







Building the Emergency Fleet

A HISTORICAL
Narrative of the
problems and
achievements of the
United States Shipping
Board Emergency Fleet
Corporation

By

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Former Head, Publications Section
Emergency Fleet Corporation

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*Dedicated to My Wife
whose interest and encourage-
ment have made this
work possible*

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CHARLES M. SCHWAB
First director general, Emergency Fleet corporation



EDWARD N. HURLEY
Chairman, United States Shipping Board



CHARLES PIEZ
Second director general, Emergency Fleet corporation



HOWARD COONLEY

Vice president, in charge of administration, Emergency Fleet corporation



JOHN J. ACKERSON

Vice president, in charge of construction, Emergency Fleet corporation

Author's Preface

NOTHING short of war with Germany served to arouse the American people and the government to the need of a merchant marine. For half a century our people neglected the shipping problem or looked upon it with indifference. We were content, in peace time, to depend upon the ships of other nations to carry our commerce. Apparently we believed war to be so unlikely that there was no cause for alarm.

Sporadic attempts were made by societies and patriotic individuals to awaken the nation to the danger of neglecting ocean shipping, but these attempts failed miserably. The public slumbered on, from the time of the Civil War until 1898, when the Spanish-American war caused a momentary disturbance. That war had much the same effect upon the nation as an alarm clock often has upon a sleeping man. He hears the alarm, but is too lazy, or indifferent, to get up. So, after 1898, the American people rolled over for another nap.

But from that time the country was restless and from time to time gave the subject of ships and shipping laws brief consideration. Congress passed laws, which resulted only in driving to foreign flags most of what shipping we did have on the Pacific. This failed to disturb anybody, except a few ship-owners who were concerned over going out of business. After a brief hearing to those gentlemen, the United States dismissed the subject once more.

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It is not difficult to analyze the attitude of congress and the people. American seamen would not go to sea for the low wages paid to foreigners. Foreign shipping nations had tonnage to spare and could quite easily take care of our needs and at rates, perhaps, that we could not hope to match. To build ships, everybody believed, was hopelessly expensive as a government enterprise and of doubtful future as a private undertaking. Shipbuilding involved so much ready capital that there were few individuals or corporations, even, in position to undertake it. So the tendency was to procrastinate or to dismiss the subject entirely. The comparatively few shipyards in existence continued to build ships—mostly for other countries and for the navy—and there were no developments until 1914, when the war began in Europe.

Even then America was slow to act. We had no serious thought of joining in the war until fighting had been going on in Europe for nearly two years. It was not until it became obvious that German submarine sinkings were threatening to deplete the world's shipping and we began to realize that, sooner or later, the United States would be drawn into the vortex, that we turned our attention seriously to the shipping situation and the effect of submarine sinkings upon the United States.

On Sept. 7, 1916, congress passed an act creating the United States shipping board, to regulate shipping and to promote the development of an American merchant marine. That act was the first definite, constructive legislation passed in several decades that aimed at the restoration of America's lost

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prestige on the ocean. Even then it was not contemplated, or at least, not clearly designated, that the shipping board should undertake actual construction of ships. The board was designed as a regulatory body, to inquire into shipping rates, to stabilize shipping conditions and solve problems relating to shipping that had developed as a result of the war. Eventually it was hoped that an American merchant marine might be an outgrowth of the board's activities, but at that time there was no appropriation available for creating a fleet of new merchant ships and no well defined plan or organization to accomplish that purpose.

The creation of the shipping board was a fortunate and timely act. It gave the government a valuable nucleus for the organization later of the Emergency Fleet corporation and made possible much preliminary investigation and research of vital importance. When the declaration of war, in April, 1917, brought to a focus the nation's desperate need of ships, the necessary initial energy for setting into motion the machinery for shipbuilding and ship operation was at hand.

Is it not a strange thing that statesmen had not appreciated in advance this country's position in the event of war? It was patently obvious that, if we became involved, we should have to depend upon the friendliness of other nations, perhaps neutrals, to carry troops and munitions; that without such aid, this nation would be helpless to wage war anywhere except upon American soil. And yet, after the demonstration in 1917 of our own embarrassing weakness, there arose, early in 1919, doubt in some quarters as to the wisdom of proceeding; of

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rebuilding, if necessary, our maritime code; or doing anything and everything within the power of the country to build up and maintain a merchant marine commensurate in size with the bigness and prosperity of the country.

America suddenly found itself confronted with the necessity of waging war 3000 miles across the Atlantic. The emergency accomplished overnight what half a century of neglected opportunity and indifference failed to bring about. In the stress of the most gigantic undertaking ever attempted by man, the United States Shipping Board Emergency Fleet Corporation was born and charged with building a fleet of ships sufficient to transport and maintain an army of millions of fighting men in Europe.

It is not the intention here to detail the causes that led to the creation of the United States shipping board, the parent of the Emergency Fleet corporation. Yet, to make the story of the Fleet corporation's scope and activities clear, it is well that we should review briefly the beginning of the two organizations.

The United States shipping board was created by Section 3 of the federal act passed Sept. 7, 1916, which provided:

That a board is hereby created, to be known as the United States shipping board. * * * * The board shall be composed of five commissioners, to be appointed by the President, by and with the advice and consent of the senate; said board shall annually elect one of its members as chairman and one as vice chairman.

The first commissioners appointed shall continue in office for terms of two, three, four, five and six years, respectively, from the date of their appointment, the term of each to be designated by the President, but their successors shall be appointed for terms of six years, except that any person

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chosen to fill a vacancy shall be appointed only for the unexpired term of the commissioner whom he succeeds.

The first annual report of the United States shipping board, published in Washington, Dec. 1, 1917, contains the following review of the board's early organization:

"Pursuant to the provisions of the act, the President on Dec. 22, 1916, nominated as commissioners of the shipping board the following: William Denman, of California; Bernard N. Baker, of Maryland; John A. Donald, of New York; John B. White, of Missouri, and Theodore Brent, of Louisiana.

"On Jan. 19, 1917, the senate confirmed the appointment of Messrs. Denman, Baker, White and Brent; and on Jan. 23, 1917, confirmed the appointment of Mr. Donald.

"On Jan. 26, 1917, the President accepted the resignation of Commissioner Baker, and on Jan. 30, 1917, the board, as so constituted, was formally organized.

"On March 12, 1917, the President nominated Raymond B. Stevens, of New Hampshire, as a commissioner of the shipping board, vice Mr. Baker, resigned, and the appointment of Mr. Stevens was confirmed by the senate on March 15, 1917.

"On July 24, 1917, the President accepted the resignations of Commissioners Denman and White, and nominated as commissioners in their stead, respectively, Edward N. Hurley, of Illinois, and Bainbridge Colby, of New York, those nominations being confirmed by the senate on July 25, 1917, and Aug. 8, 1917, respectively.

"On July 26, 1917, the President accepted the resignation of Commissioner Brent, and on Sept. 29, 1917, nominated to

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succeed him Charles R. Page, of California, who was confirmed by the senate on Oct. 3, 1917.

"On July 2, 1917, Lester Sisler, then chief clerk of the interstate commerce commission, was transferred to the board as assistant secretary, and on Oct. 4, 1917, he was appointed secretary of the board."

The shipping act authorized the board to form one or more corporations "for the purchase, construction, equipment, lease, charter, maintenance and operation of merchant vessels in the commerce of the United States." In compliance with this authorization, the board, on April 16, 1917, organized under the laws of the District of Columbia, with a capital stock of \$50,000,000, the United States Shipping Board Emergency Fleet Corporation. To the corporation the shipping board delegated its ship construction program.

There was included in the urgent deficiencies act approved June 15, 1917, an emergency shipping fund provision which conferred upon the President far-reaching authority to requisition, construct and operate ships without limitations or conditions (save such limitations as result from the amounts of the appropriation).

The President was given authority to exercise the power vested in him through such agencies as he should determine and by an executive order dated July 11, 1917, the President delegated this authority to the Emergency Fleet corporation. The shipping board was clothed with authority to acquire vessels already constructed and to operate, manage and dispose of ships later to be acquired by the United States. Thus the Emergency

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Fleet corporation and the United States shipping board have acted always as the direct representative of the President with authority to use all the broad war powers conferred upon him by the shipping act.

To carry out the construction program, the Emergency Fleet corporation was authorized to spend \$3,671,000,000, of which \$2,625,451,000 was appropriated by congress.

It must be remembered that although the United States shipping board was the parent body and the members of the board were trustees of the Emergency Fleet corporation, the operations of the two organizations were distinct. The shipping board, on the one hand, had three main phases of activity: 1—Acquisition of vessels after construction; 2—operation of these vessels, and 3—regulation of shipping and shipbuilding.

