turned over to the finance and accounting unit.⁸

VOUCHERS

Vouchers were approved until this, too, was taken over by the finance and accounting unit.⁸ Some difficulty was encountered in the early period with laundry vouchers, and those for civilian employees. The units needing the services of civilians had no Government funds with which to employ them. Nor was any disbursing officer of the Medical Department immediately available. Vouchers were prepared and sent to the disbursing officer. Mail service was slow and unreliable. Those rendering service desired prompt payment. In the case of civilian employees, payment weekly was desired. Sometimes the unit changed station before the check was returned and there was still further delay and a misunderstanding upon the part of those to whom the debt was owed.

^a See pp. 94-96, Vol. I, of this history.

The chief surgeon authorized the use of the hospital fund for the payment of these vouchers, or, in the absence of a hospital fund, the payment from private funds, reimbursement in either case to be made upon presentation of the voucher with proper notations.⁸

In March, 1918, the chief quartermaster, A. E. F., upon the request of the chief surgeon, authorized quartermasters to liquidate these accounts from funds in their possession, reimbursement to be made by the Medical Department. This measure was of material assistance since quartermaster disbursing officers were at most stations.⁷⁰

ACCOUNTABILITY

It was impossible to maintain accountability for medical supplies as between the United States and the American Expeditionary Forces. It is true that invoices were received, but usually not until long after the supplies had been received and frequently after their issue. Invoices were received from each of the several depots in the United States. Each depot numbered its invoices serially, and the packages from each depot were also numbered serially. A single shipment of supplies received at a depot in France would not include all of the supplies listed on one invoice, but, on the other hand, would contain several packages having the same number. Markings on the boxes were indefinite, and it was impossible to determine from which depot they had been shipped and to which invoice they should be credited.⁸ Many supplies were received in France marked for special units and no invoices were furnished. Frequently these supplies found their way into the supply depot, where, because the necessity for supplies was so great and the storage space so inadequate, they were placed in stock and issued.⁸ The supplies shipped as "replenishment supplies, — Division," caused some difficulty in this connection at first, as it was not understood in France that by such marking only could shipments from the United States be effected. The supplies so received were obviously not intended to be carried in the division train and it was impracticable, even had it been desirable, to segregate these supplies as a reserve for the particular division. They were placed in stock. Supplies received from European sources arrived at the depots in partial shipments.⁸

It was early apparent that entire accountability must be abandoned or the needs of the American Expeditionary Forces be neglected.⁸ At the medical supply depots in the American Expeditionary Forces, accountability remained for the property received, and there was accountability in fixed units. At the front it was impossible to maintain any system of accountability and General Orders, No. 74, general headquarters, A. E. F., December 13, 1917, provided for the cessation of all accountability there.

DECENTRALIZATION

Very early in the history of the American Expeditionary Forces the necessity for decentralization was recognized. It was foreseen that the judgment of the man on the spot would be required, therefore the authority to act should be delegated to him. Consistently the chief surgeon attempted to follow this policy in matters of supply.

At first requisitions for medical supplies from units on the lines of communication were made in quadruplicate, one copy being retained by each requisitioning officer. Three copies were sent to the chief surgeon, Line of Communications, and after action by him, were sent to the medical depot for issue.⁸

On August 13, 1917, Circular No. 1 was published, of which the following is an extract:

Circular No. 1.

HEADQUARTERS LINE OF COMMUNICATIONS,
AMERICAN EXPEDITIONARY FORCES,
OFFICE OF THE CHIEF SURGEON.

“Requisitions for medical supplies” will be sent to the surgeon, B. G. and L. O. C., at his office, which for the present time is in Paris. Two copies of the requisition should be made, one to be forwarded and one retained by the officer making the requisition.

F. A. WINTER,
Colonel, Medical Corps,
Surgeon, B. G. and L. O. C.

Approved:

By order of Brigadier General Blatchford:

J. P. McADAMS,
Captain, 11th Infantry, Acting Chief of Staff.

This was an early effort to relieve the using units of any burden connected with supply. It was contemplated that supplies asked for were to be issued to the greatest possible extent, since there would be under this procedure no retained copy of requisitions in the office of the chief surgeon and, therefore, no way of checking requests against previous requisitions.

In Circular No. 6, issued by the chief surgeon, Line of Communications, on September 28, 1917, attention was called to the need for one copy only.

On the theory that the only legitimate reason for withholding supplies asked for was the necessity for protecting the interests of other, later, requisitioners by maintaining in the depots sufficient stock to meet their requirements, on December 4, 1917, the policy of sending requisitions direct to the depot was instituted and the depot officer was given the authority to modify the requisitions in the name of the chief surgeon, Line of Communications, if such modifications were necessary to the maintenance of at least a small reserve of essential items.⁷¹ Such practice did not, in any way, deprive units of needed supplies. It gave them less reserve in their own possession, and necessitated other requisitions at short intervals.⁸

This policy was applicable also to vouchers;⁷¹ but, in so far as vouchers were concerned, it was modified on June 12, 1918, when upon the establishment of the finance and accounting unit, chief surgeon's office, these vouchers were again sent to the chief surgeon.⁷²

On December 15, 1917, the commanding officers of base hospitals were authorized to meet emergency needs by local purchases.⁷³ The purpose of this authorization was perhaps not clearly understood by all of those to whom it was given. It was, of course, never thought by the chief surgeon that \$100 a month would meet the entire supply needs of a base hospital. The purpose was to relieve the commanding officer of the necessity for making requests for authority to purchase in each case, or to make a written explanation of the

circumstances requiring an emergency purchase without authority. It was intended to enable the commanding officer to have made minor repairs to Medical Department equipment.

Circular No. 19, published by the chief surgeon, Line of Communications, February 14, 1918, indicated further his desire to decentralize the operation of the Medical Department:

1. *Report of expenditures.*—Expenditures made from Medical Department funds under the provisions of paragraph 4, Circular 15, this office, will be reported monthly to the section surgeons, showing amount of each expenditure and the purpose for which expended.

Section surgeons are empowered to authorize expenditures and to approve vouchers therefor from Medical Department funds for purposes properly chargeable under regulations against such funds, of amounts not to exceed \$250.

Section surgeons will furnish monthly to the chief surgeon, general headquarters, A. E. F., through this office, a list of vouchers approved by them during the month, giving the amount, from whom purchased, the organization making the purchase, with the name of the officer signing the voucher, and the general class of article purchased.

* * * * *

3. *Statement of hospital funds.*—These statements will hereafter be sent to the section surgeons, who will act upon them, forwarding them, when approved, direct to the chief surgeon, general headquarters, A. E. F.

Subsequently, the following circulars, which are self-explanatory, were promulgated:

Circular No. 26.

AMERICAN EXPEDITIONARY FORCES,
OFFICE OF THE CHIEF SURGEON,
France, May 4, 1918.

* * * * *

5. *Forwarding of purchase vouchers.*—All vouchers covering purchases made under the provisions of paragraph 4, Circular No. 15, Chief Surgeon's Office, Line of Communications, and all vouchers for purchase made under the provisions of paragraph 1, Circular No. 19, chief surgeon's office, Line of Communications, will be sent through the section surgeon to this office, for payment by the disbursing officer attached hereto.

6. *Requisitions upon the Red Cross.*—Hereafter requisitions upon the Red Cross will be honored at the Red Cross depots after approval by the following officers:

For all troops within a division, by the division surgeon.

For all hospitals and troops in the Services of Supply, by the section surgeons.

Attention is again invited to the fact that the Red Cross should not be asked for articles on the supply table or properly chargeable against Medical Department funds, except in emergencies, and to the undesirability of submitting to the Red Cross requisitions for articles erased from the medical supply tables by reason of their unimportance.

* * * * *

8. *Purchase of technical apparatus locally.*—It is believed that many small purchases, particularly of surgical instruments and minor technical apparatus, are being made in the local markets. This is no doubt due to the fact that there was great difficulty in securing these articles from the supply department in the early days. A well-balanced and well-maintained shipment of such equipment is now being received from the United States and it is desired that all requests for this material should pass first through the medical supply depot; the officer in charge of which will, if necessary, make request upon the purchasing officer.

M. W. IRELAND,
Brigadier General, National Army, Chief Surgeon.

Circular No. 43.

AMERICAN EXPEDITIONARY FORCES,
OFFICE OF THE CHIEF SURGEON,
August 1, 1918.

* * * * *

9. *Authority to authorize expenditures and approve vouchers on Medical Department funds.*—Authority to authorize expenditures and to approve vouchers for purchases properly chargeable against Medical Department funds, in sums not to exceed \$250, is granted to the commanding officers of all hospital centers and to the chief surgeons of armies.

The authority to authorize expenditures and to approve vouchers for purchases properly chargeable against Medical Department funds, in sums not to exceed \$100, is hereby granted to chief surgeons of army corps.

M. W. IRELAND,
Brigadier General, Medical Corps, National Army, Chief Surgeon.

Circular No. 45.

AMERICAN EXPEDITIONARY FORCES,
OFFICE OF THE CHIEF SURGEON,
France, August 13, 1918.

* * * * *

III. *Civilian employees for hospital centers.*—Authority is hereby granted to commanding officers of hospital centers to authorize the employment of such civilian employees as may be necessary for the administration of the base hospitals under their command. The employment of these civilians must be in accordance with existing regulations; and attention is invited to Bulletin No. 14, headquarters, Line of Communications, February 13, 1918, and Circular Order No. 7, headquarters, Services of Supply, March 11, 1918.

M. W. IRELAND,
Brigadier General, Chief Surgeon.

Following the shifting of the duty of acting upon requisitions to the officer in charge of the supply depots, the supply division of the chief surgeon's office was concerned with matters connected with storage space for future needs; with estimates of supplies needed for succeeding months; with estimates of tonnage requirements, and with their defense; with purchases for American Expeditionary Forces units; and with occasional purchases for stock; with the authorization of civilian employees; and with Red Cross aid to American Expeditionary Forces units; with priorities for Medical Department supply units and personnel therefor.

REFERENCES

- (1) Report of the chief surgeon, A. E. F., to the commanding general, S. O. S., March 20, 1919, concerning the activities of the chief surgeon's office. On file, Historical Division, S. G. O. Also: Final Report General John J. Pershing.
- (2) Historical Report of Medical Activities, Line of Communications, American Expeditionary Forces, during the War Period, undated, by Brig. Gen. F. A. Winter, M. C. On file, Historical Division, S. G. O.
- (3) Weekly War Diaries, chief surgeon, A. E. F. (Memoranda for the chief of staff, A. E. F.) July 21, 1917. On file, Historical Division, S. G. O.
- (4) *Ibid.*, September 2, 1917.
- (5) Wadhams, Sanford H., Col., M. C., and Tuttle, Arnold D., Col., M. C.: Some of the Early Problems of the Medical Department, A. E. F. *The Military Surgeon*, Washington, D. C., 1919, XLV, No. 6, 636.
- (6) Weekly War Diaries, chief surgeon, A. E. F., November 25, 1917.
- (7) Letter from the chief surgeon, L. O. C., to the chief surgeon, A. E. F., February 14, 1918. Subject: Centralization of supply control. Copy on file, Historical Division, S. G. O.

- (8) Report of the activities of the supply division, chief surgeon's office, A. E. F., May, 1919, by Col. N. L. McDiarmid, M. C. On file, Historical Division, S. G. O.
- (9) G. O., No. 130, G. H. Q., A. E. F., August 6, 1918.
- (10) Memorandum from the medical representative of the chief surgeon on the General Staff to the chief surgeon, A. E. F., April 28, 1918. On file, Historical Division, S. G. O.
- (11) Letter from the chief surgeon, L. O. C., to the chief surgeon, A. E. F., January 17, 1918. Subject: Therapeutic sera. Copy on file, Historical Division, S. G. O.
- (12) Telegram from the Surgeon General to the officer in charge, medical supply depot, El Paso, Tex., May 19, 1917. Copy on file, Finance and Supply Division, S. G. O., 14778—C.
- (13) Telegram from the Surgeon General to the officer in charge, medical supply depot, New York City, May 19, 1917. Copy on file, Historical Division, S. G. O.
- (14) Letter from Lieut. Col. H. C. Fisher, M. C., to Col. M. W. Ireland, M. C., August 11, 1917, relative to medical supplies for the American Expeditionary Forces. Copy on file, Historical Division, S. G. O.
- (15) Letter from the chief surgeon, A. E. F., to the Surgeon General, July 3, 1917. Subject: Forwarding medical supplies without requisition. Copy on file, Historical Division, S. G. O.
- (16) Memorandum, Headquarters, A. E. F., August 20, 1917. Subject: Automatic supply. Copy on file, Historical Division, S. G. O.
- (17) Cablegram No. 145-S. From General Pershing to The Adjutant General, September 7, 1917.
- (18) Cablegram No. 155-S. From General Pershing to The Adjutant General. Paragraph 7, for the Surgeon General.
- (19) Letter from the Surgeon General to the chief surgeon, A. E. F., October 27, 1917, relative to automatic supply. On file, Finance and Supply Division, S. G. O., 713-250.
- 15
- (20) Letter from the Surgeon General to the officer in charge, medical supply depot, New York, October 6, 1917. Subject: Automatic replenishment of medical supplies per month. Copy on file, Historical Division, S. G. O.
- (21) Letter from the Surgeon General to the officer in charge, medical supply depot, New York, October 13, 1917. Subject: Automatic replenishments. Copy on file, Historical Division, S. G. O.
- (22) Letter from the Surgeon General to the officer in charge, medical supply depot, New York, November 8, 1917. Subject: Automatic replacement of post supplies. Copy on file, Historical Division, S. G. O.
- (23) Letter from the Surgeon General to the officer in charge, medical supply depot, New York, November 9, 1917. Subject: Replenishments for the 26th and 42d Divisions. Copy on file, Historical Division, S. G. O.
- (24) Letter from the Surgeon General to the surgeon, medical base group, A. E. F., October 27, 1917. Subject: Automatic replenishment of supplies. Copy on file, Historical Division, S. G. O.
- (25) Letter from the chief surgeon, A. E. F., to the officer in charge, Intermediate Medical Supply Depot No. 3, February 1, 1918. Subject: Automatic supply. Copy on file, Historical Division, S. G. O.
- (26) First indorsement, office of the chief surgeon, L. O. C., to the chief surgeon, A. E. F., February 15, 1918. Copy on file, Historical Division, S. G. O.
- (27) Letter from the officer in charge, Intermediate Medical Supply Depot No. 3, to the chief surgeon, L. O. C., February 4, 1918. Subject: Automatic supply. On file A. G. O., World War Division, Chief Surgeon's File, 401.
- (28) Letter from the chief surgeon, A. E. F., to the Surgeon General, April 2, 1918. Subject: Automatic supply. Copy on file, Historical Division, S. G. O.

- (29) Report of chief of medical group to assistant chief of staff, 4th section of general staff, December 31, 1918. Subject: Activities of medical group, 4th section, general staff, General Headquarters, A. E. F. Copy on file, Historical Division, S. G. O.
- (30) Memorandum from Col. S. H. Wadhams, General Staff, G. H. Q., to the chief surgeon, A. E. F., May 28, 1918. On file, A. G. O., World War Division Chief Surgeon's File, 319.2.
- (31) Final Report of Gen. John J. Pershing.
- (32) Organization of the Armies of Supply, A. E. F., Monograph No. 7. Prepared in the Historical Branch, War Plans Division, General Staff, June, 1921, Washington, Government Printing Office, 1921, 10, 11.
- (33) Letter from the adjutant general, A. E. F., to the acting commander, L. O. C., July 19, 1917. On file, A. G. O., World War Division, Chief Surgeon's File, 370.41.
- (34) Organization of the Services of Supply, 123.
- (35) Supply Circular No. 19, office of the chief surgeon, L. O. C., February 14, 1918.
- (36) Third indorsement, from the chief surgeon, L. O. C., to the officer in charge, advance medical supply depot No. 1, Is-sur-Fille, August 21, 1918. On file, A. G. O., World War Division, Chief Surgeon's File, 400.01.
- (37) G. O., No. 55, G.H.Q., A. E. F., April 12, 1918.
- (38) Letter from the chief surgeon, L. O. C., to the commanding general, L. O. C., February 11, 1918. Subject: Storage for Medical Department. Copy on file, Historical Division, S. G. O.
- (39) Memorandum for the Medical Department from the assistant chief of staff, G-4, G. H. Q., A. E. F., April 19, 1918. Copy on file, Historical Division, S. G. O.
- (40) Memorandum for the assistant chief of staff, G-4, G. H. Q., from the chief surgeon, A. E. F., April 25, 1918. Copy on file, Historical Division, S. G. O.
- (41) Letter from the chief surgeon, A. E. F., to the fourth section, general staff, G. H. Q., A. E. F., May 24, 1918. Subject: Reserve stock at railhead—G. O., No. 55. Copy on file, Historical Division, S. G. O.
- (42) Second indorsement, chief surgeon's office, A. E. F., June 1, 1918, to the assistant chief of staff, G-4, general staff, G. H. Q., A. E. F. Copy on file, Historical Division, S. G. O.
- (43) Telegram from the assistant chief of staff, G-4, G. H. Q., A. E. F., June 12, 1918, to the officer in charge, Intermediate Medical Supply Depot No. 3, Cosne. On file, A. G. O., World War Division, Chief Surgeon's File, 322.33.
- (44) Memorandum for the commanding general, L. O. C., from the chief surgeon, L. O. C., January 24, 1918. Subject: Priority of shipments from base ports. Copy on file, Historical Division, S. G. O.
- (45) Third indorsement, G. H. Q., A. E. F., chief surgeon, general staff, February 2, 1918, to commanding general, L. O. C. Copy on file, Historical Division, S. G. O.
- (46) Fourth indorsement, office of the commanding general, L. O. C., February 6, 1918, to the commanding officers, Base Sections Nos. 1, 2, and 5. Copy on file, Historical Division, S. G. O.
- (47) Based on correspondence between the commanding general, L. O. C., and the commanding generals, base sections, A. E. F. On file, A. G. O., World War Division, Chief Surgeon's File, 400.24.
- (48) Memorandum for the general staff, from the chief surgeon, A. E. F., April 23, 1918, concerning supply depots for hospital centers. Copy on file, Historical Division, S. G. O.
- (49) Memorandum for the chief of utilities, A. E. F., from the assistant chief of staff, G-4, Hq., S. O. S., April 29, 1918. Copy on file, Historical Division, S. G. O.
- (50) Letter from the chief surgeon, L. O. C., to the commanding officer, B. H. No. 18, A. E. F., October 19, 1917. Subject: Issue of medical supplies to divisional troops in your area. Copy on file, Historical Division, S. G. O.
- (51) Report of the Medical Department activities of Base Section No. 1, undated, by Col. Charles L. Foster, M. C. On file, Historical Division, S. G. O.

- (52) Second indorsement from the chief surgeon's office, A. E. F., July 27, 1918, to the commanding officer, hospital center at Mesves, concerning hospital center medical supply depots. Copy on file, Historical Division, S. G. O.
- (53) Letter from the chief surgeon, A. E. F., to surgeons of base sections, January 1, 1919. Subject: Accountability. On file, A. G. O., World War Division, Chief Surgeon's File, 143.
- (54) Correspondence pertaining to tonnage forecasts. On file, A. G. O., World War Division, Chief Surgeon's File, 400.314.
- (55) Memorandum from the adjutant general, S. O. S., to the chief surgeon, A. E. F. April 29, 1918. Subject: Quartely forecast. On file, A. G. O., World War Division, Chief Surgeon's File, 400.314.
- (56) Memorandum from Hq. S. O. S., to the chief surgeon, A. E. F., April 6, 1918. Subject: Tonnage priority lists. On file, A. G. O., World War Division, Chief Surgeon's File, 440.1.
- (57) Letter from the chief surgeon, A. E. F., to the assistant chief of staff, G-1, Hq., S. O. S., July 16, 1918. Subject: Report of tonnage estimates. Copy on file, Historical Division, S. G. O.
- (58) First indorsement from the chief surgeon, A. E. F., to the Surgeon General, January 11, 1918, relative to overseas shipments. Copy on file, Historical Division, S. G. O.
- (59) Lists of overseas shipments from all ports for the month of July, 1918.
- (60) Letter from the Chief of Embarkation Service to the Surgeon General, June 17, 1918. Subject: Overseas shipments. On file, Record Room S. G. O., 400.16.
- (61) Manual for the Medical Department, U. S. Army, 1916, par. 536.
- (62) Military History of the American Red Cross in France, by Lieut. Col. C. C. Burlingame, M. C. Copy on file, Historical Division, S. G. O.
- (63) Letter from the Surgeon General to Mr. Henry D. Gibson, general manager, American Red Cross, March 8, 1918. Subject: Order for surgical dressings. On file, Finance and Supply Division, S. G. O., ⁶⁰²/₇₈.
- (64) S. O., No. 73, H. A. E. F., August 20, 1917.
- (65) Manual of Splints and Appliances, for the use of the Medical Department of the United States Army, 1918.
- (66) Letter from the chief surgeon, L. O. C., to the chief surgeon, A. E. F., February 11, 1918. Subject: Red Cross production. Copy on file, Historical Division, S. G. O.
- (67) Letter from the Surgeon General to the director of military relief, American Red Cross, Washington, April 8, 1918. Subject: Method of handling Red Cross supplies. On file, Finance and Supply Division, S. G. O., ^{250 Fr.}/₃₀₂.
- (68) Letter from Maj. J. A. Hartwell, to Lieut. Col. Fred T. Murphy, October 15, 1918. Subject: Report on surgical dressings. Copy on file, Historical Division, S. G. O.
- (69) Circular No. 56, office of the chief surgeon, A. E. F., November 19, 1918.
- (70) Circular No. 16, office of the chief surgeon, A. E. F., March 28, 1918.
- (71) Circular No. 14, office of the chief surgeon, L. O. C., December 4, 1917.
- (72) Circular No. 33, office of the chief surgeon, A. E. F., June 12, 1918.
- (73) Circular No. 15, office of the chief surgeon, L. O. C., December 15, 1917.

CHAPTER XLVII

FINANCE AND ACCOUNTING

PURPOSE

An act of Congress, dated September 24, 1917, authorized the Comptroller of the Treasury and the Auditor for the War Department to send to the American Expeditionary Forces portions of their organizations for performing there the functions of their offices. As a result of the establishment of the offices of the Assistant Comptroller of the Treasury and of the Assistant Auditor for the War Department in France,¹ and in accordance with the request of General Pershing, the chiefs of the various War Department bureaus organized units to function in the American Expeditionary Forces in a manner similar to the finance and property divisions of the several departments in the United States. Thus the unit formed in the Medical Department eventually became the finance and accounting division of the chief surgeon's office, A. E. F.²

PERSONNEL

In availing himself of the authorization referred to above, the Surgeon General had an officer of the Medical Corps ordered to Washington for consultation, and upon arrival directed him to obtain and organize a force sufficient to care for the Medical Department accounts for an army of 2,000,000 men.³ After consultation with the Assistant Auditor for the War Department and with various other departmental authorities this officer modeled his organization on that of the corresponding division of the Surgeon General's Office.³ In order to get men qualified for this work all the large banks as far west as Chicago, and a large number of insurance companies, railroads, and department stores were requested to supply the names of drafted men qualified for service in this group.³ Prompt replies were obtained but, meanwhile, almost all the men named had been assigned to such duties that their transfer was not feasible. Banks were then asked to supply lists of their employees who were about to be called to the colors and from these by induction and enlistment the number desired was obtained. From time to time personnel to a total of 7 officers (including the chief of the division) and 135 men pertaining to this group were sent to France.³ It was purposed, in so far as the men were concerned, that many of them would perform clerical service not only in the office of the chief surgeon, A. E. F., but also at medical supply depots, with division surgeons, and in similar assignments.³

Because of numerous transfers, the enlisted personnel of this unit was further reduced to 37 men. One of the officers was sent to Paris for duty in the bureau of accounts, A. E. F., and one was assigned to duty with the general purchasing board, A. E. F.

On April 1, 1918, when the unit was attached to the office of the chief surgeon, it consisted of 6 officers and 47 men. Gradually other personnel were added until in February, 1919, this division consisted of 10 officers, 132 enlisted men, and 15 French civilians. This was its maximum strength.³

PREPARATORY WORK

In November, 1917, a temporary office was established at the New York medical supply depot, where the plan of organization was developed, and recruits were examined to determine their technical qualifications.³ These men were then sent to Governors Island to be recruited and temporarily quartered. While there they were given some drill and were instructed in their prospective duties. Supplies also were collected at this place and plans made for the details of procedure and work of the detachment abroad.

The first section of this detachment, consisting of 5 officers and 100 men, left the United States on January 4, 1918, and arrived at St. Nazaire on January 17.³ From January 24 to February 13 the group was stationed at Bois, where its organization was perfected.² Plans of procedure were chartered and suggestions worked out for the improvement of the methods of handling money and property accounts of the Medical Department.

After the unit moved to Tours, on February 13, it established its office, and about March 15 began its actual work in rooms assigned to it in barracks No. 66.³

A second section of this group, consisting of 2 officers and 35 men, which had arrived in France on February 9, was broken up, only the officers and 2 enlisted men eventually joining the original unit then at Tours.³

On May 1, 1918, the finance and accounting division became a part of the division of supplies of the chief surgeon's office, A. E. F.³

SCOPE OF ORGANIZATION

At first, the division had three chief activities: Money accounting, disbursing, and property accounting.⁴ As occasion demanded, other functions were added until eventually the division had 15 distinct but related activities and was divided into corresponding sections.²

DISBURSING

This section paid French commercial bills, all doubtful vouchers (when found to be legal) which were referred to it by other disbursing officers of the Medical Department, all laundry accounts, and all civilian personnel pay rolls.² For the month of January, 1919, these disbursements amounted to 844,207.70 francs, representing 573 vouchers. Prior to March 1, 1919, the disbursing officer paid one-third of the total number of Medical Department vouchers settled in France. Before payment the auditor checked up duplications. A liaison was established with both the hospitalization division, chief surgeon's office and the quartermaster department, A. E. F., in matters pertaining to laundry accounts whereby many hospitals through use of near-by quartermaster laundries saved many thousands of dollars. By April 30, 1919, the section had

paid 4,593 vouchers. This section made considerable savings by eliminating duplicate payments and by arranging that hospitals use existing facilities instead of purchasing supplies and labor in open market. Records were made of the time elapsing between dates of purchase and dates of payment, and every effort was made to expedite settlements, thus promoting good will on the part of French vendors. Arrangements were made whereby quartermaster disbursing officers of Base Hospitals and hospital centers might pay accounts of civilians then employed, the Medical Department appropriations to be reimbursed by Treasury transfer. The importance of this provision is borne out by the fact that on November 30, 1918, there were 3,782 French civilians on Medical Department pay rolls. The average amount of purchases made direct by field organizations were made of record, by which many possible expenditures, by certain units which were given to extravagance, were eliminated.

AUDITING MONEY VOUCHERS

In this section were audited all accounts which already had been paid (except those on civilian pay rolls) by disbursing officers of the Medical Department, A. E. F.² So far as possible any errors in these accounts were corrected before they were forwarded to the Treasury Department at Washington for final audit. Vouchers were examined to determine whether they were legal, were correct charges against Medical Department funds, conformed to authorization for disbursement, were arithmetically correct, and there was no duplication. The analysis also included such matters as the time interval between delivery of supplies and payment therefor; the size of average purchase; comparison of volume and prices of similar articles purchased by different units. Data thus gained made possible not only an expedition of payments, but also an elimination of unnecessary purchases and an approximate standardization of prices. Because of this careful auditing very few suspensions were made by the Treasury Department in the accounts of Medical Department disbursing officers. By cancellation of erroneous vouchers and by securing the agreement of other departments, A. E. F., to pay items which properly belonged to their appropriations, many millions of dollars were saved to the Medical Department. A cash refund of approximately \$15,000 worth of overpayments was received, as a result of detection of overpayments and duplication of vouchers. The value of carefully auditing money vouchers and recording financial data was fully demonstrated when it was necessary finally to submit the accounts of medical disbursing officers to the Assistant Auditor for the War Department. These accounts were in such condition that they could be accepted without causing any difficulty to the disbursing officers.

ANALYSIS AND RECORD OF DISBURSEMENTS

This section made an index and abstracts of all vouchers before they passed out of the possession of the Medical Department.² These important abstracts included such data as the name of the vendor, material, price paid, date paid, by whom paid. They were made with the view of facilitating future settlement of claims which previous wars showed would continue to be made for many years.²

ANALYSIS AND RECORD OF ACCOUNTS OF CIVILIAN PERSONNEL

This section audited and made abstracts from pay rolls of civilian personnel before the rolls were forwarded to the Treasury.² The abstracts showed names of civilian employees, authority for employment, when and where employed, when and by whom paid, etc. Prior to payment many erroneous items were eliminated, some refunds were procured, and some payments were transferred to other corps. Also in this section, efforts were made to provide for prompt payments.

ANALYSIS AND RECORD OF HOSPITAL FUNDS

This section audited the individual hospital fund statements rendered by the mess officers of the various Medical Department units, maintained a file of custodians of hospital funds, and records covering the amounts due to various hospitals from individual officers for subsistence while they were patients in hospital.² At the peak of this work in March, 1919, 691 organizations were rendering monthly statements and the transactions represented by them amounted in one month to approximately 35,000,000 Francs.² Not only were many underpayments and overpayments corrected, but efforts were made also to promote prompt payment of bills rendered by French civilians.⁴ Deficits were prevented by issuing warnings to those concerned; in some instances, when gross negligence was evident, liquidation was secured from the private funds of officers who were responsible. Arrangements were made for the transfer of food stocks between organizations. The decision of the Comptroller of the Treasury giving the Medical Department the right to retain proceeds from sale of waste, and the right to turn in to the Quartermaster Corps unused food stocks, led to relatively large savings; proceeds thus secured from the sale of garbage amounted to several hundred thousand francs.⁴ One of the activities of this section pertained to the collection of funds from officers for payment of their subsistence while in hospital at the rate of \$1 per day.⁴ Many officers inadvertently overlooked this obligation, but thousands of dollars were saved by carefully following them up.⁴

TRAVELING AUDITORS OF HOSPITAL FUNDS

This section consisted of a small staff which checked up records when there appeared to be anything irregular, but whose chief duty was instruction in the field of mess officers and hospital fund custodians in technicalities pertaining to these funds, the correction of errors, and the proper execution of disbursing and property papers.² Constantly in the field, they gave instruction to Medical Department clerks in the preparation of disbursement vouchers, property vouchers and returns;² also, they assisted very materially in closing money and property accounts of units returning to the United States.⁴ Always there were more calls for their services than could be met.²

CUSTODIANSHIP OF CENTRAL HOSPITAL FUND

The work which engaged this section was taken over about September 13, 1918, when the hospital fund in the chief surgeon's office amounted to 18,800 francs.⁴ Subsequently, this section controlled the central hospital fund, the loan or donation of small amounts to new organizations, the transfer of

hospital funds between organizations, the reception of funds from disbanding units, and the closure of balances.² The fund on May 1, 1919, was over one hundred and fifty times what it had been when taken over in the previous September, the item of interest alone amounting to almost as much as the initial central fund.² By May 9, 1919, it amounted to 2,862,792.31 francs;⁵ By May 24, it was 3,084,000 francs.⁶

LIAISON WITH FINANCE DIVISIONS AND TREASURY OFFICIALS

By means of this section the finance and accounting division maintained close liaison with similar divisions in other departments, American Expeditionary Forces, the finance officer, the finance requisition officer, and the officials of the Treasury in the American Expeditionary Forces.² This contact proved to be of value in keeping abreast of the various developments in financial matters in the American Expeditionary Forces.

ISSUE OF CLEARANCE CERTIFICATE

Through this section clearance certificates were issued covering money and property accountability.² In the cases of deceased officers these certificates were issued to the Treasury Department and in the case of others to the officers themselves. This work became considerable during the later history of the finance and accounting division; however, its performance was expedited through advance information concerning organizations or individuals returning to the United States which thus permitted the preparation of clearances even before these were called for. Arrangements were such that these certificates were issued at any hour of the day or night, usually a few minutes after they were requested. Of the total number of clearances issued prior to April 30, 1919 (other than those to deceased officers), only 156 were for parts of the accounts concerned, all other clearances being complete. Officers were assisted in every possible way in placing their accounts in correct form, and every effort was made to create good will among those returning to the United States and to civil life. Only 312 of the many certificates for deceased officers were for partial clearance and practically all of the debts in these cases were for small charges while in hospital.

BILLING ALLIES FOR HOSPITAL CHARGES

One section of the finance and accounting division was engaged in compiling data, from all available sources, relative to the hospitalization of allied troops in American hospitals, in converting these data into proper bills, and in submitting them to the governments concerned.² During the period that this work was being conducted by this section, these bills amounted to \$194,084.32. In April, 1919, this work was turned over to the Medical Department representative at Paris in compliance with orders that that officer be charged with the conduct of all financial transactions with foreign governments. Also this section formulated some of the bills against other departments of the American Expeditionary Forces, but this work also was turned over eventually to the Medical Department representative in Paris.

COMPILATION OF STATISTICAL DATA AND FINANCIAL REPORTS

This section compiled monthly, semiannual, and annual financial reports of various kinds, and also certain special reports which were of peculiar value at different times.² These financial reports, which were rendered to the offices concerned, covered almost every phase of the financial operations of the Medical Department. From statistical data which this division maintained it was possible to trace completely all Medical Department funds from the time they left the United States Treasury until they were expended for material and labor. These records covered the financial transactions of the Medical Department from the inception of the American Expeditionary Forces until April 30, 1919.

EXAMINATION AND FILING OF PROPERTY VOUCHERS

This section maintained from 7,500 to 10,000 individual files each of which concerned an accountable or responsible officer.² During its most strenuous period approximately 3,500 vouchers per week were handled. Invoices, receipts, and returns were compared; discrepancies noted; certificates were audited, recorded, and filed; a card index for all officers responsible for medical supplies was maintained. The determination of property responsibility was the source of much trouble throughout the entire period of activity of the finance and accounting division, for it was seriously handicapped by the uncertain states of property accountability in that jurisdiction. This was occasioned by confusing orders capable of various interpretations. Before the armistice was signed accountability was especially uncertain, but an attempt was made to require a strict accountability, subject to due consideration of the conditions incident to active warfare. By May 1 returns to that date had been audited. Whenever necessary, statements of differences were drafted and the balance of the returns filed in such a way as to be accessible and to show the final disposition of the case and the authority for this action.

EXAMINATION OF PROPERTY RETURNS

More than 1,000 returns were received and audited by the section engaged in this duty.² It would have been completely overwhelmed had not Circular No. 68, chief surgeon's office, February 8, 1919, been issued, conformably to existing orders. This circular limited the officers responsible for Medical Department property to those at base hospitals, supply depots and schools and thus eliminated from such accountability thousands of other officers who would have been required to render returns.

LEGAL REFERENCE LIBRARY

The section in charge of the legal reference library maintained complete files and formulated indices of Army Regulations, general orders, bulletins, and circulars issued by the different headquarters, whether the United States Army or the American Expeditionary Forces, abstracts of statistics and decisions of the Comptroller of the Treasury, the Auditor for the War Department, the Judge Advocate General, etc.² This section had been organized merely for the

use of the finance and accounting division, chief surgeon's office, in settling questions of legality and in keeping up to date different files of orders and decisions, but in addition, copies of its compilations were used by Treasury officials, the advisory board of war risk insurance, the secretary of the general staff, financial bureaus and other departments of the Army, and by various officers of the Medical Department either in the office of the Chief Surgeon or elsewhere.³ This section was also called upon to draw up contracts.⁴ Questions were referred to it much as opinions were asked of attorneys in civil life, for the personnel of this section were lawyers in civil life.

LIAISON WITH BUREAU OF ACCOUNTS AND FINANCE BUREAU

With the formation in Paris of the bureau of accounts by General Orders, No. 5, Services of Supply, 1918, and the finance bureau, by General Orders, No. 199, General Headquarters, A. E. F., 1918, a member of the finance and accounting division, chief surgeon's office, was in liaison with each of them and was permitted to pass upon many contemplated plans which affected financial operations in which the Medical Department was concerned.² The cash expenditures of that department until April 30, 1919, amounted to \$15,000,000. By May 8, 1919, the Medical Department had purchased in Europe medical and hospital supplies to a value of \$21,084,943.14, exclusive of the cost of 19 hospital trains (approximately \$5,166,666.67).²

CENTRAL HOSPITAL FUND, THIRD ARMY

By March 21, 1919, instructions had been given for the establishment of a central hospital fund in the office of the surgeon, Third Army, and authority had been given that office to give or take from hospital funds of units in the Third Army such sums as might seem proper, to retain in the central fund such portions of hospital funds, of departing units as might seem desirable, to audit hospital fund statements of units in the Third Army and to retain audited statements, to arrange for payment of civilian personnel out of the hospital funds, Third Army, and to audit civilian pay rolls.⁷

ARRANGEMENTS FOR RETURNING IMPORTANT FINANCIAL AND PROPERTY PAPERS TO THE UNITED STATES

Early in April, 1919, arrangements were made to send important financial and property papers to the United States by regular courier service, and at the same time a commissioned officer from the finance and accounting division, who was thoroughly acquainted with the various documents and could explain them to the interested departments in the United States.⁸ A section was established in this division to collect all these Medical Department finance and property papers to be sent back to the United States and to compile a complete index of all communications and other papers which previously had been sent there.

DISCONTINUANCE OF FINANCE AND ACCOUNTING DIVISION

By May 14, 1919, the chief surgeon, A. E. F., approved the discontinuance of the finance division as of June 15, following.² Small detachments of the office force were to remain in service at Tours, Coblenz, Antwerp, and Washington, while other members of it were to be discharged. The entire division

was then preparing copies of all records that might be needed after the originals had been returned to the United States. These copies were to be retained in the chief surgeon's office, A. E. F.²

A small part of the finance and accounting division continued in the chief surgeon's office, to make such disbursements as were necessary and to maintain liaison with fiscal offices in the United States.² This service continued after the American Expeditionary Forces was succeeded by the American Forces in France and the American Forces in Germany.⁹

During the period August to November, 1919, the closing months of our activities in France, claims for services rendered or supplies delivered to various hospitals and units throughout France were investigated and vouchers prepared and paid.⁹ Many of the accounts so paid were of long standing, the original bills apparently having been lost.⁹ Investigations of these charges were difficult, not only on account of insufficient receipts but also because officers who gave the orders, received the supplies, or engaged the services had returned to the United States.

After November 15, 1919, no further payments were made by the Medical Department, but all vouchers were prepared and submitted to the quartermaster disbursing officer for payment.⁹ Since the medical disbursing officer ceased to function, a total number of 70 claims for services rendered or supplies delivered (many of these being final settlements covering a series of transactions with the various persons or companies and requiring a complete check of all bills rendered and paid in order to avoid duplication) were investigated and vouchers prepared for submission to the quartermaster for payment.

REFERENCES

- (1) A handbook of economic agencies of the war of 1917. Monograph No. 3. Prepared in the Historical Branch, War Plans Division, General Staff, 1919.
- (2) Report on the activities of the chief surgeon's office, A. E. F., to May 1, 1919, made to the Surgeon General by the chief surgeon, A. E. F. On file, Historical Division, S. G. O.
- (3) Historical report to the secretary, general staff, G. H. Q., A. E. F., on the Medical Department, A. E. F., to May 31, 1918, made by the chief surgeon, A. E. F. Copy on file, Historical Division, S. G. O.
- (4) The Medical Department, A. E. F., to November 11, 1918, compiled by Capt. E. O. Foster, S. C., from the chief surgeon's records, A. E. F., under the direction of the chief surgeon, undated. On file, Historical Division, S. G. O.
- (5) Letter from the officer in charge, finance and accounting division, chief surgeon's office, A. E. F., to the chief surgeon, A. E. F., May 12, 1919. Subject: Report for week ending March 21, 1919. On file, Historical Division, S. G. O.
- (6) Letter from the chief surgeon, A. E. F., to the chief of staff, A. E. F., May 28, 1919. Subject: War diary for week ending May 24, 1919. Copy on file, Historical Division, S. G. O.
- (7) Letter from the officer in charge, finance and accounting division, chief surgeon's office, A. E. F., to the chief surgeon, A. E. F., March 24, 1919. Subject: Report for week ending March 21, 1919. On file, Historical Division, S. G. O.
- (8) Letter from the officer in charge, finance and accounting division, chief surgeon's office, A. E. F., to the chief surgeon, A. E. F., April 14, 1919. Subject: Report for week ending April 11, 1919. On file, Historical Division, S. G. O.
- (9) Letter from the chief surgeon, American Forces in France, to the commanding general, A. E. F., December 30, 1919. Subject: Report from July 1, to December 30, 1919, Copy on file, Historical Division, S. G. O.

CHAPTER XLVIII

ACTIVITIES OF INTERMEDIATE MEDICAL SUPPLY DEPOT NO. 2, GIEVRES, FRANCE ^a

The activities of this depot began on October 10, 1917, when, as a part of the general storage activities of the American Expeditionary Forces, a small section of the intermediate supply depot at Gievres was assigned to the Medical Department. In its subsequent growth, the depot operated under trying conditions and without facilities ordinarily considered essential to effective results. For many months the warehouses had no sides, and paulins, strung from the eaves, afforded the only means of protection. The floors were of sand, thereby preventing the use of hand trucks. There were no overhead cranes, no loading platforms, no mechanical box stackers. An inadequate supply of gravity rollers, a few express carts, and wheelbarrows actually represented the only labor-saving devices that ever were available to this depot. Brute strength was the primary factor in the handling of the supplies through every process of unloading, transferring, stowing, and loading; nevertheless, despite vicissitudes, not the least of which was inexperienced help, an organization and an esprit de corps were developed by means of which effective results were accomplished.

ADMINISTRATION

Personnel of the administration section comprised the officer in charge, the executive officer, and several stenographers.

The general management, direction, and control of the depot were vested in the administrative section. The directing head was the officer in charge. In matters of internal administration the officer in charge was the sole arbiter, and upon him devolved the responsibility of formulating the guiding policies of the management of the depot, the making of decisions affecting such policies, and the exercise of broad supervisory powers over the several departments. He was the coordinating factor between the office and warehouse, and in this capacity he exercised an important function. Inasmuch as a large proportion of the administrative duties were handled by the executive officer, whose function is described below, the officer in charge was left comparatively free to keep in close touch with the operations division, and consequently was afforded an opportunity to obtain the point of view of both the office and warehouse. This was extremely desirable in an organization of this size, for although each division had its own individual problems, the three were closely connected, and such problems had to be solved in relation to the needs and demands of the other divisions. This close association between the divisions which constituted

^a The following statements of fact are based on "Organization, Scope and Methods of Procedure of Intermediate Medical Supply Depot No. 2, A. E. F.," undated, by Maj. Samuel Smelsey, San. Corps. On file, Historical Division, S. G. O.

separate entities, and the consequent need for coordination, are discussed in the following pages.

Another important function exercised by the officer in charge was the amendment or alteration of requisitions and the cancelling or due listing of items which the depot was unable to furnish. This subject is taken up at length below under the head of "Requisition department."



FIG. 46.—Intermediate Medical Supply Depot, No. 2, Gievres; main office

The executive officer acted as assistant to the officer in charge and disposed, without reference to him, of administrative problems not requiring a change in policy or procedure. He kept the personnel informed upon matters pertaining to changes in administrative practice and in the relationship between the depot and the chief surgeon's office. He also handled the more important nonroutine correspondence and such as was not referred to the general departments within the office. In general he was in direct charge of matters pertaining to administration, as opposed to operations, at the same time exercising for the officer in charge a supervisory relationship over the operations division and the detachment.

PROPERTY ACCOUNTING DIVISION

SCOPE, ACTIVITIES, AND JURISDICTION

The property accounting division embraced all the activities and functions pertaining to property accountability or responsibility. Briefly, the work of this division involved the auditing and control of requisitions, invoices, stock records, returns, and warehouse receipts and issue slips for medical, quarter-

master, ordnance, and engineer property for which this depot was accountable or responsible. The property officer was in charge of this division and he had as his assistants such noncommissioned officers or privates as were necessary to maintain an effective supervision.

REQUISITIONS DEPARTMENT

At first, all requisitions for medical supplies were submitted by units of the American Expeditionary Forces direct to the office of the chief surgeon, Line of Communications. From there, if approved, they were sent, usually in modified form, to the medical supply depots for issue. Subsequently, under a policy of decentralization, promulgated by the chief surgeon's office, units were directed to submit their requisitions to the surgeons of the base, intermediate or advance sections, according to their location. In emergencies, units could send their requisitions direct to the depots, in which instances, however, the chief surgeon's office was immediately notified.

Usually requisitions for medical supplies were received at this depot in triplicate.^b They were submitted first to the officer in charge who subjected them to careful scrutiny. He had authority from the chief surgeon's office to substitute items of equivalent value or character, to "cut" the amounts requested if the stock on hand did not warrant such issue, due listing the balance.

The requisitions were then entered in a record known as the "Requisition book." This book had the following headings under which appropriate entries were made: Requisition number; date of requisition; date requisition was received; name and address of consignee; items (abbreviated list); authority for requisition; initials of entry clerk; date completed and initials of clerk making entry; date filed and initials of clerk making entry; voucher number of invoice.

Entries were made according to the requisition numbers, which ran consecutively.

Reference was made to the requisition file by means of a card index which was classified according to units, arranged alphabetically, a separate card being used for each unit. Under the name and address of a unit, appeared the date the requisition was received, date invoiced and date filed. If the requisition as submitted was not legible or properly arranged, copies were made in sextuplicate. Four of these copies including the original were sent to the operations division, one to the medical property department and the sixth copy was retained. The regulating officer designated on the margin, the warehouses from which he desired the supplies to be loaded. These were then returned to the office where they were extracted and prepared on a form known as the "Warehouse issue order." A tentative due list of items not in stock was prepared at the same time, and these were not included in the issue orders. The issue orders were prepared in quintuplicate, one copy of which was retained in the requisitions department, one was sent to the medical property department and three forwarded to the regulating officer. The regulating officer sent these to the officer in charge of the tracks concerned in order of

^b Such requisitions occasionally included items of quartermaster property. A detailed description of the method of handling them may be found under the caption, "Quartermaster, Engineer, and Ordnance property department."

priority or as the exigency of the situation demanded. When the warehouse officer completed the shipment or filled such items as he was able, the orders were returned to the relating officer. If there were any items which could not be filled, the issue order was returned to the office with a notation to that effect.^c Such items are compared with the tentative due list indicated above, and either canceled or due listed at the discretion of the officer in charge, his action depending largely on the possibility of receipt of such supplies in the near future.