The Emergency Fleet corporation had two principal functions, one of which was delegated to it by the shipping board. Its chief and commanding field of activity was the construction of ships. It was found convenient and the part of wisdom by the United States shipping board to delegate one of its activities, namely, the operation of ships, to the Emergency Fleet corporation, so that the operation of the merchant fleet became one of the two duties of the corporation.

Thus we find the Emergency Fleet corporation beginning its great enterprise in wartime, clothed with all the powers of seizure or commandeering in the premises possessed by the President of the United States himself and authorized to spend the tremendous sum of nearly three and three-quarters billion dollars. Everything that money and the united support of a

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wealthy nation could do was at hand to help the Emergency Fleet corporation in its task, but confronting it were obstacles that seemed insurmountable. How those obstacles were overcome is a story of one of America's greatest wartime achievements.

The Emergency Fleet corporation had two tremendous advantages. One was capable leadership. Throughout the emergency strong men were in command of both the construction and administrative phases of the work. The corporation, too, was fortunate in being able to obtain the services of employes whose previous training fitted them peculiarly for their individual tasks. The organization was well balanced, efficient and imbued with a spirit of enthusiasm that could not be daunted by obstacles. The personal element was a big factor in the success of the corporation and should be given proper recognition.

W. C. MATTOX.

Preface by Charles M. Schwab

AMERICA IS again entitled to a high place on the roll of ship-building nations. After the close of the Civil war, this most vital and significant industry had been permitted to languish, until the time came when there was no real merchant marine flying the American flag and we were content to depend upon foreign ships to carry our commerce. I feel a sense of shame when I look back at the years when we neglected the obligation that we owed, not only to ourselves, but to posterity and to the world—the bounden duty to provide tonnage to meet every possible emergency.

How many lives could have been spared had we built our ships in time of peace—before the conflagration of war started in Europe! How much speedier could Germany have been brought to her knees! American ships, had they been ready, would have turned the tide long before the fateful day in August, 1918, when our troops stopped the foe at Chateau Thierry. What an infinite pity that we were not ready when the sickening need arose!

But I can find solace in the story of what happened when we, the American people, did awaken to the fact that ships were necessary. In a single year we made up for many years of indifference. We were put to a test such as no other nation ever was called upon to meet and we met that test magnificently.

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Such yards as already existed were busy building ships on private and foreign contract. We were at war and the best of our young men were urgently needed for service abroad or for work at supplying munitions and food. Our railways were overburdened. Our trained shipbuilders were dishearteningly few in numbers and were already employed in existing shipyards. Every war industry was crying for steel and competing for labor.

Our problem was, briefly, to build vast new shipyards, train an army of men in the crafts necessary to the industry, transport these men to tidewater, provide them with houses, find and train executives, prepare plans for ships, purchase and transport vast quantities of material and build all the tonnage we could—and do it all within the shortest possible limits of time. We were out to break all the records known to modern shipbuilding. Anything short of success would have been disappointing, unbearable, to the American people. The task seemingly was impossible, but it had to be accomplished.

Never did America respond more nobly to the need of the hour. But it required every ounce of energy and all the resourcefulness of brawn and brain that we possessed.

There were three factors which made the success of the shipbuilding program possible. It is difficult to distinguish between them as to their relative importance. One was the efficiency of the organization which directed the task, another was the patriotism and enthusiasm of the American people, and the third was the possession of natural resources, almost



MAIN OFFICE OF EMERGENCY FLEET CORPORATION AT 140 N. BROAD STREET
PHILADELPHIA

Preface

without limit. Lacking any of these, I doubt if we could have succeeded, although it may have been that American brains could have found a way to supply the lack of steel and timber, within our own borders, had that been necessary.

Building up a proper organization to direct the manifold activities of the Emergency Fleet corporation was a herculean task. No other modern industry involves such a variety of activities as shipbuilding. Within a year after the Emergency Fleet corporation was formed and headquarters were opened in a Washington office building,—with a personnel of five—the organization had grown to more than 8000 in its personnel and had representatives stationed at every important city in the United States. This gigantic machinery was controlled by executive officers in Washington and later at Philadelphia, with such efficiency and system that every ton of steel and every foot of timber used in the construction of our ships could be accounted for.

Reaching out from the home office, the corporation directed the activities of men in the forests of the northwest and south and in the iron mines of this country, South America and England. It enlarged and extended existing industrial plants whose facilities were not adequate to meet the demand for shipbuilding material and where necessary it provided money and arranged for the construction of new plants. An army of railroad men was indirectly under the command of the Emergency Fleet corporation officers. All along our ocean coast from Maine down the Atlantic to Florida, around the Gulf and up the Pacific coast, scores of new shipyards were

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laid out by the Emergency Fleet corporation engineers and built under their supervision.

At the beginning of the program there were less than 50 shipyards capable of building oceangoing merchant vessels, but when the armistice was signed in November, 1918, there were 186 plants either constructing ships or ready to lay down their first keels.

Without an able and conscientious organization to direct and manage this industrial machinery, the program could not have hoped to succeed.

Fully as important, however, to my mind, was the spirit of patriotism with which the people undertook this stupendous task. Every man, high or low, rich or poor, who was called upon to make sacrifices to help was found ready. When 250,000 men were asked to volunteer for shipyard labor more than 300,000 responded. When the country's great executives were called upon to drop their private business affairs and in many cases to sacrifice large personal incomes and to give their brains and their ability for a government pittance in salary, they responded to a man.

I consider myself fortunate to have been called upon to become director general of the Emergency Fleet corporation and to have led that army of men in the yards and shops and the splendid organization of men and women in the offices to victory. I unhesitatingly give all the credit for their success to those who made it possible. They were, first, the boys who built the ships and who supplied the material and equipment; second, the men and women at Washington

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and Philadelphia—representing every state in the union—who stayed on the firing line throughout the fight. I believe the nation owes a vote of thanks to Edward N. Hurley, Charles Piez, Howard Coonley, James L. Ackerson and the other officials who formulated policies and directed the gigantic task. But no less measure of gratitude is due all those who helped and without whose aid success would have been impossible.

I do not believe the country, even today, appreciates the full measure of the success of the Emergency Fleet corporation. It may not be generally known that, despite the handicap of labor shortage, inexperienced management, unprecedentedly severe winter weather and transportation difficulties incidental to the war, the Emergency Fleet corporation in a single year built and delivered more than 3,100,000 deadweight tons of shipping, far more than the greatest output of any other nation in any single year. American efficiency cut the time required to build a modern steel ship of from 3500 to 9000 tons from nine months to a year and a half down to 30 to 120 days. In one yard the actual average time required to complete a vessel, from keel laying to delivery, was reduced to less than 70 days.

Hog Island, the industrial marvel of the world, was a successful wartime expedient—worth every dollar that we spent for it. Hog Island suffered from the same cause that harmed other war industries—the fact that the war ended before it had an opportunity to prove its real value.

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When the armistice came, I asked the author of this book to tell the story of the Emergency Fleet corporation's beginning and the steps by which it developed. He has not attempted to compile a record of statistical information but has told in narrative form what the big job was and how it was completed.

All of us who had a part in the building of our new merchant marine feel very strongly that now is a wonderful opportunity for the country to regain its lost prestige on the high seas. The possession of adequate tonnage for carrying merchandise is certain to be a vital factor in the future prosperity and progress of the nation. We have demonstrated that we can build ships in sufficient number and of a quality that ranks with the best vessels afloat. If we neglect our opportunity now and fail not only to continue the shipbuilding program, but to provide laws for the proper safeguarding of American shipping interests, we shall not have done our duty to the coming generation. It is my prayer that America never again will be found unprepared in the matter of ships whatever the emergency may be.

With the experience the war has given us, we have an asset of untold value. Let us use this asset and send American ships, manned by American boys, carrying American goods to every port in the world.

A handwritten signature in cursive script, reading "C. M. Schwab". The signature is written in dark ink and is centered on the page.

THE TIDAL WAVE



JULY 4, 1918

95 Ships Launched

UNITED STATES SHIPPING BOARD EMERGENCY FLEET CORPORATION

ONE OF MANY POSTERS USED BY FLEET CORPORATION TO ENCOURAGE
PRODUCTION

CHAPTER I

Early Trials of Corporation

IN THE early spring of 1917, the dream of spanning the Atlantic with wooden ships had seized upon the public imagination. It was not believed by many authorities at that time that the Emergency Fleet corporation could hope to succeed in a program of steel ship construction because all existing yards were occupied and busy on private contracts. The so-called wooden ship idea threatened to exclude all else. It was introduced to the government by F. Huntington Clark, Roxbury, Conn., who was employed by the shipping board and Fleet corporation until June, 1917.