On such requisitions as were designated by the chief surgeon's office, that office was notified immediately of any items which this depot was unable to fill. The chief surgeon in turn notified this office to due list or cancel the items or else extract the same to other depots. When not required to notify the chief surgeon of such items and where there was but slight possibility of obtaining the same within the near future, the consignee was notified by letter that those items were canceled and was requested to make requisition for the same at some future time.

When it was decided to due list certain items a list was prepared in duplicate, and one copy was sent to the regulating officer and the other retained. As new stock arrived it was applied against these due lists which were filled as far as possible. The due list was then sent to the office, showing just what had been shipped thereon. If not completed, a second due list was made from the balance, or else canceled as the officer in charge might determine. This procedure could be followed two or three times, depending upon the number of items due listed, which in some cases, was considerable, and the probability of completing the shipment within a reasonable time.

These steps were recorded on a form known as a "Requisition status card" which showed the progress of the requisition and the action taken thereon. This form, when filled out, showed the following data: Requisition number; consignee, unit and location; date warehouse and issue order returned; first due list (date); second due list, etc. (date); items canceled (date); extracted to chief surgeon's office (date); requisition completed (date); filed (date); remarks.

The requisitions department also kept a bound record known as the "Open requisition book." Requisitions were arranged according to the location of the unit, and appropriate entries were made under the captions, name of unit, requisition number, date received, date completed or closed.

The track assembly book was a record which showed by tracks the numbers and destinations of cars loaded for shipment. The information contained therein was based on the reports sent in by each track during the course of the day, and was used as a basis for all reports, telegrams and other information compiled daily. Detailed shipping reports and advices of shipments were forwarded to the post regulating officer, the regulating officers of the advance section (should the shipments be routed via a regulating office), the chief surgeon, and the consignee. The reports to the post regulating officer were prepared on special forms; the reports to all others concerned were telegraphic.

^c A detailed discussion of the action of the regulating department with respect to items not shipped is given below under "Operations division."

Less than carload shipments were handled in the same manner as described above except that shipments were made through the local railroad transportation officer who receipted for the shipment as it was delivered at the L. C. L. warehouse. This receipt was filed with the requisition.

All papers, such as warehouse issue slips, invoices, issue orders, telegraphic advices of shipment, tracers, and any other records or correspondence affecting the requisition in any way, were filed by requisition in a separate filing cabinet under the requisition number. Such data represented the course of the requisition from the time it was received in the office to its final disposition and showed every action taken thereon. Consequently, when any question concerning the requisition arose after the file had been closed, the necessary information could be obtained at a moment's notice by reference to the requisition file.

Requisitions for blank forms were submitted on a separate requisition form, and upon receipt were given a number of an entirely different series from that pertaining to requisitions for medical supplies. The procedure in filling such requisitions, however, was practically the same, except the original requisition was used in lieu of a warehouse issue order, since the blank forms were kept in one warehouse. Blank forms were not invoiced, because they were expendable property.

MEDICAL PROPERTY DEPARTMENT

Broadly speaking, the medical property department was the recording and auditing branch of the property accounting division. Primarily, its functions consisted in the auditing and posting of items of medical property to stock records and returns, the accomplishment of invoices, the adjustment of stock, and the preparation of reports on supplies and storage. The work of this department was divided into three sections, known as the stock record section, the return section, and the voucher section.

STOCK RECORD SECTION

The principal activity of the stock record section was to record the receipt and issue of every item of stock, the date of such receipt or issue and the number of the check sheet from which the postings were made. Two forms of check sheets were used to record such receipts and issues. One was known as the warehouse receipt slip and the other as the warehouse issue slip, of which mention was made above. These were prepared by the checkers, as the supplies were loaded from or into the cars, separate slips being used for each car. The warehouse receipt slips, made out in duplicate as the cars were unloaded, were submitted by the track officer to the receiving officer, who scrutinized them for possible errors. If the receiving officer approved them, he initialed and forwarded them to the regulating officer, who in turn forwarded them to the property officer. They were then given to a clerk who checked them against the car record and numbered each. The slips were again subjected to a very careful examination, and any entries which were incorrect or inadequate either were corrected or questioned. The originals were given to the

return clerks and the duplicate copies to the stock record clerks for posting. All questioned entries were ignored, the object being the return of such slips to the receiving officer for correction and explanation. After the necessary corrections had been made, and the items posted, the duplicate check sheet was filed numerically. The original was forwarded to the finance and accounting division of the chief surgeon's office.

The warehouse issue slips were prepared by the checkers in triplicate, separate slips being used for each car loaded. Each slip bore the requisition number which the checker obtained from the issue order. The triplicate copy was placed in the car, and the two remaining copies were forwarded to the regulating officer who checked them against the requisition or issue orders, and passed them on to the office. The duplicate copy was turned over to the requisition department, the original to the invoice department. After the check had been made in the requisition department in the manner just described, the original and duplicate slips were forwarded to the stock record section where again they were checked against the warehouse issue order for possible errors of accuracy of nomenclature. Then they were distributed to the stock clerks who made the proper postings.

In order to record in systematic fashion receipts, issues, and balance of every item of stock on hand, a stock record was devised. A separate case was used for every item, appropriate entries being made under the following captions: Supply item, unit, receipts, date, warehouse receipt number, quantity, issues, date, requisition number, total (balance), warehouse, and track.

Receipts were posted to the stock card from the warehouse receipt slips and issues from the warehouse issue slips. The cards were arranged in accordance with the supply table, and were divided into post and field supplies and subdivided under each according to the class of items, such as medicines, stationery, miscellaneous, additional articles, dental, laboratory, X ray, veterinary, surgical instruments, and Red Cross supplies. The extent to which these classes further were broken up was dependent upon the volume of receipts and issues. Each stock clerk posted to a given number of items, whether it was in the post or field, and postings were made only to those items for which he was responsible. As he made his entries, the items on the slips were checked and these slips were then passed to the next stock clerk who made the necessary postings, and so on until every item on the check sheet had been posted. Thus, if a warehouse receipt or issue slip, as the case might be, contained a variety of items belonging to the several classes enumerated above, such slip passed through the hands of a number of stock clerks. These clerks handled only the duplicate copy of the check slip, which, after all postings had been made, were filed consecutively by the number given it upon the arrival at the office. The original was handled by the return clerks whose functions are described in the succeeding pages.

Property pertaining to base hospitals, field hospitals, ambulance companies, and other field units, held for storage, was checked in by packages instead of by items. This was done because the bulk of such property was received in in mixed boxes, unmarked, and none of it was available for general issue. A separate card, however, was used for each unit.

RETURN SECTION

A depot return was maintained for each item. This return was prepared in duplicate and, in effect, was a duplication of the stock records, in that it showed receipts, issues, and balance of every item carried in the depot; however, it did not show the dates of receipt or issue or location of stock. This duplication had its advantages in that it afforded an additional check as to the accuracy of the entries made. In other words the balance on the return had to agree with the balance on the stock record. If not, the discrepancy was at once investigated and subsequently adjusted. Postings to the return were entered under the following captions: Supply item, receipts (debit), warehouse receipt slip number, quantity, unit, issues (credit), requisition number, quantity, balance. The return clerks used the original copy of the warehouse receipt slip and posted simultaneously with the stock record clerks. The duplicate copy of the issue slip was turned over to them after postings had been made by the stock record clerks. The work of the return section was laid out in practically the same way as that of the stock record section, and the return was carried in accordance with the supply table. Each clerk was given a definite class of items to post.

The original copy of the return was forwarded every three months to the Surgeon General of the Army; the duplicate was retained in the files of the office.

VOUCHER SECTION

The voucher section was responsible for the accomplishment of invoices and bills for medical property received, the adjustment of the property return, the preparation of reports of stock on hand and correspondence relative to the foregoing. The accomplishment of invoices involved a careful examination of the warehouse receipt slip in order to avoid duplicating the receipt of the same item or items. Frequently invoices failed to show the number of the car in which the supplies were shipped or the number of the *ordre de transport* covering such shipment. This information was essential, owing to the fact that many invoices were received for the same class of items, and ordinarily there were no other means of identifying a particular shipment. As a result, invoices frequently were returned for this information. If the invoice checked with the supplies received, the date and voucher number of the invoice, the name of the invoicing officer, shipping point, the warehouse receipt slip number (actually, the voucher number) and date of accomplishment all were entered on the warehouse receipt slip covering the items invoiced. This effectually prevented receipting twice for the same supplies.

Invoices for quartermaster property taken up as medical property were handled under the provisions of Army Regulations and existing orders.

Invoices from the purchasing officer of the Medical Department were handled in the same fashion except that only three copies were received. Only one was returned to him and the other two were disposed of in the manner indicated above. The same procedure governed the accomplishment of bills from vendors in France or England except that one copy was retained and the

balance were returned direct to the vendor. The supplies covered by these bills later were invoiced by the officer making the purchase.

Ordinarily an expenditure voucher was prepared quarterly and submitted to the finance and accounting division of the chief surgeon's office. Such vouchers covered expendable items of medical property, such as office supplies, which were used in the operation of the depot. A warehouse issue slip was made out for every item so expended. This slip bore the initials of the executive officer indicating approval of such expenditure. The duplicate copy was used by the stock and return clerks for the necessary postings, and the originals were tentatively filed. At the end of the period one voucher covering the total number of items and amounts was prepared on the basis of these slips and forwarded as indicated.

Nonexpendable medical supplies used by the depot, such as office furniture and typewriters, were carried on what was known as the depot return. Such property was dropped from the stock records and from the regular return on certificate and taken up on depot return. This return was made to the Surgeon General in exactly the same way as that kept for the depot stock.

Frequently an error in checking was discovered after warehouse receipt slips had been posted. This could have been due to a variety of causes but usually to improper markings on the container.^d In such instances an adjustment voucher was prepared in duplicate stating the cause of the error, how the property was taken up and how adjusted. The original copy was forwarded to the finance and accounting division of the chief surgeon's office and the duplicate was filed with the return. The necessary corrections were then made on both the stock records and on the return.

A report of the medical, Red Cross, and quartermaster supplies on hand was prepared and submitted to the chief surgeon's office every two weeks. This report was arranged according to the supply table, and each item was set forth alphabetically by class. The figures for this report were obtained from the stock records which were balanced with the return each week.^e In addition, the report contained a list of items and amounts representing European purchases received during the period.

This report also included certain statistics with respect to storage, showing the amount of storage space authorized, available and occupied, together with any changes which occurred during the preceding two weeks. Such figures were based upon the cars received and shipped, allowance being made for the difference between the size of the American and French cars. A car movement report showing the total number of cars received, dispatched and transhipped was also embraced by this report.

Each week a report was sent to the chief surgeon's office showing those items of which the stock either was very limited or exhausted. With such information the supplies division of the chief surgeon's office was enabled to replenish such items as it deemed necessary by shipment from base ports or base storage stations.

^d A typical illustration is the following: A box marked "Oatmeal soap" was unloaded. It was removed to the issue room and upon being opened was found to contain surgical instruments.

^e Over 3,000 separate and distinct items were handled by this depot. As stated, a separate stock card and return sheet were kept for each of these items; therefore it was necessary to strike a balance on each in order to compile a stock report.

QUARTERMASTER, ENGINEER, AND ORDNANCE DEPARTMENT

This depot handled for issue a number of items of quartermaster property. This necessitated the maintenance of separate stock records, returns and the invoicing of and receipting for quartermaster property as a separate function. It proved desirable to consolidate such functions in a distinct department, together with those relating to the handling of ordnance and engineer property, inasmuch as the volume of work required was not large compared with that of the medical property department, and the segregation proved effective.

Upon the receipt of a requisition, items of quartermaster property, if there were such, were extracted and a separate warehouse issue order was prepared. This issue order bore a special requisition number with a cross reference to the requisition for medical property. These items were invoiced separately, and the two receipted copies of these invoices were filed consecutively by voucher number. Card indexes to the quartermaster requisitions were maintained. These showed the name and location of the unit, the quartermaster requisition number, voucher number and the medical requisition number, thus affording ready reference to the requisition or papers relating thereto. These cards were filed alphabetically by units.

The same form of stock record used for recording receipts and issues of medical property was employed for items of quartermaster property, and the same procedure governed their use.

The return of quartermaster property was handled in the same manner as that prescribed for medical property, except that the original copy of the return, together with one copy of the receipt for supplies received and one copy of the receipt for the supplies invoiced, were filed with the Quartermaster General every six months. These receipts were vouchers to the property return.

Invoices for quartermaster property received were checked against the warehouse receipt slips. If the two agreed the invoice was accomplished in the manner described above and the property return and stock record correspondingly debited. If, however, there was a wide discrepancy, authority was requested of the invoicing officer to amend the invoice accordingly. If such authority was not granted, he was requested to furnish the necessary certificates and affidavits setting forth the amounts shipped and the circumstances surrounding the same. Action was taken as contemplated by Army Regulations and existing orders. All the correspondence and papers pertaining to the property in question were filed with the retained copies of the receipts.

Since there was no accountability for engineer property, therefor no return was rendered; however, the officer in charge was responsible for the care and proper usage of any engineer supplies on hand. Hardware and trackage were practically the only engineer property handled, and this was used solely in the several operations of the depot.

Ordnance property was handled somewhat similarly. Supplies received from the Ordnance Department were invoiced and receipted for, but across the face of the invoice, two copies of which were returned to the invoicing officer,

was written "Final return rendered. No accountability under G. O. No. 44 c. s., G. H. Q., A. E. F." The commanding officer was responsible for the property received for.

Quartermaster, engineer and ordnance supplies used by the depot or the detachment also came under the jurisdiction of this department. It was responsible for the procurement, use and custody of such property.

INVOICE DEPARTMENT

To insure greater accuracy, not only in invoicing but also in shipping, the invoices for medical property were prepared in a separate department acting independently of the voucher section just described. As previously mentioned, the original copy of the warehouse issue slip was turned over to the invoice department where it was carefully checked against the original requisition and the issue order. By this means, an additional check was obtained with respect to the items shipped and any discrepancies were quickly brought to light. Upon agreement between the warehouse issue slip and the issue order, the invoice was prepared in triplicate. This invoice showed the requisition number, voucher number, date shipped, the car numbers, and O. D. T. numbers covering shipment, and the authority under which same was made. It was supplemented by a notation as to whether or not the invoice was only a part of, or completed, the requisition. In case the invoice covered but a portion of the requisition, the same requisition number was used on succeeding invoices, but different voucher numbers were given to each. It occasionally happened that one invoice covered shipments applying to two or more requisitions, but ordinarily, this occurred only in those instances where a number of due lists were filled for the same unit.

The original copy of the invoice was forwarded to the finance and accounting division of the chief surgeon's office, the duplicate to the consignee, and the triplicate copy was filed with the requisition. The supplies were invoiced the day following the shipment, whether the requisition was completed or not. Thus the consignee had his copy of the invoice to use as a check against the supplies before the latter were received. Accomplishment was effected by acknowledging receipt across the face of the invoice which was then forwarded to the finance and accounting division of the chief surgeon's office. In case the items received did not check with the invoice, the consignee could request authority of the depot to amend his invoice accordingly. Such authority was granted where investigation disclosed that the discrepancy was due to error in checking or computing. Under such conditions authority was granted in form of a letter, the original of which was forwarded to the finance and accounting division of the chief surgeon's office and the duplicate to the consignee. The former was accompanied by an adjustment voucher bearing the following information: Requisition number, voucher number, consignee (name and location of unit), item, amount invoiced, to read (showing proper items and correct amount).

The retained copy of this letter and a copy of the adjustment voucher were given to the medical property department where appropriate debit and credit

entries were made on the stock records and the property return. These papers were then filed with the return together with any correspondence on the subject.

If, on the other hand, in the opinion of the officer in charge the discrepancy occurred through no error or negligence of this depot, authority to change the invoice was not granted the consignee. The latter's recourse, in such a case, was defined by Army Regulations and existing orders.

CAR RECORD DEPARTMENT

Broadly speaking, the work of the car record department involved the maintenance and check of records of all incoming and outgoing cars, the accomplishment of *ordre de transport* and the tracing of cars. The depot was notified of incoming cars by telegraphic advices. These were followed by the yellow portion of the O. D. T. forwarded by the consignor and the red portion of the O. D. T. turned in by the local rail transport officer. The telegraphic advices, which were sent the day the car was dispatched, obviously preceded the arrival of the cars. This enabled the depot to determine at any time the number of cars en route and to plan its work accordingly.

The telegraphic advices always included the number of the O. D. T. covering the shipment. This information was placed in a permanent record known as the *ordre de transport* book and entries were made under the following captions: Date shipped, serial number (yellow portion), serial number (red portion), car initials, car number, contents, shipping point, date car received, remarks.

The date that the car was received was obtained from the receiving book, described below. If after reasonable time the cars had not arrived, a list of such cars was prepared and the necessary tracers were sent.

For each car received and unloaded a separate warehouse receipt slip was prepared in duplicate by the checker. The detailed procedure in this connection has already been described. When this slip was turned in at the office, it was passed first to the desk of the receiving clerk, who gave it a number¹ and then entered the information in the record known as the receiving book. Appropriate entries were made under the following headings: Date received, car initials, car numbers, shipping point, contents, checker, warehouse receipt slip number, warehouse.

These receipt slips were also checked against an informal record of cars received, prepared by the receiving clerk who made the rounds of the tracks twice daily. Such a record was important in that it constituted an independent check of incoming cars and enabled the receiving clerk to determine whether or not all the warehouse receipt slips for the cars received had been turned in at the office.

The *ordre de transport* was accomplished by acknowledgement thereon of receipt of the cars covered. The red portion was returned to the local R. T. O., who forwarded it to the French railway officials, and the yellow portion was sent direct to the office of the chief quartermaster, A. E. F.

¹This number followed each item contained in that particular car, through every process and record. It was entered on the stock records, medical return, quartermaster return and stock cards (if quartermaster property), on invoices covering the shipment. Obviously this was of much assistance in tracing or identifying shipments.

Cars overdue were traced by means of a form letter sent to the local car tracing office and to the car record office at headquarters, Services of Supply.

A record of outbound cars was kept in a record known as the shipping book. The information was recorded under the following headings: Date shipped, requisition number, car number, consignee, destination, contents, authority for shipment, O. D. T. number, warehouse issue-slip number, warehouse.

This information was compiled from the warehouse issue slip whose function has been explained above. The O. D. T. number was supplied by the local *ordre de transport* office where was prepared the *ordre de transport*, from information submitted by the office on a special daily report of shipments.

To facilitate reference to cars received or shipped, a record known as the car record book was devised. The last two numbers of the cars received and shipped were used as the basis of the index. The numbers were entered consecutively, together with the date received or shipped. On the left-hand side of the sheet appeared the numbers of the cars received and on the right-hand side, the numbers of the cars shipped. The book was so indexed and arranged that it was extremely simple to locate the number of the car. Once determined, by means of this book, that a car had been received or shipped, additional information could quickly be obtained by reference to the receiving book or shipping book, or to the warehouse slip itself.

FILING AND RECORD DEPARTMENT

Upon this department devolved the responsibility of handling all correspondence, records and papers not pertaining directly to requisitions and personnel. As indicated above, all papers relating to a requisition were filed with the requisition; papers pertaining to personnel were filed in the detachment office. Correspondence was filed under the Dewey decimal system in accordance with the arrangement devised by the War Department. A suitable cross reference system was maintained by means of appropriate card indexes.

OPERATIONS DIVISION

LAYOUT OF WAREHOUSES

The warehouses of this depot were located on a series of parallel tracks reserved for the exclusive service of the Medical Department. On each track were constructed three warehouses, placed end to end, with sufficient spaces between to act as firebreaks. The tracks were of such a distance apart as to afford a storage field approximately 100 feet wide in front of each warehouse. The standard warehouse was of brick or steel construction, and measured 500 feet in length by 50 feet in depth, the height at the eaves being 14 feet. Floors were of sand, and there were no unloading platforms. Communication between the various warehouses was maintained over a system of dirt roads, supplemented by a narrow-gauge track which carried small push cars.^g

^g There were in operation eight complete warehouse groups, together with issue rooms, an L. C. L. warehouse, and a group of segregated storage sheds for alcohol and other highly inflammable articles. This afforded a total warehouse floor space of 400,000 square feet and an available warehouse capacity of approximately 3,250,000 cubic feet.

This layout naturally divided the depot into a series of warehouse groups of three buildings, and upon this condition as a basis a group system of warehousing was developed. Each track was known as a warehouse group, and was apportioned certain classes of supplies which it handled exclusively. Each warehouse group had its own executive organization, and operated as an independent unit in all matters which did not affect other groups; in the latter instance, however, operations were directed by a central regulating department, the work of which is described below.



FIG. 47.—Intermediate Medical Supply Depot, No. 2, showing railroad tracks

GENERAL PLAN OF ORGANIZATION

The officer in charge of warehouses who supervised the operations division, was directly responsible to the officer in charge of the depot in all matters pertaining to the physical operations of the plant. The officer in charge of warehouses had to arrange the depot stock with regard to facility in handling as well as protection against fire, utilize to the best advantage the labor and facilities afforded him, and, above all, see that requisitions were filled and shipped without delay or mistakes. His primary duty was to coordinate the various departments of his organization. In matters requiring special technical knowledge, the officer of warehouses was instructed by a member of the advisory group.

Although, as noted above, the group system of warehousing was employed, general operations were governed by functional divisions. To accomplish such control there were maintained three departments, the receiving department, the warehousing department, and the regulating department, each of which functioned for the entire depot, and which were coordinated by the officer in charge of warehouses. Each of these departments had a clearly defined jurisdiction, and the various jurisdictions could not overlap.

Actual warehousing operations were in charge of five operating sections known as the warehouse group section, the sorting section, the field unit section, the issue section, and the L. C. L. section.



FIG. 48.—Intermediate Medical Supply Depot, No. 2, showing Decauville track and turntable, as used in all warehouses

RECEIVING DEPARTMENT

The receiving department was concerned solely with the proper checking of all incoming supplies, and was under the charge of the receiving officer.

The receiving officer was notified of all telegraphic and letter advices of shipments en route to the depot. He kept a file of all cars requiring special attention upon receipt, and issued necessary instructions when such cars arrived. He examined the work of the checkers, and had general supervision of all rechecks and adjustments in receipts.

CHECKING AND CHECKING PROBLEMS

As cars were unloaded, their contents were recorded by checkers on the standard warehouse receipt slip. Each warehouse receipt slip bore, in addition to the items checked, the car number, consignor, and any information which could aid in accomplishing invoices. Supplies from the United States usually bore the case numbers of the depot or origin, which numbers were recorded. However, a large proportion of goods received from English and European sources had practically no marks of identity. In such instances checkers were instructed to record purchase order numbers, date of shipment, ports of embarkation and debarkation, and, where available, the manufacturer's name. The receiving officer was responsible for the information as entered on these warehouse receipt slips, and he examined them carefully before they became a part of the depot records.

Very often boxes showed no identifying mark, making it impossible for the checker to record their contents at the time of unloading. In such an event, the box was checked "contents unknown," placed to one side, and marked with a large circle and car number noted, signifying that it had not been checked. These boxes were collected under the supervision, of the receiving officer, sent to issue room, opened, their contents checked and marked on the boxes, and a cross made in the circle, denoting that the box had been checked. This system aided the checker greatly, and proved to be a simple solution of an aggravating problem.

In addition to the regular stock there always was arriving a large amount of property belonging to the base hospitals, field hospitals, ambulance companies, evacuation hospitals, or simular units. Such property being packed for the most part in mixed or unmarked boxes, it could be checked by unit and box number only. If a packer's list was available, such a check was sufficient; if not, much work was entailed in opening the various cases and checking the unit item by item. The receiving officer kept informed as to whether such property was to be sent to a particular unit, held in stock as a complete unit, or unpacked and taken into the depot stock item by item. He also supervised the actual checking of this class of property.

THE WAREHOUSING DEPARTMENT

The warehousing department, directed by the warehouse supervisor, was concerned with those problems that were related to the actual storage of supplies and the employment of labor.

The warehouse supervisor kept the officer in charge of warehouses carefully informed as to available and occupied storage space, the location of supplies, and the condition of the various warehouses from a point of view of storage efficiency. He directed the manner of loading and unloading cars, determined the methods of stowing the various classes of supplies, and advised the warehousemen as to their layout. He also supervised the manner in which labor was employed, conferring with the regulating officer in regard to labor requisitions and the movement of labor details as the day's work progressed.

SECTION OF FIRE PREVENTION

The section of fire prevention was under the control of the warehousing department. This section was responsible for all matters pertaining to the prevention of fire and the checking of conflagrations. Inspectors made daily tours of the depot, notifying all concerned of any infringements of fire regulations, supervising corrective measures where found necessary, inspecting all fire fighting apparatus, and keeping the depot organization informed regarding all matters pertaining to this section. These inspectors worked in conjunction with the inspectors of the post fire department. For fire fighting, a permanent



FIG. 49—Intermediate Medical Supply Depot, No. 2, showing interior of a warehouse

organization was maintained, headed by the assistant fire marshal, who was one of the depot officers. Each motor engine was manned by a company of selected men commanded by a noncommissioned officer. Fire wells to supply the engines were located at strategic points and a system of bell alarms extended over the entire depot. A force of orderlies was immediately available in case of fire, and necessary telephonic communication was automatically established as soon as an alarm was given. The officer in charge of warehouses directed any salvage work that became necessary in the emergency. Fire drills were held frequently to familiarize every man with his duties.

Repair and carpentry work was handled by a squad of machinists and carpenters under the direction of a noncommissioned officer.

The depot guard was furnished by line troops and property could not be removed from warehouses without proper written authority.

THE DEPOT TRANSPORTATION SECTION

The depot transportation section, in charge of a noncommissioned officer, was responsible for the care and use of all motor trucks or horse-drawn vehicles assigned to the depot. Warehouse groups desiring transportation facilities made requisition upon this transportation section for such trucks and teams as were necessary, stating the approximate length of time these were to be used. A standard transportation requisition was employed. Each truck or or team was checked out and in at the transportation department on the truck register. This department also handled forage and bedding for the horses as well as gas and oil for the motors, and was responsible for the police of stables and garages, care of the horses, and the upkeep and repair of trucks and wagons. The light delivery truck proved a marked success in interwarehouse transportation, and the army escort wagon was almost indispensable. The light soil and abundant rains of central France limited the use of heavy trucks to such hauls as could be made over rock roads. Light delivery facilities were permanently assigned to the depot, while heavier trucks were requisitioned as as needed on the post transportation pool which was handled by the Motor Transport Corps.

REGULATING DEPARTMENT

The regulating department, headed by the regulating officer, was the control board for the whole operations division, and its functions were executive rather than advisory. Briefly, the regulating department planned and brought to accomplishment each day's work.

To facilitate such control, the regulating office was located centrally among the warehouses, and was connected with all parts of the depot by telephone and a system of orderlies. It was imperative that this communicating system be thorough and efficient; moreover, the whole operations division had to keep this department fully informed regarding depot conditions.

The regulating officer was responsible for the prompt and accurate filling of all requisitions and for a coordination of facilities that make possible a smooth-running and efficient organization. To attain this end, the regulating officer had to know exactly what was going on in every section of the depot. He had to know the status of each requisition and due list. And finally he constantly had to keep himself and his department in such a position as to be able to change the layout of work at a moment's notice and without causing confusion or delay.

There were two sections of the regulating department, the requisition section, which handled all requisitions, issue orders, files, and stock records, and the labor and railway transportation section which handled all matters pertaining to labor distribution, empty car orders, requests for switching, reports from the warehouse groups, together with all reports, records, and files

pertaining to car movements. Each section was under the close supervision of the regulating officer, who personally directed much of the detail of the departmental work.

The detail of the regulating department can best be presented by tracing a requisition through the various steps to its completion. The original requisition came from the main office directly to the hands of the regulating officer. Under his direction each item was marked with respect to the warehouse group or issue room from which it was to be shipped. By reference to these marks the office clerks extracted the requisition, making out an issue order for each warehouse group and issue room from which items were to be shipped. These issue orders then went to the regulating officer in triplicate.

Having a number of requisitions before him in the form of issue orders, the regulating officer first decided upon their priorities, both from the point of view of the urgency of the requisitions and of those local considerations which had a bearing upon the process of filling them. He made his decisions and laid out the next day's work each afternoon. He then turned to the labor and transportation section and informed the noncommissioned officer in charge regarding the labor details and cars required to accomplish the day's work as he had planned it. As the personnel of the depot was sufficient to supply men for directive and specialized positions only, the labor details were elastic, and were furnished day by day by the executive organization of the post. Thus the amount of work to be done determined the size of the labor details which were ordered each evening by telephone.

Empty cars for loading were distributed by the post regulating officer, who was in close touch with the needs of the units at the front and transportation conditions. Empty cars were requisitioned in duplicate upon a standard form, one copy going to the post regulating officer and the other to the local railroad yardmaster. On the basis of these car orders the post regulating officer distributed the empty cars available, and the local yardmasters placed them where ordered. In case a shortage of empty cars existed, requisitions were filled in the order of their priority, this being determined by a consideration of supply and transportation conditions throughout the theater of operations. The requisition for empty cars showed the exact position in which the cars were to be spotted, the proposed destinations, the nature of supplies to be loaded, and the priority as determined by the depot regulating officer.

At this point it will be well to describe the method of handling inbound shipments. Solid trains of materials arrived at Gievres and were turned over to the local railroad transportation officer for classification. For this purpose huge classification yards had been constructed. Here all the medical loads were placed on a certain series of tracks. At all hours of the day and night car spotters, carefully instructed by the depot regulating officer, examined the cars containing medical property and classified them as to contents and the proper location for spotting. This classification was recorded on the spotter's car sheet which showed the car initial and number, its contents, and the warehouse at which it was to be spotted. This form was made in duplicate, one copy going to the regulating officer and the other to the local yardmaster. Each car was chalked on both sides with the number of the warehouse at

which it was to be spotted, this being done for the information of the train crew. The spotter usually could learn the contents of the car from the car paster, but often he had to open the door and make a rapid survey of the contents for himself. Trains were spotted from this classification yard once during the night and usually twice during the day. The spotter's car list preceded the cars to the depot, however, and the regulating officer thus was able to plan for the unloading an hour or two in advance. The receiving officer also examined these car sheets and noted the arrival of any cars requiring his special attention.

Early each morning the regulating officer was informed of inbound loads arriving during the night, in order that he could distribute labor details to the best advantage. At the opening of the day's work, each warehouse group sent to the labor and railroad transportation section of the regulating department a track report showing the empty cars, inbound loads, and misplaced loads at each warehouse. These morning track reports were consolidated, and the morning report for the entire depot was obtained. From this information the regulating officer could determine whether or not it would be necessary to change the layout of work as planned the night before. The depot morning report was submitted as soon as possible to the post regulating officer for his information. The accurate preparation and prompt submission of these morning track reports was essential for the regulating department to adjust the machinery of the depot to take care of the requirements of the various warehouse groups and any error in stating these requirements was likely to affect the whole depot.

Knowing how many cars were available or were to be available for loading during the day, the regulating officer was in a position to send out issue orders in a quantity sufficient to utilize every car. No issue order was sent to a warehouse group for loading until the regulating officer was certain that sufficient cars were available to handle it. This prevented an accumulation of issue orders in the warehouses and enabled the regulating department to know exactly what requisitions were to be filled or partly filled during the progress of the day's work.

The original issue order was stamped with authority to issue and went to the officer in charge of the proper warehouse group or issue room. Any special instructions regarding the loading of the requisition were attached to the issue order in the form of a memorandum from the regulating officer, and the various warehouse groups and issue rooms began at once the work of issuing supplies and loading them for shipment. When supplies were issued from the warehouse group or issue room a checker prepared a standard warehouse issue slip. This issue slip showed the requisition number, consignee, destination, car number and the approximate weight of the load, and was a list of the number of boxes and total quantity loaded of each item.

There were three methods of shipping requisitions. The first method was employed when each warehouse group concerned with a requisition issued a sufficient quantity of supplies to fill one or more cars. This was the simplest case, and presented no special problem. As soon as the car was ready for shipment the warehouse issue slip was examined by the officer in charge of the issuing group and was sent to the regulating department.

The second method was employed when several warehouse groups issued supplies in quantities that individually were insufficient to fill a car, but which in total amounted to one or more carloads. In such a situation there were two alternatives: A car could be switched from track to track for piecemeal loading, or the load could be collected by the depot transportation department and assembled at a designated track for loading. The regulating officer determined which method was to be used, basing his judgment on the considerations of labor and transportation involved. Often, for example, a track was so congested that a switching of cars would upset the work of the entire warehouse group, thus making the assembly system preferable.

If a car was to be partially loaded and switched to another track for completion, the regulating officer attached to the various issue orders a memorandum stating the order of switching to be followed. Each warehouse group notified the railroad transportation section as soon as the car was ready for switching and sent to the warehouse group which was to finish the loading a warehouse issue slip showing the supplies already loaded. The issue slip thus served as an advance notice of the car number. Items loaded after a switch had been made were entered on this same warehouse issue slip, thus avoiding the resultant confusion if each warehouse group had sent to the regulating officer separate issue slips.

If, on the other hand, a requisition was to be assembled at a certain warehouse group, each issue order was marked "Assemble at —— track, warehouse ——" while the issue order to a warehouse group at which the assembly was to be made showed from which warehouse groups and issue rooms supplies were to be received for loading. The warehouse issue slips were sent to the warehouse group at which the loading was to take place and there served as a check when supplies were actually loaded. The checker who loaded the car pinned these various issue slips together and sent them to the regulating department in the usual manner. This procedure kept all the issue slips for the car together, but gave the regulating department a check on the work of each warehouse group concerned with the requisition. The car number, and the approximate weight of the load was to be entered on each issue slip by the checker who loaded the car.

The third method of shipment was employed when a requisition was of such a size as to demand less than the shipping space afforded by one car. Such shipments were known as L. C. L.^a shipments. These shipments were handled by a specialized department, one warehouse being designated the L. C. L. warehouse. Issue orders for these small requisitions bore the letters "L. C. L." in bold type, and were handled by warehouse groups exactly as were the requisitions which were assembled for loading at a particular warehouse group, except that each package, before delivery to the L. C. L. department was to be stenciled with the consignee's name and address and the requisition number.

Every shipment of two or more cars and many single-car shipments leaving the depot were convoyed to destination. This practice grew out of unnecessary delays to which cars ordinarily were subjected. Experience proved that under

^a Less-than-carload lots.—*Ed.*

convoy the chances of getting to final destination the entire shipment of cars within a reasonable time were infinitely greater than when left entirely to railroad officials. One convoy usually was placed in charge of not more than six cars. If a larger number was shipped to a single point, additional convoys were furnished. Cars destined to the advance section usually were made up in solid trains bound for adjacent points and were routed via a regulating station. Such trains were handled by the post regulating officer who furnished the necessary conveyors.

Each convoy was furnished with a list of the cars showing car numbers and contents. The consignee acknowledged on this list receipt of such cars as were delivered. Upon his return the convoy gave this list to the property officer and it was filed with the requisition. Should any cars fail to reach their destination tracers were at once instituted and every effort was made to expedite delivery.

When an issue order was sent out from the regulating office the duplicate went to the requisition section, where it was placed in a current file, and the triplicate went to the warehouse stock balance clerk, who deducted each item from the warehouse stock balance. The labor and railway transportation section kept in close touch with car movements and the entire regulating department directed all its energies toward keeping the day's work up to the schedule as planned by the regulating officer.

As soon as the car was loaded or unloaded, or a less than carload lot shipment was ready, the warehouse receipt or issue slips were sent to the regulating office. Here they were received by the car movements clerk, who entered them in a register and recorded any changes of status on the track board. This board showed for each warehouse the following information: Inbound loads due (entered from the spotter's car sheet); loaded cars spotted (entered from the track reports); outbound loads ready (entered from the warehouse issue slips); empty cars (entered from track reports and warehouse issue and receipt slips); assigned labor details (entered from verbal report of the noncommissioned officer in charge of labor distribution). There was then in the regulating office a graphic representation of the exact transportation conditions at each warehouse in the depot.

As soon as the warehouse receipt slips had been registered and transportation changes recorded on the track board they were sent to the receiving officer, who examined, corrected, and initialed them. They were then turned over to the warehouse stock balance clerk for entry, after which they were sent to the main office. Warehouse issue slips passed from the car movements clerk to the requisition section, where they were checked against duplicate copies of the issue orders, item by item, thus keeping the file of issue orders always accurate. Any mistakes in filling requisitions were brought to the attention of the regulating officer and proper adjustments were made. The warehouse issue slips then went to the main office. The requisition section thus knew the exact status of every item on a requisition and could check up discrepancies before a shipment had left the depot. This prompt check on requisitions was one of the most valuable phases of the work of the regulating department and required the attention of an alert and accurate clerical force.

As the items on a requisition were filled the various warehouse groups checked them on the issue orders. As soon as a particular issue order was completed it was sent to the requisition section of the regulating department, where it was checked against the retained copy of the issue order and then sent to the main office. This afforded within the operations division a double check on every requisition.

As the regulating department marked an original requisition for extraction there were noted certain items which could be furnished from the stock of the depot. These items were marked by drawing a circle around the amount requisitioned and were extracted as the proposed due list. After examination by the regulating officer this list was turned over to the balance due clerk. The warehouse stock balance showed the amount of each item available for issue and from it the regulating officer and the balance due clerk kept themselves informed as to depot shortages. During the progress of a requisition the balance due clerk watched the proposed due list and deducted from it any items which arrived at the depot before the requisition was completed. Such items had to be included on the issue orders of the various warehouse groups. To facilitate this part of the work of the regulating department the warehouse stock balance clerk kept a stock shortage board which consisted of a list of all stock items pasted on a wall board. Opposite each item not in stock was placed a peg. A glance at this board showed all depot shortages and a constant reference to the warehouse stock balance was avoided. When a requisition had been completed the proposed due list automatically became the requisition shortage list and went to the main office where a formal due list was prepared. After approval by the officer in charge this formal due list was returned to the balance due clerk who filed it by the organization making requisition and cross indexed it by item on the items due record. Due lists were filled on the order of the regulating officer who was kept informed regarding the due-list file by the balance due clerk.

The foregoing survey gives an idea of the complexity of the duties of the regulating department. However, this routine was a relatively unimportant part of the work of the regulating officer, for his principal function was to make adjustments, straighten out tangles, and keep the whole operating machine in harmony. For this the regulating officer was responsible to the officer in charge of warehouses. Each evening he submitted to the officer in charge of warehouses a progressive report of car movements, hour by hour, during the day. This report showed briefly and clearly the work accomplished by the depot and after examination by the officer in charge of warehouses it was sent to the post regulating officer.

THE WAREHOUSE GROUP SECTION

Each warehouse group was in charge of a commissioned officer who was entirely responsible for the management of that group. His assistant was a noncommissioned officer with general supervision, and there was a noncommissioned officer in charge of each warehouse. In addition there was a track clerk, who handled all the clerical work of the group. Each warehouse had a permanent force of warehousemen and special laborers. Each group had

a squad of experienced checkers. The administration of the warehouse group was in the hands of the warehouse officer and he was responsible to the receiving department, the warehousing department, and the regulating department for those activities with which they were respectively concerned. He inspected inbound cars, directed the order, place, and method of unloading, and inspected the warehouse receipt slips before they left the warehouse group. He directed the stacking of all supplies received and took necessary measures for their protection. Since a large amount of supplies were stored in the open, or covered with paulins only, the warehouse officer decided, with the aid of the supervisor of warehouses, just what articles could safely be stowed in this manner. As there were no floors in the warehouses, he had to see that sufficient dunnage, in the form of logs or slabs, was placed on the ground to preserve property from mold and dampness. He had to take all possible steps to minimize fire hazards. He had to utilize to the best advantage the labor assigned him. He was responsible for the prompt transfer to their proper location of supplies not carried in his stock. He supervised the filling of requisitions and examined all warehouse issue slips prepared by his checkers. The noncommissioned officer assisting the warehouse officer was responsible to him for the performance of whatever duties he was assigned. The noncommissioned officer in charge of each warehouse was responsible to the warehouse officer for all matters pertaining to the operation of his warehouse as a unit. On him rested the final responsibility for the proper storage, protection and handling of supplies, the filling of requisitions, and the efficiency of labor.

The checkers were assigned to cars by the warehouse officer through his assistant and were responsible to him directly. Being assigned to a certain car the checker's sole responsibility was to prepare through the use of the warehouse receipt and issue slips an accurate list of the items loaded or unloaded, record all shipping information concerning the car, and turn these warehouse issue and receipt slips over to the track clerk promptly upon the completion of loading or unloading.

The track clerk compared all reports submitted by the warehouse group; received, recorded, and sent to the regulating office all warehouse receipt and issue slips; acted as telephone orderly at the office of the warehouse group; prepared car pasters for each car loaded on his track; aided the warehouse officer in the issuing of orders and instructions and the obtaining of information. All papers, orders, and instructions coming to the warehouse group were received by the track clerk, and distributed in accordance with the orders of the warehouse officer.

The procedure within the warehouse group can best be shown by outlining a day's work there. At the beginning of the day the assistant to the warehouse officer inspected all cars on his track. The information which he obtained was entered on the morning track report by the track clerk, and this report, having been signed by the warehouse officer, was sent to the regulating department. Labor details were distributed as ordered by the warehouse officer, checkers were assigned to cars to be unloaded, and unloading instructions issued to the various warehouses. The work of unloading began at once. Soon, issue orders

for the day's work arrived and were distributed by the warehouse officer, labor details redistributed if necessary, and checkers assigned to empty cars to be loaded. The work of loading then began. As a car was loaded, the checker prepared a warehouse issue slip in triplicate. As soon as the loading was finished the checker placed the triplicate copy in the car, closed the door, and sent the original and duplicate of the issue slip to the track clerk. The track clerk recorded the car number, consignee, contents, and approximate weight in the track register, and after obtaining the signature of the warehouse officer, sent the issue slip to the regulating department. He then prepared two car pasters which were turned over to the car sealer, who pasted one on each side of the car. This car sealer then securely fastened and sealed all car doors and windows, removed all old markings and pasters, and chalked on each side of the car the destination. The warehouse officer then inspected the car and pronounced it ready for shipment. Loaded cars were "pulled" from the tracks during the night only, unless congestion demanded a clearing of the tracks during the day.

Each item of supply was given a definite warehouse group location, and each warehouse group had a list of items which it was authorized to store. Inbound loads were spotted with reference to this distribution list, but it frequently occurred that a certain car contained items belonging to two or more warehouse groups. Badly mixed cars were handled by the sorting section, but it frequently had to be decided whether a car should be switched from warehouse group to warehouse group, unloading supplies at the proper location only, or, on the other hand, the entire car be unloaded where it was spotted and the foreign items distributed to their proper locations by other means. This decision was made by the warehouse officer but it was subject to the revision of the regulating officer. In case such car was to be switched, the warehouse receipt slip for those items already unloaded, was sent to the warehouse group at which the unloading was to be continued. Here it acted as an advice of shipment and was used for the checking of the remainder of the car. This procedure prevented any misunderstanding on the part of the regulating department as no receipt slips arrived at the regulating office until the car was entirely unloaded. Supplies which, for the sake of saving in time of transportation, had been unloaded in the wrong warehouse, were distributed to their proper locations by truck, wagon or by the interwarehouse track system. The prompt clearance of such items was a mark of good warehousing, and was of the utmost importance to all concerned.

The warehouse group had to keep the regulating department accurately informed as to all car movements occurring during the day. To this end the track clerk sent to the railroad transportation section immediate telephonic advice of all cars arriving at or leaving the warehouse group, and in addition made a written track report four times each day. The morning track report has already been described. As much as possible of the switching of cars was done during the noon hour, hence a track report was made at 11 a. m. and another at 2 p. m. The 11 o'clock report included all requests for switching, and the 2 o'clock report showed how many of these switches had been made. The fourth track report was submitted at 5 p. m. and showed the proposed

condition of the track at the close of the day's work. It was made direct to the officer in charge of warehouses, who determined what shipments required convoys and notified the main office to make necessary arrangements for the procurement and instruction of the convoys. The report of cars loaded then was sent to the main office for the information of the car record department.

Before 4.30 p. m. each day, each warehouse group submitted a daily report of cars loaded. This report showed the car numbers, consignee, and destinations of all cars loaded during the day or to be loaded before the close of work.

In addition to these formal reports, the warehouse officer kept the receiving, warehousing, and regulating departments constantly informed concerning those matters which fell under their respective jurisdictions.

THE SORTING SECTION

The sorting section, in charge of a commissioned officer, handled all badly mixed, inbound cars. The sorting warehouse was centrally located and was connected with all warehouse groups by wagon roads and narrow-gauge track. Here cars were unloaded, and checked in the usual manner. A section of the warehouse was assigned as an assembly point for supplies belonging to each warehouse group, sorting thus being carried on according to distribution of items through the depot. The efficiency of the sorting section depended upon the rapidity with which these segregated piles of supplies were transferred to their proper locations. The officer in charge of the sorting section was responsible to the three functional departments in the same manner as were the officers in charge of the various warehouse groups; however, his work was checked carefully by the supervisor of warehouses. Due to the large number of mixed cars that arrived from the bases, the sorting section performed a very necessary function in the operation of the depot.

THE FIELD UNIT SECTION

The field unit section, in charge of a commissioned officer, handled all matters pertaining to field hospitals, evacuation hospitals, ambulance companies, regimental infirmaries, camp infirmaries, camp infirmary reserves, combat equipments and related units. Under the supervision of the receiving officer the officer in charge checked these units as they arrived, and either completed them or broke them up for depot stock. Field units were stored and handled under the direction of supervisor of warehouses and issued in accordance with instructions of the regulating department. Several complete units were kept constantly in stock for issue on emergency requisitions.