In general, Mr. Clark's idea was to use the available timber in the construction of a vast fleet of wooden ships of standard design which he and other advocates of the plan thought could be built at high speed and serve quickly to overcome the submarine menace.

Maj. Gen. George W. Goethals, builder of the Panama canal and a recognized master engineer, was called to Washington from New Jersey where he had been in charge of a great government roadbuilding project. General Goethals arrived in Washington on April 14, 1917, and two days later, when incorporation papers were taken out in the District of

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Columbia for the Emergency Fleet corporation, he became the first general manager of the corporation.

The situation at that time may well be described as chaotic. The wooden ship idea had drawn a swarm of contract hunters to Washington, every man bent upon obtaining a government job in wood shipbuilding and no two of them with ideas alike as to how to proceed. There were few wood shipyards actually in existence and for many months it appeared that most of our shipbuilding would be done on paper. Many of the real shipbuilders were engaged on contracts for steel vessels and had enough on hand to carry on for some time without trying to get government contracts. They were having great difficulty in obtaining steel because of the abnormal demand from munitions plants. The big problem in the shipbuilding enterprise at that time was to find yards in which to begin construction.

The shipping board faced the necessity, even before this country entered the war, of beginning upon a program of construction to expand the commercial tonnage under the American flag. During the period beginning in January, 1917, German submarines began to show great destructiveness and in February they started their unrestricted campaign. By April the destruction had reached a rate which seemed to justify the fears of the shipping board that not less than 13,000,000 deadweight tons of shipping would be destroyed before the end of the year. The April rate was not maintained, but the total destruction for the year, 1917, proved to be between 8,000,000 and 9,000,000 deadweight tons (includ-

Early Trials of Corporation

ing vessels damaged and not sunk and those destroyed by mines.)

The shipping board ordered an investigation to determine the possibility of building steel ships. The results of this investigation were told by Chairman Denman in his testimony before the senate committee on commerce, Jan. 21, 1918.

"We found none of them (steel shipyards) willing to build for the board," said Mr. Denman, "and all of them complained that their facilities were either completely utilized by the navy or by their merchant contracts; all said they would be unable to take any large contracts from us.

"They complained greatly of their inability to obtain labor, were rather pessimistic about the expansion of labor supply; and on the whole, we had the impression at that time—that was in the month of February and in the month of March—that we could not look for a very large extension of steel construction immediately, certainly not without the granting of war powers to the board, or to somebody who could co-ordinate all the shipbuilding facilities.

"Now, to meet that situation, we turned to investigate the possibility of wooden ships. A great deal has been said about the attitude of the board on the question of wooden tonnage, our friends of the press—if I may use a phrase of the West—'overplaying our hand' on the question of building wooden ships. An impression grew throughout the United States that the shipping board had nothing in mind but the creation of a wooden tonnage increasing the fleets of the United States.

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“But that was entirely and completely erroneous and I think it has done more harm—this unfortunate occurrence—to shipbuilding expansion than any other single thing that has occurred.”

Mr. Denman went on to point out that the shipping board did not believe wooden ships were as good as steel vessels, due to greater depreciation, cost of upkeep, smaller size and other factors, but in view of the emergency and the seeming impossibility of entering upon a steel shipbuilding program, the board turned to the wooden ship as a possible solution of the need for tonnage. As Mr. Denman said, the board favored wooden ships because the country demanded ships; and it seemed that the quickest way of getting vessels was to build them of wood.

It developed upon investigation that timber in sufficient quantities for a program of wood shipbuilding was available upon the Pacific coast and in the south. F. A. Eustis, who later became the agent for the United States shipping board in charge of reconstructing Great Lakes vessels for sea service, was a strong supporter of the wooden ship idea and he brought to the shipping board assurances of the certainty of a supply of engines and impressed upon the board by his vigorous arguments the feasibility and necessity of the wood shipbuilding plan.

General Goethals' attitude may be summed up in his statement to *Sunset Magazine* in September of 1917 in which he said:

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"We must have all the ships it is possible to secure, both wood and steel, under contract satisfactory to the interests of the government and fair to the contractor."

General Goethals proposed to concentrate upon the production of steel tonnage by double shift employment in the yards, the extension of existing plants and the building of vast new plants. He did not, as was commonly believed at that time, offer opposition to the wooden ship as an emergency proposition, but he did insist upon the feasibility of a steel shipbuilding program in addition. At the time General Goethals came in as general manager of the Fleet corporation, however, the shipbuilding program definitely included only wooden ships.

Mr. Eustis had been engaged in preliminary organization work in which he had sent out agents to look up locations for new yards. Among these agents were Eads Johnson, Capt. John F. Blain and Capt. A. F. Pillsbury. Mr. Johnson was assigned to the Gulf coast and Captains Blain and Pillsbury to the Pacific coast. They were authorized to find shipyard locations and to get work started as speedily as possible.

This blanket authority resulted in a most surprising situation, particularly on the Gulf coast, where men of no shipbuilding experience afterward asserted they were told to go ahead and build ways without the formality of having contracts in advance. The contracts were to be arranged later, they said.

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The whole country at this time was inflamed with the war spirit. The press was demanding action to get troops in Europe and to get the shipbuilding program under way. Every move of the government was watched with a critical eye. There were fears of U-boat raids on Atlantic shipping and coast cities. And, *the whole war program depended upon ships.*

That was the situation General Goethals found when he came with the corporation. He ordered an immediate survey and found that agents had been committing the government to the expenditure of hundreds of thousands of dollars without contracts and without specifications. He traced all the correspondence dealing with new wood shipyards and telegraphed that all work be held up until an inspector and auditor were on the ground at each proposed shipyard site. Fortunately very little work had been done at any of these projected plants which had been authorized with such scant formality.

Meanwhile the shipbuilding program was receiving wide publicity. General Goethals and his entire office personnel were housed in four small offices in Washington and from early morning until far into the night every day these offices were filled with visitors—mostly contract hunters.

By that time the corporation lacked even a definite outline of policy and had no particular plan of procedure. The first move obviously was to draw up a form of contract and Joseph P. Cotton of the law firm of Spooner & Cotton, of New York, was called in to advise the officials. That was the

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start of what subsequently became the legal and contract divisions.

The country had been organized into districts for field representatives and one of General Goethals' first acts was to call in all the agents for instructions. He gave them a series of lectures on their duties and on the activities of the corporation, and some order soon began to appear out of the confusion. Contracts were let for the building of wooden ships, one of the first going to the G. M. Standifer Construction Co. on the Pacific coast.

General Goethals always believed that the Emergency Fleet corporation should have a broader field than was contemplated originally. He thought that it was within the province of the corporation to build a merchant marine and that its activities should not be limited by the emergency of war. He, therefore, turned his attention to the steel ship as the larger and more important product of the corporation.

A survey had brought to light three principal difficulties in the way of a wood shipbuilding program.

The first was the problem of getting going yards into operation for the production of any type of vessel. Practically all of the existing plants were steel shipyards and, as mentioned, they were tied up with contracts for private owners.

The second difficulty was to build a wooden ship large enough for overseas service. This presented a new engineering problem and one that would require all the skill of American architects.

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The material problem was the third difficulty and it seemed to be almost insurmountable. It was not an easy task to find timber of the size and in the quantity needed for building vessels large enough for sea service. And, as for steel in sufficient quantities, the demand was so great on account of other war activities that the Fleet corporation faced virtually a closed door in that direction. Labor agitation had resulted in the price of timber and steel plates going skyward. Even to contemplate a shipbuilding enterprise on a large scale was disheartening.

It was on two important questions that General Goethals came into conflict with Chairman Denman. To understand the situation fully it should be kept in mind that final authority in the shipbuilding enterprise was divided between the Emergency Fleet corporation, as represented by the general manager, and the United States shipping board, as represented by the chairman. This dual authority was largely responsible for many of the early troubles of the corporation. General Goethals and Mr. Denman disagreed in the first place upon the extent of the shipbuilding program. General Goethals believed that it should be comprehensive enough to cover not only the wooden but also the steel vessels. Mr. Denman was convinced that the wooden ship could be made to meet the emergency.

Another point of disagreement between the two was the price for building vessels named in contracts. Actual shipbuilding operations were held up because Mr. Denman believed the costs too high. This attitude was most discourag-

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ing to a man of General Goethals' type. The latter's idea was to get things started and push them to the utmost. The cost, he believed, was a mere detail, considering that the country was at war and that the need for ships outweighed any hesitation over costs. In General Goethals' mind therefore the conflict resolved itself into a contest of "procrastination versus action."