THE ISSUE SECTION

On practically all requisitions there were many items which had to be shipped in less than case lots. To meet this situation effectively, a series of issue rooms was established where a stock of each supply item was kept in such a manner as to facilitate issue in small lots. One issue room handled the reg-

ular medical and surgical stock; a second, X-ray property; a third, laboratory equipment and supplies; a fourth, veterinary articles; a fifth, dental supplies; a sixth, kitchen and dining room equipment; and a seventh, blank forms and medical books. This specialization of issue rooms, made possible a large daily output and secured efficiency of issuing and packing from a technical point of view.

The medical and surgical issue room occupied a building 400 by 50 feet. At one end of the room, and occupying approximately one-half the floor space, a maximum and minimum stock of each item in the medical and surgical group of supplies was maintained. This stock was arranged alphabetically according to the supply table. This portion of the issue room was in charge of a non-commissioned officer, who was responsible for keeping up the required stock at all times, provided the supplies were in the depot. To do this, he made requisitions on the various groups and arranged for depot transportation to transfer such supplies to his issue room.

At the other end of the issue room were the shelves, arranged in rows which extended across the building. Between these shelves and one of the side walls was a trucking aisle, and on the opposite side was a narrow aisle serving the layout tables, which extended in a single row down the room at right angles to the shelves. Between the layout tables and the front wall was a wide space used as a packing floor and trucking aisle. This packing floor was provided with all necessary packing materials, empty boxes being stacked just outside the warehouse.

The shelves were 30 inches deep and were placed 12 inches apart, being built in rows. Each row was divided into six 4-foot sections, and each section consisted of six superimposed shelves. Items were arranged in accordance with the supply table except for bulky articles which were placed on the top shelves or in bins under the layout table. The bottom shelves were reserved for surplus stocks and usually were unoccupied.

The shelves were kept full by a squad of stock clerks who drew upon the feeder supply at the other end of the room. The shelf stock had to be kept complete, and to facilitate their work the stock clerks were permitted to take supplies from the feeder stock without written requisition. The shelves were stocked from each alternate aisle, and the rear trucking aisle was reserved for the exclusive use of the stock clerks. This arrangement prohibited any interference between the issue clerks and the stock clerks, as the issue clerks filled their orders from those aisles not used by the stock clerks. Thus the stocking of the entire issue room was automatic, and any delays or failures to maintain stocks were evidences of inefficient operation.

Issue orders came from the regulating department to the officer in charge of the issue room, who examined them and planned the work of the day. He then turned them over, together with his instructions, to the noncommissioned officer in charge of the issue clerks. The issue clerks began filling the requisitions as instructed, taking the various items from the shelves and placing them on the layout table, where each article was checked and rechecked. Each issue clerk handled the items on certain sections of shelves only and was assigned a certain portion of the layout table. Hence in filling

requisitions the issue clerks could not interfere with one another, as each filled only those items which were handled in his sections of shelves. For example, to one issue clerk was given the portion of an issue order which included post medicines; to another, that portion dealing with instruments and appliances. Requisitions were extracted with this arrangement in mind, and issue orders were prepared accordingly. As soon as an issue clerk had filled his portion of the requisition or had used all the layout space assigned to him, he notified the chief packer, giving him a requisition number and the address of the consignee. The chief packer then assigned to one of his squad the work of packing the supplies. In the event that several small requisitions were laid



FIG. 50.—Medical Supply Depot, No. 2, showing issue room

out on the same table, they were blocked off from one another by movable partitions which projected 6 or 8 inches above the surface of the table. In filling large requisitions the issue clerk usually made arrangements with the chief packer whereby the supplies on one-half of his section of the layout table were being packed at the same time that he was filling the other half of the table, thus causing no delay. The chief packer gave to each box an issue room number, and marked it "Mixed box, medicines," or in some similar manner, and stenciled it with the requisition number and address of consignee.

Procedure from this point was exactly the same as that followed by the warehouse group in shipping requisitions.

Because of the large number of items on the average issue order, the issue room recorded on its warehouse issue slip only the number of mixed boxes that it shipped on the particular requisition. The issue order, properly checked, was used by both the regulating department and the main office as a record of items shipped from the issue room. This practice, while apparently irregular, affected such a saving of time and proved to be so accurate that it was considered an unqualified success.

The officer in charge of the issue room had the same responsibility as the officer in charge of a warehouse group, with certain additional details incident to the handling of unpacked supplies. For example, he kept for his own protection a record of all narcotics received and issued, making frequent inventories of the stock on hand. The issue rooms were the first points in the depot to feel a strain, and any inefficiency of operation caused congestion that was fatal to the smooth filling of requisitions.

LESS-THAN-CARLOAD-LOT SECTION

The L. C. L. section handled all shipments which were so small as to make the use of an entire car inadvisable.

The noncommissioned officer in charge of the L. C. L. section received from the regulating department a shipping advice for each L. C. L., to be shipped, showing the warehouse groups from which packages were to be received. A section of the L. C. L. warehouse was assigned to each of these requisitions, and as the various packages came in they were checked against the warehouse issue slip and stacked in their assigned places. When all warehouse groups had delivered their portions of the shipment, the total number of packages was determined and each package was given a shipping number; for example, in a shipment of 25 cases, the fifth box to be given a number would be designated box No. 25-5. As soon as the shipment was ready, the warehouse issue slips were sent to the regulating department. From the L. C. L. warehouse these shipments were sent to the post L. C. L. warehouse by truck or car and here, after recheck of the box numbers they were shipped by the railway transport officer under the direction of the post regulating officer. This pooling of all less-than-carload lots in the post enabled practically all supplies to be delivered to the French transportation companies in solid carloads, thus solving one of the most difficult of the shipping problems faced by the American Expeditionary Forces.

APPENDIX

EXCERPTS FROM THE MANUAL FOR THE MEDICAL DEPARTMENT, UNITED STATES ARMY, 1916

ARTICLE IX.—SUPPLIES AND MATERIALS

GENERAL PROVISIONS

474. The supply table enumerates the medical supplies issued to the Army and the quantities and sizes of original packages. These supplies are selected for the military service, and it is believed that all necessary articles are included and that the quantities allowed will be found sufficient under ordinary circumstances. Requests for particular preparations simply because they are agreeable to the taste or save trouble in compounding will not be approved; nor will preparations of a drug be furnished when one or more practically equivalent ones are on the supply table. The Medical Department will supply from time to time new remedies of determined therapeutic value, but newly introduced remedies which offer no manifest advantage over those already issued will not be supplied.

(a) Medical officers are requested to communicate freely to the Surgeon General any suggestions tending to the improvement of medical supplies, appliances, etc., and to make reports as to new designs of apparatus, field equipment, etc.

475. In preparing returns, requisitions, invoices, and receipts pertaining to medical and hospital supplies, the nomenclature, order of entry, classification, and weights and measures of the supply table will be followed. To facilitate the handling of these papers one line of writing only will be placed in each interlinear space. No letter of transmittal is required with them.

476. Medical officers in charge of medical supply depots will purchase and distribute medical and hospital supplies for the Army according to instructions given them from time to time by the Surgeon General. Purchases at posts or by officers not in charge of supply depots (except prescriptions purchased under the provisions of Army Regulations, and anti-toxins purchased under the authority indicated hereinafter in the supply table) will not usually be made without special authority from the Surgeon General, or, in the Philippine Department or Hawaiian Department, from the department surgeon. When the emergency is so great that there is not time to obtain special authority by mail through the regular channels, application therefor may be made direct by telegraph. When it is impracticable to telegraph, small quantities of articles immediately needed to save life or prevent suffering and distress among the sick may be purchased without advance authority. Vouchers for such unauthorized purchases will be forwarded without delay on Form 330 or Form 330a, W. D., to the department surgeon, or if from a command under the immediate supervision of the War Department to the Surgeon General, unless otherwise directed by him. They must invariably be accompanied by a letter explaining why the necessary articles were not on hand, and what the circumstances were which did not admit of requiring for them in the regular way or of making telegraphic application for authority to purchase them. Timely action in requiring for supplies will as a rule obviate the necessity of telegraphic application or of unauthorized purchases.

(a) Purchase vouchers must be accompanied by one invoice of articles purchased, Form 12, a duplicate of which should be retained by the officer accountable for the property.

REQUISITIONS

POST MEDICAL SUPPLIES

477. Annual requisitions for post medical supplies will be prepared on Form 33, for the year commencing January 1, unless some other date is designated by the Surgeon General.

(a) They will be forwarded not less than 20 days before the beginning of the year, to the department surgeon, in quadruplicate, or in the case of general hospitals and independent posts direct to the Surgeon General in triplicate.

478. Articles of which a definite allowance is given on the supply table will be required for on the annual requisition except as otherwise provided in paragraph 486. No remark will be made opposite the name of any article that a special kind or special make or pattern is wanted, as the annual requisition is intended to include only such articles as are kept on hand in supply depots for issue, and not such as have to be specially purchased; the latter when wanted must be asked for on special requisition.

(a) Only such quantities will be asked for as probably will be needed during the year, computed on the basis of original packages. Fractional parts of a bottle or package will not be asked for. The quantities asked for, plus the quantities on hand, must not exceed those specified in the table for the official population most nearly corresponding to that of the post or command. The quantity of each article on hand, as verified by a medical officer in accordance with paragraph 512*a*, will be stated and will be deducted from the quantity allowed annually by the supply table (ignoring for the purpose of this deduction fractional parts of bottles and packages on hand) to ascertain the balance which may be asked for, is needed.

(b) Before forwarding an annual requisition it will be carefully examined and compared with the supply table to see that it has been correctly made out in strict accordance with these regulations and to avoid the delay that its return for correction will occasion if they are not complied with.

479. The local prevalence or rarity of certain diseases, as well as the quantity or number on hand of each article, will be considered in the preparation and approval of annual requisitions.

480. The smaller posts will not need all the articles included in the supply table. The surgeon is not expected to inquire for an article merely because it is listed. He should call only for what there is reason to think he will need.

481. The department surgeon to whom an annual requisition is forwarded will see whether it is prepared in accordance with the above regulations. If it is, he will approve and forward one copy direct to the medical supply depot designated for his territory by the Surgeon General; if it is not, he will alter it to conform to these regulations and then forward it to the depot approved as altered. In either event he will forward the second copy of the requisition, with the action taken by him noted thereon, direct to the Surgeon General. He will retain the third copy in the files of his office and will return the fourth copy to the surgeon with his modifications, if any, noted thereon.

482. Special requisitions for post medical supplies are annual, quarterly, or emergency. They will be made on Form 35, but separately from those for field medical supplies and those for dental supplies. The same number of copies will be executed, and they will be forwarded to the department surgeon or to the Surgeon General direct, as in the case of annual requisitions from the same posts or hospitals. (See par. 477*a*.)

483. Except as otherwise provided in paragraph 486, articles not on the supply table which will be needed during the year will be called for on the annual special requisition. It will be forwarded with the regular annual requisition. The articles will be listed in alphabetical order, and the necessity for them will be fully explained in the column of "Remarks." To avoid delay in filling these requisitions a full description of special articles, instruments, and appliances required for will be given in "Remarks," together with a statement of their cost or approximate cost, as ascertained from dealers' catalogues or other reliable sources of information. When unusual drugs or chemical reagents are called for, similar information as to their cost will be furnished.

484. Except as otherwise provided in paragraph 486 and in the footnotes to the supply tables, articles on the supply table of which no allowance is stated, or which are issued "as required," will be called for on the quarterly special requisition.

(a) When supplies are exhausted or their exhaustion is imminent, a renewal thereof may be asked for on the quarterly special requisitions forwarded during the remainder of the year. These articles should be listed according to the nomenclature, classification, and alphabetical arrangement of the supply table.

(b) When quarterly special requisitions are necessary they will ordinarily be forwarded on or before January 1, April 1, July 1, and October 1, for the ensuing three months, respectively. A quarterly requisition may, however, be forwarded at any time during the quarter in which the supplies are needed.

(c) When under these regulations a quarterly special requisition would be made at the same time as an annual special it will be consolidated therewith.

485. When, as a result of the prevalence of an epidemic or for any other reason, necessary supplies are likely to be exhausted before the next quarterly special requisition is to be made, they will be called for on an emergency requisition, Form 35, forwarded at once upon the development of the deficiency, with a full explanation of the emergency and its cause. In extreme cases telegraphic application should be made direct to the Surgeon General, or in the Philippine Department or Hawaiian Department to the department surgeon, for the supplies needed to meet the emergency, which will be followed by a letter of explanation. Surgeons will be held accountable for any suffering which may result from their failure to require for supplies when it is evident the same will be needed.

(a) The frequent rendition of emergency post requisitions would usually argue a want of reasonable foresight in requiring for supplies, or a want of proper economy in the use of hospital property, and would be a reproach to medical administration. If due care in the use of hospital property is exercised, and the regulations herein made for the timely preparation of annual and quarterly requisitions are observed, it will seldom be necessary to resort to the emergency or telegraphic requisition.

486. The following special rules will be observed:

(a) Identification supplies will be asked for on quarterly special requisitions. On these requisitions no other items should appear, as identification supplies are issued from the New York supply depot only.

(b) Articles required to replace unserviceable property, whether on the supply table or not, will be required for on the quarterly special requisition. The exact number and condition of the unserviceable articles on hand will be expressly stated in "Remarks."

(c) Mineral oil, coal, gas, and electric current, for operating sterilizers, X-ray machines and other therapeutic apparatus will be obtained on request addressed to the Surgeon General, or, in the Philippine or Hawaiian Departments, to the department surgeon.

(d) Supplies for a subpost or camp will, in the absence of orders to the contrary, be required for quarterly upon the surgeon of the main post or command, who will issue them after approval by the department surgeon.

487. The department surgeon to whom a special requisition is forwarded will personally and carefully scrutinize it and make such changes therein as he may deem proper. He will indorse on each of three copies his approval or recommendation as to the action to be taken and will forward them, except as indicated in section (a) hereinafter, to the Surgeon General. He will retain the fourth copy in the files of his office. One copy of the requisition forwarded to the Surgeon General's Office will be returned to the surgeon, through the department surgeon, with modifications, if any, noted thereon. In the Philippine and Hawaiian Departments the department surgeons are authorized to act upon special requisitions as upon annual requisitions.

(a) In the case of a special requisition to meet an emergency not admitting of delay the department surgeon is authorized to approve the same, forwarding one copy, with his approval indorsed thereon, to the medical supply depot designated for his territory, forwarding a second copy to the Surgeon General with an indorsement stating the circumstances, retaining the third copy in his files, and returning the fourth copy to the surgeon with his modifications, if any, noted thereon; but requisitions for articles not on the supply table

must in all cases be forwarded to the Surgeon General for his action (except in the Philippine and Hawaiian Departments, where the department surgeons will act upon them).

488. Medical supply officers to whom approved requisitions for supplies are referred by department surgeons conformably to these regulations are authorized to issue the same from stock, if on hand, or to purchase them for issue, if not on hand, subject, however, to instructions given by the Surgeon General respecting the allotment and expenditure of public funds available for purchases.

FIELD MEDICAL SUPPLIES

(For provisions respecting requisitions from organizations in the field, see pars. 551 to 533)

489. Requisitions to replenish field medical supplies or to replace unserviceable field equipment at permanent posts will be executed in triplicate, on Form 35, and will be forwarded to the department surgeon, or, in the case of an independent post or station, direct to the Surgeon General.

(a) The department surgeon who receives a requisition in triplicate for field medical supplies in conformity with this regulation will promptly forward the same, with his recommendations indorsed on each copy, to the Surgeon General. In the Philippine and Hawaiian Departments the department surgeons are authorized to act upon them as upon requisitions for post supplies. One copy of the requisition will be returned to the surgeon with modifications, if any, noted thereon.

490. Requisitions from permanent posts for field medical supplies should be unnecessary except immediately following active military operations or as the result of changes in the supply tables.

DENTAL SUPPLIES

491. Articles of post medical supplies needed by the dental surgeon will be issued by the surgeon, as to his other assistants, from time to time in such quantities as are needed for the work at the post. The surgeon is charged with the responsibility of keeping on hand the articles indicated in the supply tables as used by dental surgeons.

492. Requisitions for other dental supplies, annual and special, will be executed in triplicate by the dentist, who will forward them through the surgeon to the department surgeon, or, in the case of independent posts or commands, to the Surgeon General. The department surgeon will promptly transmit them, with his recommendations indorsed on each copy, to the Surgeon General. In the Philippine and Hawaiian Departments the department surgeons are authorized to act upon them as upon requisitions for post supplies. One copy of the requisition will be returned to the dentist with modifications, if any, noted thereon.

493. Annual requisitions will be made on Form 36 for the year beginning January 1 (unless some other date is designated by the Surgeon General), and will be forwarded not less than 20 days before that date.

(a) Articles of which a definite allowance is fixed on the dental supply table will be required for on the annual requisition, except as otherwise provided in paragraph 491. Annual dental requisitions will be subject to the regulations in paragraph 478 governing the preparation of annual post requisitions, so far as the same are applicable.

494. Articles on the dental supply table for which no allowance is specified or which are issued "as required," will be required for on quarterly special requisitions, Form 35, except as otherwise provided in paragraph 491, for the quarters beginning January 1, April 1, July 1, and October 1.

(a) Articles not on the dental supply table, which are absolutely necessary for dental work soon in prospect, will also be called for on the quarterly special requisition, with a full explanation of their necessity.

(b) Textbooks on dental subjects will be asked for on quarterly special requisitions.

495. In emergencies, when dental instruments, appliances, or supplies not on hand, or to replace similar articles which have become unserviceable, will be needed before the next quarterly special requisition, they may be required for on an emergency special requisition, to be forwarded at once upon the development of the emergency, with a full explanation of its character and cause.

TRANSFER OF MEDICAL SUPPLIES

(See pars. 49 and 228)

496. In ordinary transfers of medical supplies the transferring officer will at once forward invoices (Forms 23, 24, 28, or 31) in duplicate one to the Surgeon General direct and one to the receiving officer. The latter will promptly upon completion of the transfer forward receipts (Forms 23, 24, 28, or 31) in duplicate, one to the Surgeon General and the other to the transferring officer. A packer's list (Form 32) will, if necessary, be furnished by the transferring officer.

(a) All supplies shipped will bear the name of the consignor as well as that of the consignee.

497. In cases in which complete transfer of medical property occurs, the receiving officer, instead of giving separate receipts, as provided in paragraph 496, will receipt for the property transferred on the final return, both original and duplicate (Form 17c), of his predecessor. The transferring officer will at once forward the original return, bearing the receipt above prescribed, to the Surgeon General. The duplicate return will be filed with the retained records of the hospital.

498. Great care should be exercised before receipting for cases of instruments, microscopes, and other property of similar character not enumerated on the property papers in detail, to ascertain that the full contents of such cases are present and in good order. Incomplete cases will be receipted for as such and a list of the missing articles will accompany the receipt, in order that the proper officer may be held accountable for the deficiency. Receipts without remark for cases of instruments and similar property will be considered as evidence that they are complete and in accordance with the lists of contents marked in the cases or as given in the supply table, and the receiving officer will be held responsible in accordance therewith.

499. The transferring officer will enter on his invoices, and the receiving officer on his receipts, the condition of all articles not serviceable.

500. Medical officers will report to the Surgeon General and to the transferring officer all defects observed in the quality, quantity, or packing of medical supplies.

ACCOUNTABILITY

501. Medical officers will take up and account for all medical property of the Army which comes into their possession. If it is property with which they have not been formally charged (as, e. g., property found at post) they will report if possible to whose account it is to be credited. (See, however, par. 504b.)

(a) Members of the Dental Corps will follow a similar course regarding dental property coming into their possession, except supplies issued under paragraph 491.

502. No medical property will be accounted for as on hand at the end of the accounting period unless the same is then in fact on hand. Medical property expended, lost, or destroyed must be dropped accordingly, and credit therefor claimed by certificate or affidavit as required by Army Regulations. If the evidence is considered satisfactory by the Surgeon General the credit will be allowed as claimed; if not satisfactory, the accountable officer will be required to refund the value of the property.

503. In invoiceing or accounting for broken packages, such as bottles, jars, etc., fractions will be given as one-fourth, one-half, three-fourths.

DISTRIBUTION OF FIELD MEDICAL SUPPLIES IN TIME OF PEACE

504. Surgeons on duty with line organizations are charged with the responsibility of keeping on hand in time of peace the field medical supplies mentioned in paragraph 632. These supplies will be so distributed that in case of mobilization the various organizations will arrive at their concentration camps completely equipped, but without medical supplies in excess of the prescribed allowances. For example: If a regiment is divided between two stations the camp infirmary may be assigned where the larger proportion of the register is stationed and the combat equipment to the station of the other units. If a regiment is

divided between three or more stations the camp infirmary may be assigned to one station, and the combat equipment to another, while the units at each of the other stations may be supplied with an extra medical and surgical chest (par. 932). The additional articles for the establishment of a regimental hospital should be kept at the same station as the camp infirmary, as they are supplementary to the latter and of little value by themselves.

(a) If the supplies thus provided for detached battalions or companies prove insufficient for the requirements of practice marches and other field exercises engaged in during peace they may be supplemented by equipment improvised from post supplies, but requisitions for field supplies in excess of these provisions should not be necessary.

(b) In order to carry out the provisions of this paragraph, surgeons of detached battalions or companies will be required to hold the supplies (except individual equipments) pertaining to the combat equipment and camp infirmary on memorandum receipt from the surgeon at regimental headquarters.

505. When the battalions or companies of an organization are stationed in different departments but belong to the same tactical division the distribution of the field medical equipment of the organization will be decided by the War Department upon the recommendation of the department commander in whose department the headquarters of the organization is stationed.

506. In the event of mobilization, organizations will take with them to the concentration camp the combat equipment and the camp infirmary only unless otherwise specifically directed by the department commander, except that the extra medical and surgical chests provided for detached battalions or companies may be taken if required for use en route. In the latter case such additional supplies will be turned in to the depot when the organization has joined its division.

RETURNS OF MEDICAL PROPERTY

507. Officers in charge of medical property will on being relieved of the same prepare a return thereof in duplicate (Forms 17, 17a, 17b, and 17c), showing all articles received, expended, sold, transferred, etc., during its period. The original of this return will be promptly transmitted to the Surgeon General. The duplicate, with a complete set of vouchers, will be filed with the retained records of the hospital.

(a) Returns of property issued for personal use, including the portable dental outfit, will be rendered at the end of each calendar year.

(b) Returns of field supplies will be made separately from returns of post supplies. (See, however, par. 504b.)

508. Returns of dental property will be made by the dental having custody thereof.

SALES

509. When medical property is sold the officer responsible therefor will pay the necessary authorized expenses of the sale, if any, out of the proceeds, taking proper vouchers for such payments, and will deposit the balance or net proceeds, without delay, and if possible on or before the last day of the month during which he receives the proceeds, with the nearest United States depository, to the credit of the Treasurer of the United States. Immediately upon making the deposit he will notify the Surgeon General by letter direct of his action, giving the date or dates of the sale and the amount of the proceeds of the articles sold on each date.

(a) Within 10 days after the end of the month during which he receives the proceeds of the sales he will render to the Surgeon General direct an account current (Form 320b or Form 320, W. D.) debiting himself thereon under the proper heading with the net proceeds of the sales and crediting himself with the amount deposited. He will insert the proper heading—that is, the designation of the proper fund to which the proceeds go (see par. 510)—in one of the blank spaces provided therefor at the top of the ruled columns. He will forward with his account an exhibit in duplicate of the articles sold, as follows:

First. In the case of a sale of condemned property at auction or on sealed proposals, if there were any expenses attending the same, the exhibit will be made out on Form 325, W. D., and

be accompanied by the vouchers for the expenses of sale; if there were no expenses, the exhibit will be made out either on Form 325 or on Form 322, W. D., as the accountable officer may prefer; in either event, the exhibit will be accompanied by a copy of or a suitable extract from the inventory and inspection report.

Second. In the case of sales of medicines to civilians under paragraphs 242 to 244 of this Manual the exhibit will be made out on Form 322*a*, W. D.

Third. In the case of other authorized sales the exhibit will be made out on Form 322, W. D.

(*b*) A duplicate of the account and a triplicate of the exhibit should be retained by the officer.

510. The proceeds of authorized sales of serviceable medical property accrue to the special fund "Replacing medical supplies" for the proper two-year period, thus: The proceeds of sales made during the fiscal year 1916 pertain to the fund "Replacing medical supplies, 1916-17"; the proceeds of sales made during the fiscal year 1917, to the fund "Replacing medical supplies, 1917-18"; and so on from year to year. The accountable officer should render his accounts accordingly, carefully noting that it is the date of sale that determines the fund to be credited and not the date of collecting the proceeds, which is immaterial in this connection; otherwise embarrassment in the adjustment of his accounts will follow.

(*a*) The proceeds of sales of condemned property accrue to "Miscellaneous receipts," and should be so designated.

DISPOSITION OF MEDICAL PROPERTY ON ABANDONMENT OF POSTS

511. Unless modified by special instructions from the Surgeon General, the following rules will be observed in the disposition of medical property upon the abandonment of a post:

(*a*) Unserviceable property will be submitted to an inspector, with a view to final disposition by sale or destruction.

(*b*) A list of all other articles will be forwarded to the department surgeon, or, in the case of an independent post, to the Surgeon General, for decision as to where they shall be sent.

(*c*) Only such nonexpendable articles as are in perfect order, including recent medical works, and instruments which can not be transferred to other posts without unnecessary duplication, should be turned in to a medical supply depot.

USE AND CARE OF MEDICAL PROPERTY

512. Officers will be held responsible for the serviceable and complete condition of all property in their possession, except such as may have been rendered unserviceable by fair wear and tear.

(*a*) The responsible officer will once each year cause all medical property in his charge to be carefully examined by a commissioned medical officer and verified by the returns, invoices, etc.

513. With the permission of the surgeon, medical officers may take books and instruments from the hospital for professional use; but no medical property of any description will be taken away from a post by an officer on being relieved or when availing himself of a leave of absence, except by authority of the Surgeon General, or within the limits of the Philippine or Hawaiian Departments by authority of the department surgeon.

514. The stock of alcohol, alcoholic liquors, opium, and the salts, derivatives, and preparations of opium or coca leaves will be kept in a locked closet in the storeroom and only issued to the dispensary in unit containers from time to time as may be necessary, upon the written order of a medical officer.

(*a*) In the storeroom, receipts and expenditures of these articles will be accounted for in the manner prescribed for the dispensary (par. 240).

515. Field supplies and equipment will not be used at posts, except when required for purposes of instruction.

516. Field chests and appliances will be frequently inspected and kept in perfect order for immediate field use.

517. The exchange of medicines with druggists is prohibited.

518. The issue of articles for use in the preparation of cleaning mixtures, cosmetics, or perfumery, or for use with spirit lamps, etc., is prohibited.

519. The responsible officer will cause all instruments in his charge to be examined by a commissioned medical officer at least once each month.

520. Steel and plated instruments may be prevented from rusting by keeping them in a 20 per cent formalin solution saturated with borax.

521. Surgical instruments and appliances that require and are considered worth repairing will be reported through the department surgeon to the Surgeon General, or in the Philippine or Hawaiian Departments to the department surgeon, with a statement of the repairs needed, giving the name of the maker of each article.

522. The responsible officer will also report to the Surgeon General, or in the Philippine or Hawaiian Departments to the department surgeon, such articles of bedding or furniture as may need and are considered worth repair or renovation. The work should be done by post labor if practicable, request being made for authority to purchase necessary material. If this is not practicable, the officer will obtain one or more estimates in detail of the cost of repair or renovation of such bedding or furniture and forward them with his report.

523. Blankets not in use should be frequently examined and properly protected. When stained but otherwise in good condition they should be continued in service. Hospital bedding will not be used by members of the Hospital Corps, except when on duty in the wards.

524. When a typewriter is to be transported the ribbon spools should be removed and packed separately, the carriage of the machine securely tied to the base in such a manner that it can not move in any direction, and the steel rods or blocks for locking the carriage placed in position. Medical officers will be held responsible for damages to typewriters which result from careless packing.

525. Rubber and flexible catheters and bougies will be kept in talc or glycerin to preserve them.

526. When the canvas in litters becomes soiled it will be removed from the litters, washed, and replaced. When it becomes torn or unserviceable new canvas of the proper size should be applied for to replace it.

THE SANITARY SERVICE IN WAR

MEDICAL SUPPLIES

551. In combat, expenditures of surgical dressings and similar articles from the equipment of troops on the line are normally replenished from the reserve supplies of the nearest ambulance company or camp infirmary. No formal requisitions, invoices, or receipts will be required.

(a) In emergencies the division surgeon may authorize the transfer of supplies between other sanitary formations. If the supplies so transferred are nonexpendable, invoices and receipts will be executed and forwarded in the usual manner.

(b) Medical Department blank forms for the use of troops not under the jurisdiction of a department commander, operating with a tactical command mobilized for field service, whether in the theater of operations or in the interior, or in time of war or of peace, will be procured by requisition, Form 37, on the chief medical officer of the command (camp surgeon, division surgeon or surgeon medical base group as the case may be), who will alter and approve the same at discretion for issue from his emergency reserve or from the proper depot. (See pars. 885 and 961). Blank forms of other staff departments will be procured as provided by the regulations of those departments or by Army Regulations.

(c) Supply depots on the line of communications obtain their supplies in the manner prescribed in paragraphs 782 to 792. (*C. M. M. D., No. 2.*)

552. With the exceptions noted in the preceding paragraph, all medical supplies for troops in the theater of operations will be required for on emergency special requisitions (Form 35). These requisitions will be made in duplicate. Those from divisional troops

will be forwarded to the division surgeon. This officer will modify them at his discretion, and if the requisition, as approved, is within the limits of the prescribed allowances for the organization making it, the original will be forwarded to the most convenient depot for issue. If the requisition as approved calls for articles in excess of the prescribed allowances, it will be forwarded to the surgeon, base group, for his action. Requisitions from sanitary formations on the line of communications will be forwarded through medical channels to the surgeon, base group, who will modify them at his discretion and forward the original to the most convenient depot for issue. In all cases the duplicate copy of the requisition will be returned to the office of origin with modifications, if any, noted thereon.

(a) In emergencies medical supplies may be issued to evacuation ambulance companies and evacuation hospitals on requisitions approved by the surgeon, advance group.

553. Sanitary formations operating in the service of the interior obtain their medical supplies as prescribed for time of peace. (See pars. 477 to 495.)

554. Medical and other supplies for the use of the sick and wounded are transported, so far as possible, by the Medical Department with its own transportation. Supplies which can not be thus transported are invoiced to the Quartermaster Corps for transportation, and their shipment is expedited as much as possible, ammunition and rations alone, as a rule, having precedence. When necessary, members of the Hospital Corps are detailed to accompany medical property.

555. The method by which supplies are forwarded from the line of communications and distributed to troops in the zone of the advance is described in Field Service Regulations: *Supply Service*.

ARTICLES XI.—THE SERVICE OF THE INTERIOR

* * * * *

MEDICAL SUPPLY DEPOTS

612. Additional medical supply depots will be established by the Surgeon General as he may deem necessary, having due regard for the sources of supply and facilities for distribution.

* * * * *

ARTICLE XIV.—THE LINE OF COMMUNICATIONS

THE BASE MEDICAL SUPPLY DEPOT

782. A medical supply depot will be establishment at the base. The officer in charge of this depot will prepare in quadruplicate a list of all supplies required showing the maximum and minimum quantities of each article which should be kept on hand in the depot, having due regard in formulating this estimate to the number of troops to be supplied, the time required by the depot to replenish supplies, the character of the military operations in prospect, etc. In stating the minimum quantity of supplies the supply officer should include at least one medical reserve unit (par. 891) for each division at the front, in addition to the supplies likely to be required by the sanitary formations on the line of communications. Three copies of the above-mentioned list will be forwarded through military channels to the commander of the military forces. When approved, one copy will be retained at the headquarters of the commander of the field forces, one copy will be sent to the Surgeon General, and one copy will be returned to the officer in charge of the depot.

(a) When the supply on hand of any article exceeds or falls below the specified maximum or minimum, the fact will be reported in writing to the commander of the line of communications and to the senior medical officer on the staff of the commander of the field forces, with appropriate explanatory remarks.

783. Stock to replace issues from these depots will be maintained without formal requisition. (See F. S. R.: *Zone of the Advance, General*.) When such replenishment is desired, single copies of the invoices on which supplies were issued, stamped "Replenishment requested," will be forwarded direct to the designated source of supply. Any articles shown on an invoice for which replenishment is not desired will be erased therefrom before the invoice is stamped and forwarded. Invoices stamped and forwarded as above described will be acted upon as if they were approved requisitions.

784. Requisitions from the depot for other than the replenishment of issues, if within the limits of the maximum and minimum table, will be forwarded in duplicate to the surgeon, base group. He will modify them at his discretion, forward one copy to the issuing depot in the home territory and return the other copy to the base depot with his modifications, if any, noted thereon.

785. Requisitions for supplies not provided for in the maximum and minimum table require the approval of the Surgeon General.

786. In emergencies the surgeon, base group, may authorize local purchases to supply the immediate needs of the depots on the line of communications.

THE ADVANCE MEDICAL SUPPLY DEPOT

787. The stock on hand at this depot will be considered a part of the available supply of the base depot, as far as the table fixing the maximum and minimum stock limits is concerned.

788. Maximum and minimum limits of stock to be maintained at this depot will be determined by the commander of the line of communications on recommendation of the surgeon, base group, to whom any variations of stock above or below the prescribed limits will be reported at once with appropriate explanatory remarks. In making his recommendations the surgeon, base group, should include in the minimum quantity of supplies to be maintained at this depot at least one medical reserve unit (par. 891).

789. Issues from the advance depot will be replenished from the base depot without formal requisition, in the manner provided under base supply depots (par 783).

790. Requisitions from the advance depot for supplies other than those required to replace issues will be forwarded in duplicate to the surgeon, base group. He will modify them at his discretion, send one copy to the base supply depot for issue and return the other copy to the writer with his modifications, if any, noted thereon.

791. The advance depot is intended as a source of supply for troops in the zone of the advance and it should not, except in emergency, be depleted by issues to evacuation hospitals, evacuation ambulance companies, and other units on the line of communications.

792. The operations of this depot will necessarily be controlled by the military situation in the zone of the advance. If the troops are occupying defensive positions with little probability of an immediate advance the depot may be established in buildings, if they are available, or under canvas; if they are advancing the depot may be maintained on barges, in box cars, or on motor trucks. In the latter case the prescribed stock of supplies may, temporarily, have to be reduced to such essentials as surgical dressings, medicines, and other articles of that class. In determining the character of the articles that may be eliminated under these circumstances much will depend upon the facility with which supplies can be obtained from the base.

SUPPLY LETTERS NOS. 1 TO 29, INCLUSIVE, MEDICAL DEPARTMENT, UNITED STATES ARMY

WAR DEPARTMENT,
OFFICE OF THE SURGEON GENERAL,
Washington, December 5, 1917.

The following instructions are supplemental to the Manual for Medical Department, and are not intended to supersede the latter. Attention is invited to paragraph 477 et seq. M. M. D., 1916, with reference to the preparation of requisitions.

W. C. GORGAS, *Surgeon General*.

[Supply Letters Nos. 1 to 23, inclusive, consolidated and revised]

1. ACCOUNTABILITY

(a) *For medical and dental property.*—A number of instances have recently occurred in which officers accountable for medical and dental supplies have left their property on changing station without transferring it to another officer. This practice has been found to result almost invariably in serious complications in the settlement of the property returns

of the accounting officer. Attention is therefore called to the urgent necessity for the transfer of all property as contemplated in paragraph 659, A. R., before the accountable officer is separated from it.

(b) *Returns of medical property.*—The attention of all medical officers is invited to the fact that a great amount of extra and seemingly unnecessary work has been caused in the examination of returns of medical property, due to the following causes:

Failure to forward promptly invoices of property issued or receipts for property received, as provided by paragraph 496, M. M. D., 1916.

Failure to properly number all vouchers pertaining to the return.

Failure to arrange articles on returns and vouchers in the same order and under the same name as shown in the Manual for the Medical Department. In this connection attention is invited to paragraph 475, M. M. D., which provides that "in preparing returns, requisitions, invoices, and receipts pertaining to medical and hospital supplies the nomenclature, order of entry, classification, and weights and measures of the supply table will be followed."

Failure of medical officers to retain accountability for litters with slings which are in the hands of company commanders, as indicated by footnote 3, page 254, M. M. D.

Failure of medical officers of militia to properly transfer to the property and disbursing officer of the respective States, or otherwise account by proper voucher for the property in possession of the organization on muster out.

Failure to show shortage in units on the slips of the return carrying such units.

Failure of officers signing receipts for medical property who are not themselves accountable officers to follow their signatures with the words, "For and in the absence of -----" (naming the accountable officer).

Failure to check over units carefully before receipting for them. Officers must realize that they will be held accountable for units as a whole when receipted for without remark. In this connection attention is invited to paragraph 498, M. M. D. Attention is also especially invited to paragraphs 502, 507, and 512, M. M. D.

Failure to give the name of the issuing officer on the brief of receipt for medical property.

Failure to leave blank on briefs of invoices the lines intended for the name and rank of the officer to whom medical property is issued. (The two lower lines for station or command should, however, be filled in by the issuing officer.)

(c) Departmental and divisional surgeons should take such steps as are necessary to enforce the requirements of the Manual for the Medical Department, 1916, relative to the care and returns of medical property.

(d) Officers making returns of medical property should in all cases state on Form 17 the name of the organization or the post to which the return pertains.

(e) Both returns of medical property and vouchers pertaining thereto should be signed with pen in a legible manner by the accountable officer. In this connection attention is invited to the provisions of paragraph 779, Army Regulations, 1913. In case of signatures which are not clearly legible, the officer's name should be typewritten in addition to the signature.

(f) The supply officer on duty with ambulance sections and with field hospital sections should be accountable for all property in those sections, whether medical, quartermaster, or ordnance. This property should be held by organization commanders on memorandum receipt.

(g) The supply officers of the respective sections should secure the necessary personnel from that assigned to duty with the headquarters of those sections.

2. ACID (PICRIC) AND BENZINE

(a) Under the rules promulgated by the Interstate Commerce Commission for the transportation of explosives and other dangerous articles, picric acid "dry" is classed as a "high explosive." When "wet" with 20 per cent water it is still so dangerous that it can only be shipped under special restrictions and at a prohibitive cost. It should not be

requested, except under the most extreme emergency, and in case it is obtainable locally authority for local purchase should be requested.

(b) Benzine, from its inflammable nature, is also dangerous, and should be procured locally if possible.

3. AMBULANCE COMPANY EQUIPMENT

The quantities noted after the following items are authorized for ambulance companies at maximum strength:

Foot powder.....	tins.....	150
Iodine swabs.....	boxes....	100
Spiritus ammonii aromaticus.....	bottles..	18

4. AMBULANCES (MOTOR)

The serial number of each ambulance should be indicated in all correspondence relative to motor ambulances, including vouchers.

(a) *Disposal of unserviceable spare parts, etc.*—During active field service, or conditions simulating thereto, the following rules will govern the disposal of unserviceable spare parts, accessories, etc., pertaining to motor vehicles of the Medical Department:

(1) Spare parts and accessories worn out in the service which have no salable value may be disposed of in such manner and under such regulations as the department surgeon or division surgeon may direct.

(2) Bolts, cap screws, cement, cotter pins, cotton waste, emery cloth, gasoline, grease, lamp cord, mats, oils, rivets, sandpaper, solder, tape, washers, and wood screws may be dropped on the certificate of the responsible officer showing in what manner they were expended.

(3) Articles which have a salable value, or which may be salvaged, and the parts used in repair of other machines will be turned in to the nearest machine shop for such use as can be made of them. The acknowledgment of the receiving officer will be accepted as relieving the responsible officer from further accountability therefor.

(4) Unserviceable tires and inner tubes will be turned into the Louisville depot.

(b) *Nonskid tires.*—As the chains with which motor ambulances are equipped can not be operated on nonskid tires successfully, only plain-tread tires are authorized and will be issued in the future.

(c) *Oil and gasoline.*—The scanning of the reports of motor ambulances (Q. M. C. Form 417) brings to light the fact that high gasoline and oil consumption, per mile, without apparent cause, is general throughout the service.

Officers responsible for motor ambulances should take steps to check any and all waste of gasoline and oil, and see that the men charged with the care and operation of those vehicles be instructed to exercise care in this respect, in order that the cost per mile may be reduced and maintained at an economic figure.

Unnecessary "idling" (i. e., running of the motor while the car stands still) is a source of gasoline waste often overlooked by men not properly trained, and ignored by the careless and indifferent.

The operation of vehicles on soft tires is not only the greatest single enemy of high tire mileage, but it also has a bad effect on the fuel bill, owing to the added resistance imposed,

An over-rich mixture, improperly adjusted brakes, and unskillful handling of the spark lever, are common causes for excessive fuel consumption, which can be remedied by careful and intelligent operation. Leaking valves, valve caps, spark plugs, and piston rings (indicated by poor compression in one or more cylinders and general lack of power) will lower the miles per gallon perceptibly, and should be attended to by a skillful mechanic without delay, as such defective operation grows rapidly and steadily worse.

Gasoline and motor oils will hereafter be purchased from the Quartermaster Corps.

Attention is invited to the following order:

Changes No. —

WAR DEPARTMENT,
Washington, November —, 1917.

Paragraph 134 $\frac{1}{4}$, 1916 Supplement to the Compilation of Orders, is changed as follows, 134 $\frac{1}{2}$. (P. 46, 1916 Supplement to the Compilation of Orders) *Motor vehicles, searchlights, and other power equipment.*—Motor vehicles, searchlights, and other power equipment furnished by the Ordnance and Medical Departments and the Engineer and Signal Corps will be repaired and maintained at the expense of the respective departments and corps; the gasoline and lubricants for them will be supplied by and at the expense of the Quartermaster Corps, except to the Medical Department. Facilities on hand in the Quartermaster Corps for repair and maintenance of vehicles may be furnished to the respective departments and corps, and gasoline and lubricants may be furnished by the Quartermaster Corps to the Medical Department, settlement therefor to be made by the usual transfer of funds (sec. 11, G. O. 51, 1916). (C. C. of O. No. —, November —, 1917.)

(463.7, A. G. O.)

By order of the Secretary of War:

TASKER H. BLISS,
General, Chief of Staff.

Official:

H. P. McCaix,
The Adjutant General.

5. ARGYROL AND PROTARGOL (SUBSTITUTES FOR)

Argyrol and protargol have become very expensive and equivalent substitutes will be issued therefor. Narvol and silver nucleinate have been examined at the Army Medical School and the Walter Reed General Hospital and have been found to be equal to argyrol in bactericidal action and effect upon the mucous membranes.

Progentum and silver proteinate have also been examined and are considered suitable substitutes for protargol in most cases of disease of the mucous membranes.

These, or other satisfactory substitutes, will therefore be used in lieu of argyrol and protargol, unless the former is especially desired for eye work, in which case it should be so stated on the requisition.

6. BIOLOGICAL PRODUCTS

(a) The following is a list of biological products furnished from the Army Medical School:

Bacterial vaccines.—Typhoid vaccine, paratyphoid A and B vaccine, triple typhoid vaccine, vaccine against strangles and the complication of influenza in horses, gonococcus vaccine,^a staphylococcus vaccine,^a staphylococcus-aene vaccine,^a streptococcus vaccine.^a

(b) *Sera, agglutinating, for diagnostic purposes.*—Typhoid, paratyphoid A, paratyphoid B, dysentery Flexner, dysentery Y, cholera, melitensis, dysentery Shiga, pneumococcus, Type I; pneumococcus, Type II; pneumococcus, Type III; meningococcus, polyvalent; meningococcus, normal; meningococcus, intermediate A; meningococcus, intermediate B; parameningococcus.

(c) The following vaccines and sera are authorized for human use: Triple typhoid vaccine (furnished as indicated above), smallpox vaccine, antianthrax serum (issued only for special cases) antimeningitis serum (in packages containing 2-15 c. c. vials), antipneumococcal serum (50 and 100 c. c. vials), antistreptococcal serum (50 and 100 c. c. vials), diphtheria antitoxin (1,000, 5,000, and 10,000 units), tetanus antitoxin (1,500, 3,000, and 5,000 units).

(d) *Miscellaneous.*—Human serum water.

The following should be obtainable from department laboratories. Now obtainable from the Army Medical School: West tubes, veal broth glucose agar, material for oil solution of dichloramine-T.

^a On account of the general opinion that any therapeutic results obtained from the use of a vaccine are due to the nonspecific protein reaction and not to any specific action of the vaccine, the use of these vaccines is not advised. Equally good results can be obtained from the use of small doses of triple typhoid vaccine.

Outfits for the Schick test are obtained from the department laboratories.

In case mice are not readily obtainable locally, they should be obtained from the department laboratories.

(b) *Biological products (veterinary).*—The following biological products (veterinary), recommended by the veterinary advisory board, are authorized for use in the Army:

(a) *Antitetanic serum* (1,500 units in vials, as required, 500 units in syringe containers).—At the National Army and National Guard camps this may be obtained on requisition to the division surgeon. For places other than camps, requisitions should be forwarded to the department surgeon.

(b) *Mallein, ophthalmic* (as required).—Hereafter all mallein required for the veterinary service of the Army will be obtained from the Bureau of Animal Industry, Department of Agriculture. Telegraphic requests should be made to this office, stating the number of animals to be tested. The purchase of any commercial preparations of this substance is disapproved.

(c) *Prophylatic vaccine for strangles and the complications of equine influenza (distemper vaccine).*—This is carried in stock at the various camp medical supply depots and should be obtained from them or the Army Medical School; requisitions to be forwarded to division or department surgeons, as the case may be, for approval and transmission to the depots.

(d) *Simultaneous anthrax serum and spore vaccine.*—To be obtained by telegraphic request to this office.

(e) *Expired biological products not returnable.*—On account of the low price at which the biological products are sold to the Government, the manufacturers do not replace time-expired products. All of these products should be destroyed when the time limit is past. Care should be taken, however, to see that large stocks are not accumulated, and vaccines and sera should be obtained frequently in small quantities in order to avoid waste.