The general foresaw the handicaps under which the Emergency Fleet corporation would be forced to carry on business if authority continued to be divided between the general manager and the chairman. He requested that complete power to act be placed in the corporation. Chairman Denman, on the other hand, insisted upon retaining final authority in all matters connected with the corporation's activities. Decision finally was carried to the White House, and the President's ruling upheld the system of dual authority.

This was entirely unsatisfactory to General Goethals, but he tried to continue the work on that basis. Subsequently he found that contracts were held up, and that the work of shipbuilding was lagging. He ended the controversy suddenly by resigning on July 27, 1917, and President Wilson took matters into his own hands once more by requesting the resignation of Mr. Denman.

Rear Admiral Washington Lee Capps was appointed to succeed General Goethals and Edward N. Hurley, an Illinois manufacturer, was named chairman of the United States shipping board. Rear Admiral Capps had been engaged in naval construction work for many years, and had been chief

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of construction of the navy department. He was an expert in the science of shipbuilding but he, too, soon found that the system of dual authority was a handicap. The strain of the work so affected Admiral Capps' health that on Dec. 1 he sent his resignation to the President.

In the meantime, however, the all important requisitioning order had gone forth taking over the steel ships on the ways or under contract for private owners. The requisitioning order was ready for issuance before General Goethals went out of office, but was held up and changed so as to include not only the ships on the ways but the pending contracts. While this change avoided certain legal entanglements that might have developed otherwise, it also resulted in a most embarrassing delay to the whole shipbuilding enterprise.

Rear Admiral Frederick R. Harris succeeded Admiral Capps, but remained at the head of the corporation only 16 days. He also found that he was handicapped by the system of dual authority which had hampered the movements of his predecessors. Admiral Harris was a good executive and he made some moves in organization and methods which served as a basis for much improvement later.

Charles Piez, Charles Day, and Arthur J. Mason were engaged in making a survey of the shipyards at Mr. Hurley's instigation, when Admiral Harris resigned, and Mr. Piez was asked to undertake the general managership of the Emergency Fleet corporation. He took office on Dec. 18 and remained in virtual control of all of its activities until May 1, 1919.

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The by-laws* of the corporation were revised at the time Admiral Harris resigned and the dual authority clause was eliminated. Full power was placed upon the chairman of the United States shipping board and the president of the board of trustees, who, under the organization then existing, was one and the same man. The province of the shipping board was to say what should be built, and that of the Emergency Fleet corporation was to build it. This simplification of matters brought immediate relief and made possible the construction program achieved in the year 1918.

The first task of the Emergency Fleet corporation was to lay the foundation for its future activities. That meant, first of all, proper organization. There was no precedent to guide the officers because never before had the government, under the pressure of wartime necessity, undertaken to carry

*The change in the by-laws of the Emergency Fleet Corporation which simplified the operating methods of the corporation was made Nov. 15, 1917, by amendment. The amendments which placed full power upon the president of the corporation are shown in the following comparison:

Original Paragraph

The president shall preside at all meetings of the stockholders and of the trustees, and he shall, together with the secretary, sign all contracts and papers on behalf of the corporation. * * *

The general manager shall be *ex officio* chairman of the executive committee. He shall have the general oversight and management of the business and affairs of the corporation, and shall have power to employ and discharge all clerks, employes, and agents, determine their salaries, and prescribe and define their duties.

Amended Paragraph

The president shall preside at all meetings of the stockholders and of the trustees, and he shall, together with the secretary, sign all contracts and other instruments on behalf of the corporation. He shall have the general oversight and management of the business and affairs of the corporation, and shall have power to employ and discharge all clerks, employes, and agents, determine their salaries, and prescribe and define their duties. * * *

(Eliminated by new by-laws.)

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out a great construction program through the instrumentality of a corporation. The Emergency Fleet corporation was something new.

It came into being and developed into a tremendously great and complicated organization in a very short time. Departments were created overnight, each to perform a specific task. There was no time in the early days to group the activities under a proper scheme of organization. The result was that the personnel was built around the individuality of the department heads. There was a natural tendency toward overlapping authority and conflict of jurisdiction. Yet despite this situation, the corporation made rapid progress and there was a surprising lack of friction. It was not until nearly a year after the date of the incorporation papers that steps were taken for a reorganization of units according to functions and order was obtained throughout the corporation. Howard Coonley, a Boston manufacturer, came to the corporation in April, 1918, as vice president in charge of administration. As a result of his efforts and his masterful diagnosis of the corporation's physical ills, it was transformed, in the course of a few months, into perhaps the best balanced and most efficient organization in the country.

The corporation was entrusted with a task that carried with it a patriotic appeal which proved a valuable asset. Men and women responded to the call of the Fleet corporation as a patriotic duty. Thus it was possible to mobilize, not only the nation's shipbuilding brains, but a personnel of high ability and loyalty. It would have been a painfully slow process for

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any private company or association to have built up an organization equal in efficiency. A private enterprise would have had to pay salaries out of all proportion to those paid by the corporation. This fact was exemplified in the case of Charles M. Schwab. He was one of the famous dollar-a-year men, who came out of the ranks of private industry to help win the war. Mr. Schwab's contribution to America's wartime strength cannot be reckoned in dollars. The salary actually owing to him when he ceased to be director general after nine months in office was exactly 75 cents.

Gathering in the shipbuilding brains of the country was not, however, accomplished altogether by merely calling upon the men desired or needed. It was an exacting and discriminating task. The men in America who knew how to build ships were employed in the shipyards then existing, or were in technical schools or colleges or the navy, and could ill be spared for Fleet corporation work. The number of capable marine engineers in this country was limited at the start, but even the trained men that would have been available otherwise could not be taken from their tasks without consulting the needs of the shipbuilding companies. The maximum output of ship tonnage was demanded. Such production was impossible, however, if the yards were crippled by the loss of trained executives. The Emergency Fleet corporation, on the other hand, would be seriously handicapped without the services of these same men in its technical departments.

Other war industries were draining the country of men willing to enter upon government work and capable of filling

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executive positions of a nontechnical character. Thus the problem of the Emergency Fleet corporation was intensified because it was just as difficult to find experienced executives as to obtain the services of technical experts. The importance of this latter problem should not be underestimated, for while the Fleet corporation was primarily an organization of technical men with the duty of directing the construction of ships, those of the personnel with technical ability were numerically a small part of the whole organization.

To direct the program it was necessary not only to provide plans and specifications for the ships themselves, but to buy material; see to its delivery in the proper quantities and sequence; to prepare contracts; to plan and build new yards and factories and enlarge and extend existing ones; to provide the labor needs of the different yards; to see to the physical well-being of shipyard labor by providing houses; to adjust pay of labor so as to stabilize supply and prevent discontent; and to do many hundreds of other things which were demanded by the stress of wartime conditions.

All these required not men necessarily trained in the science of shipbuilding, but capable executives, each fitted to handle the peculiar problem assigned to him. Thus for the purchasing of material, the government drew upon the experienced purchasing and supply men. For scheduling and shipping material to the shipyards, the railroads gave up their best employes. For directing the construction of houses and buildings and enlarging transportation facilities, the nation's

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best talent in contracting and traction activities was summoned.

Each of these men had his own organization to build up and to perfect. As the work progressed and the corporation's building program was enlarged, more and more departments came into being and the problem of finding the right men to direct the manifold activities of the corporation was constantly becoming more difficult and exacting.

The steadily mounting losses due to the ravages of the German submarine during the period from April, 1917, until the signing of the armistice in November, 1918, brought constantly increasing pressure to bear every month upon the Emergency Fleet corporation. It seemed that the whole result of the war depended upon the nation's success in building ships fast enough to defeat the submarine. The Fleet corporation's output of completed tonnage mounted month by month and the end of the war was all that prevented its reaching a production fully equal to the highest hopes held by the nation.

When the armistice was signed in November, 1918, the shipbuilding industry had grown to gigantic proportions. At the time the armistice was signed, there were 898 shipways actually in use by Emergency Fleet corporation contractors as against 234 shipways—including shipways for navy vessels—capable of building ocean going ships in April, 1917. There were many other shipways under construction in new yards, but not yet ready for building operations. It can be presumed with safety, therefore, that in the year following the

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signing of the armistice, had the war continued, tonnage production would have been enormously increased. The shipyards were in position then to supply all the demands that continuation of the war might have entailed.