7. COMBAT EQUIPMENT

The combat equipment must be maintained intact and every effort should be made to preserve the entire field equipment complete for actual combat. To this end additional supplies should be issued from post stocks for routine use at sick call and for the treatment of trivial cases at infirmaries. The compressed surgical dressing materials of the field supplies are very expensive and should be used only to equip pouches, belts, and chests. Articles of post supplies should be utilized wherever practicable.

8. DENTAL SUPPLIES (REPAIR OF)

The attention of dental surgeons is invited to the fact that the following articles can usually be repaired. Before submitting these articles for condemnation, therefore, they should be carefully examined and if found to be worthy of repair, authority should be requested to turn them into a medical supply depot: Handpieces, dental (S. S. White); engines, dental; lathes, dental; forceps; soldering and heating outfit; and all electrical appliances.

9. DRESSING, SURGICAL (CONSERVATION OF)

All manufacturers of the country who have the equipment to make field dressings are making every effort to supply the requirements of the Army and Navy, but unless great care is exercised by medical officers, there will be a shortage.

9. DRESSING—SURGICAL—(CONSERVATION OF)

All manufacturers of the country who have the equipment to make field dressings are making every effort to supply the requirements of the Army and Navy, but unless great care is exercised by medical officers, there will be a shortage.

The following suggestions should be considered:

(a) Never use "field" dressings, if "post" dressings are available. The latter cost much less and are easier to obtain.

(b) Substitute absorbent cotton for absorbent gauze whenever possible; the gauze looms of the country are now being worked to their full capacity.

(c) The feasibility of laundering soiled dressings should be given careful consideration.

10. DRY CELLS

The chloride of silver dry cells used in the standard electric apparatus, manufactured by the Chloride of Silver Dry Cell Manufacturing Co., have considerable sale value. The unserviceable dry cells should always be turned into the depot when new ones are received.

11. GENERAL ORDERS, BULLETINS, ETC.—WAR DEPARTMENT AND ANNUAL REPORT OF THE SURGEON GENERAL (BINDING OF)

(This relates to regular Army posts only)

The annual report of the Surgeon General will hereafter be bound every second year (two reports to be bound in one volume) and should be forwarded at the end of each two years to the medical supply depot from which the surgeon receives his medical supplies.

The general orders, circulars, and bulletins, War Department, will be bound yearly, as heretofore, and should be forwarded by mail to the medical supply depot for that purpose as soon as the indices are furnished by the War Department. Especial care should be taken to see that the files of general orders are complete, including title page and index.

Medical supply officers are authorized to obtain estimates in the usual manner for the accomplishment of this work, the binding to be uniform with previous volumes.

Upon the completion of the binding, the volumes should be returned to the stations from which they were received, where they will be taken up on the next return of medical property.

When post surgeons forward these publications to the supply depot for binding, they should notify the department surgeons in order that the latter may be fully informed regarding the progress of the work. Medical officers stationed at independent places should notify this office when action has been taken as above indicated.

This supply letter should not be construed as authority for the binding of annual reports, general orders, etc., for the library of any independent station for which such binding has not heretofore been done.

12. HAND-AX CARRIERS

When making requisition to the Ordnance Department for hand axes, hand-ax carriers should also be requested. They are not supplied by the Medical Department.

13. HEROINI HYDROCHLORIDUM

No additional purchases will be made, and after the present stock is exhausted this product will be dropped from the supply table.

14. ICHTHYOL

Ichthyol is practically unobtainable. Ichthyogen, ichthytar or other substitutes will be supplied instead. Requisitions should call for ichthyol or equivalent.

15. INSECTICIDE

Sodium fluoride for roaches.—This salt has been found to be most effective. It should be freely sprinkled in a finely divided form in those places where the insects are most prevalent. It may be asked for in 5-pound quantities on special requisitions. The salt is practically without poisonous quality to the human subject unless large quantities of it are consumed.

16. INSTRUMENTS (CARE OF)

(a) It has been determined by prolonged study at the medical supply depot in Manila that a most satisfactory method for keeping instruments under conditions where rust is apt to interfere with the preservation of steel material has been found in a solution of 20 per cent formalin, saturated with borax. The immersion of the instruments in this solution

has resulted most efficiently in the prevention of rust; and its use is recommended to medical officers, under conditions where the rust factor is encountered, for surgical instruments of all kinds.

A repair shop at the New York depot makes it possible to do ordinary repairs to surgical instruments at that place and at diminished cost. Instruments should habitually be sent by mail upon authority of this office.

(b) *Instruments (conservation of).*—There is a serious shortage of all kinds of surgical instruments, and although the manufacturers are making every effort, it will be many months before the requirements of the Army can be met. The situation as regards surgical needles is even worse. Practically no needles are made in this country, and their importation from England has been curtailed by the British Government. Arrangements have been made for producing them in this country, and it is hoped that within a few months the demand can be supplied.

In view of the conditions outlined above, all officers of the Medical Department will institute measures to conserve the present supply of surgical instruments, and thereby prevent the occurrence of a shortage otherwise inevitable.

17. INVOICES

(a) *Invoices and receipts for articles turned into depots for repairs.*—These are not required, and a list showing the articles forwarded will be adequate in lieu of invoices and receipts. If for any reason the supply officer is unable to return the articles after repair, he will communicate the fact, and the question of invoices and receipts can then be taken up.

(b) *Discrepancy between invoice and quantity of supplies received.*—In all cases where the quantity or quality of items received from a medical supply depot differs from the invoice covering such shipments (either overdelivery or shortage), or whenever supplies are received without invoice, the medical supply officer making the shipments should immediately be informed regarding the discrepancy, in order that the matter may be promptly and satisfactorily adjusted.

18. MEDICAL PROPERTY, UNSERVICEABLE (DISPOSITION OF)

Under the provisions of A. R. 907, as amended by Changes A. R. No. 61, W. D., September 24, 1917, the following-named medical supply depots are designated to receive such unserviceable medical property as is worth the transportation charges and which can be advantageously disposed of either by sale or by being broken up into parts and used in the repair or manufacture of other articles:

Medical supply depot, 1210 Arch Street, Philadelphia, Pa.: From all posts, camps, and stations in the Eastern and Northeastern Departments.

Medical supply depot, Stewart Avenue and Glenn Street, Atlanta, Ga.: From all posts, camps, and stations in the Southeastern Department (excepting those in the States of Arkansas, Louisiana, and Mississippi) and the coast defenses of Galveston, Tex.

Medical supply depot, 500-512 North Fourth Street, St. Louis, Mo.: From all posts, camps, and stations in the States of Arkansas, Louisiana, Mississippi, Missouri, Kansas, Colorado, and Oklahoma.

Medical supply depot, 3930 Federal Street, Chicago, Ill.: From all posts, camps, and stations in the Central Department excepting those in the States of Colorado, Kansas, and Missouri.

Medical supply depot, 309 North Medina Street, San Antonio, Tex.: From all posts, camps, and stations in the Southern Department, excepting those in the State of Oklahoma.

Medical supply depot, Bay Street, Harbor Warehouse No. 3, San Francisco, Calif.: From all posts, camps, and stations in the Western Department.

It is noted from many reports of survey and inspection reports that medical property is being quite extensively destroyed. It is desired that such property, any part of which can be utilized in the manufacture of other articles or supplies, be turned into a depot. The article may have no salable value at a particular post, camp, or station and yet a

material part of it may be of value in the manufacture of other articles or in the repair of articles of like character.

There will be established at several places in the United States hospitals for the training of disabled soldiers which will probably be known as "curative shops," in which damaged and unserviceable articles can be reworked or repaired, or other articles made out of the material. It is intended to send to such hospitals for use in various ways, in the training of such disabled soldiers, and to prevent the total loss of more or less serviceable material.

19. MEDICAL SUPPLIES (CONSERVATION OF)

The attention of officers of the Medical Department (medical, dental and veterinary) is invited to the fact that there is at present a shortage of medicines and dressings in the United States, and that it is probable that this condition will continue indefinitely.

All officers are therefore enjoined to make every effort to eliminate waste of supplies of every kind, and especially of those belonging to classes mentioned in paragraph No. 1.

As regards the conservation of medicines, the following rules should be observed:

(a) Medicine should be prescribed only when there is a clear indication for its use. Soldiers very seldom require placebos; cheap ones should be used if placebos are required at all.

(b) Medicines should not be prescribed in large quantities. For example, a 4-ounce mixture should not be ordered if a 2-ounce will do, or a dozen tablets given if less than that number will meet the requirements of the patient. The quantity prescribed should not exceed the number of doses the officer writing the prescription expects the patient to take in the following 48 hours.

(c) It is advisable to administer medicines in hospitals or dispensaries under supervision whenever possible.

(d) Particular care should be taken to avoid the unnecessary administration of cocaine, quinine, and all preparations containing morphine or opium. The stocks of quinine and opium are very small at present and every effort should be made to conserve the supply of these important drugs.

20 NEEDLES (HYPODERMIC)

Great care should be taken to specify the particular syringe for which hypodermic needles are required. This specification will avoid delay necessitated by having to ascertain the type of syringe for which the needles are desired. Hypodermic needles are scarce and difficult to obtain. They should be made to last as long as possible.

21. PENCILS (HAIR)

On account of the war, this item is now unobtainable in the United States. Substitutes should be improvised by the surgeons.

22. PETROLATUM LIQUIDUM AND RUSSIAN OIL

The standard liquid petrolatum of the supply table is a pure refined product and will answer all purposes indicated by the heavy Russian oil. It has been used for internal administration, satisfactorily both at the Walter Reed General Hospital and attending surgeon's office, Washington, D. C.

23. POTASSIUM PERMANGANATE

This item is at present practically unobtainable, and will no longer be supplied. Terminal disinfection is seldom necessary, and other material must be substituted. This office concurs in the following statement:

Terminal disinfection is apparently of little value, especially if proper care has been exercised during the course of disease.—Manual for Health Officers, by J. S. MacNutt, lecturer of Public Health Service in the Massachusetts Institute of Technology.

24. PUBLIC FUNDS (AUTHORIZATION FOR EXPENDITURE OF)

(a) When permission is given to a surgeon for the purchase or repair of Government property, the amount involved is charged against the quarterly allotment in this office. The purchase should be made and vouchers in payment submitted to this office for approval, within 30 days after receipt of the authority. If purchase be delayed for any cause beyond this period the surgeon should report the fact and state when the purchase will be completed. In any event, a report should be made showing how much of the authorized amount has been actually expended.

(b) *Bulletin No. 37, W. D., December, 1915.*—The attention of all medical officers who make deposits of money to the credit of the Treasurer of the United States is invited to the stringent requirements of Bulletin No. 37, W. D., December, 1915, and the notation to be made on the efficiency reports of those who fail to comply therewith.

25. REQUISITIONS

(a) All requests for supplies from organizations in or attached to divisional camps should be made to the medical supply officer of the camp through the division or camp surgeon. If a supply be not in stock, the several requisitions should be consolidated by the medical supply officer and included in his monthly request for replenishment of supplies for his depot. These monthly requisitions should be forwarded to the Surgeon General's Office for action, except in cases of emergency, when application may be made by telegraph or small quantities of supplies procured locally to save life or prevent suffering, as provided in paragraph 476, Manual for the Medical Department.

All medical supplies will be invoiced to the medical supply officer of the camp who will be responsible for their proper distribution to the troops or personnel of the command for which intended.

(b) Field medicines will be used at the camps instead of post medicines.

(c) Scales, weights, and other paraphernalia for dispensing medicines will not be supplied to camps.

(d) During the period of the present emergency no instruments or appliances should be requested on requisitions which are not included in the List of Staple Medical and Surgical Supplies, part I.

(e) *Field special requisitions.*—It is necessary that a separation be made of requests for post medical supplies, and those for field supplies, because of the difference in stock carried by depots.

All articles listed as post supplies and additional articles of that classification are properly placed on requisition for post medical supplies. Following the same plan, all articles of field supply should appear on a field requisition. The two requisitions should be rendered at the same time to cover the supplies necessary for the period. Veterinary supplies and dental supplies should also be requested on separate requisitions.

(f) *Supplies on hand.*—Not infrequently a special operating table, cabinet for dressings and instruments, or other special apparatus is requested on a special requisition, and the request is accompanied by the showing "On hand—O," whereas the returns in this office show that other similar articles are on hand at the hospital. The statement "On hand—O" should hereafter be qualified with a further statement in the column of "Remarks," showing the number and make of equivalent articles which may be on hand at the hospital, when this is the fact.

It is directed that amounts indicated in the "On hand" column shall include the amount of each item due on approved pending requisitions, in addition to the quantities actually on hand.

(g) *Initial equipment and replenishments.*—All requisitions for initial equipment and for replenishments for National Guard and National Army camps should be forwarded direct to this office for approval. The requisitions, except in emergency, will not be forwarded more frequently than once a month. Emergency requisitions may be forwarded at any time, but a full statement of the necessity must be entered under the column of "Remarks."

(h) *Annual requisitions to be discontinued.*—Annual requisitions will be discontinued during the period of the war. All requisitions for medical, dental, veterinary, and automobile supplies will be prepared on Form No. 35, Medical Department.

It is not intended, nor is it desirable, to request all the items on the several supply tables. The officer who prepares the requisition should request only those articles which he habitually prescribes and uses. Surgeons are cautioned to exercise every possible economy. As previously indicated in this supply letter, an unlimited quantity of medical supplies can not be obtained, and if our troops abroad are to have an adequate supply, those at home must economize.

26. RUBBER GOODS (UNSERVICEABLE)

All unserviceable rubber goods, including gloves, rubber sheeting, hot-water bottles, fountain syringes, etc., should be turned into the nearest medical supply depot (excepting Washington and New York) by parcel post.

27. SERA (DIAGNOSTIC)

Diagnostic sera (agglutinating) should be obtained from the Army Medical School on request sent direct to the commandant of that institution. (See par. 6b.)

28. SILK (OILED)

The purchase of oiled silk is to be discontinued owing to the scarcity and prohibitive price of this article. Oiled paper will be purchased and issued in lieu of the above.

29. SLIDES (GLASS)

These are imported and at present very difficult to obtain. Great economy should be exercised in their use.

30. SPARK PLUGS

Attempt should not be made to repair spark plugs locally. It has been frequently noticed that more damage has been done by ineffectual attempts at repair than through fair wear and tear. Generally a spark plug that has not been tampered with requires only thorough cleaning and renewal of insulating wax about the center electrode. Authority should be requested to turn defective spark plugs into a supply depot for repair.

31. SPHYGMOMANOMETER

Instructions should always be given the users of all types of aneroid instruments that they will not stand rough usage, and steps should be taken to keep the manometer out of the hands of inexperienced attendants, who frequently through curiosity try them out with the usual disastrous results.

32. SYRINGES

Until further notice, the Luer type syringes will be issued in the following sizes: 2-c. e., 10-c. e., and 30-c. e.

33. TANKS (SOAPSTONE, DEVELOPING)

The tank, developing, soapstone, is a large and expensive tank and will no longer be issued. Only porcelain tanks will hereafter be issued.

34. TURPENTINE

It is evident that at some post the refined medicinal turpentine issued in bottles has been used for the making of floor polish. In view of the fact that this bottled turpentine is exclusively for medicinal use and costs very much more than the commercial turpentine in cans, it should never be used as an ingredient of floor polish.

35. TIN CONTAINERS

The attention of all medical officers is invited to the present shortage of tin. It has become increasingly difficult to obtain an adequate supply of tin containers for field supplies, and it is directed, therefore, that all serviceable empty tin containers be returned to the nearest supply depot by parcel post or mail.

Upon receipt of these empty tins the medical supply officers will have them refilled and reissued upon approved requisition.

36. TYPEWRITING MACHINES (PACKING)

(a) These machines are sometimes received at depots packed in such way as to provoke the comment of a supply officer that "the damage sustained in transit was such as to render it impossible to repair the machine." Every care should be given this matter with a view to securely fastening the carriage in place. Ribbon spools should be removed and wrapped separately. The machine should be securely fastened to the bottom of the box in which it is packed, using bolts or hinges for the purpose.

(b) *Free repair to typewriters.*—The Royal typewriters are purchased by the Medical Department under the following guaranty:

Each typewriter is guaranteed to be a perfect working machine, and any broken or defective parts not due to misuse, accident, or neglect will be replaced free of charge at any time within two years from date of delivery.

It has been observed that numerous requests for repairs to typewriters have been received in this office just after the two-year period has elapsed, in which cases it has been necessary to have the repairs made at the expense of the Government. It is directed that hereafter all new typewriter machines (Royal) be thoroughly gone over after they have been in use about 18 months, and that a request for such repairs as are necessary be forwarded to this office in time to obtain the benefit of the two-year clause mentioned above.

37. VETERINARY MEDICINES (CONSERVATION OF)

With the increase of knowledge it has become clear that the majority of drugs have no economic value as therapeutic agents; in other words, they do not favorably influence the course of disease to an appreciable extent.

In private practice drugs for veterinary use continue to be valuable in so far as they impart to preparations in public demand certain features, such as odor or appearance.

The use of many nonessential drugs has become a habit; it therefore behooves veterinary officers prescribing drugs at public cost, for public animals, to revise their therapeutics and use only such drugs as are known to be valuable in an economic sense. The number of the latter is small. In making requisition for drugs for veterinary use the minimum, rather than the maximum, requirements should be estimated.

The value of a drug is to a great extent dependent upon its freshness, and the medical supply depots are not so inaccessible as to justify veterinary officers in stocking dispensaries as one would provide against a siege.

It should be borne in mind that the temporary nature of everything military in time of war renders the holding of large stocks of drugs injudicious and unnecessary.

It is well known to experienced members of the veterinary profession that it is the inefficient practitioner who makes great show and use of drugs.

Pressure is frequently brought to bear by laymen upon veterinarians of the service to prescribe powders of various kinds for what is known as "conditioning" purposes.

This practice should be discontinued as, in the absence of organic disease, any defect in condition may as a rule be remedied by intelligent attention to stable management with special attention to watering and feeding. If these are neglected, medicinal agents will not make good the neglect. Even at the present time the superstitious devotion to drugging of horses and mules amounts with many people to a fetish. It is for veterinary officers to bring contemporary knowledge up to date, and absolutely refuse to prescribe needless drugs at the request of those ignorant of such matters.

The greatly increased cost of drugs, the large doses that are appropriate for horses as compared with human beings, the enormous increase in public animals, are all factors that contribute to the importance of putting into economical practice modern knowledge as to the inefficiency for veterinary therapeutic purposes of the majority of drugs habitually prescribed.

There has been issued a standard supply table for use of the Veterinary Corps. After due deliberation and consultation it is believed the drugs listed therein are ample for veterinary practice.

The ability of a practitioner may be judged from his deviation from this supply table and the state of his mortality and incurable list.

38. WEB BELTS

Belts, web, medical officers' (par. S64), and belts, web, enlisted men's, Medical Department (par. S65), are now the property of the Medical Department.

Belts, web, medical officers' (par. S64), will hereafter be issued to officers on memorandum receipt. One copy of receipt will be forwarded to the Surgeon General's Office, by receiving officer; the accountable officer will forward one with his return of medical property as authority to drop same, retaining a copy for his file. When a medical officer is separated from the service the web belt in his possession will be turned in to the nearest accountable medical supply officer, who will give receipt for same, one copy to be forwarded to the Surgeon General's Office and one retained. The property will be taken up on his return.

An officer will not be relieved from responsibility for belts in his possession for which he has given a memorandum receipt until he has returned the property to a proper accountable officer.

Belts, web, enlisted men, Medical Department (par. S65), will be charged on Form 637, A. G. O. The accountable officer will prepare invoices in duplicate on Form 28 MD. The receiving officer will certify thereon that the belts were received and charged on Form 637, giving names of enlisted men. The duplicate receipt will constitute the voucher on which the accountable officer will drop from his returns the articles enumerated. When an enlisted man is separated from the service, the responsible officer will prepare Form 28 in duplicate, listing thereon the medical property in soldier's possession, and turn same over to an officer accountable for medical property, who will take the property up on his return.

All belts now in possession of officers and enlisted men held by company or detachment commanders on memorandum receipts will be dropped by the accountable officers after the officer who signed the receipts complies with these instructions.

39. X-RAY

(a) *Films*.—It is advised that 5 by 7 inch films be used for the hands and feet.

(b) *Plates*.—Referring to paragraph S48, M. M. D., X-ray plates 11 by 14 inches will no longer be issued. The Roentgenologist of the Army Medical School informed this office that three sizes of X-ray plates are sufficient for all purposes, viz, 8 by 10 inches, 10 by 12 inches and 14 by 17 inches. After the present supply of 11 by 14 inch X-ray plates is exhausted this size will not be furnished upon requisitions unless specifically emphasized, and approved by this office.

(c) *Tubes*.—The metal parts of X-ray tubes are costly, and as long as they are in good condition the tubes can be repaired by simply building the glass around the metal. Any punctured tube can be reblown. Authority should, therefore, be requested to turn into a medical supply depot all punctured X-ray tubes. Metal parts that are in good condition, unless they are of the old type with platinum target, should also be turned in to the supply depot.

* * * * *

FIELD EQUIPMENT

(See Notes)

Litters, combat equipment (pars. 866 and 867, M. M. D.) and camp infirmary equipment (pars. 869 and 870, M. M. D.) will be issued as indicated below. The allowance of litters is one for every 50 men, or major fraction thereof, of the authorized strength of the organizations. It includes those issued to companies and those forming a part of the units mentioned herein, all being usually carried on the combat wagons of other transportation of the organizations.

Organization	Litters	Combat equipment	Camp infirmary
Division headquarters and headquarters troop.....	See note 1.	See note 1.	
Infantry regiment..... number.....			1
Headquarters company..... do.....	6		
Supply company..... do.....	3		
Machine-gun company..... do.....	4		
Battalion..... do.....	20	1	
Infantry machine-gun battalion (3 companies)..... do.....	12	1	
Infantry machine-gun battalion (4 companies)..... do.....	16	1	
Artillery regiment, light (2 battalions)..... do.....			1
Headquarters company..... do.....	4		
Supply company..... do.....	2		
Battalion..... do.....	12	1	
Artillery regiment, heavy (3 battalions)..... do.....			1
Headquarters company..... do.....	5		
Supply company..... do.....	3		
Battalion..... do.....	9	1	
Trench mortar battery..... do.....	4		
Engineer regiment..... do.....			1
Headquarters..... do.....	2		
Battalion..... do.....	16	1	
Signal battalion..... do.....	9	1	
Train headquarters and military police..... do.....	7		
Ambulance company (par. 874, M. M. D.)..... do.....	* 100		
Field hospital company (par. 879, M. M. D.)..... do.....	50		
Total for division.....	1,081	25	8

* Forty-eight of these on ambulances.

NOTE 1.—Division headquarters, telegraph companies, balloon aero squadrons, companies, etc., should be equipped with the following medical supplies in lieu of the regular combat equipment:

Ax, short handle..... number.....	1	Desk, field, no. 2 (par. 941, M. M. D.)..... number.....	1
Bucket, g. i..... do.....	1	Lantern, folding..... do.....	1
Candles, each, sixes..... pounds.....	1	Litter with sling..... do.....	1
Chest, medical and surgical (par. 932, M. M. D.)..... do.....	1	Box surgical dressings (par. 955, M. M. D.)..... do.....	1
..... number.....	1	Wire cutter..... do.....	1

NOTE 2.—Expendable articles pertaining to the combat equipment and to the camp infirmary should not be used while the troops are at the mobilization and concentration camps. Nonexpendable articles may be used when necessary.

NOTE 3.—Packsaddles will not be issued for use overseas; medical carts will be used instead.

SUPPLY LETTER NO. 24.

MARCH 11, 1918.

SIR: Attention is invited to the following, and strict compliance with the instructions and suggestions contained therein is directed:

BIOLOGICAL PRODUCTS—TYPHOID VACCINE, ETC.

The commandant of the Army Medical School invites the attention of this office to the great waste of triple typhoid vaccine. This material cost the Medical Department at least \$50 per liter, not including overhead charges; i. e., pay of officers and enlisted men engaged in its manufacture, packing and shipping, and expressage. Many medical officers do not seem to appreciate the money value of this vaccine, and the Army Medical School constantly receives requisitions calling for amounts greatly in excess of actual requirements. A great number of medical officers allow the time limit to expire, and even return the vaccine to the Army Medical School, at great expense, by express, after it has become worthless and should be destroyed.

The Army Medical School has shipped to the various camps since the draft enough vaccine to vaccinate the present Army from two to three times.

In view of the large quantities of vaccine which are being allowed to pass the time limit in the supply depots, it is evident that the instructions in Circular No. 16, S. G. O., March 20, 1916, indicated below, are not being followed:

When for any reason a larger stock is on hand than appears to be needed, directions as to its disposition will be obtained from the commandant, Army Medical School, upon application to him direct, stating date of receipt of the vaccine.

As time-expired vaccine is being returned to the Army Medical School, attention is also invited to the following quotation from Circular No. 16:

Stock over four months old will be destroyed when a new supply has been received.

In view of the above, all biological products will in the future be invoiced, receipted, and accounted for, the same as other medical supplies. Medical officers are cautioned to exercise the greatest economy in the use of this material. They should not ask for quantities in excess of their needs within the time limit. In case an emergency arises requiring more of this material, an additional supply may be obtained on telegraphic request.

Medical officers who have on hand a greater quantity of triple typhoid vaccine than is required for immediate use should notify the commandant of the Army Medical School 30 days prior to the expiration date, so that it can be shipped to some other point where it may be needed and its loss be avoided.

Any biological supplies which have become worthless on account of deterioration should be placed before a surveying officer for his action in order to determine the responsibility for the loss resulting from failure to comply with these instructions.

LYE AND OTHER CLEANING MATERIAL

While this office approves the use of lye in proper quantities for the cleaning of hospital floors, corridors, etc., the tendency everywhere to use an excessive quantity of this product is noted. It is believed that a more satisfactory method of determining the quantity to be used could be devised than to pour the lye from the can into a pail. It is suggested that a can of lye be dissolved in a sufficient quantity of water and that the minimum quantity of this solution per pail of water to obtain the results desired should be determined experimentally. The lye solution should then be made up in bulk and instructions issued those concerned with the cleaning as to exactly how much of the solution to put in each pail of water.

The same plan should also be applied to the soap used for cleaning purposes.

This office does not intend to limit the quantity of supplies rightfully used, but it must call upon division surgeons and all others having control of the expenditure of these supplies to see that there is no waste. Waste does not necessarily mean the throwing out of unused materials, but applies equally well to the using of larger quantities to obtain results than are really needed.

ELECTRICAL APPARATUS

Owing to the fact that requisitions for electrical apparatus for use with the electrical current available at the hospital frequently fail to specify the kind of current on which the apparatus is to be used, or give incomplete data, much unnecessary correspondence is required, thereby causing delay in filling the requisitions. In the future all requests for electrical apparatus for use on the current available at the hospital will specify the type of current (a. c. or d. e.), voltage, cycle, and phase.

MEDICAL PROPERTY, UNSERVICEABLE, DISPOSITION OF

Referring to section 18 of "Consolidated Supply Letters, Nos. 1 to 23, inclusive," all property to be turned in to regular medical supply depots, except as provided under section 17 (a), should be regularly invoiced and receipted for.

In view of the establishment of a reclamation division of the Quartermaster Corps, at the various posts, camps, cantonments, and other units of the army, the following directions should apply:

All articles of unserviceable property pertaining to the mobile army heretofore "destroyed," "broken up," or "sold" on inventory and inspection reports, or "destroyed" on survey reports, except animals, and that which must be disposed of at once for sanitary reasons, will be turned over on inventory and inspection reports and survey reports under paragraph 717, Army Regulations, to the reclamation officer. The inventory and inspection reports will show the property in a column "To be turned in for salvage," and will, upon completion by the inspector, without approval, be a valid voucher for the accountable officer to drop it from his return. Unserviceable expendable articles will not be destroyed but will be turned over, with a list of the same, by the responsible officers to the reclamation officer,

and in view of the establishment of these reclamation units, section 18 of the Consolidated Supply Letters is accordingly modified.

Nothing in the provisions of the above paragraph should, however, be construed to invalidate the provisions of paragraph 1488, Army Regulations, 1913.

ACCOUNTABILITY (RETURNS OF MEDICAL PROPERTY)

Referring to section 1 (b) of "Consolidated Supply Letters, Nos. 1 to 23, inclusive," attention is invited to the following:

Much additional time is required in handling vouchers on account of the signature of the officer being illegible. The name of the officer signing the paper should in all cases be typewritten under his signature, or in the brief of the voucher, unless the signature is clearly legible. In this connection attention is called to the provisions of paragraph 779, Army Regulations.

Invoices and receipts should both be promptly forwarded, as required by paragraph 496, Manual for the Medical Department, 1916, and the articles mentioned in such vouchers and also in the returns of medical property should be listed in the same order, and under the same name, as shown in the supply table of the Manual for the Medical Department, as required by paragraph 475.

The name of the issuing officer should in all cases be given on the brief of the receipts for medical property, in order that there may be no uncertainty in this office to whom credit for the transfer should be given.

Articles must be entered upon all requisitions, invoices, and receipts, also upon property returns, in the following order:

1. All articles of regular issue in accordance with the arrangements of the supply table;
2. Additional articles as follows:
 - (a) Drugs, medicines, and antiseptics.
 - (b) Stationery.
 - (c) Miscellaneous hospital supplies.
 - (d) Surgical instruments and appliances.
 - (e) Laboratory supplies (including chemicals).
 - (f) X-ray supplies.

If this procedure is followed, the time required in checking requisitions, vouchers, and the returns will be materially reduced and the procedure simplified. It is therefore enjoined upon all officers to see that these instructions are strictly followed.

Officers who are accountable for post, field, dental, and veterinary supplies should keep each in a separate section of the property return, but vouchers pertaining thereto should be numbered in one series.

INVOICES (DISCREPANCIES BETWEEN INVOICE AND QUANTITY OF SUPPLIES RECEIVED)

The following additional instructions are issued in connection with section 17*b* of Consolidated Supply Letters, Nos. 1 to 23, inclusive:

Numerous cases have occurred in which officers on receipt of property, part of which is missing, have altered the receipt by striking out the articles not received.

This procedure is not contemplated by Army Regulations, and it entails unnecessary correspondence on the part of both this office and the issuing depot.

The proper procedure in such cases, where property is not received within a reasonable time, is to call for the action of a surveying officer. Testimony from the issuing officer should in all cases be called for and taken into consideration before conclusions are reached by the surveying officer. In this connection attention is called to the provisions of law that when a transportation company accepts property for transportation it becomes responsible for its safe delivery and is not to be relieved of such responsibility on account of faulty packing.

Unless the issuing officer is found to be responsible for the shortage, the receiving officer should receipt in full for the property issued and use the report of survey as a voucher for dropping the missing articles from his return of medical property, and the value of the lost or damaged property should be charged to the transportation company.

In this connection see paragraphs 66S, 712, and 721, Army Regulations.

PENCILS, HAIR, AND POTASSIUM PERMANGANATE

Notwithstanding sections 21 and 23 of Consolidated Supply Letters, Nos. 1 to 23, inclusive, reports are constantly received at the various depots that hair pencils and potassium permanganate have not been furnished upon approval requisitions or that they are missing from chests, etc.

Although requisitions may be approved and sent to the depots for issue which may include these articles, they will for the present not be furnished.

When found short in the various chests, etc., issued, this shortage should not be reported to the issuing officer.

SUPPLY LETTER NO. 25

MAY 7, 1918.

CONSERVATION IN THE USE OF ENVELOPES

The Post Office Department has advised that it is experiencing increasing difficulty in securing sufficient envelopes for Government business. It is therefore urged upon everyone to be as economical in the use of envelopes as is possible in properly carrying on the department's business.

Where more than one communication is sent to a certain individual or office in one day one envelope should be used wherever possible for all. For internal or interdepartmental business, envelopes should not be used, except in the case of confidential matter. For communications, not confidential, between offices at the various camps, etc., where these offices are not located under the same roof, large, heavy manila envelopes may be used, not to be sealed, and to be returned to the sending office for use again.

SUPPLY LETTER NO. 26

JUNE 29, 1918.

CONSERVATION OF GAUZE AND OTHER SURGICAL SUPPLIES

1. In view of the enormous increase in the requirements for gauze bandages and other surgical supplies, every effort should be made to reduce the amount of these supplies used in the operating rooms, dressing rooms, and wards.

2. The gauze and bandages can be washed and sterilized for reuse, and this should be done repeatedly as long as they can be used. They should be made in the most advantageous size and shape for conservation. Rubber gloves which have been punctured or have small holes should be patched and tested for leaks and sterilized. Where repairs have been repeatedly made and the gloves are not considered safe for major operative work, they may be used for assistants and ward dressing. Catgut can be conserved by adopting an economical method of tying. Adhesive plaster should be used as sparingly as practicable. Ether

may be conserved by using local anesthetics—novocain, procain, or apothesine wherever practicable.

3. Conservation of surgical supplies has already been undertaken in some of the base hospitals, and the results have been most satisfactory. One of these hospitals reports for April, 1918, that 282 operations were performed, and that the amount of supplies used was less than one-third of the previous month. (See attached report.)

4. While the varying equipments of different hospitals may modify the method used for the reclamation of gauze and bandages, the following method is suggested: Each surgical ward and dressing room should be equipped with two galvanized iron buckets with a cover, lined by a paper bag, in one of which should be put all blood-stained and slightly soiled dressings; in the other, pus-stained dressings. These buckets should be taken twice daily—oftener, if necessary—to the room where dressings are washed. If no laundry equipment or laundry machinery, is available, the gauze and bandages can be washed by hand, using heavy rubber gloves for this purpose. Previous to washing the slightly stained and blood-stained dressings should be soaked for 12 hours in cold water containing one-tenth per cent of chloride of lime; the pus-stained dressings in a solution containing one-tenth of 1 per cent chloride of lime and one-half of 1 per cent washing soda. If washed by hand, these dressings should be boiled for at least one hour. Where laundry machinery is available, or in the larger hospitals which are now being furnished with equipment for the reclamation of reuse knitted gauze, ordinary gauze and bandages may also be reclaimed. The gauze and bandages should be put in mesh bags, soaked for 12 hours as directed above, boiled for 1 hour, transferred to the washing machine and, if a rotary tumbler is available, can be dried in the bags in this tumbler. If this is not available, gauze and bandages can be passed through a wringer and hung on lines to dry. After drying, dressings should be sorted, folded, put in packages and sterilized in the ordinary way for 30 minutes at 15 to 30 pounds pressure on two successive days. Careful bacteriological tests should be made from time to time to test its sterility.

5. This office desires practical suggestions for the best methods of reclaiming absorbent cotton for reuse.

6. It is only by the cooperation of the surgical staff of each hospital that the desired conservation of supplies can be brought about. You should, therefore impress upon the medical officers the necessity for the utmost care in the use of these supplies, and for careful supervision of such use by their subordinates.

7. It is directed that a monthly report of the amount of gauze, bandages, cotton, rubber gloves, catgut, adhesive plaster, and anæsthetics used, be returned to this office, with the supplemental report of surgical operations directed in the letter from the Surgeon General's Office, March 20, 1918.

8. This office has made somewhat extensive investigations, with a view to developing satisfactory substitutes for absorbent cotton and gauze and gauze bandages. Certain satisfactory wood-fiber substitutes for cotton have been found and one of these, known as "Cellneotton," is now being provided in large quantity.

Crimped paper bandages are also being tried, and reports to this office indicate that they are just as good as gauze bandages in all "dry" cases.

These substitutes cost just about one-half as much as absorbent cotton and gauze bandages. The lower cost, however, is not the only advantage to be derived from the use of these substitutes. It opens up another source of supply and makes it easier for the supply division of this office to meet the overseas demand for surgical dressings.

It is, therefore, directed that, wherever possible, substitutes for cotton and gauze and gauze bandages be used. Requisitions for these articles should be made in the usual way.

REPORT FROM A CANTONMENT HOSPITAL FOR APRIL, 1918

JUNE 29, 1918.

Amount of supplies used during the month of April:

Gauze: 600 yards, drawn from the supply room, of which amount 350 yards are still on hand for daily dressings; making a total wastage for the month of 250 yards.

Before undertaking conservation, the average monthly wastage was 3,000 yards, making a saving in this one hospital for one month of 2,750 yards.

Cotton, absorbent; 2 pounds, used by anesthetists.

Cellucotton: 14 rolls.

Rubber gloves: 30 pairs used. All now serviceable and in daily use.

Catgut, chronic and plain: 312 tubes—a fraction over one tube for each operation.

This saving was accomplished by using instruments for tying. (Similar to the method described by Grant.)

Ether: 421 cans, used for 250 cases of general anesthesia.

Adhesive plaster: 42 spools.

At this hospital the following orders were issued concerning the making of dressings:

Empyema pads shall be made as follows:

1. Cellucotton or old gauze or old cotton, 8 by 6; gauze covers, 18 by 18.

Abdominal pads for first dressings, to be used in hospital, shall be made as follows:

1. Cellucotton or resterilized gauze, 8 by 6; gauze covers, 10 by 18.

Sponges for operations shall be made as follows:

1. Single layer of gauze, 24 by 18, folded so as to make sponge 4 by 4.

Abdominal pads or sponges shall be made as follows:

1. Gauze shall be folded so as to make a sponge or pad 9 by 12.

2. All sponges shall have a tape 6 inches long attached to one corner and an iron ring (harness) attached.

All dressings must be saved, rewashed, and will be sent back to operating room after going through high-pressure sterilization.

All dressings must be sterilized twice after being double wrapped.

SUPPLY LETTER NO. 27

August 8, 1918.

RECEIPTS FOR MEDICAL PROPERTY ISSUED

This office has received complaints from supply depots that receipts for medical property issued by them are returned to them with check marks opposite the various items on the receipt. As these receipts are to be checked item by item, both at the depots and in this office, they should be sent in without check marks. The body of these receipts are ordinarily carbon copies of the issuing officer's invoice, and in case the receiving officer desires to check the vouchers with the property actually received, such checking should be done on his retained invoice and not on the receipt signed by him.

EXTRA SECTIONS FOR FILING CABINETS

Requisitions for extra sections for filing cabinets, etc., should state, in all cases, the kind of filing cabinet on hand, giving the name of the manufacturer and, if possible, catalogue number. This information is required by the purchasing officer so that he may supply the proper additional sections.

WEB BELTS

Paragraph 38, Supply Letters Nos. 1 to 23, inclusive, is revoked, and the following instructions substituted therefor:

Belts, web, medical officers' (par. 864), and belts, web, enlisted men, Medical Department (par. 865), are now the property of the Medical Department.

Belts, web, medical officers' (par. 864), will hereafter be issued to officers on memorandum receipt. One copy of receipt will be forwarded to the Surgeon General's Office by receiving officer; the accountable officer will forward one with his return of medical property as authority to drop same, retaining a copy for his file. When a medical officer is separated from the service, the web belt in his possession will be turned in to the nearest accountable

medical supply officer, who will give receipt for same, one copy to be forwarded to the Surgeon General's Office and one retained. The property will be taken up on his return.

An officer will not be relieved from responsibility for belts in his possession for which he has given a memorandum receipt until he has returned the property to a proper accountable officer.

Belts, web, enlisted men, Medical Department (par. 865), will be charged on Form 367, A. G. O. The accountable officer will prepare invoices in duplicate on Form 28 M. D. The receiving officer will certify thereon that the belts were received and charged on Form 637, giving names of enlisted men. The duplicate receipt will constitute the voucher on which the accountable officer will drop from his returns the articles enumerated. When an enlisted man is separated from the service, the responsible officer will prepare Form 28 in duplicate, listing thereon the medical property in soldier's possession, and turn same over to an officer accountable for medical property, who will take the property up on his return.

All belts now in possession of officers and enlisted men held by company or detachment commanders on memorandum receipts will be dropped by the accountable officers after the officer who signed the receipts complies with these instructions.

DENATURED ALCOHOL

It is directed that no further purchases of denatured alcohol be made without special authority from this office. Ethyl alcohol is cheaper and may be substituted for the denatured alcohol wherever the use of the latter is authorized.

GAUZE SPONGES

Owing to the great increase in the cost of sponges, gauze, no further issues thereof will be made after the present stock is exhausted. Cellucotton sponges, prepared locally will be substituted for venereal prophylaxis work and for all other purposes for which the gauze sponges of the supply table have hitherto been used.

REQUESTS FOR PURCHASES

In making requests for purchases, the cost must, in all cases, be stated.

SUPPLY LETTER NO. 28

OCTOBER 9, 1918.

1. SPECIFICATIONS FOR FLOOR OILS

Oils purchased by the Medical Department for hospital floor uses should conform as nearly as possible to the following specifications:

The oil is to be a pure, heavy mineral oil; that is to say, it must be totally free of all fatty oils and waxes, tar oil, rosin oil, or rosin, etc.:

1. It is to be clear and of a color not darker than light brown.
2. It is to be odorless, or, at most, to possess not more than a faint kerosenelike odor.
3. It is to be of neutral reaction.
4. Its viscosity at 20° C. is to be not less than 4, compared with distilled water. Other characters being equal, preference will be given to oil of high viscosity.
5. It is to contain not more than 2.75 per cent by weight of light (volatile) oils, determined by heating the oil on the steam bath in the open dish during six hours.

2. RED CROSS SUPPLIES

All supplies received from Red Cross organizations for use of Medical Department of the Army will be taken up and accounted for on returns of medical property.

A list of the articles received will be forwarded to the Surgeon General's Office.

Request for Red Cross supplies must be approved by the commanding officer of Medical Department organizations or division or camp surgeons of camps.

3. QUOTING RECORD NUMBERS ON DISBURSEMENT VOUCHERS

All disbursement vouchers covering purchases on authority from this office must quote the supply division record number, which will appear in the upper right-hand corner of letters and at the beginning of telegrams.

4. PRICE ON METAL COVERS FOR ROYAL TYPEWRITERS

The contract price with the Royal Typewriter Co. for the fiscal year 1919 on typewriter metal covers, as approved by the Treasurer of the United States, and appearing in the schedule of supplies of the General Supply Committee, is as follows:

Metal covers for Royal Nos. 5 and 10, commercial carriage.....	each	\$3. 00
Metal covers for Royal No. 10, with 14-inch carriage.....	do	3. 50
Metal covers for Royal No. 10, with 18-inch carriage.....	do	4. 15

These prices include baseboards.

5. CONSERVATION OF EMPTY BOTTLES

Due to the scarcity and great demand for all kinds of bottles, the following instructions relative to the salvage of empty bottles will be complied with:

1. All empty bottles will be turned over to the medical supply officer at camps and hospitals before turning in; these bottles will be thoroughly washed and dried.
2. The supply officer will carefully assort all bottles received and will make local issues of reclaimed bottles whenever possible.
3. When large quantities have accumulated, report will be made to this office.

6. EMPTY BOXES

Empty packing boxes will be carefully taken apart with a nail puller and preserved for future use; the sides, top, and bottom, when taken apart, should be fastened between the ends by driving a few nails through the boards to keep them intact.

Where boxes of different sizes are received and sufficient storage space is available they may be nested.

Report should be made to this office for proper disposition upon accumulation of a carload of empty serviceable boxes.

7. REQUISITIONS

Articles appearing on both post and field supply tables will be applied for on post requisitions only, with the following exceptions:

First-aid packets.—Litters and accessories, the accessories to consist of the following: Poles, canvas, braces, straps, slings, tacks, serews, rings, studs.

8. ALLOWANCES OF MEDICAL SUPPLIES FOR THREE MONTHS FOR ORGANIZATIONS IN CAMPS

It is expected that the allowance of expendable articles will be sufficient to cover all ordinary requirements for three months.

Nonexpendable articles will be replaced only as they become unserviceable. With proper care most of them should remain in serviceable condition for several years.

When supplies are exhausted, or their exhaustion is imminent, a renewal thereof should be asked for on special requisition forwarded to the division surgeon.

1. Allowance for one regiment of Infantry.
2. Allowance for one regiment of Artillery or Engineers.
3. Allowance for one machine-gun battalion (two companies).
4. Allowance for one machine-gun battalion (four companies).
5. Allowance for one signal battalion.
6. Allowance for one division headquarters.
7. Allowance for trains and military police.
8. Allowance for one regiment of Cavalry.