The magnitude of the work which the nation had undertaken with the Emergency Fleet corporation as its agent, soon developed to a point beyond the wildest dreams of the originators. It was not until the winter of 1917-18 that its scope was fully appreciated. In April, 1917, the corporation was housed in four rooms in the rear of the eighth floor of the Munsey building in Washington. There were five persons on the payroll; General Goethals, general manager; F. A. Eustis, assistant general manager; Frank A. Browne, engineer; F. Huntington Clark, engineer; and George E. Oller, chief clerk. It was in these rooms that the machinery was set in motion. Then began a magic growth that reached its climax the following spring. At that time the corporation had offices in 21 different buildings at the national capital and was still lacking necessary space.*

This situation resulted in the removal of the corporation to Philadelphia in June, 1918.

*The following buildings were occupied in whole or in part: U. S. Shipping Board building, 1319 F street, N. W.; American National Bank building; Munsey building; New National Theater building; 715-17 13th street, N. W.; 406 Seventh street, N. W.; 1311 Massachusetts avenue; Rauscher's, Connecticut avenue and L street; 1312 Massachusetts avenue; Real Estate Trust building; Eagle Club, 6th and E streets, N. W.; 1304 G street, N. W.; 1206 F street, N. W.; 612 F street, N. W.; 902 Pennsylvania avenue; 602 F street, N. W.; 1227 R street, N. W.; 415 7th street, N. W.; 606 F street, N. W.; 1217 F street, N. W.; 5th floor, 613 G street, N. W.

CHAPTER II

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THE steel ship is essentially a type of vessel most to be depended upon for transoceanic service and it became eventually the most important production of the Emergency Fleet corporation. It had to form the nucleus of whatever permanent American merchant marine was to be hoped for, because at its best the wooden ship was an emergency vessel and concrete ship construction was undertaken as an experiment.

In the summer of 1917, Rear Admiral Capps, then general manager of the corporation, created the division of ship construction and had as his aides, Lieut. Commander J. L. Ackerson and Capt. Elliot Snow, both naval constructors. Admiral Capps then began to plan an organization commensurate with the work that he foresaw was involved.

Rear Admiral Francis T. Bowles, former president of the Fore River Shipbuilding Co., was invited by Admiral Capps to become the head of the new division of construction. Shortly after Admiral Capps took the office, he issued the requisitioning order of Aug. 3, 1917, which took over 431 merchant ships then building or contracted for by private United States and foreign owners in 36 American shipyards. That act proved to be one of the most important and far-reaching government requisitions

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during the war. At one stroke it brought within the authority and responsibility of the Emergency Fleet corporation a total of 137 vessels then under construction, aggregating 970,006 deadweight tons. Seventeen of these ships were launched before the requisitioning order and were being outfitted, the remaining 120 being then on the ways and at various stages of completion. The requisitioning order enabled the Fleet corporation before the end of the year 1917 to complete 301,809 deadweight tons of ships.

The order also had the effect of forcing a speedy assembly of a field organization. District officers already had been appointed and assigned to various sections where shipbuilding operations were contemplated or already in progress, but there was not yet a workable system or direct line of authority to enable such officers to push the work forward. Naval architects and marine engineers were sent out from the home office as field officers, clothed with authority to settle technical questions and to issue necessary instructions to the shipbuilders. Later the districts were organized according to geographical location and full authority to deal with steel ship and wooden ship construction problems was placed in district officers and district supervisors, respectively. The creation of the district manager, with jurisdiction over both steel and wooden ship construction was a later development which served to simplify the district organization and to increase efficiency. The Emergency Fleet corporation took over with the requisitioned vessels a multitude of griefs and difficulties which later proved a severe handicap to rapid construction progress. Ships on the ways,



CHARLES PIEZ AND ADMIRAL FRANCIS T. BOWLES

As assistant general manager, Admiral Bowles was in charge of the Hog Island, Submarine Boat and Merchant Agency Yards

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when requisitioned, were of every size and type of ocean-going steel vessels. There was no uniformity as between different yards, no opportunity to standardize parts, and there were many obstacles in the way of speedy construction. Speed then was the primary goal. America's chances of victory appeared to depend upon the rapidity with which our merchant marine ships could be constructed. It was necessary, however, to clear the ways of the vessels under construction and to assume contractual obligations held by the various shipyards with private and foreign owners.

The requisitioning order transferred the title of all steel ships of more than 2500 deadweight tons from the original purchasers, irrespective of nationality, and vested it in the United States. To direct the work of completing the vessels thus seized, the services of Laurens N. Prior were obtained. Mr. Prior, who later became naval architect for the Fleet corporation, and afterwards assistant manager of the division of steel ship construction, formed the nucleus of an organization to have full charge of the technical management of this steel ship construction work. This organization included George Crouse Cook, who later became a major with the American expeditionary forces in France, and Pierce J. McAuliffe, who eventually became head of the department of production and inspection of the steel ship construction division, and still later manager of the ship construction division (May, 1919).

Besides the office of naval architect, the construction division included the department of general commandeering. It

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was through this department that one of the important activities of the corporation developed.

The entire resources of raw materials in this country had been placed at the disposal of the government at the outbreak of the war. The Emergency Fleet corporation had the authority to commandeer virtually anything in the United States which the officials believed necessary to the shipbuilding program. Other war industries, however, held similar powers and to prevent conflict, all were placed under the jurisdiction of the war industries board, as a judicial body, to pass upon the needs for raw materials and apportion them according to dictates of supply and the urgency of the various products for war purposes. The corporation was able, however, to take over not only the ships on the ways in existing yards and if necessary the yards themselves, but housing facilities, street car lines and steam railway lines, and the entire output of manufacturing establishments. In certain cases, it commandeered and took over actual management of such plants. The entire industrial resources of the country, in fact, were placed at the command of the government and regulatory measures adopted by the war industries board afforded equitable distribution.

Industrial conditions, however, were not encouraging in the period immediately after the declaration of war. One of the first effects of the war was to reduce the available labor supply. There were conflicting demands for raw materials from the various branches of the government and added to these difficulties were bad weather conditions during the following winter

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when speedy progress was so essential to the safety of the nation.

With the formation of the division of construction, the Emergency Fleet corporation undertook to dispose of two problems quickly enough to meet the emergency and wisely enough to withstand the criticism of a vigilant and suspicious public press. One was to provide designs for ships and the other was to build them.

Theodore E. Ferris, a widely known naval architect, previously had been appointed naval architect by General Goethals. Mr. Ferris, with H. H. Thayer Jr. as his representative in Washington, designed a 3500-ton wooden ship, many contracts for which had been let under the authority of Mr. Demnan, then chairman of the United States shipping board. It was the intention that the contractors should be provided by the corporation with complete plans of the wooden ship and all its parts.

This was an entirely new model of vessel, larger than the steamers of wooden construction already in use, and its designing and construction proved much more difficult than had been anticipated. It soon developed that manufacturing conditions due to causes previously outlined, were such that machinery and boilers as well as the other ship accessories could not be obtained from established builders. The mobilization and conversion of allied manufacturers was imperative. This condition brought into being the machinery design office, headed by Angelo Conti as chief executive, and R. L. Lovell, who had

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been chief engineer for Mr. Ferris, as the consulting and directing authority.

Problems relating to steel ship construction soon were found to demand the undivided attention of a part of the division of construction, particularly after the requisitioning order of Aug. 3. Soon after Admiral Capps had issued this order and the department of general commandeering was formed, Admiral Bowles having, meanwhile, reported for duty, a new problem in connection with the building of steel ships demanded immediate attention. It was found necessary to add certain equipment, such as gun mountings and quarters for naval gunners, so that the vessels would be suitable for war needs. The general principles of these alterations had been determined upon in consultation with the ship protection committee and had been promulgated to all builders and district officers, but there was difficulty in interpreting and applying the designs on the part of the builders and district representatives. To avoid delays incidental to explanation by correspondence, three field officers were appointed to visit the shipbuilders and settle on the spot all matters connected with the alterations desired. These three field officers were Mr. Ackerson, W. L. Ferguson and Daniel H. Cox, who later became manager of the steel ship construction division.

The two activities of the division of construction called naturally for separate units to have charge of wooden ship and steel ship construction. Each of these divisions was dependent upon a technical department, so the next move in the organization of the construction branch of the corporation was the crea-

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tion of three separate departments: the steel ship construction division under Admiral Bowles, the wood ship construction division under James O. Heyworth, and the engineering division under Mr. Ferris, who had been prevailed upon to move his organization from New York to Washington. Mr. Ferris came to the corporation as naval architect and consulting engineer and Mr. Lovell as chief engineer.

The first construction work in the steel shipbuilding field developed the need of another organization to assist builders in obtaining the maximum production and to see to proper inspection of vessels. This led to the formation of the department of inspection and production, Pierce J. McAuliffe being taken from the department of general commandeering to head the new department.

In the meantime (December, 1917) Charles Piez had been appointed general manager, succeeding Admiral Harris. He proceeded at once to build up a compact organization. Changes, however, followed in quick succession in the ranks of the corporation, it being found expedient to assign the men of proved ability in the home office to important positions in the field. Admiral Bowles was one of these.