Allowance of medical supplies for three months for organizations in camps

Articles	1	2	3	4	5	6	7	8
Strength of organizations	3,834	1,697	293	776	488	238	2,292	1,902
MEDICINES AND ANTISEPTICS								
Acetphenetidinum (phenacetin), 324-mgm. tablets, 500 in bottle	12	5	2	2	1	1	4	3
Acidum acetylsalicylicum, 324-mgm. tablets, 500 in bottle	10	4	2	3	1	1	3	3
Acidum boricum, 324-mgm. tablets, 500 in bottle	12	5	2	2	1	1	4	3
Ether, ¼ pound in tin	15	6	2	3	1	1	2	2
Alcohol	20	8	3	4	2	2	5	5
Apomorphinæ hydrochloridum, 6-mgm. hypo. tablets, 20 in tube	2	1	1	1	1	1	1	1
Argentii nitras crystals, 1 ounce in bottle	2	1	1	1	1	1	1	1
Argentii nitras fusus, 1 ounce in bottle	2	1	1	1	1	1	1	1
Argyrol (or equivalent), 1 ounce in bottle	2	1	1	1	1	1	1	1
Atropinæ sulphas, 0.65-mgm. hypo. tablets, 20 in tube	1	1	1	1	1	1	1	1
Barbital, 324-mgm. tablets, 500 in bottle	3	2	1	1	1	1	2	2
Bismuthi subcarbonas, 324-mgm. tablets, 500 in bottle	2	1	1	1	1	1	1	1
Capsicum, 32-mgm. tablets, 500 in bottle	1	1	1	1	1	1	1	1
Chloralum hydratum, 324-mgm. tablets, 500 in bottle	1	1	1	1	1	1	1	1
Chloroformum, ¼ pound in tin	20	8	3	4	2	1	4	4
Cocainæ hydrochloridum, 10-mgm. hypo. tablets, 20 in tube	8	4	2	2	1	1	2	2
Codæina, 32-mgm. tablets, 500 in bottle	4	2	1	1	1	1	2	2
Collodium, 1 ounce in bottle	16	8	3	4	2	1	4	4
Epinephrine hydrochloride, 1-mgm. tablets, made soluble by the addition of boric acid, 25 in tube	6	2	1	1	1	1	2	1
Glycerinum, 1 quart in bottle	6	3	2	2	1	1	2	2
Hexamethylenamina, U. S. P., 324-mgm. tablets, 500 in bottle	3	2	1	1	1	1	2	1
Hydrargyri chloridum corrosivum tablets (antiseptic) (par. 902), 250 in bottle	6	3	1	2	1	1	2	1
Hydrargyri chloridum mitis, 32-mgm. tablets, 1,000 in bottle	4	2	1	1	1	1	2	1
Ichthyolum (or equivalent), 3 ounces in bottle	6	3	1	1	1	1	2	1
Iodoformum, U. S. P., ¼ pound in bottle	5	3	2	2	2	1	3	3
Iodum-potassii iodidum, in tube	200	100	30	40	20	10	30	50
Iodine swabs, 6 in box	100	50	16	21	12	6	16	25
Linimentum rubefaciens, tablets (par. 902), 25½ in bottle	20	10	3	4	2	1	10	6
Liquor formaldehydi, 1 gallon in jug	20	10	3	4	2	1	10	6
Magnesi sulphas, 1 pound in tin	90	36	12	16	5	3	36	24
Mistura glycyrrhizæ composita tablets (par. 902), 1,000 in bottle	30	12	4	5	2	1	12	8
Morphinæ sulphas:								
8-mgm. hypo. tablets, 20 in tube	30	12	4	5	2	1	12	8
8-mgm. tablets, 500 in bottle	5	2	1	1	1	1	2	1
Nitroglycerin, 0.65-mgm. tablets, 500 in bottle	2	1	1	1	1	1	1	1
Normal saline solution, tablets (par. 902), 100 in bottle	2	1	1	1	1	1	1	1
Oleum ricini, 1 quart in bottle	24	9	3	4	1	1	9	6
Oleum tercinthinæ rectificatum, 1 quart in bottle	18	8	2	3	1	1	8	5
Petrolatum, 1 pound in tin	30	12	4	5	2	1	12	8
Phenol, ½ pound in bottle	32	12	4	5	2	1	12	8
Phenylis salicylas, 324-mgm. tablets, 500 in bottle	4	2	1	1	1	1	2	1
Pilule albi composite (or tablets) (par. 902), 500 in bottle	12	5	1	2	1	1	5	2
Pilule cathartice composite, 1,000 in bottle	6	3	1	1	1	1	3	2
Pilule ferri carbonatis, 1,000 in bottle	4	2	1	1	1	1	2	1
Plumbi acetas, 130-mgm. tablets, 500 in bottle	5	2	1	1	1	1	2	1
Potassii iodidum, 324-mgm. tablets, 500 in bottle	4	2	1	1	1	1	2	1
Protargol (or equivalent), 1 ounce in bottle	40	18	6	8	2	2	18	12
Pulvis ipecacuanhæ et opii, 324-mgm. tablets, 500 in bottle	6	3	1	1	1	1	3	2
Quininae dily. frochloridum, 32-mgm. hypo. tablets, 20 in tube	9	4	1	1	1	1	4	3
Quininae sulphas, 200-mgm. tablets, 1,000 in bottle	8	4	1	2	1	1	4	3
Sapo mollis (green soap), ½-pound bottle in case	30	12	4	5	2	1	12	8
Sodii bicarbonas, 324-mgm. tablets, 1,000 in bottle	10	4	1	2	1	1	4	2
Sodii bicarbonas et mentha piperita (par. 902), tablets, 1,000 in bottle	3	2	1	1	1	1	2	2
Sodii bromidum, U. S. P., 324-mgm. tablets, 500 in A. C. bottle with stopper paraffined	8	3	1	1	1	1	3	2
Sodii carbonas monohydratus, for surgical use, ½ pound in bottle	1	1	1	1	1	1	1	1
Sodii salicylas, 324-mgm. tablets, 500 in bottle	6	3	2	2	2	1	3	2
Spiritus ammoniæ aromaticus, ½ pound in bottle	16	7	2	3	1	1	3	5
Strophanthinum 0.5-mgm. hypo. tablets, 20 in tube	1	1	1	1	1	1	1	1
Styrcininae sulphas, 1-mgm. hypo. tablets, 20 in tube	60	25	8	12	4	3	20	16
Sulphur lotum, 1 pound in tin or carton	3	1	1	1	1	1	1	1
Tinctura opii, ½ pound in bottle	2	1	1	1	1	1	1	1
Trochisci ammonii chloridi, 250 in bottle	6	3	1	2	1	1	3	2
Unguentum hydrargyri chloridi mitis, 30 per cent., ½ pound in bottle	10	5	2	3	1	1	5	3
Zinci oxidum, powder, ½ pound in bottle, tin or carton	50	20	7	9	3	2	20	12
Zinci sulphas, 324-mgm. tablets, 500 in bottle	4	2	1	1	1	1	2	1
	2	1	1	1	1	1	1	1

NOTE.—This table supersedes that contained on pages 22, 23, 24 and 25, Supply Letters Nos. 1 to 23, inclusive

SUPPLY LETTER NO. 29

DECEMBER 10, 1918.

FORMULA FOR NEUTRAL SOAP TO BE USED IN ALL WASHING MACHINES

1. This soap is to be prepared in the following manner:

Use 50 per cent of Wyandotte laundry soda or any other good washing soda to 50 per cent of neutral chipped soap. To 5 gallons of water, add 1 pound of chipped washing soap and 1 pound of laundry washing soda. Permit this to boil slowly for a period of from 40 minutes to 1 hour. In weight this will make about 39 pounds of semipaste.

To 50 pounds of linen use 7 gallons of water and 3 pints of the above-named soap or semipaste. This will produce soapsuds to cleanse this amount of linen thoroughly.

PROMULGATIONS, GENERAL HEADQUARTERS, A. E. F., CONCERNING THE PROCUREMENT AND DISTRIBUTION OF SUPPLIES

[Corrected copy]

General Orders, No. 8.

HEADQUARTERS AMERICAN EXPEDITIONARY FORCES,

France, July 5, 1917.

The tables hereto attached show the present distribution of staff duties of the headquarters of the American Expeditionary Forces. The information given in these tables is not to be communicated, either directly or indirectly, to the press or to any person not holding an official position in the military service.

The distribution of staff duties in the headquarters of divisions, army corps, and other commands subordinate to these headquarters will conform in principle to the distribution of duties shown in these tables.

The distribution of duties within each staff department at these headquarters and the assignment of personnel to such duties will be regulated by the chief of the staff department concerned.

The object of these tables is to form a basis of coordinated action between the several staff departments in a command. They have been prepared after a comprehensive study of the staff organization of the French and British armies, and are intended to adapt the requirements of modern field conditions to our own staff system. This will serve as a guide to all concerned.

By command of Major General Pershing:

JAMES G. HARBORD,
Lieutenant Colonel, General Staff,
Chief of Staff.

Official:

BENJ. ALVORD,
Adjutant General.

ORGANIZATION OF HEADQUARTERS, AMERICAN EXPEDITIONARY FORCES

TABLE I

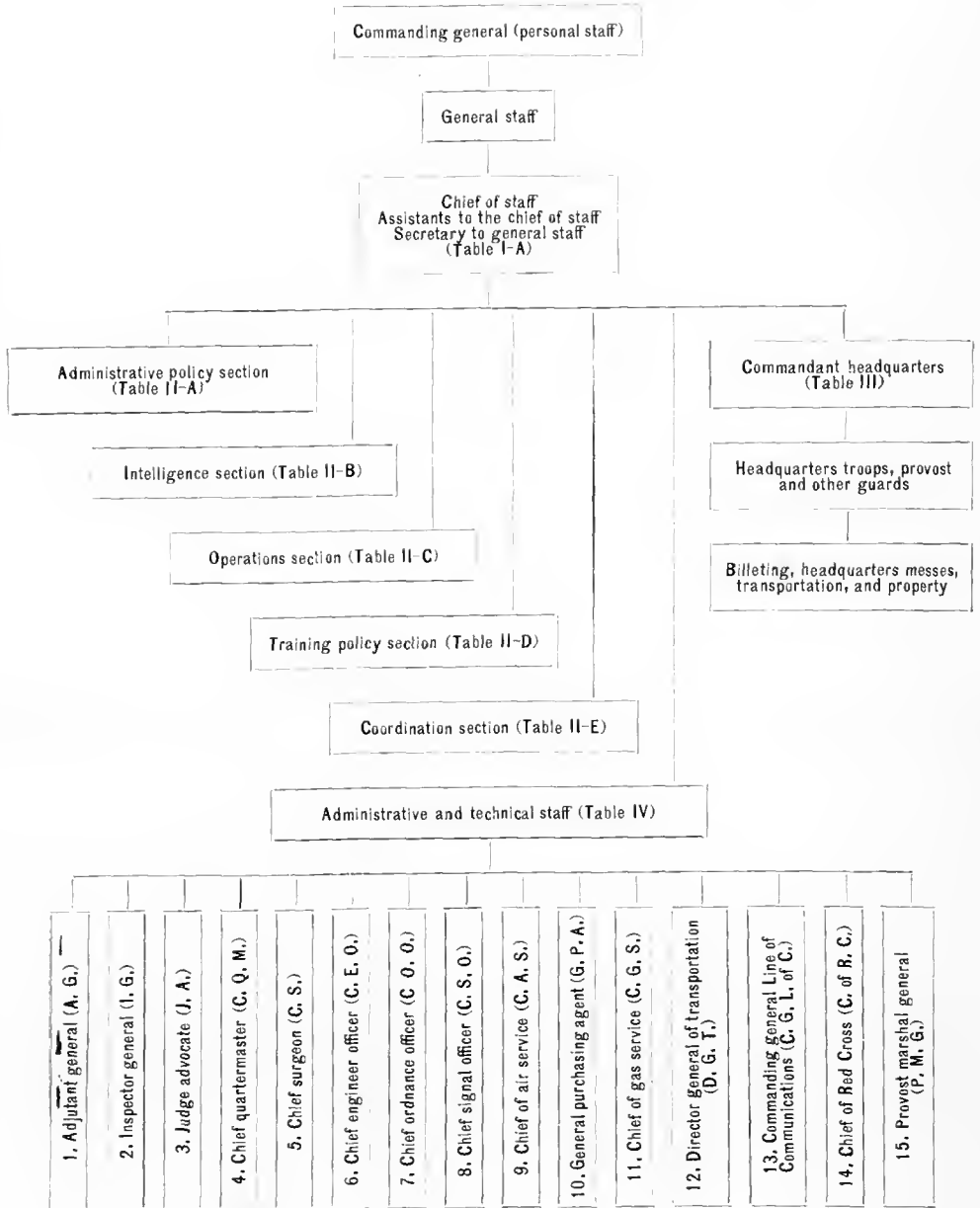


TABLE II (A).—GENERAL STAFF ADMINISTRATIVE SECTION

POLICY

1. General matters of administrative policy.
2. Administrative staff organization.
3. Replacements.

4. Evacuation of sick and wounded.
 5. Ratio of combat troops to Line of Communications troops.
 6. Supplies.
 7. Possibilities of production and transportation in connection with contemplated operations.
 8. Operations of railways in France.
 9. Priority of supply shipments and locality of purchase.
 10. General weighing and balancing of demands and requirements in men and materials from the standpoint of operations section.
 11. Recommends decisions on general policy on above-mentioned matters.
 12. Preparation of cablegrams and letters stating matters of administrative policy.
 13. Liaison with technical and administrative services on questions of policy.
 14. Details of organization and equipment of Line of Communications and transportation department troops and services.
- * * * * * * *

TABLE II (E).—GENERAL STAFF COORDINATION SECTION

1. Coordination of staff work on matters of administrative policy.
2. Supervision of the application of administrative policies throughout the command.
3. Compilation of the current and prospective state of supply, construction, and transport in the command.
4. Preparation of graphics showing the state of supply, construction, and transport in the command.
5. Compilation of current information on the execution of all administrative policies throughout the command.
6. Settlement of details and coordination and supervision of the execution of the general administrative policies decided upon.
7. Coordination of supply and transportation arrangements for combat.
8. Coordination of supply on all items in which shortage exists.
9. Orders for assignments of new units.
10. Organization lists of American Expeditionary Forces (order of battle).

* * * * * * *

TABLE IV.—TECHNICAL ADMINISTRATIVE SECTION

* * * * * * *

MEDICAL CORPS

- Sanitation of camps, quarters, and occupied territory.
 Health of command.
 Care of sick and wounded.
 Collection and evacuation of sick and wounded.
 Medical personnel.
 Medical supplies.
 Veterinary personnel.
 Veterinary supplies.
 Laundries and baths (medical aspect).
 Disinfection of clothing, etc.
 Supply of personnel and material for gas defensive under supervision of director of gas service.
 Technical inspection of medical organizations and establishments.

* * * * * * *

COMMANDING GENERAL, LINE OF COMMUNICATIONS

- Service of territorial command in the zone of the Line of Communications.
 Supply, sanitary, and telegraph service in the zone of the Line of Communications.
 Until further orders all construction work in the zone of the Line of Communications.

NOTE.—Upon receipt of this order each head of each of the above-mentioned services will submit detailed chart showing subdivision of duties in his department and proposed personnel.

* * * * *

General Orders, No. 43.

HEADQUARTERS AMERICAN EXPEDITIONARY FORCES,
France, September 30, 1917.

The following instructions on the subject of supplies are published for the information and guidance of all concerned:

1. The regular, prompt receipt of supplies is one of the prime necessities for the good administration of any command. The officer whose mind is distracted by the lack of food, clothing, or munitions, or by worry as to whether such supplies will arrive in time for his needs, is not free to devote his energies to the training of his men nor to the defeat of the enemy. Owing to a situation which could not be foreseen when the F. S. R. were written, conditions are such that some changes have had to be made in the organization of the staff and Line of Communications, as contemplated in those regulations. The new organization is shown in General Order No. 8 (corrected), a careful study of which is necessary to grasp its detail and to insure a proper coordination of effort as regards supply and construction. The regulations hereinafter given are explanatory of the methods of procedure under the organization adopted.

2. Supply depots and establishments of the Line of Communications and the personnel thereof are under the command of the commanding general, Line of Communications, who is responsible for their administration, discipline, police, safety, and sanitation. He is also responsible that prompt notice of any shortage or probable shortage is brought to the attention of the chief of the staff department, A. E. F., concerned.

3. The responsibility for the procurement of all supplies of any class rests with the chief of the staff department, A. E. F., concerned, who will procure everything possible in Europe, sending to the United States only for such items as can not be obtained in Europe. Each chief will exercise a strong technical control and supervision over all the establishments of his department throughout the theater of operations. This control will be exercised through his representative on the staff of the commanding general, Line of Communications, as far as Line of Communications establishments are concerned. The chief of each staff department, A. E. F., will submit immediately, for approval, lists showing the kind and quantity of supplies that will be kept on hand in the various depots of the Line of Communications as the proper supply under the provisions of paragraph 1, confidential memorandum, August 7, 1917, these headquarters. These lists will, upon approval, be the guide for the commanding general, Line of Communications, who is charged with keeping the full stock of supplies on hand in his depots. Changes in these lists will be made from time to time as better information is obtained as to the exact needs of our forces, and these changes when approved will govern.

4. Each chief of staff department may submit for approval lists of special or unusual supplies not normally issued in accordance with existing orders or regulations, and after such lists are approved organization commanders are authorized to requisition for these supplies directly upon the depot supplying them. All other requisitions for materials or supplies for organizations or for works will be submitted to the chief of the staff department concerned, who will arrange for their issue. When new troops are due to arrive or when at any time the chief of staff department can foresee a need for materials or supplies, he should anticipate the needs of the organizations concerned and take the necessary steps to have the materials or supplies delivered in advance of requisitions.

5. Whenever there is any shortage in an important article of material or supply in transportation facilities and the necessity arises for coordination of issues, the determination of amounts to be issued and the distribution thereof will be fixed by the coordination section, general staff, after consultation with the chief of the department concerned, until normal conditions are restored.

6. Whenever articles not on the automatic supply basis are issued from any depot from the stock on hand in depot, the issuing officer will send a copy of the lists of materials issued, stamped across the face "For replacement," to the chief of his department, Line of Communications, and this list or issue slip will have the force of a requisition. The necessary steps will then be taken to replace issues either by direct delivery from primary sources or by transfer from another depot farther to the rear, where the actual replacement will be made. Routine issues of articles which are on the automatic supply basis will be forwarded periodically from the rear depots to the advance depots and thence to the troops, under instructions of the commanding general, Line of Communications, without requisition, and notice of the issue of such articles need not be made by the issuing depot. The principle of automatic supply will be applied as far as practicable to all articles of regular issue.

7. The chief of each staff department on the Line of Communications is immediately in charge of the depots and establishments of the Line of Communications, and it is his function to keep informed as to the kind of materials and supplies on hand; and, so far as such authority may be delegated to him by the chief of his department, A. E. F., to make requests on the representative of his department on the general purchasing board for replacements that can be obtained in Europe. All requisitions for supplies and materials to come from the United States and all exceptional purchases in Europe will be made or approved by the chief of the department, A. E. F.

8. No purchases of supplies, other than emergency purchases for his own office, or such materials as the staff officer of the Line of Communications is authorized to require of him, will be made by the purchasing officer of the general purchasing board, except as authorized by the chief of his department, A. E. F. The purchasing agent or disbursing officer is not, in general, concerned with the initiation of purchases or with the state of supplies in the depots. His function is to purchase and inspect the supplies ordered, to provide for their transportation to France, and to pay for them.

9. The officer in charge of each supply depot will keep the chief of his department, Line of Communications, periodically informed as to the stock on hand in his depot, and will issue supplies on requisitions approved by the chief of his department, Line of Communications, or such supplies as are authorized for automatic issue. Requisitions coming to the chief of any department, A. E. F., will after approval be sent to the corresponding chief, Line of Communications, for filling.

10. When supplies are issued from depots to troops, or for construction work, the receiving officers will receipt for the supplies on the usual forms, with a notation showing the organization or the work for which the supplies or materials are to be used. No further formal accounting for the supplies or materials will be required from the receiving officer (F. S. R., par. 370). The same care will be taken of all equipment supplies and materials, and the same economy in their use will be observed as if a formal accounting were required. Commanding officers are charged with the duty of seeing that neither men nor organizations of their command waste, make misuse of the supplies, materials, or equipment furnished to them, or accumulate a surplus thereof. Organizations or individuals demanding much in excess of the average amounts required by other like units under similar conditions will be investigated, and proper action taken if waste, misuse, or undue accumulation is discovered.

11. Each chief of staff department, A. E. F., will arrange for periodic technical inspections of the establishments of his department, in all parts of the theater of operations, with a view to checking any unauthorized use or abuse of equipment, supplies or materials, or any undue accumulation of the same beyond reasonable needs.

By command of Major General Pershing:

JAMES G. HARBORD,
Colonel, General Staff, Chief of Staff.

Official:

BENJ. ALVORD,
Adjutant General.

(For official circulation only.)

General Orders, No. 73.

HEADQUARTERS AMERICAN EXPEDITIONARY FORCES,
France, December 12, 1917.

1. The supply of American troops in France is divided into three phases: The first is the procurement of such supplies; the second is their care and storage; the third is their transportation. The responsibility for the first lies with the chiefs of various supply departments, A. E. F.; for the second with the commanding general, Line of Communications; for the third with the director general of transportation. The general supervision of all is exercised by the general staff, as a rule, through the coordination section.

2. *Chiefs of supply departments.*—The chiefs of supply departments, A. E. F., are responsible for the procurement of all supplies, material, equipment, plants, establishments, etc., that may be necessary for the American troops in France. This is accomplished by purchase or requisition in Europe or in the United States. (For full statement of their functions see par. 3, General Order 43, H. A. E. F.)

3. *Commanding general, Line of Communications.*—The commanding general, Line of Communications, through his several agencies, is responsible for the care and storage of supplies, material, and equipment, for the construction, maintenance, and repair of all agencies necessary to accomplish this purpose; for the manufacture, salvage, repair, and cleaning of equipment. He is responsible that the supplies are distributed among the several depots in accordance with the approved projects.

The commanding officer of each base and intermediate section, Line of Communications, in addition to the other administrative, police, and sanitary functions assigned to him by the commanding general, Line of Communications, is responsible for the administration of his depots and for maintaining the proper stock of supplies, materials, and equipment therein, in accordance with the approved project. When the shipment of supplies is authorized, it is his duty to have them loaded into cars and to have the cars properly marked and turned over to the representative of the transportation department.

The commanding officer, advance section, Line of Communications is responsible for the administration, police, and sanitation of the territory in the advance section, including supply depots, hospitals, remount depots, camps, prisons, etc. He establishes camps, hotels, etc., in the neighborhood of regulating stations for the accommodation of troops remaining overnight, and is responsible for the discipline, administration, and sanitation of the railway personnel and construction troops of the transportation department in his zone, except as regards their technical employment or their location.

4. The function of the Line of Communications is to relieve the combatant field forces from every consideration except that of defeating the enemy. All agencies established for that purpose belong to the Line of Communications unless otherwise specially assigned.

5. *Director general of transportation.*—The director general of transportation has charge of the unloading of freight and troops from ships at points of debarkation and of the transportation of all troops and supplies by rail, in accordance with instructions received from proper authority. He is responsible for the construction, maintenance, and operation of such railroad lines and rolling stock as come within American control. He will have a representative at each regulating station, at each group of supply depots, at each railhead, and at each important railroad station, to facilitate military traffic. He is responsible through his proper representatives, that all freight turned over to the transportation department for transportation is promptly delivered to its destination.

6. The railroad personnel in the advance section, Line of Communications are subject to the orders of the regulating officer in so far as concerns their receiving, caring for, and transporting troops and supplies and as regards priority of shipments. This control is exercised through the proper railway officers. They are subject to the orders of the commanding officer advance section, Line of Communications, in all matters of discipline, sanitation, and administration not involving questions of railway management. They are subject to the orders of the director general of transportation in all matters pertaining to their technical work in the construction, operation, and maintenance of the railways, and as regards their location or employment.

7. The agencies through which the troops in the zone of the armies are supplied from the storage depots are the regulating stations and refilling points.

8. A regulating station is a large railway yard where ears from the supply depots and from the rear are received and made up into trains for the divisions. Usually a separate train is provided for each division. Here also are received all express and mail for organizations at the front. This is sorted in regulating station and distributed in separate cars for each division and turned over to the transportation department for dispatch to destination.

9. Troops coming into a regulating station are detrained, if necessary, and reembarbed into trains which will take them to their proper divisions. Trains containing troops for a single division are forwarded direct to destination.

10. The regulating officer is a member of the coordination section of the general staff. He, as a rule, belongs to the headquarters of an army or a group of armies, but not to lesser units. It is his duty to give all orders for the movement of troops and supplies in advance of the advance depots and to follow the movements through to completion; the troops to their proper destination, and the supplies until delivered to divisional supply officers, or to supply officers of detached or nondivisional organizations. To him are sent all orders for and information regarding the transportation of men and material in the advance section, Line of Communications, and all notices of shipment of men or material to arrive at the regulating station, either from front or from the rear. He must be promptly advised by army headquarters of any changes or movements at the front that will affect the supply. He in turn must inform the railway officials in time for them to make preparations for the contemplated move, and must take the necessary measures to insure the proper supply.

11. He is kept in close touch with the headquarters of the army to which it is attached, by frequent visits and conferences. In certain questions which are reserved for the decision of general headquarters communication is held direct between those headquarters and the regulating officer.

12. All the personnel engaged in transportation and handling of men, material or supplies in the advance section, Line of Communications, are subject to the orders of the regulating officer in all matters pertaining to these duties. (See also par. 6, above.)

13. *Railheads and refilling points.*—The railhead, as the name implies, is the point on the railway at which the troops or supplies are discharged. The refilling point is the place at which the division trains receive the supplies. The two may coincide. The personnel at the railheads and refilling points are responsible to the regulating officer for the unloading, care, and preservation of the freight, mail, and express until turned over to the division trains. At or near the refilling point may be established a field base, or dump, which is usually a temporary shelter where one day's supply of rations, fuel, forage, gasoline, etc., may be kept to fill the division trains immediately upon their arrival, thus avoiding long waits for late railway trains.

14. *Evacuation stations.*—For the reverse movements of personnel or supplies there are evacuation stations and sorting stations. An evacuation station is a place for the collection of men and material that have become unfitted for use in the front and for which movement to the rear is contemplated. The personnel of these stations receive and care for the personnel and material to be evacuated and at the proper time load them on trains provided by the regulating officer. Orders for the evacuation of men or material are ordinarily issued by the chief of staff, general staff, at army headquarters, which should receive early notification of desired movements so that the regulating officer may have time to provide for the amount and kind of rolling stock required. In action the officer in charge of an evacuation station may call directly upon the regulating officer for the necessary railway equipment to evacuate the wounded.

15. Sorting stations are railway stations to which evacuated men and materials are sent from the evacuation stations and where they are sorted into their special classes and thence shipped to their final destination in the rear. Sick and wounded are sent to the various hospitals; worn out and broken material to shops along the line of communications.

16. *Classification and distribution of supplies.*—All supplies desired by troops are, for the purpose of this order, divided into four classes, viz; first, food, forage, and any other

articles of automatic supply; second, shoes, clothing, and other similar equipment without which the individual can not perform his functions as a soldier; third, articles of authorized equipment, either for individuals or organizations, such as trucks, paulins, axes, shovels, etc., the absence of which, in small quantities, will not prevent the individual or organization from performing its functions; fourth, all articles the distribution of which must depend upon the character of future operations, and all items of an exceptional nature not part of the equipment of troops, but necessary for their protection from the weather or the enemy.

17. Class 1 supplies will be obtained and distributed as follows:

(a) Regimental supply officers or supply officers of other independent organizations will submit ration returns to the division quartermaster, or quartermaster of the organization to which they are attached. He in turn will consolidate the returns. The division return will be submitted to the local supply officer at the refilling point for filling.

(b) If for any reason any of the component parts of the rations demanded by the division can not be supplied at the refilling point, the supply officer in charge there will furnish the division supply officer with an order on any field base, or dump, which will be honored upon presentation.

(c) The daily automatic supply is based on the actual strength of the division in men and animals. Reports are made on the 10th, 20th, and the last day of each month by headquarters of the division to the headquarters of the corps. Here they are consolidated and corps troops are added and the same information is sent to the headquarters of the army (chief of staff, general staff). Army headquarters then notifies the regulating officer by wire of the number of men and animals belonging to each division. The regulating officer informs the various supply depots of the numbers for which the automatic supply is required, indicating the division or detached or nondivisional organization for which the supplies are required, by the proper symbol number.

(d) The various classes of supplies are then loaded into railway cars, properly checked and rechecked, and each car is labeled on both sides with symbol number of the division, or detached or nondivisional organizations, for which the supplies are destined. A list of the contents of each car is posted in a conspicuous place in the car. Information regarding the shipment is telegraphed to the regulating officer by the depot officer, and the regulating officer then prepares schedules of the make-up of the trains for various divisions, gives them to the representative of the transportation department, who will make up respective trains and dispatch them to their destinations.

(e) On arrival at refilling point the train is promptly unloaded and the supplies required for the division are immediately transferred to the division trains by the local supply officer, or they are put under cover for issue the following day.

(f) The period elapsing from the date on which the division strength report is made and date on which rations are drawn (one to four days) renders it imperative that, in accordance with the adopted policy, a small stock shall be kept at, or near, the refilling point in order to enable proper adjustments to be made.

18. In the case of bulk trains (full trainloads of forage, coal, etc.) arriving at regulating stations, the following procedure will be observed.

To fill the demands of a division for such commodities, one or more railway cars, with cargo corresponding to nearest weights demanded by the respective divisions, will be cut from the trains, marked with the division symbol and turned over to the representative of the transportation department for proper marshaling and dispatch. The contents of a full car will not be broken.

19. This method will result in overissues or underissues, as the case may be, and will require adjustment from day to day. A record book, with headings for plus or minus issues and the amounts due to different organizations will be kept for making the adjustments in further shipments.

20. Class 2, supplies (shoes, clothing, etc.):

(a) Requisitions are submitted by the company commanders and, upon consolidation and approval by the regimental commander, are checked by the proper division staff officer and sent directly to the proper advance depot.

(b) The depot officer will inform the railway officials of the number and kind of cars that he will require to forward these supplies and the time and place he will want them spotted for loading.

(c) The regulating officer keeps informed of these calls and if there is any necessity therefor, arising from shortage of cars or special needs for other shipments, indicates the order of priority. After the cars are placed by the railway personnel, they are loaded by the depot personnel, and the procedure until they are delivered to the refilling points is as heretofore described for carloads of class 1 supplies.

21. The accuracy, necessity for, and sufficiency of these requisitions rest upon the regimental commander. The final responsibility rests with the division commander.

22. Class 3 supplies (wagons, trucks, axes, shovels, sanitary and hospital supplies, equipment, etc.): These supplies are requisitioned by the organizations in the manner prescribed for class 2. These requisitions are received by the supply officers of the division and are filled from any disposable supplies in the division. The remainder of the requisition is forwarded to corps headquarters where a similar procedure is followed. The corps supply officer, in consultation with the A. S. G. S., fills the needs from disposable supplies within the corps parks, trains, or dumps, and the remainder of the requisition is forwarded to army headquarters, where a similar procedure is followed.

23. The remainder of the requisition, which can not be furnished from the resources at the disposition of the army are forwarded to the advance depots, Line of Communications, where the procedure is the same as prescribed for articles of class 2.

24. Class 4 (ammunition, timber, etc.): Requisition for articles of this class are handled in the same manner as described for those of class 3, except that after the articles which are disposable within the army have been furnished, the remainder of the requisition is forwarded direct from the army headquarters to the proper supply officer at general headquarters, where it is considered in connection with contemplated operations, and of the relative need of other units. Final action is taken in consultation with the chief of staff, general staff.

25. In order to expedite the supply of these articles to the troops, certain amounts in the depots, called credits, may be placed at the disposition of Army headquarters. Upon these credits Army headquarters may draw without reference to general headquarters, sending their requisition direct to the proper depot officer. Army headquarters should inform the proper supply officer at general headquarters of such drafts upon the credits, in order that he may know at all times the status of the credits. Action upon requisitions for articles on which no credit has been established, and upon renewal of amounts withdrawn from existing credits, is determined by the proper supply officer at general headquarters, in consultation with chief of staff, general staff. When decision is reached the necessary information is sent to the proper depot, with directions to forward the supplies or to renew the credits as the case may be. Information upon all such points is also sent to the regulating officer and to army headquarters. Army headquarters will also be informed if the credit is not to be renewed immediately.

26. Corps troops and army troops send their requisitions direct to corps and army headquarters, respectively, and a similar procedure is followed for each class of supplies as outlined above.

27. Division commanders are hereby directed to detail an officer at each station at which freight is received by that division where such an officer is not otherwise provided to be known as the local supply officer of that refilling point. This officer will be charged with the receipt and prompt unloading of all cars received at that station for American troops. He will be warned of their arrival by the regulating officer and will make his requisition upon the local commanding officer for the necessary troops to unload the cars within 24 hours after they are placed for unloading. He will be charged with the proper cleanliness of that part of the yard that may become littered up by American troops. The necessary details of troops will be furnished him for both of these purposes. He will receive his instructions from the regulating officer.

28. Until further orders, the 10-day reports called for in paragraph 17-c will be submitted to commanding officer, advance section, Line of Communications, who will promptly forward them to the regulating officer to serve as the basis of an automatic supply

until the figures are changed. Until further orders, requisitions for class 3 supplies will be forwarded to the proper supply depots, requisitions for class 4 supplies will be sent to the proper supply officer at general headquarters, from the division or other independent unit. Requisitions submitted before December 20 will be acted upon under regulations heretofore in force; after December 20 all requisitions will be submitted in accordance with the plans herein outlined.

By command of General Pershing:

JAMES G. HARBORD,
Brigadier General, Chief of Staff.

Official:

ROBERT C. DAVIS,
Adjutant General.

General Orders No. 13.

FRANCE, *January 21, 1918.*

II. 1. So much of paragraphs 4 and 9, General Order 43, these headquarters, 1917, as is in conflict with paragraphs 17a, b, c, 18, 20, 22 to 26, General Order 73, these headquarters, 1917, is revoked.

General Orders No. 20.

FEBRUARY 4, 1918.

IV. So much of paragraph 10, General Order No. 73, series 1917, as provides that the regulating officer shall belong as a rule to the headquarters of an army or group of armies is rescinded, and the following is substituted therefor: "The regulating officer is a member of the coordination section of the general staff of these headquarters. He is the agent through whom are effected the supply and evacuations for each army or group of armies assigned to his particular regulating station."

HEADQUARTERS AMERICAN EXPEDITIONARY FORCES,
CHIEF OF STAFF, GENERAL STAFF,
France, January 9, 1918.

From: Commander in chief.

To: Commanding general, Line of Communications.

Subject: Distribution of supplies.

1. The operations of the American Expeditionary Forces are now entering a phase where each department and each officer thereof is going to be tried by results, and no failure in supplies must be permitted to occur. Your attention is therefore invited, first, to the question of procurement for which the chiefs of supply departments are primarily responsible; second, to distribution of supplies for which subordinates of his department on the Line of Communications are responsible; third, the transportation for which the transportation department is responsible.

* * * * *

3. While the commanding officer, Line of Communications, and his subordinates are not responsible for the procurement of supplies, and while the chiefs of the various departments are supposed to keep track of the amount of supplies on hand, this does not relieve the Line of Communications if it does not give adequate warning whenever there is a possibility of shortage in sight. They know the requirements and are closer to the detailed work than the chiefs of departments, and it should be their responsibility to sound the first note of warning.

* * * * *

By order of the Commander in Chief:

W. D. CONNOR,
Colonel, General Staff, National Army,
Chief of Section.

[Confidential. Corrected copy]
General Orders, No. 31.

GENERAL HEADQUARTERS,
AMERICAN EXPEDITIONARY FORCES,

France, February 16, 1918.

1. General Orders, No. 8, 1917, these headquarters, is revoked and the following is substituted therefor.

2. The tables hereto attached show the distribution of staff duties of the general headquarters of the American Expeditionary Forces. The information given in these tables is not to be communicated, either directly or indirectly, to the press or any person not holding an official position in the military service.

The distribution of staff duties in the headquarters of divisions, army corps, and other commands subordinate to these headquarters will conform in principle to the distribution of duties shown in these tables.

The distribution of duties within each staff department at these headquarters and the assignment of personnel to such duties will be regulated by the chief of the staff department concerned.

The object of these tables is to form a basis of coordinated action between the several staff departments in a command. They were originally prepared after a comprehensive study of the staff organization of the French and British Armies, now revised as a result of our own experience. They are intended to adapt our staff system to the requirements of modern field conditions and will serve as a guide to all concerned.

3. The Line of Communications as herein reorganized will be known and designated as the Services of Supply. The commanding general, Services of Supply, in addition to his other duties will exercise all of those functions heretofore prescribed for the commanding general, Line of Communications.

4. A service of utilities is announced. It will include the transportation department the motor transport service, forestry service, and lumber and the production and all construction under the commanding general, Services of Supply. The above services will be coordinated by the chief of utilities under the commanding general, Services of Supply.

5. The chiefs of the administrative and technical staff services, under their titles and authority as members of the staff of the commander in chief, will exercise all of their functions in the matter of procurement, supply, transportation and construction under the direction of the commanding general, Services of Supply, by whom these activities will be coordinated. The chief of each of these services is authorized, in his discretion, to designate an officer of his service to represent him with each general staff section at general headquarters.

6. The chiefs of services will so organize their offices that the efficiency of their departments will not be impaired by necessary absences for conference with, or for other duty assigned to them by, the commander in chief.

By command of General Pershing:

JAMES G. HARBORD,
Chief of Staff.

Official:

BENJ. ALVORD,
Adjutant General.

ORGANIZATION OF GENERAL HEADQUARTERS, AMERICAN EXPEDITIONARY FORCES (G. H. Q., A. E. F.)

TABLE I

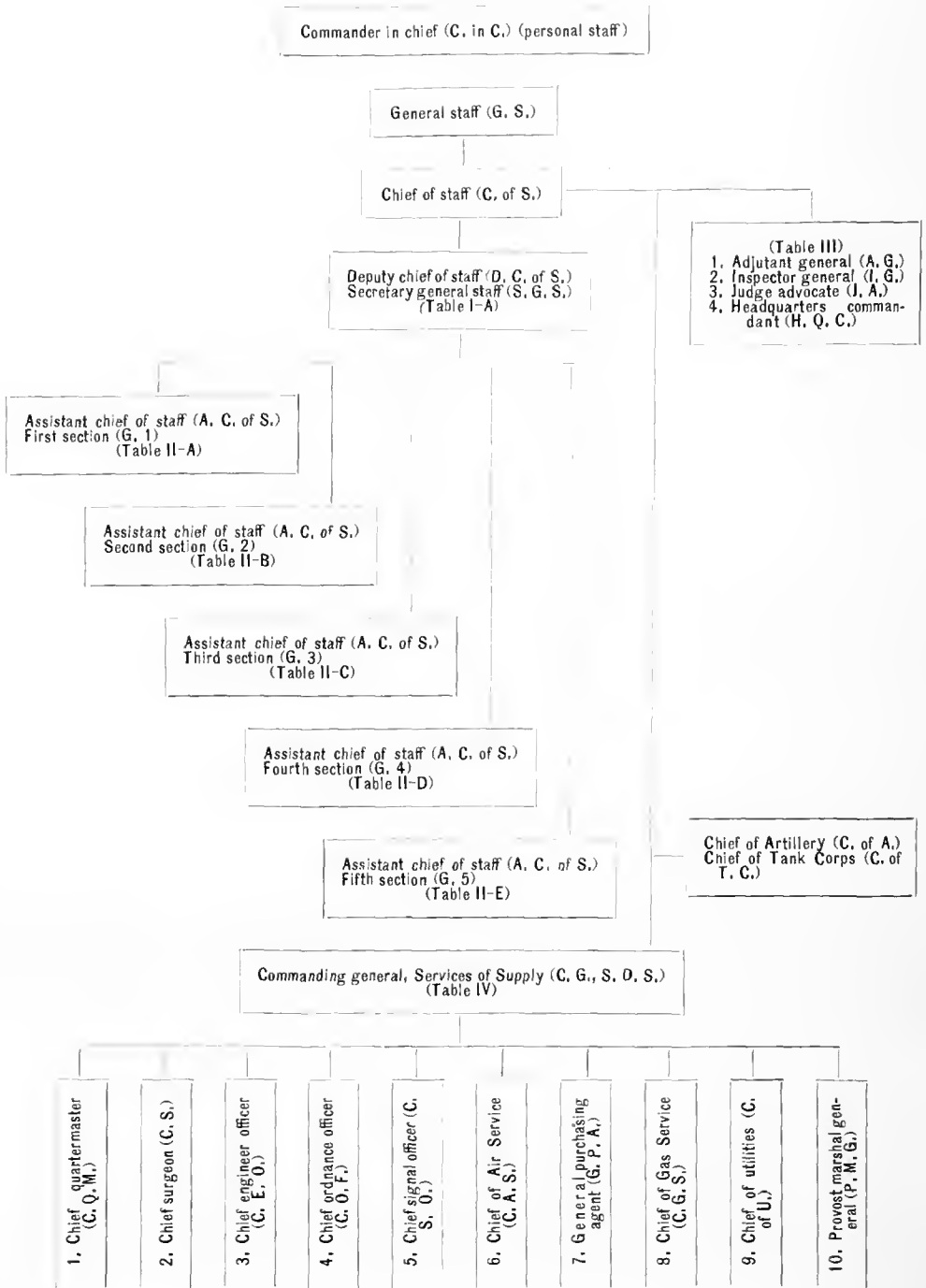


TABLE II (D).—GENERAL STAFF

ASSISTANT CHIEF OF STAFF, FOURTH SECTION (G-4)

Supervises supply, construction, and transportation in France, including location of railway and supply establishments.
 Analyzes statistics concerning the above.
 Guarantees supply and transportation arrangements for combat.
 Supervises hospitalization and evacuation of the sick and wounded.
 Supervises all operations of the Services of Supply not assigned to other sections of the general staff.
 Makes assignment of all new units arriving in France; of all labor and labor troops.

TABLE IV.—SERVICES OF SUPPLY

(Commanding general, Services of Supply)

Transportation and construction.
 Service of territorial command.
 Supply, sanitary, and telegraph service, paragraph 368, F. S. R.

TECHNICAL AND ADMINISTRATIVE SERVICES

(Medical Corps)

Hospitals.
 Sanitary inspection.
 Health of command.
 Care of sick and wounded.
 Collection and evacuation of sick and wounded.
 Medical supplies.
 Veterinary supplies.
 Supply of personnel and material for gas defensive under supervision of director of Gas Service.
 Technical inspection of medical organizations and establishments.

General Order 44.

MARCH 23, 1918.

1. General Orders, No. 43, series 1917, these headquarters, as amended by section 11 (1), General Orders, No. 13, current series, these headquarters, and General Orders, No. 63, series 1917, these headquarters, as amended by section 11 (2), General Orders, No. 13, and section IV, General Orders, No. 20, current series, these headquarters, are hereby revoked and the following is substituted therefor:

GENERAL PROVISIONS

(See General Orders, No. 74, 1918)

2. The regular and prompt receipt of supplies is one of the prime necessities for the good administration of any command. The officer whose mind is distracted by the lack of food, clothing, or munitions, or by worry as to whether such supplies will arrive in time for his needs, is not free to devote his energies to the training of his men nor to the defeat of the enemy. Owing to a situation which could not be foreseen when the F. S. R. were written, some changes have had to be made in the organization of the staff and Line of Communications as contemplated in those regulations. The new organization is shown in General Order No. 31, current series, a careful study of which is necessary to grasp its details and to insure a proper coordination of effort as regards supply and construction. The regulations hereinafter given are explanatory of the methods of procedure under the organization adopted.

3. The commanding general, Services of Supply, is responsible for the procurement of all supplies, material, equipment, plants, and establishments necessary for the American troops in France. This is accomplished by purchase or requisition, in Europe, or in the United States. He is also responsible for the care and storage of such supplies, material, and equipment, and for their manufacture, salvage, repair, and cleaning, when necessary, and for the construction, maintenance, and repair of all agencies necessary to accomplish these purposes. He is responsible that the supplies, material, and equipment are maintained and distributed amongst the several depots in accordance with approved projects. The general supervision of all these functions is exercised by the general staff, as a rule, through G-4 thereof.

4. He is charged with unloading of freight and troops from ships at all points of debarkation, and with the transportation of all troops and supplies by rail therefrom, in accordance with instructions received from general headquarters (G-4). He is responsible for the construction, maintenance, and operation of such utilities as may be necessary to accomplish these objects, including such French railroad lines and rolling stock as come within American control.

5. He will have a representative of the transportation department at each regulating station, group of supply depots, at each railhead, and at each important railroad station, to facilitate military traffic, and he is responsible that all freight turned over to the transportation department for transportation is promptly delivered to its destination.

6. In these duties the commanding general, Services of Supply, is assisted by a technical staff consisting of the chiefs of the various supply departments and technical services hereinafter called the Services of Supply. Each chief of service will exercise a close personal control and supervision over all the establishments of his department throughout the theater of operations. They will each keep the approved projects up to date, and maintain corresponding lists showing the kind and quantity of supplies, material and equipment that should be kept on hand in the various depots for which they are responsible as the proper supply under the provisions of paragraph 1, confidential memorandum, August 7, 1917, A. E. F. These projects will, upon approval by general headquarters, be the guide for the commanding general, Services of Supply, who is charged with keeping the full stock of supplies on hand in his depots. Changes in these projects will be made from time to time as better information is obtained as to the exact needs of our forces, and these changes, when similarly approved, will govern.

7. Each chief of service of supply may submit, for approval of general headquarters, lists of special or unusual supplies not normally issued in accordance with existing orders or regulations, and after such lists are approved organization commanders are authorized to requisition for these supplies as hereinafter explained. When new troops are due to arrive, or when at any time the chief of service of supply can foresee a need for materials or supplies, he should anticipate the needs of the organizations concerned and take the necessary steps to have the materials or supplies delivered in advance of requisitions.

8. Whenever there is any shortage in an important article of supply, equipment, or transportation, and the necessity arises for coordination of distribution or a reduction of allowances becomes necessary, the commanding general, Services of Supply, will report the case to general headquarters (G-4) for instructions to govern until normal conditions are restored.

9. Whenever articles not on the automatic supply basis (class 1) are issued from any depot from the stock on hand in depot, the issuing officer will send a copy of the lists of materials issued, stamped across the face "For replacement," to the chief of his services, Services of Supply, and this list or issue slip will have the force of a requisition. The necessary steps will then be taken to replace issues, either by direct delivery from primary sources or by transfer from another depot farther to the rear, where the actual replacement will be made. Routine issues of articles which are on the automatic supply basis will be forwarded, periodically, without requisition, from the rear depots to the advance depots under instructions of the chief of the service of supply concerned, and thence to the troops, under instructions herein contained. Notice of the issue of such articles need not be made by the issuing depot. The principle of automatic supply will be applied as far as practicable

to all articles of regular issue. The regulating officer will notify the general staff, Services of Supply, of changes in rate of automatic issues, who will notify the chiefs of services concerned.

10. The chief of each service of supply, Services of Supply, is immediately responsible for his depots and establishments in the Services of Supply, and it is his duty to keep informed as to the kind of materials and supplies on hand, and to call upon the representative of his service on the general purchasing board for replacements that can be obtained in Europe. All requisitions for supplies and materials to come from the United States and all exceptional purchases in Europe will be made in accordance with policies approved at general headquarters.

11. No purchases of supplies, other than emergency purchases for his own office, will be made by the purchasing officer of the general purchasing board, except as authorized by the chief of his service, A. E. F., or as directed by the commanding general, Services of Supply. The purchasing agent or disbursing officer is not, in general, concerned with the initiation of purchases or with the state of supplies in the depots. His function is to purchase and inspect the supplies ordered, to provide for their transportation to France, and to pay for them. He will investigate all possible sources of supply that might reduce the tonnage to be brought from the United States.

12. The commanding officer of each base, intermediate, and advance section, Services of Supply, except as otherwise specifically provided for, is responsible for the discipline, police, and sanitation of the area assigned to him, in so far as the American personnel and institutions are concerned and for so much of the administration as may be assigned him by the commanding general, Services of Supply. The administration of tactical divisions and schools or camps of instruction will be governed by special instructions issued from time to time from general headquarters.

13. The officer in charge of each supply depot will keep the chief of his service, Services of Supply, periodically informed as to the stock on hand in his depot, and will issue supplies on requisitions approved by the chief of his department or service, or as herein otherwise prescribed. When shipment of supplies is authorized, it is his duty to have them promptly loaded into cars, to have the cars plainly marked, as prescribed in section II, General Order No. 17, 1918, and to send full telegraphic information in regard to the shipment to the consignee, or if into the zone supplied from a regulating station, to the regulating officer. This telegram should include car initials, car number, date of shipment, organization for which intended, routing and contents of car in sufficient detail for identification. Unless otherwise authorized, all shipment to points in the advance section will be made through the regulating station.

14. When supplies are issued from depots to establishments, troops, or for construction work, the receiving officers will receipt for the supplies on the usual forms, with a notation showing the organization or the work for which the supplies or material are to be used. No further formal accounting for the supplies or materials will be required from the receiving officer. (F. S. R., par. 370.) The same care will be taken of all equipment, supplies, and material and the same economy in their use will be observed as if a formal accounting were required. Commanding officers are charged with the duty of seeing that neither men nor organizations of their commands waste, make misuse of the supplies, materials, or equipment furnished to them, or accumulate a surplus thereof. Organizations or individuals demanding much in excess of the average amounts required by other like units under similar conditions will be investigated, and proper action taken if waste, misuse, or undue accumulation is discovered.

AGENCIES OF SUPPLY AND EVACUATION IN THE ADVANCE SECTION, SERVICES OF SUPPLY

15. A regulating station is a large railway yard where cars from the supply depots and from the rear are received and made up into trains for the divisions. Here also are received all express, mail, and freight for organizations at the front. These are sorted in the regulating station and distributed in separate cars for each division, or group of nondivisional organizations, and turned over to the transportation department for dispatch to destination. Usually a separate train is provided for each division or group.

16. All troops forwarded to points in the advance section will be sent to the proper regulating station, and advice of each movement will be sent to the regulating officer by wire, giving the strength in officers, men, and animals, the tonnage of baggage and freight of each unit and its assignment. The same information must be furnished him for each entraining point regarding any troops whose movement he must arrange for. Troops coming into a regulating station are detrained, if necessary, and reentrained into trains which will take them to their proper divisions. Trains arriving at a regulating station containing troops for a single destination are forwarded direct.

17. The regulating officer is a member of the fourth section, general staff (G-4). As a rule he belongs to the headquarters of an army or a group of armies. Until such organizations are formed he may be assigned to G-4 of the staff of the command he is supplying. It is his duty to give all orders for the railway movement of troops and supplies within the sector served by his regulating station, and to follow the movements through to completion, the troops to their proper destination, and the supplies until delivered to divisional supply officer, or to supply officers of detached or nondivisional organizations. To him are sent all orders for, and information regarding, the railway transportation of men, animals and material in the advance section, Services of Supply, and all notices of similar shipments due to arrive at the regulating station, either from front or from the rear. He must be promptly advised by army headquarters of any changes or movements at the front that will affect supply. He, in turn, must inform the railway officers in time for them to make preparations for the contemplated move, and must take the necessary measures to insure the proper supply. He is responsible for the daily automatic supplies of the troops which he serves, and he issues the necessary orders to insure that supply. The agents of the Services of Supply shall respond to all such requirements of the regulating officer to accomplish these ends. Only in emergency will calls for supplies be made by telegraph. Such telegraphic calls for supplies of any class will be sent by the proper headquarters to the regulating officer, who will order them from the proper depot. The object of the regulating station and of all the elements of the Services of Supply adjacent thereto is to facilitate the supply of the troops served by that regulating station, and in case of necessity the decision of the regulating officer will be authoritative on all subjects arising within such elements or units attached thereto.

18. By frequent visits and conferences, he will keep in close touch with the headquarters of the unit which he is serving. On certain questions which are reserved for the decision of general headquarters, and in emergencies, communication is held direct between general headquarters (G-4) and the regulating officer.

19. The railway personnel in the advance section, Services of Supply, are subject to orders of the regulating officer in so far as concerns their receiving, caring for, and transporting troops and supplies and as regards priority of shipments. This control is exercised through the proper railway officers. They are subject to the orders of the commanding officer advance section, Services of Supply, in all matters of discipline, sanitation, and administration not involving questions of railway management. They are subject to the orders of the chief of utilities in all matters pertaining to their technical work in the construction, operation, and maintenance of the railways, and as regards their location or employment.

20. *Railheads and refilling points.*—The railhead, as the name implies, is the point on the railway at which the troops or supplies are discharged. The refilling point is the place at which the division trains receive the supplies. The two may coincide. The personnel at the railheads and refilling points are responsible to the regulating officer for the unloading, care, and preservation of the freight, mail, and express until turned over to the division trains. At or near the refilling point will be maintained certain authorized stores for emergency issue, and one day's supply of rations, fuel, and gasoline to fill the division trains immediately upon their arrival, thus avoiding long waits for late railway trains. The stock at railheads, other than class I supplies, is for real emergency use only and will not be used to meet ordinary needs.

21. The commanding general of the unit to which the regulating officer belongs will detail an officer at each railhead to be known as the railhead officer, who will be in charge

both of railhead and refilling points. This officer will be charged with the receipt and prompt unloading of all cars received at that station for American troops. He will be warned of their arrival by the regulating officer and will unload the cars as soon as possible, and always within 24 hours after they are placed for unloading, with a personnel furnished him for that purpose, calling upon the local commanding officer for any additional men that may be necessary to accomplish that object. The railhead officer is charged with the proper cleanliness of that part of the yard that may become littered up by American troops. He will receive his instructions from the regulating officer, and may have certain supply officers detailed to assist him in administering the refilling point. The railroad transportation officer at railhead is a transportation department officer, and as regards operation of the railway he reports to and receives his orders from the railway officer of the regulating station. He receives his orders as to where and when to place cars from the railhead officer, whom he keeps constantly informed as to arrival and departure of cars. The railhead officer and a certain number of the permanent personnel for the railhead will be furnished the army for the foregoing purposes by general headquarters. Any additional personnel needed in an emergency will be furnished from the near-by organizations.

22. Evacuating stations and sorting stations are established for the reverse movement of personnel, animals, and materials. An evacuation station is a place for the collection of men, animals, and materials that have become unfitted for use in the front and for which movement to the rear is contemplated. The personnel of these stations receive and care for the personnel and material to be evacuated, and at the proper time load them on trains provided by the regulating officer. Orders for the evacuation of men or material are ordinarily issued by G-4, at army headquarters, which should receive early notification of desired movements so that the regulating officer may be given ample time to provide for the amount and kind of rolling stock required. During action the officer in charge of an evacuation station may call directly upon the regulating officer for the necessary railway equipment to evacuate the wounded. Sorting stations are railway stations to which evacuated men and material are sent from the evacuation stations and where they are sorted into their special classes and thence shipped to their final destination in the rear. Sick and wounded are sent to the various hospitals; worn out and broken material is distributed to depots or shops of Services of Supply.

CLASSIFICATION AND METHODS OF SUPPLY

23. All supplies desired by troops are, for the purpose of this order, divided into four classes, viz:

Class 1.—All articles of daily automatic supply, which shall consist of rations, forage, fuel, gasoline, lubricants and illuminants.

Class 2.—Clothing, blankets, overcoats, slickers, ponchos, bed sacks, and brassards.

Class 3.—All other authorized articles of equipment (except ammunition) furnished by the several supply departments including sector equipment and the authorized allowance of vehicles.

Class 4.—Ammunition, construction material, all articles of an exceptional nature not included in authorized allowances, and all articles the distribution of which must depend upon operations, lists of which will be published from time to time.

24. This system of supply contemplates having troops normally unencumbered with impedimenta and supplies, thus enabling them to have a maximum mobility. At the same time, the method for obtaining necessary supplies has been so simplified that any article, when needed, can be obtained on a few hours' notice.

25. Class I supplies (articles of automatic supply) will be obtained and distributed as follows:

(a) Regimental supply officers or supply officers of other independent organizations will submit ration returns and forage requisitions to the division quartermaster, or quartermaster of the organization to which they are attached. He in turn will consolidate the returns. The division return will be submitted to the local supply officer at the refilling point for filling.

(b) The daily automatic supply is based on the actual strength of the organization in men and animals. This information is furnished weekly, or as much oftener as may be necessary, to headquarters of the army (G-4) by G-1 of the division or corps from the data prepared for the statistical division, Adjutant General's Office. Army Headquarters notifies the regulating officer by wire of the number of men and animals of each division or other similar organization belonging to the army. Other organizations in the advance section, Services of Supply, send similar strength reports direct to the regulating officer. The regulating officer may call upon the various supply depots for automatic supplies required in two ways; either by indicating the division or detached or nondivisional organization for which the supplies are required by the proper symbol number or by calling for the supplies in bulk.

(c) Under the first method of procedure the various classes of supplies are then loaded into railway cars, properly checked and rechecked, and each car is labeled on both sides with symbol number of the division, or detached or nondivisional organizations, for which the supplies are destined. A list of the contents of each car is posted in a conspicuous place in the car. Information regarding the shipment is telegraphed to the regulating officer by the depot officer; and the regulating officer then prepares schedules of the make-up of the trains for various divisions, gives them to the representative of the transportation department, who will make up respective trains and dispatch them to their destinations, accompanied by an agent for each divisional or similar group of cars whenever necessary.

(d) On arrival at refilling point the train is promptly unloaded, and the supplies required for the troops are immediately transferred to division trains by the railhead officer, or they are put under cover for issue the following day.

(e) The period elapsing from the date on which the organization's strength report is made and date on which the corresponding shipment of rations are drawn upon (one to four days) render it imperative that the small stock provided for in paragraph 20 shall be kept at, or near, the refilling point.

(f) In case supplies are called for in bulk (full trainloads of forage, fuel, etc.) the following procedure will be observed: To fill the demands of a division for such commodities one or more railway cars, with cargo corresponding to nearest weights demanded by the respective organizations, will be cut from the trains, marked with the proper symbol and amount of supplies, and turned over to the representative of the transportation department for proper marshaling and dispatch. The contents of a full car will not be broken. This method will result in overissues or underissues, as the case may be, and will require adjustment from day to day. A record book with headings for plus and minus issues and the amount due to different organizations will be kept by the regulating officer and officer in charge of the refilling point for making the adjustments in further shipments and issues.

26. Class 2 supplies (clothing, blankets, overcoats, etc.):

(a) Requisitions are submitted by the company commanders, and upon consolidation and approval by the regimental commanders are checked by the proper staff officer and sent (through G-1 in division of corps, or G-4 for army troops), directly to the proper advance depot, which will fill the requisition.

(b) The depot officer will inform the railway officers of the number and kind of cars he will require to forward these supplies and the time and place he will want them spotted for loading.

(c) The regulating officer will be informed by the railway officer of these calls for cars, and if there is any necessity thereof from the shortage of cars or special needs for other shipments will indicate the order of priority. After the cars are placed by the railway personnel they are loaded by the depot personnel, and the procedure until they are delivered to the refilling points is as heretofore described for carloads of class 1 supplies.

27. Class 3 supplies: All other authorized articles of equipment, except ammunition:

(a) These supplies are requisitioned by the organization in the manner prescribed for class 2. These requisitions are received by the supply officer of the division, and are filled from any disposable supplies in the division. The remainder of the requisition is forwarded direct to army headquarters, where a similar procedure is followed. The army

supply officer, in consultation with G-4, fills the needs from disposable supplies within the army parks, trains, or dumps.

(b) The remainder of the requisition which can not be furnished from the resources at the disposition of the army is forwarded to the advance depot, Services of Supply, where the procedure is the same as prescribed for articles of class 2.

28. Class 4 (ammunition, constructions material, exceptional articles, and all articles temporarily excepted from classes 2 and 3 by orders):

(a) Requisitions for articles of this class are handled in the same way as described for those of class 3, except that after the articles which are disposable within the army have been furnished the remainder of the requisition is forwarded direct from the army headquarters (G-4) to general headquarters (G-4), where it is considered in connection with contemplated operations and of the relative needs of other units.

(b) In order to expedite the supply of these articles to the troops, certain amounts in the depots, called credits, may be placed at the disposition of army headquarters. Upon these credits army headquarters may draw without reference to general headquarters, sending their requisition direct to the proper depot. Army headquarters should inform general headquarters (G-4) of such drafts upon the credits, in order that they may know at all times the status of the credits. Action upon requisitions for articles on which no credit has been established, and upon renewals of amounts withdrawn from existing credits, is determined by general headquarters (G-4) in consultation with proper supply officer. When decision is reached the necessary information is sent to the proper depot, with directions to forward the supplies or to renew the credits as the case may be. Information upon all such points is also sent to the regulating officer and to army headquarters. Army headquarters will also be informed if the credit is not to be renewed immediately.

29. All requisitions for division, corps, and army troops or separate organizations will be given a serial number for that organization, and the various items in each requisition will also be numbered serially. When passed by the proper authority, G-1, G-4, or the commanding officer, respectively, a copy of the requisition will be returned to the proper supply officer of the organization, one copy will be sent to the chief of the proper service, Services of Supply, and one to the proper depot.

30. Articles called for on requisitions which remain unfilled for considerable periods are frequently duplicated on later requisitions submitted by the same organization, thereby leading to duplicate shipments of material or supplies to the organization making the requisition. In order to obviate this depot officers will telegraph organizations whose requisitions have not been filled 15 days after the date of the requisition, notifying the organization that the requisition has been received and that the articles therein requested which have not been shipped will be shipped as soon as available, or giving an approximate date, if possible, when the articles will be furnished. When a depot can not fill an entire requisition, the depot officer shall notify his chief of service, Services of Supply, of the items he can not supply, giving organization, requisition number, and item number. A copy of this notice shall be mailed to general headquarters (G-4) by the depot officer. The chief of service will immediately arrange to supply that depot with such articles, and when they are received the requisition will be filled. In case the need for articles which have been requisitioned and not furnished ceases to exist, the officer submitting the requisition will at once notify the supply depot holding the requisition and request the cancellation of the articles not required. Organizations will not duplicate on requisitions articles which they have called for on previous requisitions, except as provided in the following sentence: Supply officers may, from time to time, include in requisitions all items unfilled at that date, indicating opposite each item the fact that they were originally requested on requisition of certain number, but not furnished, and requesting that all unfilled requisitions be canceled.

31. The accuracy, necessity for, and sufficiency of these requisitions rest upon the regimental or other similar commander. The final responsibility rests with the division commander.

32. Corps troops and army troops send their requisitions direct to corps and army headquarters, respectively, and a similar procedure is followed for each class of supplies as outlined above.

33. Pending the establishment of army headquarters, the functions herein prescribed for army headquarters will be performed by the corps.

34. The chiefs of the various services of supply will so organize their offices that they will be free to make frequent inspections of the establishments of their departments in all parts of the theater of operations, with a view of reporting upon any unauthorized use or abuse of equipment, supplies, or materials, or any undue accumulations of the same beyond reasonable needs.

METHOD OF SUPPLY IN REAR OF ADVANCE SECTION, SERVICES OF SUPPLY

35. Units in the Services of Supply in rear of the advance section will obtain their equipment and supplies in the following general manner, the details of which shall be prescribed by the commanding general, Services of Supply:

(a) Articles of classes 1, 2, and 3 will be issued by supply depots on requisitions made direct to them. All requisitions will show amounts on hand, and no surplus over the authorized allowances will be requisitioned for.

(b) Requisitions for equipment or supplies, class 4, including all those for construction work, will be submitted to the chief of the service of supply concerned, who will, after approval, send them to the proper depot for filling. Credits for material for approved construction projects may be placed at the disposition of the officer in charge. These will be handled within the Services of Supply in a manner similar to that prescribed for credits given to army headquarters.

[For official circulation only]

General Orders, No. 130

GENERAL HEADQUARTERS,
AMERICAN EXPEDITIONARY FORCES,
France, August 6, 1918.

1. The following basic principles to govern future development of the Services of Supply are announced:

(a) While proper organization and direct control of all efforts to a common end require that the Services of Supply function in accordance with general plans formulated by the general staff of the American Expeditionary Forces, the commanding general of the Services of Supply is charged with all questions of automatic supply under approved policies of the American Expeditionary Forces.

(b) The problems of supplying these forces will be understood to embrace the requisitions by heads of supply departments, or purchase through the general purchasing board; the discharge and transportation of supplies by rail and water; the chartering and requisitioning of vessels; the necessary construction of facilities for these purposes; the procurement of personnel or the exchange thereof with the United States.

(c) Conforming to letters of instruction issued to him from time to time the commanding general of the Services of Supply is charged with the development of port facilities, storage facilities, railroad transportation, and the allotment of tonnage.

(d) Large questions of policy, including those concerning new types and new scales of equipment, except for Services of Supply troops; the immediate control of military transportation and supply in the zone of the armies, and the determination and control of war material will remain in the hands of the general staff of the commander in chief and subject to his direction and approval.

(e) Heads of supply departments, as such, will carry on their activities under the immediate direction of the commanding general, Services of Supply.

* * * * *

QUANTITIES OF MEDICAL AND HOSPITAL SUPPLIES PURCHASED DURING THE PERIOD APRIL 6, 1917, TO NOVEMBER 11, 1918.

POST MEDICAL SUPPLIES

MEDICINES, ANTISEPTICS, AND DISINFECTANTS		Atropinæ sulphas:
<p>Acacia, powder, 1 pound in bottle.....bottles.. 85,830</p> <p>Acetanilidum, ¼ pound in bottle .....do..... 56,760</p> <p>Acetphenetidinum (phenacetin), ¼ pound in bottle.....bottles.. 27,500</p> <p>Acidum aceticum, ½ pound in bottle.....do..... 52,100</p> <p>Acidum boricum, powder, ½ pound in bottle.....bottles.. 565,750</p> <p>Acidum citricum, ½ pound in bottle.....do..... 37,920</p> <p>Acidum hydrochloricum, ½ pound in bottle.....bottles.. 94,930</p> <p>Acidum nitricum, ½ pound in bottle.....do..... 71,725</p> <p>Acidum oxalicum, for surgical use, ½ pound in bottle.....bottles.. 37,714</p> <p>Acidum salicylicum, 3 ounces in bottle.....do..... 102,599</p> <p>Acidum sulphuricum, ½ pound in bottle.....bottles.. 84,400</p> <p>Acidum sulphuricum aromaticum, ½ pound in bottle.....bottles.. 5,500</p> <p>Acidum tannicum, powder, 3 ounces in bottle.....bottles.. 44,267</p> <p>Acidum tartaricum, ½ pound in bottle.....bottles.. 97,250</p> <p>Adeps lanae hydrosus, ¼ pound in bottle.....bottles.. 20,472</p> <p>Adrenalin chlorid, 1-mgm. tablets, 20 in tube.....tubes.. 178,875</p> <p>Æther, ¼ pound in tin.....tins.. 8,780,088</p> <p>Æthylis chloridum, 3 ounces in metal tube.....tubes.. 25,825</p> <p>Aleohol, 5 gallons in bottle.....bottles.. 276,085</p> <p>Aloe, powder, 1 ounce in bottle.....do..... 32,900</p> <p>Alumen, powder, ½ pound in bottle.....do..... 29,800</p> <p>Ammonii bromidum, ½ pound in bottle.do..... 8,410</p> <p>Ammonii carbonas, lumps, ½ pound in bottle.....bottles.. 29,500</p> <p>Ammonii chloridum, ¼ pound in bottle.do..... 187,104</p> <p>Amylis nitrus, 5-drop spirets, 12 in box.....boxes.. 29,550</p> <p>Antimonii et potassii tartras, ½ ounce in bottle.....bottles.. 11,500</p> <p>Apomorphinæ hydrochloridum, 6-mgm. hypodermic tablets, 20 in tube.....tubes.. 196,905</p> <p>Aqua ammoniæ, 10 per cent 1 pound in bottle.....bottles.. 137,300</p> <p>Aqua hydrogenii dioxidi, 1 pound in bottle.....bottles.. 61,000</p> <p>Argentii nitras, crystals, 1 ounce in bottle.do..... 133,985</p> <p>Argentii nitras fusus, 1 ounce in bottle.....do..... 60,200</p> <p>Argyrol, 1 ounce in bottle.....do..... 567,600</p> <p>Arseni trioxidum, 1-mgm. tablets, 250 in bottle.....bottles.. 46,800</p> <p>Asafotida, ½ ounce in bottle.....do..... 4,250</p> <p>Aspirin, 1 ounce in bottle.....do..... 842,650</p>	<p>½ ounce in bottle.....bottles.. 5,440</p> <p>0.65-mgm. hypodermic tablets, 20 in tube.....tubes.. 692,625</p> <p>0.13-mgm. optbalmic disks, 50 in tube.....tubes.. 6,800</p> <p>Balsamum Peruvianum, ¼ pound in bottle.....bottles.. 79,710</p> <p>Balsamum toluatanum, ¼ pound in bottle.....bottles.. 17,100</p> <p>Bismuthi subgallas, ½ pound in bottle.....do..... 5,850</p> <p>Bismuthi subnitrus, ½ pound in bottle.do..... 14,900</p> <p>Caffeina citrata, ½ ounce in bottle.....do..... 217,800</p> <p>Calx chlorinata, 1 pound in zink container.....pounds.. 135,424</p> <p>Camphora, powder, ½ pound in bottle.....bottles.. 357,610</p> <p>Capsicum, powder, ½ ounce in bottle.....do..... 20,200</p> <p>Cera flava, in ½ pound cake.....cakes.. 10,335</p> <p>Chloralum hydratum, 1 ounce in bottle.....bottles.. 69,900</p> <p>Chloroformum, ¼ pound in tin.....tins.. 2,163,800</p> <p>Chrysarobinum, ½ ounce in bottle.....bottles.. 17,600</p> <p>Cocainæ hydrochloridum:</p> <p>¼ ounce in bottle.....do..... 179,360</p> <p>10-mgm. hypodermic tablets, 20 in tube.....tubes.. 1,275,612</p> <p>Codeina sulphas, 1 ounce in bottle.....bottles.. 25,500</p> <p>Collodium, 1 ounce in bottle.....do..... 325,000</p> <p>Copaiba, ½ pound in bottle.....do..... 21,800</p> <p>Creosotum, 1 ounce in bottle.....do..... 108,000</p> <p>Cresol, 1 pound in bottle.....do..... 74,000</p> <p>Creta preparata, ½ pound in bottle.....do..... 18,700</p> <p>Cupri sulphas, 1 ounce in bottle.....do..... 56,900</p> <p>Digitalinum, 1-mgm. hypodermic tablets, 20 in tube.....tubes.. 154,500</p> <p>Emetinæ hydrochloridum, 22-mgm. hypodermic tablets, in tube.....tubes.. 314,500</p> <p>Emplastrum belladonnæ, 2 yards by 6 inches, in tin.....tins.. 34,600</p> <p>Emplastrum cantharidis, 1 yard by 6 inches, in tin.....tins.. 17,550</p> <p>Emplastrum sinapis, 4 yards by 6 inches, in tin.....tins.. 72,151</p> <p>Eucalyptol, 1 ounce in bottle.....bottles.. 28,800</p> <p>Extractum belladonnæ foliorum, 1 ounce in bottle.....bottles.. 16,150</p> <p>Extractum glycyrrhizæ purum, ¼ pound in jar.....jars.. 127,164</p> <p>Extractum hyoscyami, 1 ounce in bottle.....bottles.. 4,400</p> <p>Extractum rhanini purshianæ, 130-mgm. tablets, 250 in bottle.....bottles.. 43,674</p> <p>Ferri et quininae citras solubilis, 3 ounces in bottle.....bottles.. 16,566</p>	

Ferri phosphas solubilis, 1 pound in bottle bottles.....	46,600	Oleum caryophylli, 1 ounce in bottle.....	bottles..	86,000
Ferri sulphas exsiccatus, ¼ pound in bottle bottles.....	9,800	Oleum gossypii seminis, 1 quart in bottle bottles.....		434,500
Fluidextractum ecbicii seminis, 1 ounce in bottle.....	15,700	Oleum menthae piperita, 1 ounce in bottle bottles.....		28,350
Fluidextractum ergotae, ½ pound in bottle bottles.....	4,450	Oleum morrhuae, 1 pound in bottle.....	do....	20,500
Fluidextractum ipecacuanbae, ½ pound in bottle bottles.....	7,850	Oleum ricini, 1 quart in bottle.....	do....	209,300
Fluidextractum pruni virginianae, 1 pound, in bottle.....	10,550	Oleum santali, 1 ounce in bottle.....	do....	51,200
Fluidextractum zingiberis, ¼ pound in bottle bottles.....	18,450	Oleum terebinthinae rectificatum, 1 quart in bottle.....	bottles..	30,250
Foot powder (par. 902), ¼ pound in tin.....	12,980,000	Oleum theobromatis, ¼ pound in bottle.....	do....	109,100
Glycerinum, 1 pound in bottle.....	277,500	Oleum tiglii, 1 ounce in bottle.....	do....	5,800
Heroini hydrochloridum, 5.5-mgm. tablets, 500 in bottle.....	100	Opil pulvis, 2 ounces in bottle.....	do....	7,450
Hexamethyleammina (urotropin), 1 ounce in bottle.....	167,950	Pepsinum, 3 ounces in bottle.....	do....	26,199
Homatropinae hydrobromidum, 15 grains in bottle.....	10,900	Peptonizing tablets (par. 902), 125 in bottle bottles.....		9,210
Hydrargyri chloridum corrosivum: 3 ounces in bottle.....	do....	Petrolatum, 3 pounds in tin.....	tins..	369,400
Commercial, 1 pound in bottle.....	do....	Petrolatum liquidum, 1 pound in bottle bottles.....		111,400
Tablets (antiseptic, par. 902), 250 in bottle bottles.....	499,100	Phenol, ½ pound in bottle.....	do....	795,538
Hydrargyri chloridum mite: 32-mgm. tablets, 250 in bottle.....	do....	Pbenolphthalein, 130-mgm. tablets, 250 in bottle bottles.....		36,800
6.5-mgm. tablets, 250 in bottle.....	do....	Phenylis salicylas (salol), 3 ounces in bottle bottles.....		61,700
2 ounces in bottle.....	do....	Physostigminae sulphas, 0.0325-mgm. ophthal- mic disks, 50 in tube.....	tubes..	4,240
Hydrargyri iodidum flavum: 10-mgm. tablets, 250 in bottle.....	do....	Pilocarpinae hydrochloridum, 8-mgm. hypoder- mic tablets, 20 in tube.....	tubes..	28,300
1 ounce in bottle.....	do....	Pilulae aloini compositae (or tablets; par. 902), 250 in bottle.....	bottles..	382,700
Hydrargyri salicylas, 1 ounce in bottle.....	do....	Pilulae catharticae compositae (or tablets), 400 in bottle.....	bottles..	671,637
Hyoscinae hydrobromidum, 0.65-mgm. hypo- dermic tablets, 20 in tube.....	tubes..	Pilulae copalibae compositae (or tablets; par. 902), 250 in bottle.....	bottles..	39,600
Icthyolum, 3 ounces in bottle.....	bottles..	Pilulae ferri compositae (or tablets; par. 902), 80 in bottle.....	bottles..	286,225
Iodum, 1 ounce in bottle.....	do....	Plumbi acetas, 6 ounces in bottle.....	do....	168,682
Ipecacuanba, powder, 3 ounces in bottle.....	do....	Potassii acetas, 6 ounces in bottle.....	do....	20,800
Liquor cresolis compositus, 1 quart in bottle, bottles.....	1,820,050	Potassii bicarbonas, 1 pound in bottle.....	do....	6,650
Liquor formaldehydi (37½ per cent): 1 quart in bottle.....	do....	Potassii bromidum, 1 pound in bottle.....	do....	12,500
5 gallons in jug.....	jug..	Potassii chloras: Powder, 1 pound in bottle.....	do....	11,877
Liquor potassii arsenitis, ½ pound in bottle, bottles.....	3,600	324-mgm. tablets, 250 in bottle.....	do....	66,080
Lithii citras effervesceus, 324-mgm. tablets, 25 in bottle.....	bottles..	Potassii et sodii tartras, 3 pounds in tin.....	tins..	44,619
Lycopodium, 3 ounces in bottle.....	do....	Potassii hydroxidum, 1 ounce in bottle bottles.....		39,800
Magnesii carbonas, powder, 2 ounces in bottle, bottles.....	52,108	Potassii iodidum, ½ pound in bottle.....	do....	87,600
Magnesii sulphas, 4 pounds in tin.....	tins..	Potassii permanganas, 1 pound in bottle.....	do....	10,050
Massa hydrargyri, 3 ounces in bottle.....	bottles..	Protargol, 1 ounce in bottle.....	do....	1,331,050
Menthol, 1 ounce in bottle.....	do....	Pulvis glycyrrhizae compositus, ¼ pound in bottle.....	bottles..	15,200
Methylis salicylas (oil of wintergreen, syn- thetic), 1 ounce in bottle.....	bottles..	Pulvis ipecacuanbae et opii, ¼ pound in bottle bottles.....		36,700
Morphinae sulphas: Powder, ¼ ounce in bottle.....	do....	Quininae hydrochlorosulphas, 32-mgm. hypo- dermic tablets, 20 in tube.....	tubes..	417,125
8-mgm. hypodermic tablets, 20 in tube, tubes.....	5,947,012	Quinine sulphas: Crystals, 1 ounce in bottle.....	bottles..	114,000
Naphthalenum.....	pounds..	200-mgm. tablets, 500 in bottle.....	do....	186,978
Neosalvarsan, 900 mgm. in tube.....	tubes..	Resina podophylli, ½ ounce in bottle.....	do....	4,200
Nitroglycerin, 0.65-mgm. hypodermic tablets, 20 in tube.....	tubes..	Rheum, powder, 2 ounces in bottle.....	do....	3,600
Normal saline solution, tablets (par. 902), 100 in bottle.....	bottles..	Saccharum lactis, powder, 3 ounces in bottle bottles.....		49,266
Oleo-resina aspidii, 1 ounce in bottle.....	do....	Salvarsan, 600 mgm. in tube.....	tubes..	275,786
Oleum aurantii corticis, 1 ounce in bottle.....	do....	Santoninum, 32-mgm. tablets, 250 in bottle bottles.....		10,159
		Sapo mollis (green soap), 1 pound in jar.....	jars..	1,854,100
		Serum antidiphthericum.....	vials..	292,133
		Serum antimentingitidis.....	do....	124,850
		Serum antitetanicum.....	do....	29,375

Sodii bicarbonas, 1 pound in bottle.....bottles..	1,255,240	Books:	
Sodii bicarbonas et mentha piperita, tablets (par. 902), 400 in bottle.....bottles..	187,486	Blank—	
Sodii boras, powder, 1 pound in bottle.....do....	674,465	Crown (cap), 250 pages..... number..	77,700
Sodii bromidum, 6 ounces in bottle.....do....	81,266	8vo., 150 pages..... do.....	169,500
Sodii carbonas monohydratus, for surgical use, 1 pound in bottle.....bottles..	217,675	prescription (see par. 240).....do.....	20,500
Sodii fluoridum, 5 pounds in package packages..	12,223	Envelope openers.....do.....	5,660
Sodii phosphas exsiccatus, powder, 3 ounces in bottle.....bottles..	134,666	Erasers:	
Sodii salicylas, 6 ounces in bottle.....do....	91,467	Rubber—	
Spiritus ætheris compositus, ½ pound in bottle.....bottles..	7,850	Pencil..... pieces..	36,000
Spiritus ætheris nitrosi, ½ pound in bottle.....bottles..	31,700	Typewriter..... number..	10,800
Spiritus ammoniæ aromaticus, ½ pound in bottle.....bottles..	881,000	Steel..... do.....	21,500
Spiritus frumenti, 1 quart in bottle.....do....	95,000	Files, Shannon (for clinical histories).....do....	30,600
Spiritus glycerylis nitratis, 1 ounce in bottle.....bottles..	40,800	Ink, black (powder or tablets), sufficient in box for 1 quart of fluid.....boxes..	132,500
Strychninæ sulphas, 1-mgm. hypodermic tab- lets, 250 in bottle.....bottles..	508,420	Inkstands..... number..	14,000
Sugar, white, 12 pounds in can.....cans..	28,666	Labels:	
Sulphur, in roll.....pounds..	532,360	For dispensing set.....do.....	22,500
Sulphur lotum, ½ pound in bottle.....bottles..	1,074,000	For vials..... gross.....	90,000
Syrupus ferri iodidi, ½ pound in bottle.....do....	5,140	Poison, assorted..... do.....	35,210
Syrupus hypophosphitum compositus, 1 pound in bottle.....bottles..	16,200	Pads:	
Syrupus scillæ, 1 pound in bottle.....do....	11,900	Desk..... number..	6,000
Talcum, 2 pounds in tin.....tins..	38,910	Ink, for stamps.....do.....	13,000
Thymol, 1 ounce in bottle.....bottles..	24,600	Prescription..... dozen..	1,509,810
Thymolis iodidum (Aristol), 1 ounce in bottle.....bottles..	39,600	Paper:	
Tinctura aconiti, 1 ounce in bottle.....do....	14,550	Blotting—	
Tinctura benzoini composita, ½ pound in bottle.....bottles..	32,700	For desks..... quires..	36,420
Tinctura cantharidis, ¼ pound in bottle.....bottles..	1,550	Small pieces for hand blotters pieces..	2,821,400
Tinctura capsici, ¼ pound in bottle.....do....	4,750	Carbon—	
Tinctura cinchonæ composita, 1 pound in bottle.....bottles..	7,750	Cap, 100 sheets in box..... boxes..	47,400
Tinctura digitalis, ½ pound in bottle.....do....	5,050	Letter, 100 sheets in box..... do.....	140,000
Tinctura ferri chloridi, 1 pound in bottle.....do....	16,800	Fasteners..... do.....	60,000
Tinctura gentianæ composita, 1 pound in bottle.....bottles..	13,600	Manifolding—	
Tinctura myrrhae, ½ pound in bottle.....do....	2,600	Cap, 250 sheets in package..... packages..	106,700
Tinctura nucis vomicæ, ½ pound in bottle.....bottles..	30,100	Letter—	
Tinctura opii, 1 pound in bottle.....do....	56,240	500 sheets in package..... do.....	100,300
Tinctura opii camphorata, 1 pound in bottle.....bottles..	38,300	Perforated, 500 sheets in package packages..	39,000
Tinctura strophanthi, 1 ounce in bottle.....do....	3,850	Typewriter—	
Trochisci ammonii chloridi, 125 in bottle.....do....	474,300	Cap, 250 sheets in package..... do.....	80,640
Unguentum hydargyri, ½ pound in bottle.....bottles..	42,475	Letter, 500 sheets in package..... do.....	79,038
Unguentum hydargyri chloridi mitis, 30 per cent, 2 pounds in jar..... jars..	405,889	Writing—	
Veronal, 324-mgm. tablets, 250 in bottle.....bottles..	22,100	Letter..... quires..	57,000
Zinci oxidum, ¼ pound in bottle.....do....	327,828	Note..... do.....	59,300
Zinci sulphas, ½ pound in bottle.....do....	28,27	100 sheets in pad..... pads..	882,000
STATIONERY		Paste, photograph and library..... tubes and jars..	266,500
Bands, elastic..... dozen..	882,500	Pencils, lead..... number..	2,342,036
Baskets:		Penholders..... do.....	178,384
Letter..... number..	24,500	Penracks..... do.....	29,000
Waste paper..... do.....	20,000	Pens, steel..... gross.....	111,944
Binders, loose-leaf, for medical history of post (see par. 412)..... number..	9,250	Punches, perforating..... number..	8,500
Blotters, hand..... do.....	12,500	Rulers..... do.....	13,050
		Tape, office, red..... spools..	7,500
		Vaccination records.....	5,000,000
		MISCELLANEOUS SUPPLIES	
		Alcohol, denatured, 5 gallons in bottle.....bottles..	12,200
		Apparatus:	
		Compressed air (par. 903)..... number..	1,223
		Electric..... do.....	1,851
		For administration of salvarsan..... do.....	6,792
		Restraint (par. 904)..... do.....	1,750
		Applicators for throat:	
		Metal..... do.....	9,000
		Wood..... gross.....	436,200
		Aprons, cooks'..... number..	77,800
		Atomizers, hand..... do.....	49,100
		Bags:	
		Obstetrical (par. 905)..... do.....	227
		Rubber—	
		Hot water..... do.....	16,067
		Ice for head..... do.....	52,000

Bandages:		Caps:	
Gauze, roller, assorted, 6 dozen, in box		For cooks.....number..	56,000
.....boxes	488,317	Operating.....do....	30,000
Rubber, Martin.....number	53,375	Capsules, gelatin, 100 in box, assorted sizes	
Suspensory.....dozen	144,050	.....boxes	1,083,950
Bandage winders.....number	3,620	Cases:	
Bars, mosquito.....do	201,940	Aspirating (par. 910).....number..	2,350
Basins:		Ear, nose, and throat (par. 912).....do....	4,580
For sponges, etc., white enamel.....do....	80,368	Emergency (par. 913).....do....	7,600
Delft, for office.....do	6,000	Eye (par. 914).....do....	4,705
Hand, white enamel.....do	208,940	Forceps, hemostatic (par. 915).....do....	23,405
White enamel, for operating room.....do....	76,000	General operating (par. 916).....do....	8,502
Baskets, laundry.....do	6,000	Genito-urinary (par. 917).....do....	5,502
Bathrobes (gowns, convalescent).....do	273,697	Gynecological (par. 918).....do....	59
Bed cradles.....do	11,500	Pocket (par. 923).....do....	300
Bedpans, white enamel.....do	122,128	Post-mortem (par. 924).....do....	1,400
Bedsteads white enamel, and folding.....do	358,500	Tooth-extracting (par. 925).....do....	8,725
Bells, call.....do	15,900	Trial lenses (par. 926).....do....	850
Blankets, white.....do	2,302,509	Catheters, flexible.....do	428,375
Blowers, for insect powder.....do	2,000	Chairs:	
Boilers:		Arm.....do	37,641
Coffee—		Common.....do	76,517
1½-quart, enamel or tin.....do	8,200	Invalid, rolling.....do	26,620
6-quart, enamel or tin.....do	15,800	Office, revolving.....do	10,210
Double, for cooking—		Rocking.....do	26,000
11-quart.....do	15,660	Barony Hones.....do	219
4-quart.....do	30,840	Chamois skins.....do	9,300
Instrument.....do	9,840	Charts, anatomical.....sets	42
Tin, copper bottom.....do	10,420	Chests, tool, No. 1 (par. 937).....number..	100
Bookcases.....do	204	Cleavers.....do	53,000
Bottles, 4-quart, glass stopper for antiseptic		Clocks.....do	6,210
solutions.....number	13,530	Clothesline, manila.....yards	431,666
Bougies, flexible.....do	47,515	Colanders.....number	10,280
Bowls:		Cork extractors.....do	3,000
Chopping.....do	18,404	Cork pressers.....do	700
Soup.....do	667,600	Corks, long taper, assorted sizes.....dozens..	4,755,428
Sugar, with lid.....do	25,000	Corkscrews.....number	92,190
Boxes:		Cotton, absorbent, in roll.....pounds..	1,413,756
Folding, for tablets.....dozen	1,455,500	Cotton bats.....do	182,000
Fracture, folding.....number	7,580	Crinolin (stenta-hook), 6 yards in piece.....pieces..	118,224
Ointment, impervious.....dozen	614,366	Cruets, vinegar and oil.....number	21,000
Pill.....do	270,000	Crutches.....pairs	98,300
Powder.....do	207,112	Rubber tips for, assorted sizes.....number..	220,602
Brooms:		Cups.....do	514,400
Corn.....number	501,200	Drinking, paper.....do	1,750,000
Hair, long handle, for floors.....do	36,496	Feeding.....do	77,050
Whisk.....do	53,000	Spit—	
Brushes:		White enamel.....do	333,622
Hair, counter (brushes, hair, for floors)		Paper.....do	17,921,160
.....number	22,856	Metal frames for.....do	358,000
Hand, fiber.....do	868,436	Curettes.....do	66,093
Paint.....do	16,745	Cushions:	
Scrubbing.....do	280,060	Rubber—	
Shaving.....do	9,057	Small.....do	21,755
Stove blacking.....do	18,000	Open center.....do	65,540
Weighted, for polishing floors.....do	2,970	Surgical, Kelly's.....do	14,423
Extra brushes for.....do	3,250	Cuspidors.....do	77,600
Buckets:		Desks, office.....do	1,710
Covered, metal, 7-quart.....do	91,600	Dippers.....do	119,000
Fiber.....do	15,000	Dishes:	
Galvanized iron.....do	239,652	Meat, assorted.....do	484,120
Cabinets, metal, for blanks and documents		Pickle.....do	25,200
.....number	2,136	Soap, with covers, for office.....do	7,000
Extra sections for.....do	100	Vegetable.....do	129,100
Cabinets for dressings and instruments:		Dispensing sets (par. 942).....sets	550
Large.....do	1,365	Egg beaters.....number	18,048
Small.....do	1,142	Eye shades:	
Cabinets for medicines, ward.....do	7,055	Double.....do	205,000
Can openers.....do	81,000	Single.....do	173,000

First-aid packets (par. 944).....	number..	12,400,000	Linoleum.....	yards..	13,000
First-aid packets for instruction (par. 945)	number..	400,000	Litters:		
.....	number..	400,000	With slings.....	number..	365,578
First-aid packets for shell wounds (par. 946)	number..	3,956,840	Canvas for.....	pieces..	45,000
.....	number..	3,956,840	Looking-glasses.....	number..	17,916
Floor polish, or brightener, 1 gallon in can	cans..	8,700	Lye, concentrated, 1 pound, in can.....	cans..	281,037
.....	do..	9,000	Mats, door:		
Floor wax, 2 pounds in can.....	do..	38,100	Manila.....	number..	13,600
Forceps, needle.....	number..	38,100	Metal.....	do..	13,100
Forks:			Mattress covers.....	do..	327,000
Carving.....	do..	14,870	Mattresses, cotton, in one piece.....	do..	430,813
Flesh.....	do..	22,520	Measures, metal, 1-pint, 1-quart, 2-quart, and		
Table, silver-plated.....	do..	1,257,960	4-quart.....	sets..	2,700
Freezers, ice cream.....	do..	1,210	Meat cutters.....	number..	6,030
Funnels, glass:			Medicine droppers.....	dozen..	90,466
25 c. c.....	do..	9,500	Medicine glasses.....	number..	259,163
250 c. c.....	do..	20,694	Mills, coffee.....	do..	1,500
500 c. c.....	do..	17,080	Mops:		
1,000 c. c.....	do..	15,500	Handles for.....	do..	60,500
Gauze, plain.....	yards..	58,794,536	Heads for.....	do..	256,438
Gloves, rubber.....	pairs..	694,172	Mortars and pestles:		
Gowns, operating.....	number..	112,900	Glass, 10-cm.....	do..	7,900
Graduates, glass:			Wedgwood—		
10 c. c.....	do..	34,250	8-cm.....	do..	8,000
100 c. c.....	do..	11,000	20-cm.....	do..	8,500
250 c. c.....	do..	29,280	30-cm.....	do..	8,500
500 c. c.....	do..	15,961	Muslin, unbleached.....	yards..	356,000
1,000 c. c.....	do..	10,500	Needles:		
Graters:			Common, assorted.....	papers..	71,000
Large.....	do..	12,000	Surgical—		
Small.....	do..	4,300	Assorted.....	number..	8,797,140
Gravy boats.....	do..	26,500	Hagedorn's, 20 in set.....	sets..	1,740
Gridirons.....	do..	10,540	Oil cans with pumps, 5-gallon.....	number..	1,220
Hones.....	do..	5,906	Oilcloth, for table.....	yards..	169,000
Hose:			Ophthalmoscopes.....	number..	2,250
Rubber, 3/4-inch, in 50-foot lengths.....	lengths..	1,850	Pails:		
Reel carts for.....	number..	400	Commode (close stools).....	do..	51,620
Inflators, Politzer's.....	do..	1,000	White enamel.....	do..	24,000
Inhalers, ether.....	do..	20,050	Paint, white enamel, 1 pint in tin.....	tins..	54,900
Irrigators:			Pajamas, trousers.....	number..	1,654,063
Stands for.....	do..	2,300	Pans:		
Valentine's.....	do..	4,731	Dish—		
Jars:			Deep, retinned, 21-quart.....	do..	8,500
Large, for dressings, etc.....	do..	34,060	Extra heavy, retinned or metal, 35-		
Small, covered, for sutures, etc.....	do..	13,000	quart.....	number..	11,625
Kettles:			Dust.....	do..	37,600
Cronp.....	do..	6,700	Frying.....	do..	19,020
Tea.....	do..	14,200	Milk.....	do..	10,500
Knives:			Muffin.....	do..	22,400
Chopping.....	do..	1,000	Sauce.....	do..	33,820
Bread.....	do..	7,400	Paper:		
Butcher's.....	do..	23,920	Filtering, round, 10-inch.....	packages..	13,404
Carving.....	do..	22,020	Oiled, 5 yards in roll.....	rolls..	93,000
Table, silver-plated.....	do..	1,530,500	Tarred, 30 yards in roll.....	do..	1,000
Ladders, step.....	do..	500	Toilet, 2,000 sheets in roll.....	do..	2,428,100
Ladles.....	do..	17,056	Wrapping—		
Lamps:			Blue.....	quires..	39,050
Chimneys for.....	do..	141,024	Brown.....	do..	69,300
Hand.....	do..	2,630	White.....	do..	45,050
Shades for.....	do..	15,000	Percolators, glass.....	number..	700
Spirit, glass.....	do..	18,000	Pillowcases, cotton.....	do..	2,173,200
Stand.....	do..	3,125	Pillows:		
Wicks for.....	do..	345,000	Feather.....	do..	256,989
Lanterns:			Hair.....	do..	406,719
Complete.....	do..	41,000	Pill tiles, 5 by 10 inches.....	do..	1,000
Extra globes for, white.....	do..	66,000	Pins:		
Wicks for.....	do..	100,000	Common, assorted.....	papers..	1,264,572
Lawn mowers.....	do..	450	Safety.....	dozen..	6,267,598