The congressional investigation of Hog Island made it apparent that a strong, competent man should be placed in charge of the work in the three so-called fabricating yards, the American International Shipbuilding Corp., at Hog Island, Pa., Submarine Boat Corp. at Newark, N. J., and the Merchant Shipbuilding Corp. at Bristol, Pa. Admiral Bowles was appointed assistant-general manager and given direct authority



DANIEL H. COX
Head of the division of steel ship construction

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over the three yards named, and his place as head of the division of steel ship construction was taken by Mr. Cox.

Soon afterward Herbert C. Sadler, professor of naval architecture at the University of Michigan, came to the corporation as assistant manager of the division of steel ship construction. Shortly thereafter, Mr. Ferris resigned as naval architect and Mr. Prior succeeded him. He immediately undertook the reorganization of the engineering section with Axel Rossell as his assistant, all of Mr. Ferris' organization being retained in the corporation. Thus the corporation became possessed of the services of a thoroughly trained organization of ship designers. This proved to be a valuable asset during the coming months, the personnel of the engineering section remaining practically unchanged, although Dr. Sadler later exchanged positions with Mr. Prior, becoming naval architect and consulting engineer, while Mr. Prior was appointed assistant manager of the division of steel ship construction.

While the steel ship construction branch of the corporation was being built up, a new phase of activity was undertaken by the corporation. It was the building of concrete ships. Men interested in the cement and concrete construction industry throughout the country and who were converted to the idea that a vessel made of concrete could be constructed more cheaply and more rapidly than either wooden or steel ships, brought arguments before congress in favor of the government undertaking wholesale construction of ocean-going concrete cargo steamers and tankers. Some concrete vessels had been built abroad and investigation proved they were successful in

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operation. The dire need for ships of any type and size so long as they were capable of carrying ocean cargoes lent strength to the suggestion, and led to the creation of the concrete ship construction department. This department was originally under the jurisdiction of the division of wood ship construction, but it was decided that the construction of concrete ships belonged more logically with the steel ship construction branch of the corporation. It was, therefore, transferred to the administration of Mr. Cox's division, the services of R. J. Wig, head of the department, and his entire organization, being retained.

The building of steel ships under the conditions existing in 1917 and on the scale provided for under the Emergency Fleet corporation program was dependent upon many other related activities. In the four prewar years from 1913 to 1916, according to the bureau of navigation of the department of commerce, this country had built 107 steam vessels of 1500 deadweight tons or more, aggregating 805,037 deadweight tons. This included not only seagoing shipping but river and lake craft. The high mark of prewar production in the United States of seagoing vessels was in 1916 when there were 38 vessels of 285,555 deadweight tons completed.

Now it was proposed that this production be increased tenfold in a single year and it is an actual fact that in a little more than one year from the time the steel ship construction division was formed, more tonnage in seagoing steel vessels was delivered in a single month than had been delivered in the

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entire year of 1916*. To bring about this result it was necessary to carry out a tremendous shipyard construction and organization enterprise.

Before dealing with the story of how the corporation paper program was transformed into floating tonnage at the shipyards, it should be explained what the construction plans contemplated. Five distinct tasks faced the Emergency Fleet corporation at the outset.

First was the completion of requisitioned vessels, or ships on the ways and taken over by the United States. There has been much misunderstanding about the requisitioned ships, the popular idea being that all these vessels were under construction and at various stages of completion on Aug. 3, 1917, when the requisitioning order was promulgated. As an actual fact, only a percentage of the hulls thus taken over by the government were under construction at that time. The precise tonnage on the ways was 970,006 deadweight while in addition 102,565 deadweight tons of requisitioned ships were in the water being outfitted. In all, 431 vessels of 2,937,808 deadweight tons either were under construction or under contract when the government acted in requisitioning this tonnage. Legal considerations and conditions involving material, transportation and labor made it necessary that these contracts existing between the various yards and private ship investors, including both domestic and foreign owners, be completed by the Emergency

*The deliveries of steel ships from May until November, 1918, were by months: May, 42 ships, 255,541 D.W.T.; June, 43 ships, 256,385 D.W.T.; July, 36 ships, 208,605 D.W.T.; August, 41 ships, 236,045 D.W.T.; September, 45 ships, 260,950 D.W.T.; October, 45 ships, 283,400 D.W.T.; November, 52 ships, 302,875 D.W.T. The armistice was signed Nov. 11, 1918, and its immediate effect was shown in the December deliveries which were decidedly lower than the previous month.

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Fleet corporation. How this affected the entire program is one of the interesting phases of our shipbuilding enterprise.

A second task of the corporation was the creation of new yards and the extension of existing plants. It was found at the outset that many of the old yards, while splendidly equipped to carry on shipbuilding under normal conditions, were unable to meet the increased demands of the government in the emergency of war. In some plants it was possible to add more shipways and this involved the enlargement of shops, heavy investments in machinery and equipment, extensions of existing storing facilities and yard transportation system, housing projects for the accommodation of increased personnel, etc. Even with these enlargements, however, the shipbuilding facilities of the nation were far from being sufficient to meet the immediate demand for ships. The Fleet corporation, therefore, undertook to build new yards both for wooden and steel ship construction. Building the new yards was almost as great a task as constructing the ships themselves. It involved technical knowledge of plant construction, a multitude of details in transportation, labor and housing problems. The new yards were laid out and completed at the cost of many millions of dollars and their construction, in the course of a year, constituted one of the greatest achievements of American war industry.

A third task was the construction of the so-called fabricated ships.* The fabricated ship project was born of war-

*The word "fabricated," as applied to the yards, is a misnomer because the vessels constructed at the three government yards, Hog Island, Merchant and Submarine Boat plants, were in reality assembled ships.

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time necessity. It was conceived and carried out as the American idea of meeting the emergency situation in typically American style. It was in short, a proposal to "manufacture" ships by gathering the material, already fabricated, at an assembling plant.** This plan gave promise of speed in ship construction altogether impossible in the old yards. It led to the greatest single industrial undertaking during the war on this side of the Atlantic—building the American International Shipbuilding Corp. plant at Hog Island. In addition, the Submarine Boat Corp. yard at Newark, and the Merchant Shipbuilding plant at Bristol were laid down and completed under governmental direction.

With these yards, a total of 90 shipways for constructing cargo and combined cargo and troop ships, ranging from 5500 to 7500 deadweight tons each, were placed at the corporation's disposal. The parts of these vessels were fabricated at scores of industrial plants and mills throughout the country and shipped to the three yards for assembly and completion. It was an enterprise worthy of the admiration of the entire world and proved one of the most interesting developments of the war.

The fourth task was to build contract steel ships. While the old yards were completing the hulls requisitioned on the ways or for which the Emergency Fleet corporation assumed contractual relations, engineers and naval architects of the corporation were preparing plans for a series of steel

**Secretary Redfield of the department of commerce was credited with having originated the fabricated ship plan.

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ship types of different tonnage capacity, to be built under direct contract with the corporation. As fast as the existing plants completed their requisitioned contracts and the new plants reached a stage where they could begin actual ship construction, keels were laid for the ships to be built for the corporation under direct contracts. These so-called contract ships were designed with the idea of standardization of parts and types in the different yards. A plant building an 8800-ton vessel, for example, could order ship parts in quantities and make the molds for one vessel serve for any number of craft of that type. Had all the yards available for ship construction been in position to lay down the keels of these so-called contract ships at the beginning of the program, the total output in tonnage at the end of the first year would undoubtedly have been vastly increased.

The fifth task was to design and build wooden ships. Here again, as pointed out previously, the Emergency Fleet corporation undertook something new in shipbuilding. Many wooden vessels had been constructed in this country but comparatively few wood yards were still in existence when we entered the war and wood shipbuilding was looked upon as virtually a lost art. Never before had a wooden steamship of 3500 or more deadweight tons been constructed.

As an emergency proposition, it was believed that the wooden ship would release available steel ship tonnage for trans-oceanic service and prove profitable commerce carriers in coastal waters. The United States government was not content to neglect any opportunity to hasten victory over

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Germany. The immediate object was to provide tonnage capable of carrying ocean cargoes and the wooden ship seemed to offer one way of solving that problem. The fact that when the war was ended, 86 wooden vessels of 305,700 deadweight tons were completed and in operation—in other words, actually carrying cargoes—is evidence that the wooden ship program was not a failure and that the construction of wooden ships actually did release the corresponding tonnage in steel vessels for overseas purposes.

Other tasks of importance had to be undertaken by the Emergency Fleet corporation, including the concrete and composite ship program. All the other varied and intricate activities of the corporation were convergent upon the single goal—to build ships to win the war.

CHAPTER III

Designing a Merchant Fleet

THE efficiency of the ships built by the Emergency Fleet corporation rested primarily upon the skill of the marine engineers and naval architects. It was of vast importance, therefore, that the branch of the corporation having charge of technical details should consist of capable and conscientious men, willing to forego the higher salaries obtainable in private work to aid the government in the emergency. The corporation was fortunate in that, early in its career, it was able to incorporate within the organization a fully organized and competent engineering department.

To the layman it would seem impossible for any single body of men, however skilled and capable, to follow the technical details of steamship construction as carried out in shipbuilding plants scattered from Maine to Florida on the Atlantic, around the gulf, and on the entire stretch of the Pacific coast and the Great Lakes. Hundreds of ships were being built at the same time. There were 99 different types of requisitioned steel vessels. Each type called for a different design, not only for the hulls but for propelling machinery, boilers, rigging, cables, galley outfits, plumbing, propellers, etc.

The engineering organization's first efforts were confined to wood ship construction and the creation of a standard

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type of wooden vessel. General plans and specifications for a standard wooden ship were completed by May 1, 1917, and the development of necessary machinery plans was assigned to the marine engineer, who was given authority to create the original engineering department. This department was operated as such until Mr. Ferris and his force were transferred from New York to Washington, when on Sept. 19, 1917, the office of the naval architect and consulting engineer and the engineering department were merged into the technical department. This was a part of the old construction division and remained so until Dec. 5 of that year, when the construction division was divided into the steel ship construction division and the wood ship construction division. Then the technical department became a part of the steel ship construction division, although serving also the wooden ship branch of the corporation.

The great scope of the technical department's activities made it impossible for it to carry out its functions as a purely home office organization. It was charged with the examination and approval of contract hull and machinery plans and specifications. The experts of the department were called upon to criticize and approve detailed working drawings, to develop standardized types of vessels and their machinery, and to supervise the technical features of contracts for the main propelling engines, auxiliaries, deck machinery, hull and engineering equipment, manufactured under the corporation's supervision. The department also had to offer necessary technical advice on methods of policy, organization and the

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like. The work was of such volume and the difficulty of obtaining an adequate technical force of experienced marine men was so great that it was decided to transfer the work of approval of detailed working plans to the district officers.

This led to the growth of technical departments in each of the district office organizations which were responsible directly to the district executives. These district organizations, however, worked in close co-operation with the home office technical department. Thus, in the technical field of ship construction there was developed a nation-wide system which may safely be pronounced the most effective and efficient wartime industrial development for national production. Had the war lasted longer, various other governmental agencies would have imitated the Emergency Fleet corporation in its district organization and avoided many of the griefs growing out of difficulties of transportation and communication.

After the organization of the technical departments in the district offices, the activities of the marine engineers at the home office were restricted to work on original plans and specifications. It became a consulting organization and in time was able to take up the highly important and effective task of standardization.

In June, 1918, the title of the organization was changed to the engineering section, in accordance with the revised plans of organization and methods. To facilitate the detailed work of the technical department, it was divided into branches,

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each of which was under the direction of a branch executive reporting to the departmental head.

The machinery branch was charged with the responsibility of providing plans and specifications for propelling and hull machinery and equipment. The branch was made up of a number of separate organizations, each responsible for the technical details of various items of ship machinery. These items were grouped under the heads of propelling machinery, boilers, diesel engines, hull engineering and electrical apparatus, with specialists in charge of each unit. The experts left actual design and construction work to the contractors, but it was their duty to approve and advise the designers and district officers along their separate lines.

Another branch of the technical department had to do with hull construction. It was organized in the fall of 1917 and charged with preparing detailed plans for a 3500-ton Ferris wooden ship and to revise plans of vessels previously built and acquired by the organization, to embody military requirements to be used in contract work. These ships included vessels of a deadweight tonnage as follows: 3500, 5000, 5650, 7500, 8800, 9000, 9400 and 9600. Included in the changed plans made to meet military requirements were specifications for strengthening decks and sides to support the extra burden of gun mounts and take up the shock of firing and to provide quarters for naval gunners. There were certain changes, too, in the construction of bows to permit the attachment of the otter gear, a device to pick up the mooring rope on mines and prevent explosions under the

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ship. As the war continued and new ideas for ship protection and for thwarting the submarine were developed, the hull branch of the engineering section was called upon for more and more work involved in changing specifications.

While the technical department was engaged in the work of approving and correcting standard designs, another branch devoted its efforts to originating new designs. This was called the scientific branch. A great number of different plans for new steamships were brought to the attention of this branch. Expert analysis and criticism of these suggestions often led to ideas that brought about increased speed or economy in construction. The shipbuilding enterprise on such a great scale naturally brought forward many intricate scientific problems and the scientific branch of the technical department served as a sort of consulting body to pass upon and solve these problems. It also examined and tabulated data relating to completed ships for the guidance of the operating division, which was charged with handling the new vessels after delivery.

As the Fleet corporation's activities gradually reached the stage of quantity production, the technical department's work changed. Where at first the engineers were required to originate and develop ideas and to meet new problems of construction, the advance of the program simplified this work to a routine. Attention was then turned to a most pressing need in the corporation's planning and designing work.

As the yards burdened with requisitioned contracts began gradually to complete the ships and to make room for con-

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tract vessels, the engineering section turned its attention to the important matter of drawing standardized plans and specifications. It was intended that the national shipbuilding program should assume more and more the aspects of a manufacturing enterprise. It was found expedient to simplify the ordering and buying of ship parts; this also was an economy measure and made for more speed in ship construction. Its effect can be readily realized when it is understood that plates and shapes used in steel ship construction are rolled and sheared in mills according to detailed specifications. If a standardized ship is being built in a given yard, all the identical pieces of steel for given parts of all the ships can be cut at the mills without changing the stop gage on the shear, just as a given part of a standard make of automobile can be ordered and produced in large lots with a minimum of waste of time and expense. Had the war lasted longer, the cost of building ships would have been reduced materially through the introduction of the standardized system.

One valuable result of the technical department's work in the government shipbuilding program was that many young men were able to receive a broad, practical experience in ship designing that would have been impossible in private work. In a little more than a year's time they obtained intensive instruction in designing such as otherwise might have required many years. They were required to take up exhaustive research work and deal with questions of marine engineering that demanded the most critical knowledge of engineering principles. One of the shortcomings of American life is the

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lack of intensive study. Americans like to do things on a big scale. In the technical department of the Emergency Fleet corporation there were dozens of young men, graduates of engineering schools, who received a post-graduate course in practical shipbuilding from Uncle Sam.

Thus the country now has a thoroughly trained body of men upon whom it can rely for technical leadership in guiding its shipbuilding progress.

It was necessary for the corporation, in order to have exact knowledge of the progress of construction, to maintain a voluminous correspondence between the yards and the home office. To direct the work in the yards with intelligence, the home office of the Emergency Fleet corporation required details and exact information on the progress of every individual hull. A system was perfected by which semimonthly reports permitted charts and tabulations to be kept showing the status of each ship from the moment of keel laying to delivery. This work was carried out by the inspection and production section of the steel ship construction division.

This section was formed as a department by order of Admiral Bowles in September, 1917, when he was manager of the production division. The work performed consisted of preparing and standardizing reports on steel and wood ship construction coming from the yards; recording and analyzing reports on contract steel and wooden vessels received from the district officers, and organizing and developing an engineering inspection force for the inspection of propelling and auxiliary machinery.

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This summary of the department's work gives a scant idea of the vast amount of detailed knowledge required to maintain an intelligent and comprehensive view of construction progress. One of the first requisites of modern shipbuilding is exactitude. Nothing less than perfection satisfies the classification bureaus upon whose decision depend the valuation, insurance and rates under which every vessel must operate. With the entire shipbuilding facilities of the country devoted to governmental work, it was necessary for federal inspectors to watch building progress with careful eye and keen judgment. A system by which this definite and methodical means of guarding the nation's interests could be carried out was most difficult to devise because of the conditions.

Shipbuilding was being carried on under a concentration of effort to produce the maximum number of ships in a minimum of time. Delay was the bugaboo of the men responsible for building the emergency fleet. Inspectors had to observe a twofold caution in their work. They must permit nothing to delay construction progress and yet must omit no precaution against careless and inefficient work. The slogan of the corporation was "speed up," but efficiency was fully as essential as speed. Inspectors in the field, therefore, had to play a responsible part in the great game.