Pitchers:			Sprinklers, powder, hard rubber	number	15,250
Delft—			Stamps, with outfits, for making hospital		
For office	number	1,030	clothing	number	450
1-pint	do	10,000	Steels	do	17,000
4-quart	do	190	Sterilizers, for dressings	do	5
Sirup, glass	do	9,000	Stethoscopes, double	do	24,503
White enamel	do	258,464	Stools, revolving, white enamel	do	6,000
Plaster, adhesive, zinc oxide, 5 yards by 2½			Stoves:		
inches	spools	1,236,582	Alcohol	do	2,320
Plaster of Paris, 4 pounds in tin	tins	44,750	Kerosene burner	do	40,125
Plates, dinner	number	1,389,062	Stove blacking	papers	14,400
Potato mashers	do	12,160	Suppository molds	number	880
Pots:			Sutures:		
Mustard, with wooden spoons	do	7,000	Catgut—		
Stock, 24-quart	do	7,088	Plain, 1 suture in tube	tubes	14,594,828
Tea, enamel or tin	do	15,332	Chromicised, 1 suture in tube	do	6,340,231
Watering	do	2,000	Horsehair, 100 in coil	coils	173,000
Pus basins	do	209,100	Kangaroo tendon, sterilized, 1 suture in		
Racks for urinals and bedpans	do	19,000	tube	tubes	723,080
Razors	do	40,574	Silk, 3 sizes in package	packages	2,309,200
Strops for	do	19,500	Silkworm gut, 100 in coil	coils	831,724
Refrigerators:			Silver wire, in yard lengths	yards	92,500
Large	do	553	Syringes:		
Small	do	1,450	Bulb, rubber	number	8,350
Retorts, stands for	do	80	Ear and ulcer	do	55,724
Rods, glass, assorted, 10 ounces, in package			Extra needles for	do	1,025,208
packages		13,000	Extra wires for	bundles	22,000
R safes, iron	number	557	Fountain—		
Saucers	do	1,477,500	Metal, 2-quart, graduated (irrigators)		
Saws, butchers' s	do	3,200	number		24,950
Scales and weights:			Rubber	do	52,050
Apothecary's, metric system	do	1,750	Glass, Luer type—		
Balance in glass case, metric system	do	997	2-c. c. (for antityphoid vaccination)		
Grocer's	do	850	number		123,162
Platform	do	479	10-c. c.	do	37,333
Scissors, bandage	do	1,000	30-c. c. (for injection of neosalvarsan)		
Scopps	do	6,100	number		29,700
Screens, bed, folding, frames for, white enamel			Hypodermic (par. 956)	do	154,741
number		13,350	Penis, glass, in case	do	827,500
Settees, for porch or hall	do	11,234	Tables:		
Shakers:			Bedside, iron, white enamel	do	239,210
Pepper, glass	do	33,034	Dining, extension	do	1,817
Salt, glass	do	51,150	Instrument	do	6,779
Shears	do	19,425	Operating	do	2,968
For fixed bandages	do	3,668	Typewriter	do	4,558
Sheeting, rubber	yards	161,700	Tape measures, linen, 5-feet	do	24,000
Sheets, cotton	number	3,355,100	Thermo-canteries, Paquelin's (par. 957)	do	3,815
Shirts, cotton	do	401,300	Thermometers:		
Shoes, wooden, for bedsteads	do	240,000	Bath	do	8,350
Sickles	do	4,400	Clinical	do	991,738
Sieves, flour	do	8,400	Meteorological	do	1,500
Skimmers	do	7,520	Thread:		
Slippers	pairs	885,000	Cotton, assorted	spools	39,606
Soap:			Linen, unbleached, 200 yards on spool		
Common	pounds	2,552,000	spools		584
Ivory	cakes	2,105,666	Tongue depressors:		
Scouring	pounds	589,100	Metal	number	38,959
Spatulas:			Wood	gross	415,200
3-inch	number	21,392	Tourniquets and bandages, rubber	number	38,200
6-inch	do	10,092	Towels:		
Specula, rectal	do	9,190	Bath	dozen	243,616
Sphygmomanometers	do	5,404	Dish	do	162,274
Splints, Hodgen's	do	36,425	Hand	do	549,969
Sponge holders (forceps)	do	18,005	Paper, in roll	rolls	10,000
Spools, Halstead's glass	do	5,000	Traps, rat	number	6,000
Spoons:			Trays:		
Basting, tinned-iron	do	38,320	Bed, with legs	do	105,020
Table, silver-plated	do	967,516	Butler's	do	60,455
Tea, silver-plated	do	936,267	Instrument, white enamel	do	83,000

Trawels, garden.....	number..	2,000
Tubes:		
Drainage, rubber, in yard lengths, 3 sizes.....	yards.....	11,200
Rectal.....	number.....	1,130
Stomach.....	do.....	12,025
Tubing:		
Glass, assorted.....	pounds.....	24,360
Rubber.....	yards.....	251,192
Tubs:		
Bath, portable, on wheels.....	number.....	500
Foot.....	do.....	8,200
Wash.....	do.....	10,040
Tumblers, glass.....	do.....	181,450
Typewriters.....	do.....	9,896
Record ribbons for.....	do.....	69,650
Urinals, glass, graduated.....	do.....	25,000
Vials.....	dozen.....	1,314,566
Water coolers.....	number.....	9,010

LABORATORY SUPPLIES

Acid, acetic, glacial, 1 pound in bottle.....	bottles.....	9,000
Agar-agar, ½ pound in package.....	packages.....	126,000
Alcohol:		
Absolute, ethyl, 1 pound in bottle.....	bottles.....	4,600
Methyl, reagent, 1 pound in bottle.....	do.....	9,500
Aniline oil, 2 ounces in bottle.....	do.....	5,314
Apparatus, distilling.....	number.....	1,782
Balsam, Canada, 1 ounce in bottle.....	bottles.....	2,064
Baskets, wire, for test tubes.....	number.....	6,012
Baths, water:		
For paraffin.....	do.....	99
Copper, for test tubes.....	do.....	292
Tripods for.....	do.....	32
Beakers, glass.....	do.....	93,582
Bismark brown, ½ ounce in bottle.....	bottles.....	2,732
Bottles:		
Balsam.....	number.....	1,264
Dropping, T. K., for stains, 2-ounce.....	do.....	56,400
Bromin, 1 ounce in bottle.....	bottles.....	1,000
Brushes, test tube.....	number.....	31,372
Burettes:		
Glass stopcock, 25-c. c., subdivision ⅓ c. c.....	number.....	5,556
Supports for, with double clamp and three rings.....	number.....	834
Burners:		
Bunsen's.....	do.....	836
Hydrocarbon.....	do.....	600
Centrifuges, hand.....	do.....	1,732
Tubes for.....	do.....	295,155
Covers, glass.....	ounces.....	17,140
Cylinders, graduated, with foot:		
10-c. c.....	number.....	5,600
25-c. c.....	do.....	5,564
Dishes:		
Evaporating, porcelain.....	do.....	31,760
Petri's.....	do.....	345,816
Stender, 30 by 50 mm.....	do.....	36,095
Eosin, ½ ounce in bottle.....	bottles.....	7,732
Flasks, Erlenmeyer's:		
60-c. c.....	number.....	2,400
120-c. c.....	do.....	7,580
180-c. c.....	do.....	5,040
250-c. c.....	do.....	25,952
500-c. c.....	do.....	24,552
1,000-c. c.....	do.....	23,776
2,000-c. c.....	do.....	16,508

Forceps:

Cover-glass, Stewart's.....	number.....	9
Straight, medium, fine.....	do.....	7
Fuchs's:		
½ ounce in bottle.....	bottles.....	964
Acid, ½ ounce in bottle.....	do.....	2,050
Gauze, wire, iron, asbestos centers, 4 by 4 inches.....	pieces.....	692
Gentian violet, ½ ounce in bottle.....	bottles.....	9,114
Glucose, powdered, ½ pound in bottle.....	do.....	770
Hemaglobin scales, Tallquist's.....	number.....	1,500
Hematoxylin, ½ ounce in bottle.....	bottles.....	582
Hemoeytonimeters.....	number.....	9,114
Hones, Belgian, 8 by 1½ inches.....	do.....	630
Incubators, bacteriological.....	do.....	2,245
Jars, staining, Coplin's.....	do.....	15,092
Labels, microscopical, square, 500 book.....	books.....	800
Methylene blue, ½ ounce in bottle.....	bottles.....	7,364
Microscopes, post (par. 951).....	number.....	664
Microtomes, complete.....	do.....	392
Oil, immersion, 1 ounce in bottle.....	bottles.....	2,032
Paper, filtering, Swedish, Munkel's.....	quires.....	1,364
Paper, litmus:		
Blue, 100 strips, in vial.....	vials.....	49,600
Red, 100 strips, in vial.....	do.....	
Paraffin.....	pounds.....	10,400
Pencils, wax, red.....	number.....	192
Peptone, ½ pound in bottle.....	bottles.....	26,605
Pipettes:		
1-c. c.....	number.....	201,312
5-c. c.....	do.....	20,544
10-c. c.....	do.....	119,834
25-c. c.....	do.....	10,596
Graduated, 25-c. c.....	do.....	384
Rings, filtering, porcelain.....	do.....	1,000
Rods, glass, assorted.....	bundles.....	12,273
Section lifters, small.....	number.....	1,400
Slides, glass 25 by 75 mm.....	dozen.....	66,720
Stages, mechanical.....	number.....	328
Stopcocks, Mohr's, for rubber tubing.....	do.....	256
Test glasses, footed, urinary.....	do.....	5,300
Test tubes.....	dozen.....	2,727,287
Stands for.....	number.....	3,108
Thermometers, chemical:		
0-100° C.....	do.....	8,194
0-200° C.....	do.....	7,432
Tripods, iron, Bunsen's.....	do.....	1,244
Ureometers, Doremus-Hinds.....	do.....	1,198
Urinometers.....	do.....	1,840
Watch glasses, Syracuse.....	do.....	960
Wright's stain, powder, 0.2 gram in ampoule.....	ampoules.....	600
Xylo, ½ pound in bottle.....	bottles.....	6,064
Burettes, 50 c. c., graduated in ⅓ths.....	number.....	9,294

IDENTIFICATION SUPPLIES

Ink plates.....	number.....	1,000
Thermometers, chemical, 0-100° C.....	do.....	1,650

X-RAY SUPPLIES

Aprons, rubber, lead-impregnated.....	number.....	845
Barium sulphate, for X-ray work, 1 pound in bottle.....	bottles.....	7,550
Bismuth subcarbonate, 1 pound in bottle.....	do.....	13,900
Carriers, plate:		
8 by 10 inches, for use with tanks.....	number.....	100
14 by 17 inches, for use with tanks.....	do.....	1,782
Chrome alum, crystals, 1 pound in bottle.....	bottles.....	69

Films, dental, X-ray, 6 dozen in box.....boxes..	8, 642
Fluoroscopes, hand.....number.....	303
Gloves, rubber, lead-impregnated, size 9.pairs.....	884
HOLDERS, plate, for use instead of envelopes.....number.....	4, 000
Hydroquinone, ¼ pound in bottle.....bottles.....	3, 680
Metol, 1 ounce in bottle.....do.....	16, 800
Plates, X-ray.....number.....	47, 376
Sodium carbonate, dry, 1 pound in bottle.....bottles.....	12, 550
Sodium hyposulphite.....pounds.....	3, 525
Sodium sulphite, dry.....do.....	9, 460
Screens, intensifying, all sizes.....number.....	4, 214
Tanks, developing, porcelain.....do.....	714
Trays, developing:	
For 10 by 12 plates.....do.....	300
For 14 by 17 plates.....do.....	300
Tubes, X-ray, tungsten target:	
6-inch diameter (for use with induction coil).....number.....	250
7-inch diameter (for use with transformer).....number.....	500

ADDITIONAL ARTICLES

Ambulances, Ford, complete.....number.....	2, 601
Ambulances (chassis), G. M. C. No. 16.....do.....	3, 704
Ambulance bodies.....do.....	9, 082
Gauze, raw and gray goods:	
20 by 16 inches wide.....yards.....	7, 376, 705
22 by 18 inches wide.....do.....	64, 134, 957
28 by 24 inches wide.....do.....	17, 865, 122
32 by 28 inches wide.....do.....	14, 444, 950
44 by 40 inches wide.....do.....	67, 400, 000
Dressers, fumed oak.....number.....	90

DENTAL SUPPLIES—PORTABLE OUTFIT

MEDICINES

Acidum trichloroaceticum.....ounces.....	3, 238
Eugenol.....do.....	20, 720
Mercury, redistilled.....do.....	177, 640
Novocain, 50-mgm. hypodermic tablets (or equivalent).....tubes.....	130, 800
Paraform, 1/10-grain compressed tablets, Form-acoid type (or equivalent).....number.....	2, 799, 000
Phenol, camphorated.....ounces.....	110, 480
Sodium and potassium, in sealed tube.....tubes.....	43, 400

STATIONERY

Examination blanks.....number.....	1, 696, 500
Files, Shannon.....do.....	25, 600
Rulers.....do.....	1, 566

BOOKS

Dental Materia Medica and Therapeutics (Prinz).....copies.....	4, 213
Dental Pathology, Therapeutics, and Pharmacology (Burchard-Inglis).....copies.....	5, 213
Dentistry, First-Aid (Ryan).....do.....	5, 213
Dentistry, Operative (Johnson).....do.....	5, 213
Handbook for Sanitary Troops (Mason).....do.....	15, 020
Oral Surgery (Brown).....do.....	4, 713

INSTRUMENTS AND APPLIANCES

Alloy balances.....number.....	5, 720
Amalgam carriers, double end, No. 5.....do.....	3, 820
Bands, fracture, Angle's 4 bienspid and 2 molar.....sets.....	35, 455
Blowers, ehip, and hot-air syringes, No. 38.....number.....	7, 370
Extra bulbs for.....do.....	17, 162

Boilers, instrument, small, approximately 12 by 6 by 4 inches.....number.....	5, 288
Bottles, office preparation, No. 6.....do.....	56, 952
Broach reamers.....do.....	210, 420
Burnishers.....do.....	34, 060
Cases, office:	
Oak preparation, 18½-ounce glass-stopper bottles.....number.....	3, 970
Preparation, extra ½-ounce glass-stopper bottles for.....number.....	57, 740
Chisels.....do.....	45, 270
Clamps, rubber-dam, Ivory's.....do.....	29, 950
Cleaners, root-canal, Donaldson's or S. S. W., No. 5.....number.....	136, 540
Corkscrews, folding.....do.....	1, 190
Elevators:	
Kuott's type, right and left, metal handle.....number.....	9, 810
No. 3, metal handle.....do.....	5, 100
Engines, dental, all-enrd, with K3 attachment for No. 7 H. P.....number.....	6, 856
Engines, dental:	
Cables "A" for.....do.....	125
Sheaths for.....do.....	125
Cords for, extra.....do.....	48, 270
Duplex springs for.....do.....	2, 024
Sheaths for, part 10X.....do.....	230
Hand pieces for—	
"M," contra-angle, for slip joint. No. 2.....number.....	4, 550
No. 7, straight, for slip joints No. 2.....number.....	3, 050
Lubricating oil for.....ounces.....	14, 050
Slip-joint connections for—	
Part C2.....number.....	200
Part F2.....do.....	200
Engine instruments for hand piece "H" contra-angle:	
Burs—	
Dentate.....number.....	168, 000
Fissure.....do.....	93, 600
Inverted cone.....do.....	172, 800
Plug-finishing.....do.....	31, 200
Round.....do.....	253, 600
Drills.....do.....	72, 300
Mandrels—	
Nos. 302 and 303.....do.....	55, 300
Morgan-Maxfield.....do.....	2, 700
Points, carborundum, medium grit, mounted.....number.....	89, 000
Engine instruments for hand piece No. 7:	
Burs—	
Dentate.....number.....	633, 368
Fissure.....do.....	234, 560
Inverted cone.....do.....	701, 918
Plug-finishing.....do.....	59, 370
Round.....do.....	773, 996
Drills.....do.....	121, 840
Mandrels—	
Nos. 302 and 303.....do.....	88, 218
Morgan-Maxfield.....do.....	63, 717
Points, carborundum, medium grit, mounted.....number.....	99, 000
Excavators, Black's cutting instruments.....number.....	223, 720
Explorers.....do.....	79, 010
Foreeps:	
Rubber-dam—	
Clamp, Brewer's type.....do.....	5, 770
Punch, perfected.....do.....	4, 720
Tooth-extracting.....do.....	33, 677

Holders:		Desks, field, dental, empty.....number..	5,320
For cotton, Metbot's type.....number..	7,670	Stands, portable, complete, less tables for field use, Clark's type.....number..	500
For mercury, ebony No. 2.....do.....	2,200	Tables, pressed steel, white, No. 90, Harvard type, table bases to fit Clark's type stands.....number..	540
For nerve broach, No. 2.....do.....	15,710		
Rubber-dam, Anatomik.....do.....	6,400		
Hones, oil, Arkansas stone in wooden boxes.....number.....	2,920		
Lamps, alcohol:		MISCELLANEOUS	
No. 26, with flame shields.....do.....	4,320	Alloy:	
Extra wicks for.....do.....	47,070	Copper.....ounces..	16,310
Lancets:		To comply with Black's physical standards.....ounces..	72,740
Abscess, metal handles, octagon, No. 5.....number..	7,520	Boxes, soap, metal, small.....number..	23,670
Gum, metal handles, obtagon, No. 2.....do.....	7,320	Cement:	
Mallets, metal cases, No. 15.....do.....	7,350	Copper oxyphosphate, black.....boxes..	2,700
Matrix retainers, Ivory's No. 1.....do.....	6,300	Oxyphosphate, colors.....do.....	135,400
Extra bands for, bicuspid and molar.....number..	150,380	Cotton, absorbent.....rolls..	5,044,000
Matrix strips, copper, soft, 1/2 inch wide, 36-gauge.....number..	52,750	Cots, finger, rubber.....dozen..	10,563
Mechanical dams, Automaton.....do.....	5,850	Covers, paper, aseptic, 12 by 12 inches, for bracket table.....boxes..	17,950
Medicine droppers.....dozen..	31,350	Cups, polishing, soft rubber, small.....number..	678,740
Mirrors, mouth:		Disks:	
Aluminum handles, No. 4.....number..	13,600	Bristle.....do.....	1,035,582
Extra glasses for, size No. 4.....do.....	103,380	Carborundum, knife-edge.....do.....	222,486
Mortars and pestles, glass, No. 2.....do.....	4,270	Sandpaper.....boxes..	61,428
Pliers:		Garnet paper.....do.....	58,928
Dressing—		Emery paper.....do.....	67,428
No. 2.....do.....	12,400	Cuttle-fish paper.....do.....	63,428
No. 17.....do.....	2,652	Fiber, devitalizing, arsenical, in jar.....jars..	8,050
Office, smooth beak, No. 122.....do.....	6,378	Floss, silk, waxes.....spools..	112,032
Pluggers:		Gutta-percha stoppings:	
Amalgam, Woodson's.....do.....	22,380	High-heat sticks.....ounces..	24,880
Plastic.....do.....	41,886	Temporary, pink sticks.....do.....	56,890
Root-canal, Donaldson's.....do.....	22,430	Molding composition, Perfection (Detroit).....pounds..	20,240
Pots, medicine, glass, Dappen's.....do.....	23,680	Napkins, dental, aseptic.....do.....	17,130,000
Probes, silver.....do.....	5,970	Paper:	
Saws, dental:		Articulating, thin, in books.....books..	11,955
Complete, Gordon White.....do.....	6,500	Bibulous, Japanese.....sheets..	422,700
Gordon White, extra blades for.....do.....	45,523	Points, absorbent.....boxes..	74,760
Scalers:		Plaster of Paris, French, impression.....pounds..	122,856
L. H.....do.....	64,160	Points:	
Pyorrhea.....do.....	21,570	Root-canal, gutta-percha.....boxes..	62,879
Screw portes, Morrison improved, No. 2.....do.....	5,400	Soft-rubber, corrugated.....number..	460,840
Scissors, gum, curved or flat, No. 22.....do.....	4,690	Pumice stone, powdered.....pounds..	1,400
Separators, adjustable, Ivory's.....do.....	2,600	Rubber dam, plain, medium, 18 feet by 6 inches, in sealed tins.....tins..	17,940
Slabs, mixing, glass, No. 6.....do.....	8,080	Sandarac, gum.....ounces..	16,601
Spatulas.....do.....	22,192	Stoves, alcohol, Dangler type.....number..	1,120
Strips, celluloid, thin.....do.....	1,947,800	Strips, polishing, assorted grits, in boxes.....boxes..	38,908
Syringes:		Wheels, carborundum, square edge.....number..	8,072
Hypodermic—		Wood, orange, sticks, large.....boxes..	19,070
Dental, all metal, No. 172A.....do.....	5,780		
All metal, extra needles for.....do.....	352,400	BASE OUTFIT	
Extra needles for conductive anesthesia (Fischer's type).....number..	44,700	OFFICE FURNITURE AND EQUIPMENT	
Extra needles for.....do.....	173,628	Anvils, cast base.....number..	608
Water, self-filling, all metal.....do.....	10,800	Aprons, rubber.....do.....	190
Self-filling, extra pipes for, curved.....do.....	6,000	Air compressors, unit, automatic, electric, with tank, No. 95.....number..	534
Tool, universal.....do.....	9,466	Tubing, connections, and valves for.....do.....	1,422
Wire, ligature, Angle's, No. 187.....boxes..	8,106	Benches, combination, No. 17, with bellows.....number..	526
		Cabinets, dental, aseptic, pressed-steel, No. 510.....number..	717
FURNITURE		Chairs, dental (Harvard, Diamond, or Columbia), wood seat and back (white).....number..	1,550
Chairs, dental, portable, metal frame, in chests.....number..	4,030		
Chests:			
Supply, empty.....do.....	6,220		
Instrument, empty.....do.....	3,800		
Cuspidors, nickel-plated, No. 6.....do.....	350		

Cups, drinking:		
Paper.....	boxes..	30, 300
Holders, No. 1, for.....	number..	312
Cuspidors, fountain, No. 6:		
Complete with saliva ejectors, floor connections for, and table attachments, white enamel.....	number..	1, 065
Extra bowls for.....	do.....	254
Engines, dental, electric, folding brackets, all-cord, with part K-3, for H. P. 7.....	number..	1, 184
Forceps, crown-slitting.....	do.....	1, 171
Heaters, electric, No. 3:		
Spray bottles and water gasses.....	do.....	1, 542
Cut-offs No. 4, with 8 feet of tubing for operating spray bottles.....	number..	1, 140
Port polishers, contra-angle.....	do.....	205
Wood points for, assorted, in box.....	boxes..	
Post pullers, Little Giant.....	number..	1, 615
Root reamers, Peeso's.....	do.....	1, 300
Root facers, safe-side, for H. P. 7.....	do.....	1, 950
Shade bars.....	do.....	630
Switchboards, electric, type 1A.....	do.....	462
Syringes:		
Hot-air, electric.....	do.....	497
Water, 21A.....	do.....	10, 060
Extra bulbs for.....	do.....	19, 700
Tables, pressed-steel, white, No. 90, Harvard type, table bases to fit chair arms.....	number..	560

LABORATORY EQUIPMENT

Articulators:		
Plain line.....	number..	2, 390
Crown and bridge, No. 5.....	do.....	4, 000
Blowpipes, automaton.....	do.....	80
Bowls, plaster.....	do.....	3, 850
Bridge repair sets.....	do.....	1, 096
Extra nuts for.....	do.....	11, 280
Brushes, laboratory, plain, stiff bristles, 7/8 inch.....	number..	5, 275
Burners, Bunsen's dental, No. 12, with spiders.....	number..	80
Casting machines.....	do.....	654
Chalk, prepared.....	pounds..	13, 357
Cones, felt, large.....	number..	39, 470
Dentimeters, Kirk's No. 2.....	do.....	1, 241
Files, gold:		
Flat, 6 inch.....	do.....	411
Round, 6 inch.....	do.....	572
Forceps, mechanical, clasp-bending, No. 8, McKellon's.....	number..	1, 001
Gauges, plate and wire, Brown & Sharpe.....	do.....	190
Hammers, swaging, 1 1/2 pounds.....	do.....	1, 058
Investment compound.....	pounds..	25, 335
Knives, plaster.....	number..	1, 601
Ladles, melting, No. 8.....	do.....	1, 721
Lamps, alcohol, large, Purdy's.....	do.....	1, 547
Lathes, electric, including 7 chucks and bur chuck.....	number..	129
Metal, Mellett's.....	ingots..	6, 333
Moldine compound.....	pounds..	1, 958
Pliers:		
Contouring—		
No. 115, Crescent.....	number..	1, 469
No. 114, Johnson.....	do.....	1, 410
Round nose, No. 107.....	do.....	1, 024
Rubber, red.....	pounds..	8, 190
Sandpaper.....	sheets..	408, 336
Saws, frame, mechanical.....	number..	1, 351
Extra blades for.....	do.....	53, 572
Shears.....	do.....	8, 303

Soldering and heating outfits, gasoline generators, No. 45, complete, less blowpipe stands.....	number..	1, 189
Soldering appliances, Mellett's improved, with blowpipe, pads and clamps, complete.....	number..	1, 148
Spatulas:		
Plaster, 4-inch.....	do.....	3, 873
Rubber, 4-inch.....	do.....	3, 440
Tongs, soldering, 7 inch.....	do.....	5, 433
Trays:		
Lower impression.....	do.....	5, 932
Upper impression.....	do.....	5, 992
Tubing, rubber, 1/2 inch, heavy wall, white.....	feet.....	1, 120
Tweezers.....	number..	15, 359
Vises, bench, jewelers', 2 inch.....	do.....	577
Wax:		
Carvers for, Reach's.....	do.....	145
Inlay.....	boxes..	1, 201
Base-plate, pink.....	pounds..	2, 853
Wheels:		
Brush.....	number..	14, 901
Carborundum, lathe, square edge, 1 and 2 inch diameter, 1/8 inch width.....	number..	20, 380
Felt.....	do.....	10, 303
Whetstones, carborundum, 5 inch.....	do.....	286
Wire binding, 32 gauge.....	spools..	830

ADDITIONAL ARTICLES

Burnishers, tantalum, double-ended, No. 1.....	number..	2, 865
Spatulas, agate or bone.....	do.....	1, 185
Synthetic porcelain, Caulk's, 10 shades, full portion in box.....	boxes..	1, 220
Shade guides for.....	number..	1, 345
Anchor flasks.....	do.....	2, 442
Bolts for.....	sets.....	2, 412
Cusp die plates, No. 5.....	number..	470
Flask, "box".....	do.....	1, 400
Flask presses.....	do.....	1, 111
Ladles, with handles (melting).....	do.....	1, 819
Lead.....	ingots..	19, 950
Molding rings, for metal dies, Bailey type.....	number..	3, 060
Molding sand.....	tins.....	1, 630
Plate, German silver, Brown & Sharpe gauge, No. 30, size 6 by 6 inches.....	pieces..	830
Rubber, red, vulcanite.....	pounds..	8, 642
Solder, silver.....	ounces..	2, 553
Swagers (metal).....	number..	1, 931
Swaging mallets, horn.....	do.....	5, 100
Vulcanite files.....	do.....	1, 936
Vulcanite scrapers and finishers.....	do.....	12, 400
Vulcanizers, 3 flasks, gas or kerosene.....	do.....	1, 161
Wire, German silver, gauge 12, 16, and 18, 4-foot lengths.....	lengths..	345
Zinc.....	ingots..	9, 770
Head gears.....	number..	1, 680
Ligatures, rubber.....	boxes..	280
Plate dies, No. 5.....	number..	821
Pliers, Buffalo, dress:		
No. 1.....	do.....	9, 600
No. 3.....	do.....	5, 100
No. 4.....	do.....	40
Portable dress outfits.....	do.....	480
Saliva ejectors.....	do.....	480
Stands, portable, complete, with cuspidor and table in case.....	number..	3, 680
Solder, gold.....	pennyweight..	3, 400

Soldering fluid	bottles ..	340
Tap and die, Guilford.....	sets ..	280
Teeth, Trubyte, assorted.....	do.....	1, 670
Wire, clasp, No. 13 gauge, gold and platinum	pennyweight ..	760

FIELD MEDICAL SUPPLIES

MEDICINES AND ANTISEPTICS

Acetphenetidinum (Phenacetin), 324-mgm. tablets, 500 in bottle.....	bottles ..	3, 501
Acidum boricum, 324-mgm. tablets, 500 in bottle.....	bottles.....	116, 070
Acidum salicylicum, 324-mgm. tablets, 500 in bottle.....	bottles ..	32, 800
Acidum tannicum, 324-mgm. tablets, 500 in bottle.....	bottles ..	9, 500
Aspirin, 324-mgm. tablets, or equivalent, 500 in bottle.....	bottles.....	350, 648
Bismuthi subnitras, 324-mgm. tablets, 500 in bottle.....	bottles ..	93, 000
Caffeina citrata, 65-mgm. tablets, 500 in bottle.....	bottles ..	40, 400
Capsicum, 32-mgm. tablets, 500 in bottle do.....	do.....	38, 000
Cbloratum hydratum, 324-mgm. tablets, 500 in bottle.....	bottles ..	40, 800
Cndeiina, 32-mgm. tablets, 500 in bottle do.....	do.....	19, 700
Hexamethylenamina (Urotropin), 324-mgm. tablets, 500 in bottle.....	bottles ..	105, 415
Iodine swabs.....	number ..	26, 744, 560
Iodum-potassii iodidum.....	tubes ..	18, 793, 900
Linimentum rubefaciens, tablets (par. 902), 250 in bottle.....	bottles.....	81, 840
Mistura, glyeyrrhizæ composita, tablets (par. 902), 1, 000 in bottle.....	bottles ..	629, 600
Morphinæ sulphas, 8 mgm. tablets, 500 in bottle.....	bottles ..	19, 600
Nitroglycerin, 0.65-mgm. tablets, 500 in bottle.....	bottles ..	1, 000
Petrolatum.....	ounces ..	10, 462, 800
Phenylis salicylas (Salol), 324-mgm. tablets, 500 in bottle.....	bottles ..	44, 450
Pilulæ eamphoræ et opii (or tablets) (par. 902), 500 in bottle.....	bottles ..	98, 047
Plumbi acetas, 130-mgm. tablets, 500 in bottle.....	bottles ..	30, 280
Potassii bromidum, 324-mgm. tablets, 500 in bottle.....	bottles ..	33, 000
Potassii iodidum, 324-mgm. tablets, 500 in bottle.....	bottles.....	86, 500
Potassii permanganas, 324-mgm. tablets, 500 in bottle.....	bottles ..	27, 350
Pulvis ipecacuanbæ et opii, 324-mgm. tablets, 500 in bottle.....	bottles ..	125, 150
Sodii bicarbonas, 324-mgm. tablets, 500 in bottle.....	bottles.....	178, 000
Sodii salicylas, 324-mgm. tablets, 500 in bottle.....	bottles ..	179, 560
Tinctura digitalis, 0.3-c. e. tablets, 500 in bottle.....	bottles ..	19, 887
Zinci sulphas, 324-mgm. tablets, 500 in bottle.....	bottles.....	22, 500

STATIONERY

Books, note, manifolding, 4 by 6 inches, fillers.....	number ..	380, 000
Envelopes, official, large.....	do.....	535, 000
Files, Shannon, small.....	do.....	115, 600
Ink, red, powder (or tablets).....	boxes ..	6, 500

Paper, writing:		
Letter, 100 sheets in pad.....	pads ..	152, 000
Note, 100 sheets in pad.....	do.....	750, 000
Paste, photo, in tube, with brush.....	tubes ..	257, 000
Pencils, indelible.....	dozen ..	26, 873
Tags, shipping.....	number ..	7, 375, 000

MISCELLANEOUS

Aprons, rubber.....	number ..	79, 125
Ax helves, short.....	do.....	37, 200
Axes, short handle.....	do.....	12, 500
Bags, rubber, hot-water and syringe.....	do.....	20, 000
Bandages:		
Gauze, compressed.....	gross ..	530, 360
Plaster of Paris, 3-inch, in individual packets.....	dozen ..	156, 689
Bars, mosquito, frames for.....	pairs ..	244, 000
Spreaders for frames.....	number ..	122, 000
Basins, rubber.....	do.....	72, 020
Bedpans, box of (par. 906).....	do.....	1, 000
Bedsacks.....	do.....	280, 000
Beef, soluble, liquid, or extract.....	ounces ..	2, 071, 637
Blankets, rubber.....	number ..	171, 000
Bottles, 4-liter, for antiseptic solutions.....	do.....	10, 788
Boxes, pack mule, empty (par. 909).....	do.....	10, 300
Buckets, enamel ware, 3 in nest.....	nests ..	8, 000
Calcium carbide, 10 pounds, in tin.....	tins ..	19, 998
Candles.....	pounds ..	140, 960
Cases:		
Bedding—		
Large, empty.....	number ..	34, 400
Small, empty.....	do.....	20, 320
Instrument, medical officer's (par. 919).....	number ..	33, 500
Medicine, medical officer's (par. 920).....	do.....	37, 000
Microscopical supplies, supplementary (par. 921).....	number ..	300
Operating, small (par. 922).....	do.....	12, 502
Tooth-extracting, 3 forceps, in canvas roll.....	number ..	8, 725
Chairs, folding.....	do.....	230, 030
Chests:		
Acetylene (par. 927).....	do.....	25
Commode (par. 928).....	do.....	3, 000
Cooking utensils (par. 929), empty.....	do.....	2, 800
Field laboratory—		
No. 1 (par. 930).....	do.....	660
No. 2 (par. 931).....	do.....	
Medical and surgical (par. 932).....	do.....	23, 320
Supplementary (par. 933).....	do.....	115
Mess (par. 934).....	do.....	3, 800
Sterilizer (par. 935).....	do.....	5, 200
Tableware (par. 936).....	do.....	5, 200
Tool—		
No. 1 (par. 937).....	do.....	1, 024
No. 2 (par. 938).....	do.....	3, 312
Cocoa.....	ounces ..	6, 294, 928
Coffee, ground.....	pounds ..	97, 240
Corks:		
Assorted, 300 in bag.....	bags ..	20, 025
No. 2, 150 in bag.....	do.....	21, 840
No. 7, for alcohol tins.....	number ..	60, 000
Cots.....	do.....	130, 000
Cotton, absorbent, sterilized, 1 ounce in package.....	packages ..	18, 500, 000
Desks, field:		
No. 1 (par. 940).....	number ..	4, 950
No. 2 (par. 941).....	do.....	18, 680

Flasks:		
Empty (par. 864)	number	130,000
Empty (par. 907)	do	140,000
Food, ambulance boxes of (par. 947)	do	100
Food, boxes of (par. 948)	do	100
Funnels, agateware	do	3,100
Gauze, plain, sterilized, 2 half-yard lengths in package	packages	1,400,000
Gauze, sublimated, 2 half-yard lengths, in package	packages	34,000,000
Head mirrors, in case (par. 933)	number	22,098
Individual dressing packets (par. 949)	do	14,324,050
Inhalers, chloroform, Esmareh, with drop bottles	number	19,450
Lamps, acetylene	do	1,250
Lanterns:		
Folding	do	27,500
Globes for		
Green	do	33,560
White	do	238,380
Wicks for	dozen	38,333
Without globes or wicks	number	19,000
Matches, safety, boxes	dozen	346,800
Microscopes, field, with accessory cases (par. 950)	number	603
Milk, condensed, unsweetened	pounds	189,840
Mortars and pestles, porcelain, 7-cm.	number	17,000
Nails, cement-coated	pounds	20,540
Pill tiles, hard rubber	number	14,100
Pillow sacks	do	280,000
Pitchers, 3-liter, enamel ware	do	200
Plaster:		
Adhesive, zinc oxide, 5-yards by 1 inch	spools	2,023,628
Isinglass, 1 yard in roll	rolls	21,500
Moleskin	yards	102,000
Rope, 3/8-inch	feet	336,000
Saddles, pack (par. 953)	number	2,000
Scissors (par. 932)	do	4,346
Soup	pounds	109,824
Spectih, ear, 3 in set (par. 933)	sets	15,792
Splints:		
Coaptation, 5 in set	do	51,500
Wire gauze for, 1 yard in roll	rolls	1,108,808
Wood-veneer	number	218,000
Sponges, gauze, 1 dozen in box	boxes	500,000
Stoppers, rubber, for 4-ounce vials	dozen	36,666
Stoves, alcohol	number	8,320
Extra wicks for	do	4,000
Sugar, granulated	pounds	786,640
Surgical dressings (par. 955)	boxes	412
Ambulance (par. 954)	do	1,212
Sutures, catgut:		
Chromicised, 3 sizes in package	packages	870,000
Plain, 3 sizes in package	do	1,300,000
Syringes:		
Hypodermic, extra needles for	number	2,084,096
Rectal, hard rubber, 6 ounce (par. 933)	number	25,600
Tables:		
Mess, folding	do	9,000
Operating, field, folding	do	3,200
Tags, diagnosis	books	978,110
Tape measure, 60-inch	number	20,300
Tea	pounds	38,085
Test tubes, 3 in nest	nests	55,000
Tools, universal	number	13,566
Tourniquets (par. 907)	do	498,840
Trusses (for supporting litters used as operating tables)	number	5,000

Twine:		
Coarse	pounds	28,750
Fine	do	43,750
Urinals, enamel ware or agateware	number	104,600
Veneral prophylaxis units (par. 958)	do	150
Vials:		
1-ounce	dozen	66,000
2-ounce	do	103,400
4-ounce	do	86,750
Wire cutters	number	16,001

ADDITIONAL ARTICLES

Ambulance boxes	number	82,100
Bandages, paper, 2 1/2-inch, 3-inch, 3 1/2-inch, by 15 yards	gross	46,166
Bottles:		
4-ounce, oval	do	5,000
Assorted	do	29,800
Hard rubber screw cap	number	414,273
Boxes, brass, for emergency cases	do	4,000
Cans, tin, 5-gallon	do	27,000
Cases:		
Canvas, for emergency cases	do	24,000
Linen, for emergency cases	do	5,400
Canvas, for forceps	do	17,418
Complete, for enlisted men	do	300,000
Empty, for enlisted men	do	77,000
Mailing	do	93,900
Duck:		
Gray—		
72-inch	yards	105
30 1/4-inch	do	23,300
Khaki—		
29-inch	do	27,720
28 1/2-inch	do	248,800
White, 108-inch	do	35
Fluidextractum belladonnae, red, 1/4 pint in bottle	bottles	3,818
Fluidextractum digitalis, 1/4 pint in bottle	bottles	650
Jars, 8-ounce	dozen	2,575
Pepper, black, ground	tins	24,700
Pouches, hospital corps	number	12,000
Saddle, pack:		
Mantas for	do	3,200
Pads for	do	2,000
Spreaders for	do	4,400
Leather load straps for	do	12,000
Web straps for	do	3,300
Salt, table, 2 pounds in carton	cartons	3,600
Searchlights, Mazda No. 63	number	3,200
Syringes, penis, hard rubber	do	74,764
Tanks, for alcohol	do	7,100
Tags, record	do	70,000
Tins:		
Measre, 2-gram	do	32,000
Small, for chests	do	1,029,400
Wire, soft iron, No. 17 Brown & Sharpe, 100 feet in coil	coils	8,000

VETERINARY SUPPLIES

MEDICINES, ANTISEPTICS, AND DISINFECTANTS

Acetanilidum, 30-grain tablets, 100 in bottle	bottles	11,900
Acidum boricum, powdered	pounds	25,500
Acidum salicylicum	ounces	35,700
Acidum tannicum, powdered	do	28,650

Adrenalin chlorid, 1-mgm. tablets, 20 in tube	
.....tubes.....	418, 750
.Ether, ½ pound in tin.....tins.....	76, 300
Alcohol.....gallons.....	24, 890
Aloe, powdered, 2 ounces in bottle.....bottles.....	7, 375
Alumen, 60-grain tablets, 100 in bottle.....do.....	3, 150
Ammonii carbonas, lumps.....pounds.....	5, 950
Ammonii chloridum, 60-grain tablets, 100 in bottle.....bottles.....	5, 200
Apomorphinæ hydrochloridum, ⅓-grain hypodermic tablets, 10 in tube.....tubes.....	975
Aqua ammoniæ, 10 per cent.....pounds.....	27, 500
Arecolinæ hydrobromidum, 1-grain hypodermic tablets, 10 in tube.....tubes.....	15, 000
Argentii nitras fusus.....ounces.....	9, 750
Camphora, powder.....pounds.....	18, 850
Cantharidis, powdered.....ounces.....	17, 000
Carbo ligni (charcoal), powdered.....pounds.....	14, 300
Chlorazene, 500 tablets in bottle.....bottles.....	2, 400
Chloroformum.....do.....	11, 500
Chloralum hydratam.....do.....	3, 400
Cocainæ hydrochloridum, 2-grain hypodermic tablets, 10 in tube.....tubes.....	7, 950
Cupri sulphas.....pounds.....	24, 875
Ferri sulphas exsiccatus.....do.....	5, 236
Fluidextractum cannabis, U. S. P.....do.....	12, 650
Fluidextractum digitalis.....do.....	1, 787
Fluidextractum nucis vomica.....do.....	4, 750
Fluidextractum gentianæ.....do.....	4, 750
Glycerium.....do.....	5, 750
Hydrargyri chloridum corrosivum tablets (antiseptic) (par. 902), 250 in bottle.....bottles.....	1, 890
Hydrargyri chloridum mite, 30-grain tablets, 100 in bottle.....bottles.....	19, 700
Hydrargyri iodidum rubrum.....pounds.....	3, 000
Iodum, 4 ounces in bottle.....bottle.....	8, 200
Iodoform.....pounds.....	2, 387
Liquor cresolis compositus.....gallons.....	62, 375
Magnesi sulphas.....pound.....	235, 000
Malleo.....vials.....	20, 120
Morphinæ sulphas, 3-grain hypodermic tablets, 10 in tube.....tubes.....	2, 900
Normal salinæ solution tablets (par. 902), 100 in bottle.....bottles.....	5, 950
Oleum gossypii seminis.....gallons.....	29, 600
Oleum lici.....do.....	26, 200
Oleum terebinthinae rectificatum.....quarts.....	6, 900
Petrolatum.....pounds.....	68, 405
Phenol.....dn.....	11, 57
Physostigminæ salicylas, 1-grain hypodermic tablets, 10 in tube.....tubes.....	700
Pilocarpinæ hydrochloridum, 1 grain hypodermic tablets, 19 in tube.....tubes.....	9, 550
Pilule aloini comp. (equine purgative) (par. 902), 12 in package.....packages.....	20, 200
Plumbi acetas.....pounds.....	19, 100
Potassii iodidum.....do.....	5, 115
Potassii nitras, 60-grain tablets, 100 in bottle,.....bottles.....	10, 550
Sapo mollis (green soap).....pounds.....	342, 800
Sodii bicarbonas.....do.....	7, 150
Spiritus ætheris nitrosi.....do.....	24, 800
Spiritus ammoniæ aromaticus.....do.....	24, 120
Strychninæ sulphas, ½ grain hypodermic tablets, 10 in tube.....tubes.....	140, 750
Sulphocarbolate comp., 30-grain tablets (par. 902), 100 in bottle.....bottles.....	9, 550
Sulphur lotum.....pounds.....	9, 950
Tar, pine.....do.....	6, 900
Tinctura ferri chloridi.....do.....	1, 820

Tinctura opii.....pounds.....	1, 600
Zinci chloridum.....do.....	812
Zinci oxidum.....do.....	2, 380
Zinci sulphas.....do.....	7, 750
STATIONERY	
Erasers, rubber, pencil.....number.....	3, 000
Labels for vials.....gross.....	1, 182
Labels, poison.....dn.....	1, 000
Paper:	
Carbon, letter.....boxes.....	1, 000
Writing—	
Letter.....pads.....	18, 000
Note.....do.....	36, 000
Paste, photograph, in tube, with brush.....tubes.....	6, 000
Pencils, lead.....number.....	52, 000
MISCELLANEOUS SUPPLIES	
Bandages:	
Canton flannel, 3 yards by 4 inches.....dozen.....	71, 600
Roller, muslin, 3 yards by 4 inches.....do.....	41, 600
Basins, granite:	
1-quart, round.....number.....	1, 200
2-quart, round.....do.....	1, 200
4-quart, round.....do.....	1, 450
Blankets, horse.....do.....	71, 990
Boilers, instrument, H. D. Fig. 1641, 16 inches.....number.....	640
Boxes, ointment, impervious:	
2-ounce.....dozen.....	20, 004
4-ounce.....do.....	15, 000
Brushes, band, fiber.....number.....	1, 200
Buckets, galvanized-iron, 14-quart.....do.....	13, 000
Cases:	
Dental, in roll (par. 939).....do.....	186
Farrier's (par. 970).....do.....	5, 000
General operating, veterinary, in roll (par. 971).....number.....	180
Hoof (par. 972).....do.....	1, 030
Hypodermic tablet.....do.....	9, 960
With 12 vials filled as follows:	
1 apomorphine hydrochlor., ⅓-grain.	
3 arecoline, 1-grain.	
2 cocaine hydrochlor., 2-grain.	
1 glouoin, ⅓-grain.	
5 strychnine sulph., ½-grain.	
Pocket, veterinary (par. 974).....number.....	5, 200
Post-mortem, veterinary (par. 975).....do.....	430
Rectal pump (par. 976).....do.....	320
Thermo-cantery, ether (par. 977).....do.....	210
Catheters:	
Horse, rubber, size No. 20, American.....number.....	2, 300
Mare, metal.....do.....	300
Clippers:	
Horse, hand.....do.....	5, 550
Machine.....do.....	2, 950
Blades for.....do.....	7, 200
Heads for.....do.....	4, 400
Corks, long taper:	
Size No. 3.....dozen.....	7, 500
Size No. 4.....do.....	7, 500
Size No. 6.....do.....	7, 500
Size No. 7.....do.....	7, 500
Corkscrews, field, folding.....number.....	1, 330
Cotton, absorbent, 1 pound in roll.....pounds.....	78, 000
Dental boats:	
Straight, screw-driver end on handle.....number.....	3, 280
Universal file blades for.....do.....	16, 380
Universal rasp blades for.....do.....	15, 180

Disinfectors:	
Spray, hand.....	number .. 1,925
Spray pump, on skids.....	do..... 278
Funnels, enameled, 250-c. c.....	do..... 750
Gauze, plain, bleached.....	yards..... 548,000
Gloves, rubber, sizes 8½ and 9.....	pairs..... 2,060
Graduates, glass:	
10-c. c.....	number..... 850
100-c. c.....	do..... 850
500-c. c.....	do..... 600
Guns, balling.....	do..... 4,950
Harness, casting, 1½-inch rope.....	do..... 516
Hoods, operating, horse.....	do..... 770
Lamps, spirit, glass.....	do..... 575
Lanterns:	
Complete.....	do..... 3,500
Extra globes for, white.....	do..... 4,000
Wicks for.....	do..... 6,048
Medicine droppers.....	dozen..... 5,040
Mortars and pestles, Wedgwood:	
8-cm.....	number..... 500
20-cm.....	do..... 250
Needles, surgical, assorted.....	papers..... 12,500
Oakum, surgical.....	pounds..... 160,000
Ophthalmoscopes.....	number..... 150
Pill tiles, 10 by 10 inches.....	do..... 315
Plaster, adhesive, zinc oxide, 5 yards by 2½ inches.....	spools..... 9,250
Pots, watering.....	number..... 100
Pus basins.....	do..... 65
Razors.....	do..... 1,690
Saddlebags, veterinarian's.....	do..... 2,400
Scales and weights, Troemer's.....	do..... 175
Slings, suspending.....	do..... 845
Soap, Ivory.....	cakes..... 92,000
Spatulas:	
4-inch.....	number..... 200
10-inch.....	do..... 65
Sponges, animal, large.....	pounds..... 350
Stethoscopes, double.....	number..... 100
Stoves, coal-oil, blue-flame, 1 burner.....	do..... 550
Wicks for.....	do..... 1,600
Sutures, linen, sterilized, 18 inches each, 2 sizes (Nos. 16 and 20), in package.....	packages..... 58,000
Sutures:	
Silk, braided, sizes 4, 8, 12, 16, 20.....	spools..... 5,650
Tape, sterilized, 18 inches each, 2 pieces in package.....	packages..... 30,000
Syringes:	
Hypodermic, Quitman, 5-c. c., in canvas case (par. 973).....	number..... 2,100
Extra needles for.....	do..... 11,008
Extra wires for.....	bundles..... 650
Metal, dose, 1 ounce, 2 ounces, 4 ounces, with 6-inch pipes for, 2 sizes (¾ inch and ½ inch).....	number..... 11,010
Tables, equine operating.....	do..... 129

Tourniquets and bandages, rubber, Esmarch.....	number..... 55,000
Towels, hand.....	dozen..... 300
Trays, instrument, white enamel, 12 by 6 inches.....	number..... 15,000
Tubes, stomach.....	do..... 2,785
Reed cleaning stylets for.....	do..... 1,760
Tubing, rubber, ¼-inch.....	yards..... 10,600
Vials:	
2-ounce.....	dozen..... 12,572
4-ounce.....	do..... 4,008
8-ounce.....	do..... 4,756
16-ounce.....	do..... 3,372
32-ounce.....	do..... 3,162

ADDITIONAL ARTICLES

Adrenalin and cocaine tablets, 20 in tube.....	tubes..... 4,200
Fluidextractum belladonnae, ¼ pound in bottle.....	bottles..... 5,690
Fluidextractum stramonii semifine, ¼ pound in bottle.....	bottles..... 3,000
Quininae sulphas:	
1 pound in bottle.....	do..... 1,400
30-grain tablets, 100 in bottle.....	do..... 5,000
Tablets, white lotion, 100 in bottle.....	do..... 300
Directors, grooved, 5½ and 6 inches.....	number..... 600
Forceps:	
Bone, rongeur, Luer.....	do..... 155
Dissecting, 5 and 6 inch.....	do..... 4,900
Dressing.....	do..... 2,300
Bozeman.....	do..... 450
Hæmostatic, Pean's, 5½ inch.....	do..... 600
Tooth, Wolf.....	do..... 15
Mallets, rawhide, large.....	do..... 120
Pumps, rectal, injection.....	do..... 50
Scalpels, folding.....	do..... 5,000
Scissors, dressing, curve 1.....	do..... 4,150
Shears, fetlock.....	do..... 800
Speculum, mouth.....	do..... 1,400
Syringes:	
Antifoxin.....	do..... 400
Hypodermic, 30 c. c.....	do..... 1,000
Clinical Diagnosis of Internal Diseases (Wilkins)	
.....	copies..... 70
Colics of Horse (Reek).....	do..... 70
Diseases of Horses' Feet (Reek).....	do..... 370
Chests, veterinary officers.....	number..... 1,000
Capsules, gelatin, 1-ounce.....	do..... 288,000
Files, triangular.....	do..... 300
Stocks, metal, Ajax.....	do..... 259
Tags, identification, animal.....	do..... 1,800,000
Tubes, trachea.....	do..... 4,100
Wallets:	
Veterinary officers.....	do..... 4,560
Farrier's.....	do..... }

INDEX

	Page
Accountability:	
for supplies sent to the American Expeditionary Forces.....	743
medical supply depot.....	426
supply division, chief surgeon's office, A. E. F.....	810
Accounting, finance and, chief surgeon's office, A. E. F.....	817
Accounts of civilian personnel, analysis and record, finance and accounting division, chief surgeon's office, A. E. F.....	820
Accounts section, finance department, New York medical supply depot.....	681
Activities:	
connected with the overseas transportation of supplies.....	713-745
shipping regulations.....	729
transport unit equipment.....	737
depot, medical supply depots.....	69
miscellaneous, supply division, chief surgeon's office, A. E. F.....	808
of distributing medical supply depots.....	659-711
motor ambulance supply depot, Louisville, Ky.....	697
New York medical supply depot.....	659
of Intermediate Medical Supply Depot No. 2, Gievres, France.....	825
Administration, Intermediate Medical Supply Depot No. 2, Gievres, France.....	825
Administrative department, New York medical supply depot.....	665
Administrative subdivision, finance and supply division, Surgeon General's Office.....	55
Advance depots and army parks, supply division, chief surgeon's office, A. E. F.....	775
Advertisement, form of circular, for bids.....	109
Advertising for bids.....	107
Agencies:	
storing, distributing, using.....	67
using.....	81
Allies, billing for hospital charges, finance and accounting division, chief surgeon's office, A. E. F.....	821
Allowance, initial, supplies and equipment, camp medical supply service.....	429
Ambulance:	
assembly unit.....	401
body.....	351
improvements.....	353
Model AA.....	356
Model B.....	351
chassis.....	337
improvements.....	338
new contracts for.....	343
production.....	345
storage pending distribution.....	345
company—	
field equipment.....	265
field hospital, and other divisional unit equipment.....	263
motor equipment of.....	437
Ford—	
body model, 1918.....	366
chassis model, 1918.....	369
new contracts.....	369
motor—	
subdivision, Surgeon General's Office.....	333
supply depot, Louisville, Ky.....	697
Ambulances:	
donated.....	407
Ford.....	363
model, 1917.....	363
motor ambulance supply depot, Louisville, Ky.....	701
G. M. C., motor ambulance supply depot, Louisville, Ky.....	701

	Page
Ambulances—Continued.	
motor—	
camp medical supply service.....	436
gasoline, oils, and greases.....	441
Mexican border mobilization.....	32
operation and maintenance.....	440
spare parts.....	439
shortage of, 1918.....	399
veterinary.....	652
American Expeditionary Forces:	
Medical Department purchasing and disbursing office.....	764
medical supplies.....	747
supplies sent to the, termination of accountability for.....	743
Analysis and record:	
of accounts of civilian personnel, finance and accounting division, chief surgeon's office, A. E. F.....	820
of disbursements, finance and accounting division, chief surgeon's office, A. E. F.....	819
of hospital funds, finance and accounting division, chief surgeon's office, A. E. F.....	820
Apparatus:	
portable disinfecting, Mexican border mobilization.....	36
stationary, X-ray.....	579
Appendix.....	853-918
Appraisers division, inspection department, New York medical supply depot.....	675
Appropriations:	
deficiency, Mexican border mobilization.....	34
estimates and.....	85
summary of.....	91
transfers of.....	91
Army parks and advance depots, supply division, chief surgeon's office, A. E. F.....	775
Arrangements for returning important financial and property papers to the United States.....	823
Assembly unit, ambulance.....	401
Auditing money vouchers, finance and accounting division, chief surgeon's office, A. E. F.....	819
Auditors, traveling, of hospital funds, finance and accounting division, chief surgeon's office, A. E. F.....	820
Authority to make contracts.....	113
Authorization for employing civilians, supply division, chief surgeon's office, A. E. F.....	808
Automatic supply, A. E. F.....	754
Awards to bidders.....	111
Bandages, compressed gauze.....	325
Base and evacuation hospitals, dental equipment for.....	616
Base dental outfit.....	610
Base hospital:	
overseas, cost of initial equipment of a 1,000-bed.....	522
supplies and equipment.....	434
Base hospitals, overseas, supplies and equipment.....	493
Base outfits, dental.....	622
Base section and base storage depots, supply division, chief surgeon's office, A. E. F.....	779
Base storage depots and base section depots, supply division, chief surgeon's office, A. E. F.....	779
Bedside unit, X-ray.....	582, 593
Bedsteads.....	475
Belts, web, for enlisted men, Medical Department.....	242
Bid, form.....	111
Bids:	
advertising for.....	107
form of circular advertisement for.....	109
received, disposition of.....	111
Billing Allies for hospital charges, finance and accounting division, chief surgeon's office, A. E. F.....	821
Billing section, requisition department, New York medical supply depot.....	684
Biologicals:	
camp medical supply service.....	466
other.....	469
veterinary.....	654
Blankets.....	479
Boards of review, contracts.....	480

	Page
Body:	
ambulance.....	351
improvements.....	353
Model AA.....	356
Model B.....	351
Body model, 1918, Ford ambulance.....	366
Bureau of accounts and finance bureau, liaison with, finance and accounting division, chief surgeon's office, A. E. F.....	823
Camp infirmary:	
equipment.....	258
supplies and equipment.....	433
Camp medical supply depot.....	411
personnel.....	411
Camp medical supply service.....	411-474
special supplies.....	465
supplies and equipment.....	429
Cancellations following signing of the armistice, X-ray contracts.....	600
Car:	
record department, Intermediate Medical Supply Depot No. 2, Gievres, France.....	835
spare parts.....	380
Cost of initial equipment of a 1,000-bed base hospital (overseas).....	522
Catgut sutures.....	554
Central hospital fund:	
custodianship of, finance and accounting division, chief surgeon's office, A. E. F.....	820
Third Army, A. E. F.....	823
Channels for lower litters, ambulance body.....	354
Chassis:	
ambulance.....	337
improvements.....	338
new contracts for.....	343
production.....	345
storage pending distribution.....	345
boxed, factory shipments of.....	346
Model AA.....	340
model, 1918, Ford ambulance.....	369
Checking and checking problems, operations division, Intermediate Medical Supply Depot No. 2, Gievres, France.....	839
Chief surgeon's office, supply division, organization and activities of.....	747
Circular advertisement for bids, form of.....	109
Civilian employees:	
medical supply depots.....	67
motor ambulance supply depot, Louisville, Ky.....	699
New York medical supply depot.....	663, 666
Civilian personnel, analysis and record of accounts of, finance and accounting divi- sion, chief surgeon's office, A. E. F.....	820
Civilians, authorization for employing, supply division, chief surgeon's office, A. E. F.....	808
Clearance:	
and priority of materials to be manufactured.....	151
certificate, issue of, finance and accounting division, chief surgeon's office, A. E. F.....	821
Clearances, materials to be manufactured.....	156
Combat equipment.....	251
camp infirmary.....	258
Quartermaster and Ordnance supplies.....	261
replenishments.....	261
Commissioned personnel:	
medical supply depots.....	67
motor ambulance supply depot, Louisville, Ky.....	698
New York medical supply depot.....	663
Compilation of statistical data and financial reports, finance and accounting division, chief surgeon's office, A. E. F.....	822
Compressed gauze bandages.....	325
Consolidation:	
of finances.....	223
of procurement.....	207
motor vehicles.....	391
of storage.....	75
Constitution, evolution of the Medical Department supply system, under the.....	15
Containers and trucks, food.....	480

	Page
Contract:	
and authorization section, procurement subdivision, finance and supply division,	
Surgeon General's Office.....	56
review.....	126
administrative.....	126
numbering.....	127
Contracts.....	113
authority to make.....	113
boards of review.....	127
copies required.....	126
disposition of numbers and copies.....	126
forms of.....	114
new—	
for ambulance chassis.....	343
Ford ambulance.....	369
Controlled stores, supply division, chief surgeon's office, A. E. F.....	781
Copies:	
of contracts, disposition of numbers and.....	126
required, contracts.....	126
Cotton:	
and linters, factors affecting production of supplies.....	145
felt mattresses.....	477
Custodianship of central hospital fund, finance and accounting division, chief sur- geon's office, A. E. F.....	820
Cycles, motor. (See Motor cycles.)	
Decentralization, supply division, chief surgeon's office, A. E. F.....	810
Deficiencies.....	93
Deficiency appropriations, Mexican border mobilization.....	34
Dental and veterinary equipment and supplies.....	605-658
Dental department, New York medical supply depot.....	690
Dental equipment:	
and supplies.....	605
distribution.....	623
purchases.....	622
for base and evacuation hospitals.....	616
Dental outfit:	
base.....	610
portable.....	605
Dental outfits, portable, Mexican border mobilization.....	35
Dental supplies and equipment, camp medical supply service.....	449
Dental units.....	611
Depot:	
activities, medical supply depots.....	69
camp medical supply.....	411
distributing medical supply, activities of.....	659
inspection, medical supply depot.....	422
Intermediate Medical Supply, No. 2, Gievres, France, activities of.....	825
motor ambulance supply, Louisville, Ky.....	697
New York medical supply.....	659
operation, medical supply depot.....	417
requisitions, supplies and equipment, camp medical supply service.....	452
Depots:	
advance, and army parks, supply division, chief surgeon's office, A. E. F.....	775
base storage and base section, supply division, chief surgeon's office, A. E. F.....	779
for reserve supplies, period of 1900 to 1916.....	28
hospital center, A. E. F.....	781
medical supply.....	67
new, medical supply.....	72
port medical supply.....	713
storage and issue, supply division, chief surgeon's office, A. E. F.....	770
A. E. F.....	229
Disbursements.....	
analysis and record of, finance and accounting division, chief surgeon's office, A. E. F.....	819
Disbursing:	
and purchasing office, A. E. F., Medical Department.....	764
finance and accounting division, chief surgeon's office, A. E. F.....	818
supply division, chief surgeon's office, A. E. F.....	767
Disbursing section, finance department, New York medical supply depot.....	682
Discontinuance of finance and accounting division, chief surgeon's office, A. E. F.....	823

	Page
Disinfecting apparatus, portable, Mexican border mobilization	36
Disinfectors:	
other types	577
portable	567
Disposition of bids received	111
Distributing medical supply depot	659
Distributing, storing, using agencies	67
Distribution:	
dental equipment and supplies	623
motor ambulance supply depot, Louisville, Ky.	704
motor ambulances, camp medical supply service	436
procurement and, of supplies—	
pronulgations, General Headquarters, A. E. F., concerning	885-904
Revolutionary period	13
procurement and, of veterinary equipment and supplies, plan of	643
sterilizing apparatus	576
veterinary equipment and supplies	647
X-ray apparatus	594, 597
Division:	
finance and supply, September, 1917, Surgeon General's Office	46
record, correspondence and examining, Surgeon General's Office	45
Surgeon General's Office, supply	45
Division surgeon, field equipment	285
Division veterinarian, field equipment	287
Divisional unit equipment, field hospital, ambulance company, and other	263
Donated ambulances	407
Dressing packet, individual	322
Dressings:	
special surgical, developed during the World War	326
standard surgical, purchased	329
surgical	317
and sutures	541
substitute materials for	552
types of, furnished	541
Editing section, requisition department, New York medical supply depot	683
Electric power, factors affecting production of supplies	137
Emergency measures used to obtain supplies	172
Employees, civilian:	
medical supply depots	67
motor ambulance supply depot, Louisville, Ky.	699
New York medical supply depot	663, 666
Enlisted men, Medical Department, field equipment for	240
Enlisted personnel:	
Camp medical supply depot	415
Motor ambulance supply depot, Louisville, Ky.	698
New York medical supply depot	664, 666
Equipment:	
and furniture, hospital	475
and supplies—	
dental and veterinary	605
hospital	475
veterinary	629
X-ray	579
camp infirmary	258
combat	251
dental, for base and evacuation hospitals	616
field	235-332
ambulance company	265
division veterinarian	287
evacuation hospital	289
individual	235
litters and litter carriers	303
other divisional units	285
field hospital	263
ambulance company, and other divisional unit	263
initial, of a 1,000-bed base hospital (overseas), cost of	522
list of unit, X-ray	583
mess and kitchen	480
motor, of an ambulance company	437

	Page
Equipment—Continued.	
reserve, period of 1900 to 1916	25
supplies and, camp medical supply service	429
transport unit	737
unit—	
period of 1900 to 1916	22
purchased from private funds, supply division, chief surgeon's office, A. E. F.	809
Equipment section, storage and issue subdivision, finance and supply division, Surgeon General's Office	64
Estimates and appropriations	85
Europe, procurement in	764
Evacuation and base hospitals, dental equipment for	616
Evacuation hospital, field equipment	289
Mexican border mobilization	29
Evolution of the Medical Department supply system	11
period of 1909 to 1916	22
Revolutionary period	11
Spanish-American War	19
under the Constitution	15
Examination:	
and filing of property vouchers, finance and accounting division, chief surgeon's office, A. E. F.	822
of property returns, finance and accounting division, chief surgeon's office, A. E. F.	822
Excerpts from Manual for the Medical Department, United States Army, 1916	855-864
Factors affecting production of supplies	133
electric power	137
fuel	135
labor	133
raw materials	138
transportation	138
Feather pillows	479
Field equipment	235-332
evacuation hospital	289
for enlisted men, Medical Department	240
for medical officers	237
individual	235
litters and litter carriers	303
Field hospital, ambulance company, and other divisional unit equipment	263
Field inspections, supplies and equipment, camp medical supply service	443
Field litter carrier	309
Field unit section, operations division, Intermediate Medical Supply Depot No. 2, Gievres, France	836
Filing:	
and record department, Intermediate Medical Supply Depot No. 2, Gievres, France	836
examination and, of property vouchers, finance and accounting division, chief surgeon's office, A. E. F.	822
surgeon's office, A. E. F.	817
Finance and accounting, chief surgeon's office, A. E. F.	
Finance and accounting division:	
chief surgeon's office, A. E. F.—	
arrangements for returning important financial and property papers to the United States	823
central hospital fund, Third Army	823
discontinuance of	823
liaison with bureau of accounts and finance bureau	823
personnel	817
purpose	817
preparatory work	818
scope of organizations	818
administrative subdivision	55
finance section	46
liaison section	64
procurement subdivision	56
production inspection section	65
property returns section	50
records section	53
September, 1917	46
storage and issue subdivision	60
supply section	53

	Page
Finance section, Surgeon General's Office.....	46, 58
Finance bureau and bureau of accounts, liaison with, finance and accounting division, chief surgeon's office, A. E. F.....	823
Finance department:	
motor ambulance supply depot, Louisville, Ky.....	700
New York medical supply depot.....	680
Finance divisions and Treasury officials, liaison with, finance and accounting division, chief surgeon's office, A. E. F.....	821
Finances, consolidation of.....	223
Financial reports and statistical data, compilation of, finance and accounting division, chief surgeon's office, A. E. F.....	822
First-aid packet.....	317
First-aid packets for instruction.....	322
Fire prevention, section of, operations division Intermediate Medical Supply Depot No. 2, Gievres, France.....	840
Fluoroscope screens.....	598
Food trucks and containers.....	480
Ford:	
ambulance—	
chassis model, 1918.....	369
new contracts.....	369
ambulances.....	363
body model, 1918.....	366
model, 1917.....	363
motor ambulance supply depot, Louisville, Ky.....	701
Forecasts, supply division, chief surgeon's office, A. E. F.....	795
Form:	
of bid.....	111
of circular advertisement for bids.....	109
Forms of contracts.....	114
French Government:	
payments to, supply division, chief surgeon's office, A. E. F.....	768
purchases.....	765
Fuel, factors affecting production of supplies.....	135
Fund:	
central hospital—	
custodianship of, finance and accounting division, chief surgeon's office, A. E. F.....	820
Third Army, A. E. F.....	823
hospital, supply division, chief surgeon's office, A. E. F.....	809
Funds:	
hospital—	
analysis and record of, finance and accounting division, chief surgeon's office, A. E. F.....	820
traveling auditors of, finance and accounting division, chief surgeon's office, A. E. F.....	820
lack of, for purchase of supplies.....	171
private—	
unit equipment purchased from, supply division, chief surgeon's office, A. E. F.....	809
Furniture and equipment, hospital.....	475
G. M. C. ambulances, motor ambulance supply depot, Louisville, Ky.....	701
Gasoline, oils and greases.....	385, 441
Gauze bandages, compressed.....	325
Gauze packets.....	324
General Motors Truck Co., ambulance chassis.....	343
General purchasing office, Medical Department, purchase of supplies by.....	168
Greases, oils, and gasoline.....	385, 441
Hair mattresses.....	476
Hair pillows.....	478
Heaters, ambulance body.....	355
Horse hair sutures.....	556
Hospital:	
and medical supplies purchased during the period April 6, 1917, to November 11, 1918, quantities of.....	905-918
base—	
overseas, cost of initial equipment of a 1,000 bed.....	522
supplies and equipment.....	434

	Page
Hospital—Continued.	
evacuation, field equipment.....	289
field, ambulance company, and other divisional unit equipment.....	263
Hospital center depots, A. E. F.....	781
Hospital charges, billing Allies for, finance and accounting division, chief surgeon's office, A. E. F.....	821
Hospital fund:	
central—	
custodianship of, finance and accounting division, chief surgeon's office, A. E. F.....	820
Third Army, A. E. F.....	823
supply division, chief surgeon's office, A. E. F.....	809
Hospital funds:	
analysis and accounting of, finance and accounting division, chief surgeon's office, A. E. F.....	820
traveling auditors of, finance and accounting division, chief surgeon's office, A. E. F.....	820
Hospital furniture and equipment.....	475
Hospital supplies and equipment.....	475-603
Hospitals, base:	
and evacuation, dental equipment for.....	616
overseas, supplies and equipment.....	493
Improvements:	
ambulance body.....	353
ambulance chassis.....	338
Individual dressing packet.....	322
Individual equipment, field.....	235
Infirmary, camp:	
equipment.....	258
supplies and equipment.....	433
Initial allowance, supplies and equipment, camp medical supply service.....	429
Initial equipment of a 1,000-bed base hospital (overseas), cost of.....	522
Inspection:	
depot, medical supply depot.....	422
of supplies.....	195
surgical instruments.....	533
Inspection department, New York medical supply depot.....	672, 673
Inspection, field, supplies and equipment, camp medical supply service.....	443
Instruction, first-aid packet for.....	323
Instrument department, New York medical supply depot.....	693
Instruments:	
dental, production of.....	621
surgical.....	535
Interbureau requisitions.....	217
Intermediate Medical Supply Depot No. 2, Gievres, France:	
administration.....	825, 836
introduction.....	11-44
Invoice department, Intermediate Medical Supply Depot No. 2, Gievres, France.....	834
Iron, steel, and their products; factors affecting production of supplies.....	141
Issue:	
and storage depots, supply division, chief surgeon's office, A. E. F.....	770
of clearance certificate, finance and accounting division, chief surgeon's office, A. E. F.....	821
Issue section:	
operations division, Intermediate Medical Supply Depot No. 2, Gievres, France.....	849
storage and issue subdivision, finance and supply division, Surgeon General's Office.....	60
Kitchen and mess equipment.....	480
Kangaroo tendon sutures.....	556
Labor, factors affecting production of supplies.....	733
Laboratory division, medical, inspection department, New York medical supply depot.....	674
Laboratory supplies, camp medical supply service.....	465
Lack of funds for purchase of supplies.....	171
Legal reference library, finance and accounting division, chief surgeon's office, A. E. F.....	822
Less-than-carload-lot section, operations division, Intermediate Medical Supply Depot No. 2, Gievres, France.....	852
Library, legal reference, finance and accounting division, chief surgeon's office, A. E. F.....	822

	Page
Liaison:	
finance and accounting division, chief surgeon's office, A. E. F.—	
with bureau of accounts and finance bureau.....	823
with finance divisions and Treasury officials.....	821
medical supply, with the United States, supply division, chief surgeon's office, A. E. F.....	800
Liaison section, finance and supply division, Surgeon General's Office.....	64
Linters and cotton, factors affecting production of supplies.....	145
List of unit equipment, X-ray.....	583
Litter, snowshoe trench.....	307
Litter carrier:	
field.....	309
wheeled.....	312
Litter carriers.....	307
litters and.....	303
Litters:	
lower, channels for, ambulance body.....	354
trolley device for upper, ambulance body.....	353
with slings.....	303
Mail and file section, New York medical supply depot.....	666
Maintenance and operation, motor ambulances.....	440
Manual for the Medical Department, United States Army, 1916, excerpts from.....	855-864
Materials:	
substitute, for surgical dressings.....	552
to be manufactured—	
clearance and priority of.....	151
clearances.....	156
handling priorities.....	154
requirements.....	160
Mattresses.....	476
cotton felt.....	477
hair.....	476
Mechanics' school, motor ambulance supply depot, Louisville, Ky.....	705
Medical and hospital supplies purchased during the period April 6, 1917, to November 11, 1918, quantities of.....	905-918
Medical Department:	
general purchasing office, purchase of supplies by.....	168
purchasing and disbursing office, A. E. F.....	764
supply system, evolution of the.....	11
Medical officers, field equipment for.....	237
Medical property department, Intermediate Medical Supply Depot No. 2, Gievres, France.....	829
Medical supply depot:	
accountability.....	426
camp.....	411
depot inspection.....	422
depot operation.....	417
distributing, activities of.....	659
New York.....	659
No. 2, Gievres, France, activities of.....	825
Medical supply depots.....	67
depot activities.....	69
in existence when we entered the World War.....	67
new depots.....	72
personnel.....	67
commissioned.....	67
port.....	713
Medical supply liaison with the United States, supply division, chief surgeon's office, A. E. F.....	800
Medical supply officers, camp medical supply depot.....	411
Medical supply service, camp.....	411
Medical supplies, American Expeditionary Forces.....	747-852
Mess and kitchen equipment.....	480
Messengers, New York medical supply depot.....	609
Metals, nonferrous, factors affecting production of supplies.....	142
Methods control section, New York medical supply depot.....	667
Mexican border mobilization:	
deficiency appropriations.....	34
evolution of Medical Department Supply system.....	29
manner of procuring supplies.....	38

	Page
Mexican border mobilization—Continued.	
motor ambulances	32
portable disinfecting apparatus	37
ward unit	36
Mobile outfits, X-ray	583
Mobile veterinary section, field equipment	287
Mobilization, Mexican border, evolution of Medical Department Supply system	29
Model:	
Ford ambulance—	
body, 1918	366
chassis, 1918	369
1917	363
Model AA:	
ambulance body	356
chassis	340
Model B ambulance body	351
Modification, in 1918, of organization for administering supply matters, Surgeon General's Office	54
Motor ambulance subdivision, Surgeon General's Office	333
Motor ambulance supply depot, Louisville, Ky	697
distribution	704
finance department	700
mechanics' school	705
personnel	698
purchasing and miscellaneous departments	700
Motor ambulances:	
camp medical supply service	436
gasoline, oils, and greases	441
Mexican border mobilization	32
operation and maintenance	440
spare parts	439
Motor cycles	375
supplies and equipment	441
Motor equipment of an ambulance company	437
Motor vehicles	333-410
consolidation of procurement	391
overseas shipments	395
spare parts, supplies	379
supplies	385
New depots, medical supply depots	72
Newport News, Va., post medical supply depot	717
New York medical supply depot	659
administrative department	665
civilian employees	666
enlisted personnel	666
mail and file section	666
organization	664
administrative department	665
dental department	690
final	665
finance department	680
inspection department	672
instrument department	693
production department	671
purchasing department	669
requisition department	683
warehousing department	686
X-ray department	692
personnel	663
New York, post medical supply depot	713
organization	715
personnel	715
Nonferrous metals, factors affecting production of supplies	142
Nonstandard outfits, sterilizing	567
Numbering contracts	127
Officers, medical, field equipment for	237
Oils, greases, and gasoline	385, 441
Openings, side and front, ambulance body	354
Open-market purchases. A. E. F.	765

	Page
Operation:	
and maintenance, motor ambulances.....	440
depot, medical supply depot.....	417
Operations division, Intermediate Medical Supply Depot No. 2, Gievres, France.....	836
Ordnance and Quartermaster supplies, combat equipment.....	261
Organization:	
and activities of the supply division, chief surgeon's office, A. E. F.....	747
for administering supply matters.....	45-65
in the Surgeon General's office.....	45, 54
storing and distributing agencies; using agencies.....	67
general plan of operations division, Intermediate Medical Supply Depot No. 2, Gievres, France.....	837
New York medical supply depot.....	664
New York port medical supply depot.....	715
final.....	665
Outfits:	
base, dental.....	610, 622
mobile, X-ray.....	583
nonstandard, sterilizing.....	567
portable—	
dental.....	605
X-ray.....	580, 593
Overseas base hospitals, supplies and equipment.....	493
Overseas requirements section, storage and issue subdivisions, finance and supply division, Surgeon General's Office.....	63
Overseas shipments, motor vehicles.....	395
Overseas transportation of supplies, activities connected with the.....	713
Packet:	
first-aid.....	317
individual dressing.....	322
Packets:	
first-aid, for instruction.....	323
gauze.....	324
Packing section, warehousing department, New York medical supply depot.....	688
Panama Canal section, requisition department, New York medical supply depot.....	686
Papers, important financial and property, arrangements for returning to the United States.....	823
Parts, army, and advance depots, supply division, chief surgeon's office, A. E. F.....	775
Parts, spare. (See Spare parts.)	
Payments:	
to French Government, supply division, chief surgeon's office, A. E. F.....	768
to private individuals and firms, supply division, chief surgeon's office, A. E. F.....	768
Period:	
of 1900 to 1916—	
depots for reserve supplies.....	28
evolution of the Medical Department supply system.....	22
reserve equipment.....	25
unit equipment.....	22
war-time procurement plans.....	26
revolutionary, evolution of the Medical Department supply system.....	11
Personnel:	
camp medical supply depot.....	411
civilian, analysis and record of accounts of, finance and accounting division, chief surgeon's office, A. E. F.....	820
civilian employees, motor ambulance supply depot, Louisville, Ky.....	699
commissioned, motor ambulance supply depot, Louisville, Ky.....	698
enlisted medical supply depot.....	415
motor ambulance supply depot, Louisville, Ky.....	698
finance and accounting division, A. E. F.....	817
medical supply depots—	
civilian employees.....	67
commissioned.....	67
motor ambulance supply depot, Louisville, Ky.....	698
New York medical supply depot.....	663, 664
New York port medical supply depot.....	715
supply division, chief surgeon's office.....	751

	Page
Personnel section, administrative subdivision, finance and supply division, Surgeon General's Office.....	55
Personnel section, New York medical supply depot.....	666
Pillows.....	478
feather.....	479
hair.....	478
Plan of procurement and distribution, veterinary equipment and supplies.....	643
Plans:	
early, for purchases of supplies.....	169
war-time procurement, period of 1900 to 1916.....	26
Plant protection section, New York medical supply depot.....	667
Port medical supply depots.....	713
New York.....	713
Newport News, Va.....	719
other ports.....	724
Portable dental outfit.....	605
Mexican border mobilization.....	35
Portable disinfecting apparatus, Mexican border mobilization.....	36
Portable disinfectors.....	567
Portable outfits, X-ray.....	580, 593
Preferential treatment, clearance and priority of materials to be manufactured.....	154
Preparatory work, finance and accounting division, chief surgeon's office, A. E. F.....	818
Priorities, handling, materials to be manufactured.....	154
Priority and clearance of materials to be manufactured.....	151
Procurement.....	85-233
and distribution of supplies—	
pronulgations, General Headquarters, A. E. F.....	885-904
Revolutionary period.....	13
and distribution of veterinary equipment and supplies, plan of.....	643
consolidation of.....	207
of, motor vehicles.....	391
supply division, chief surgeon's office, A. E. F.....	752
from the United States.....	752
in Europe.....	764
Procurement plans, war-time, period of 1900 to 1916.....	26
Procurement subdivision, finance and supply division, Surgeon General's Office....	56, 57, 58
Production:	
ambulance chassis.....	345
of dental instruments.....	621
Production department, New York medical supply depot.....	671
Production inspection section, finance and supply division, Surgeon General's Office..	65
Promulgations, General Headquarters, A. E. F., concerning procurement and distribution of supplies.....	885-904
Property:	
accounting division, Intermediate Medical Supply Depot No. 2, Gievres, France.....	826
accounts section, storage and issue subdivision, finance and supply division, Surgeon General's Office.....	63
returns, examination of, finance and accounting division, chief surgeon's office, A. E. F.....	822
returns section, finance and supply division, Surgeon General's Office.....	50
section, warehousing department, New York medical supply depot.....	690
vouchers, examination and filing, finance and accounting division, chief surgeon's office, A. E. F.....	822
Purchase of supplies.....	165
by supply depots.....	165
by the Medical Department general purchasing office.....	168
surgical instruments.....	532
Purchases:	
dental equipment and supplies.....	622
French Government.....	765
in 1918, surgical dressings and sutures.....	544
in 1917, surgical dressings and sutures.....	542
of supplies—	
during 1918.....	177
early in 1917.....	174
plans for.....	169

	Page
Purchases—Continued.	
open-market, A. E. F.	765
vouchering, procurement subdivision, finance and supply division, Surgeon General's Office	60
X-ray apparatus	592
Purchasing:	
and disbursing office, A. E. F., Medical Department	764
and miscellaneous departments, motor ambulance supply depot, Louisville, Ky.	700
Medical Department, A. E. F.	764
Purchasing department, New York medical supply depot	669
Purchasing office, general, Medical Department, purchase of supplies by	168
Purpose, finance and accounting division, chief surgeon's office, A. E. F.	817
Quantities of medical and hospital supplies purchased during the period April 6, 1917, to November 11, 1918	905-918
Quartermaster:	
and Ordnance supplies, combat equipment	261
Engineer, and Ordnance department, Intermediate Medical Supply Depot No. 2, Gievres, France	833
Raw materials, factors affecting production of supplies	138
Receiving and shipping departments, New York medical supply depot	717
Receiving department, operations division, Intermediate Medical Supply Depot No. 2, Gievres, France	838
Receiving section, warehousing department, New York medical supply depot	687
Record, correspondence and examining division, Surgeon General's Office	45
Records department, New York port medical supply depot	715
Records section, finance and supply division, Surgeon General's office	53, 55
Red Cross, relation of the supply division, chief surgeon's office, A. E. F., to the	802
Regulating department, operations division, Intermediate Medical Supply Depot No. 2, Gievres, France	841
Regulations, shipping	729
Relation of the supply division, chief surgeons office, A. E. F., to the Red Cross	802
Relationships, supply division, chief surgeon's office, A. E. F., with other services of the Medical Department	807
Replenishment supplies, dental	623
Replenishments, combat equipment	261
Requirements:	99
Materials to be manufactured	160
Requisition department, New York medical supply depot	683
Requisitions:	
depot, supplies and equipment, camp medical supply service	452
interbureau	217
supplies and equipment, camp medical supply service	452
unit, supplies and equipment, camp medical supply service	456
Requisitions department, Intermediate Medical Supply Depot No. 2, Gievres, France	827
Reserve equipment, period of 1900 to 1916	25
Reserve supplies, depots for, period of 1900 to 1916	28
Return section, medical property division, Intermediate Medical Supply Depot No. 2, Gievres, France	831
Returns, property, examination of, finance and accounting division, chief surgeon's office, A. E. F.	822
Review:	
boards of, contracts	127
contract	126
Revolutionary period, evolution of the Medical Department supply system	11
School, mechanics', motor ambulance supply depot, Louisville, Ky.	705
Scope of organization, finance and accounting division, chief surgeon's office, A. E. F.	818
Screens, fluoroscopic	598
Section:	
finance, finance and supply division, Surgeon General's Office	46
liaison, finance and supply division, Surgeon General's Office	64
production inspection, finance and supply division, Surgeon General's Office	65
property returns, finance and supply division, Surgeon General's Office	50
records, finance and supply division, Surgeon General's Office	53
supply, finance and supply division, Surgeon General's Office	53
Service section, requisition department, New York medical supply depot	685
Shipping:	
and receiving departments, New York port medical supply depot	717
supply division, chief surgeon's office, A. E. F.	766
Shipping regulations	729
Shipping section, warehousing department, New York medical supply depot	689

	Page
Shipments:	
factory, of boxed chassis.....	346
overseas, motor vehicles.....	395
to France, dental equipment and supplies.....	624
Shortage of ambulances, 1918.....	399
Silk sutures.....	557
Silkworm gut sutures.....	557
Slippers.....	482
Smallpox vaccine, camp medical supply service.....	466
Snowshoe trench litter.....	307
Sorting section, operations division, Intermediate Medical Supply Depot No. 2, Gievres, France.....	849
Spanish-American war, evolution of the Medical Department supply system.....	19
Spare parts:	
car.....	380
motor ambulances.....	439
sterilizing apparatus.....	576
supplies.....	379
trailer.....	380
motor ambulance supply depot, Louisville, Ky.....	703
Special supplies, camp medical supply service.....	465
Spectacles, camp medical supply service.....	469
Standard surgical dressings sterilizer.....	563
Stationary apparatus, X-ray.....	579
Statistical data and financial reports, compilation of, finance and accounting division, chief surgeon's office, A. E. F.....	822
Statistical section:	
procurement subdivision, finance and supply division, Surgeon General's office.....	57
supply division, chief surgeon's office, A. E. F.....	797
Steel, iron, and their products, factors affecting production of supplies.....	141
Sterilizers:	
nonstandard outfits.....	567
standard surgical dressings.....	563
Sterilizing apparatus.....	563
distribution.....	576
spare parts.....	576
Stock record section:	
medical property division, Intermediate Medical Supply Depot No. 2, Gievres, France.....	829
requisition department, New York medical supply depot.....	685
Storage:	
and issue—	
depots, supply division, chief surgeon's office, A. E. F.....	770
subdivision, finance and supply division, Surgeon General's Office.....	60
consolidation of.....	75
pending distribution, ambulance chassis.....	345
Stores, controlled, supply division, chief surgeon's office, A. E. F.....	781
Storing and distributing agencies; using agencies.....	67
Subdivision:	
administrative, finance and supply division, Surgeon General's Office.....	55
motor ambulance, Surgeon General's Office.....	333
procurement, finance and supply division, Surgeon General's Office.....	56
storage and issue, finance and supply division, Surgeon General's Office.....	60
Substitute materials for surgical dressings.....	552
Summary of appropriations.....	91
Supplies:	
activities connected with the overseas transportation of.....	713
and equipment—camp medical supply service.....	429, 452
dental and veterinary.....	605
hospital.....	475
veterinary.....	629
X-ray.....	579
dental, replenishment.....	623
early purchases in 1917.....	174
emergency measures used to obtain.....	172
factors affecting production of.....	133
inspection of.....	195
late purchases in 1917.....	175
laboratory, camp medical supply service.....	465
manner of procuring, Mexican border mobilization.....	38

	Page
Supplies—Continued.	
medical—American Expeditionary Forces.....	747
and hospital, purchased during the period April 6, 1917, to November 11, 1918, quantities of.....	905-918
motor vehicles.....	385
procurement and distribution of, Revolutionary period.....	13
purchase of.....	165
purchases during 1918.....	177
Quartermaster and Ordnance, combat equipment.....	261
reserve, depots for, period of 1900 to 1916.....	28
sent to the American Expeditionary Forces, termination of accountability for.....	743
spare parts, motor vehicles.....	379
special, camp medical supply service.....	465
Supply, automatic, A. E. F.....	754
Supply depot:	
camp medical.....	411
distributing medical, activities of.....	659
Intermediate Medical, No. 2, Gievres, France, activities of.....	825
motor ambulance, Louisville, Ky.....	697
New York medical.....	659
Supply depots:	
medical.....	67
port medical.....	713
purchase of supplies by.....	165
Supply division:	
chief surgeon's office, A. E. F.—	
medical supply liaison with the United States.....	800
miscellaneous activities.....	808
organization and activities of.....	747
personnel.....	751
procurement.....	752
relation of, to the Red Cross.....	802
relationships with other services of the Medical Department.....	807
statistical section.....	797
storage and issue depots.....	770
Surgeon General's office.....	45
Supply Letters Nos. 1 to 29, inclusive, Medical Department, United States Army.....	864-885
Supply liaison, medical, with the United States, supply division, chief surgeon's office, A. E. F.....	800
Supply matters, organization for administering.....	45-65
Supply officers, medical, camp medical supply depot.....	411
Supply section, finance and supply division, Surgeon General's Office.....	53
Supply service, camp medical.....	411
Supply system, Medical Department:	
evolution of the.....	11
Mexican border mobilization.....	29
period of 1900 to 1916.....	22
Revolutionary period.....	11
Spanish-American war.....	19
under the Constitution.....	15
Supply table, veterinary, development of.....	632
Surgeon, division, field equipment.....	285
Surgeon General's Office:	
motor ambulance subdivision.....	333
organization for administering supply matters in the.....	45
Surgical dressings.....	317
and sutures.....	541
purchases in 1918.....	544
purchases in 1917.....	542
special, developed during the World War.....	326
standard, purchased.....	329
sterilizer, standard.....	563
substitute materials for.....	552
Surgical instruments.....	535
inspection.....	533
purchase.....	532
Sutures.....	553
catgut.....	554
horseshair.....	556
kangaroo tendon.....	556

	Page
Sutures—Continued.	
silk	557
silkworm gut	557
surgical dressings and	541
Tabulation section, storage and issue subdivision, finance and supply division, Surgeon General's Office	62
Termination of accountability for supplies sent to the American Expeditionary Forces	743
Third Army, central hospital fund, A. E. F.	823
Traffic section, warehousing department, New York medical supply depot	689
Trailer, spare parts	380
motor ambulance supply depot, Louisville, Ky.	703
Transfers of appropriations	91
Transport unit equipment	737
Transportation:	
factors affecting production of supplies	138
overseas, of supplies, activities connected with the	713
Transportation section:	
depot, operations division, Intermediate Medical Supply Depot No. 2, Gievres, France	841
storage and issue subdivision, finance and supply division, Surgeon General's Office	62
Treasury officials and finance divisions, liaison with, finance and accounting division, chief surgeon's office, A. E. F.	821
Trench litter, snowshoe	307
Trolley device for upper litters, ambulance body	353
Tubes, X-ray	593
Trucks and containers, food	480
Typhoid-paratyphoid vaccine, camp medical supply service	468
Unit:	
ambulance assembly	401
bedside, X-ray	582
supplies and equipment camp medical supply service	430
ward, Mexican border mobilization	36
Unit equipment:	
purchased from private funds, supply division, chief surgeon's office, A. E. F.	809
transport	737
X-ray, list of	583
Unit requisitions, supplies and equipment, camp medical supply service	456
United States:	
medical supply liaison with, supply division, chief surgeon's office, A. E. F.	800
procurement from, supply division, chief surgeon's office, A. E. F.	752
Units:	
dental	611
other divisional, field equipment	285
Using:	
agencies	81
storing and distributing agencies	67
Utilities section, New York medical supply depot	668
Vaccine:	
smallpox, camp medical supply service	466
typhoid-paratyphoid, camp medical supply service	468
Vehicles, motor	333
consolidation of procurement	391
Veterinarian, division, field equipment	287
Veterinary ambulances	652
Veterinary and dental equipment and supplies	605
Veterinary biologicals	654
Veterinary equipment and supplies	629
plan of procurement and distribution	643
Veterinary section, mobile, field equipment	287
Veterinary supplies and equipment, camp medical supply service	450
Veterinary supply table, development	632
Voucher section, medical property division, Intermediate Medical Supply Depot No. 2, Gievres, France	831
Vouchering purchases, procurement subdivision, finance and supply division, Surgeon General's Office	60
Vouchers:	
property, examination and filing of, finance and accounting division, chief surgeon's office, A. E. F.	822
supply division, chief surgeon's office, A. E. F.	809

	Page
Ward unit, Mexican border mobilization.....	36
Warehouse group section, operations division, Intermediate Medical Supply Depot No. 2, Gievres, France.....	846
Warehouses, layout of, operations division, Intermediate Medical Supply Depot No. 2, Gievres, France.....	836
Warehousing department:	
New York medical supply depot.....	686
operations division, Intermediate Medical Supply Depot No. 2, Gievres, France.....	839
Warehousing section, New York medical supply depot.....	688
War-time procurement plans, period of 1900 to 1916.....	26
Web belts, for enlisted men, Medical Department.....	242
Wheeled litter carrier.....	312
Wool, factors affecting production of supplies.....	144
X-ray:	
apparatus, purchases.....	592
department, New York medical supply depot.....	692
equipment and supplies.....	579
portable outfits.....	580
tubes.....	965