The men charged with the production of ships recognized the principle that competition spurs effort and this formed one of the fundamentals of the inspection and production department's work. The information reaching the home office in the form of semimonthly reports was arranged and

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tabulated, to show not only progress being made in the yards, but also to compare results in each of the shipyards and each of the districts.

By encouraging the yards to keep similar records and comparisons, the corporation was instrumental in developing a spirit of competition among the yards and shops.

All the information that could be presented appropriately in graphic form was shown by means of charts and circulated among the officials of the corporation and among the shipyards through the district organization. This enabled the inspection and production department to present the rate of increase or decrease over previous periods definitely and effectively and to hold up before the district and yard organizations a goal to be aimed at in future production.

The competitive idea developed some interesting incidents. For example, the number of rivets driven is a most important factor in reporting building progress. By compiling riveting data and presenting it by means of charts and published records to the shipyards, the corporation started a nation-wide riveting contest. This contest brought forth some remarkable records which unfortunately were too often the result of a single riveting gang's efforts and not productive of any great good in the shipbuilding program except as it encouraged better riveting work generally.

The riveting contest awakened a strong spirit of rivalry among shipworkers throughout the country. A good riveter could drive from 400 to 500 rivets a day and keep up the performance day after day without harmful effects either to him-

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self or to his work. Any man that maintained an average of 400 rivets per day was doing excellent riveting work. When, therefore, one day in March, 1918, the president of the Baltimore Dry Docks & Ship Building Co. wired Chairman Hurley of the United States shipping board that one "Finner" Shock and his gang had driven 450 1-inch rivets and 235 $\frac{7}{8}$ -inch rivets in an 8-hour working day, the report seemed to stir the ambition of every veteran riveter in America.

Only a few days later, another gang at the same shipyard drove home 1414 $\frac{3}{4}$ -inch rivets in a single day of eight hours. Two weeks later the record went soaring to 1624 $\frac{7}{8}$ -inch flush shell rivets driven by a gang in the American Shipbuilding Co.'s yard at Buffalo. That was only the beginning, however, of the riveting contest. The record went up by leaps and bounds. The acceptance of the challenge by riveters in numerous yards put the doughty "Finner" Shock on his mettle. He came back with a record of 2720 $\frac{3}{4}$ -inch rivets driven in nine hours. The next report was from the Federal Shipbuilding Co. plant at Kearny, N. J., where Edward Gibson and his gang drove 2919 $\frac{3}{4}$ -inch rivets in eight hours.

About this time English shipbuilders became interested in the riveting game and took up the American challenge with the result that in the yard of Fraser & Fraser, London, a riveting gang hammered 4267 rivets in nine hours, beating the American record which in the meantime had been raised to 3415 $\frac{3}{4}$ -inch snap rivets in nine hours, driven by John Corrigan and gang at the Detroit Shipbuilding Co.'s yard at Wyandotte, Mich.

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The laurels remained in England only one week. So widespread was the interest in the unique contest started by American shipbuilders that American papers began to offer cash prizes for new riveting records and an English publisher put up a prize of £25 to any American who could beat the English record. Charles Knight, a colored man at the Baltimore Dry Docks & Ship Building Co.'s plant, won the English money by driving 4875 $\frac{3}{4}$ -inch rivets in nine hours. The following day, the west coast claimed all honors for one Tom Horn and gang at the Moore Shipbuilding Co., Oakland, Cal., with a drive of 5620 rivets in nine hours.

The contest finally became too exciting and defeated its own ends. It was announced unofficially that an English riveter succeeded in driving more than 11,000 rivets in a single day. If this were true, the Englishman undoubtedly held the world's championship. In this country it was found that individual efforts to break records in riveting caused actual delay in the work of shipbuilding because the tendency was for the entire yard to gather and see a contestant in action. So the riveting contest was ordered abandoned. It had the effect, however, of arousing national interest in the shipbuilding enterprise and raising materially the standard of good rivet driving averages.

The riveting records were followed closely by the inspection and production section and utilized to increase the efficiency of this branch of shipbuilding. Meanwhile, the functions of the section had expanded rapidly to meet the growing demands and to keep abreast of its requirements due to the rapid development of the industry. The section was called upon

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to obtain information for the guidance of higher officials as to the advisability of awarding contracts for steel ships. Besides maintaining records of progress and accomplishments of constructors, it had to supervise the reports and activities of district representatives; seek for standardization of methods in construction work; supervise trial trips; pass upon the acceptance for registry, classification and reconveyance to original owners of steel ships; determine the progress and record the production and efficiency of the various shipyards; prepare diagrams and charts showing comparative efficiency and the progress made; record actual and anticipated dates of keel layings, launchings and deliveries; analyze the steel requirements of the various shipyards and make proper distribution of steel plates and shapes so that the maximum production might be obtained from available material. The section became one of the most active units of the corporation.

This section, as well as the other technical branches of the corporation, found itself handicapped more and more as the military requirements made inroads into the personnel. Several valuable men were claimed by the draft and for a time it seemed that the work would be seriously crippled. This was warded off by exemptions granted later to necessary Fleet Corporation employes through special arrangement with the war department.

In the steel ship construction division, as well as several other departments, women clerks were substituted for the men called by the army and their services proved eminently satisfactory. Draftswomen were added to the personnel of the inspection and

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production section. They were quick to grasp the significance and details of the work and proved so efficient that they won commendation and rapid promotion.

The production and inspection section watched every ship during progress of building, from the time the keel was laid until the vessel was turned over to the division of operation. Every step was followed in schedules and progress chart reports so that all information was visualized for the use of the officials of the corporation, district executives, and the shipyards themselves. Semimonthly reports were compiled showing keels laid, launchings and deliveries. At stated intervals, estimates of deliveries were prepared for the information of the manager of the division of steel ship construction and estimate charts were followed and compared with charts showing actual construction and deliveries.

It is an interesting and significant fact that the curve showing actual deliveries during the year 1918 was above the curve of estimated deliveries for that year up to the time of the signing of the armistice. These estimates were prepared in advance and were based upon the best opinion and highest reasonable hopes of the Emergency Fleet corporation officials. The fact that actual deliveries exceeded these estimates is clear proof that the construction program, while the war lasted, was exceeding the expectations of the corporation.

The work of the corporation as it affected a given ship did not end with the completion of that ship. There had to be a connecting link between the construction division and the division of operations. This link was the maritime branch which

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was developed from the original commandeering section. The maritime branch handled certain technical work which did not naturally fall within the province of the engineering department and most of its work had to do with vessels completed and ready for operation on the high seas.

When a steel ship was delivered, for example, it was deemed important that a record be kept of every item used in construction or equipment. Such records often were quite difficult to compile because changes were ordered and extra equipment installed on vessels, particularly on requisitioned ships, to meet war requirements. When such ships went to sea and suffered damage through enemy attack or accident, it was a convenient and necessary safeguard for the division of operations to have exact information as to parts and equipment with which to make replacements and repairs.

The maritime branch also was the connecting link between the home office and the district offices in matters dealing with completed ships. It handled such correspondence as was necessary to show the completion, performance on trial trips, classification and registration of steel vessels.

As the work of the Fleet corporation progressed and the tonnage and number of delivered vessels increased, the duties of the maritime branch were correspondingly enlarged. Shipyards were relieved thereby of a great amount of clerical work that would have been necessary had the ships not been built under government supervision.

The commandeering of completed vessels and ships privately contracted for but not yet started, involved many legal

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problems and financial arrangements. Ships were built for private account with an eye to profits for the shipbuilders, brokers and owners. As a result of the requisitioning order all of these had legitimate claims against the corporation and to fix and pass upon these claims the opinions and assistance of experienced advisors were necessary.

There was established, therefore, as a part of the inspection and production section, the finance branch, which handled all matters of financial nature referred to the construction division. Under the statute which enabled the corporation to requisition privately owned ships, provision was made for just compensation. It was necessary, of course, for the finance branch to work in close co-operation with the legal division. The efforts of the two were so successful that virtually all claims of brokers and shipbuilders were settled without litigation.

The problem of compensating former owners of requisitioned vessels was much more difficult. Most of these cases went bodily to the legal division. The question was complicated by the existence of certain treaties and in the case of former owners of foreign nationality, the legal entanglements were so involved that it was exceedingly difficult to arrive at a settlement. Where the claimants were Americans this difficulty was avoided in some cases by reconveyance to the original owners, but under the law it was not possible to follow this course in the case of owners of foreign nationality.

The value of government supervision of the shipbuilding program was emphasized, perhaps more than in any other way.

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by regulation of the distribution of materials. Before the war, shipbuilding plants were at the mercy of the steel market for their material supplies. They could not order in quantity lots except in the case of a few large yards, where contracts were numerous and the managements could make advance plans on steel requirements.

When the United States government took hold of the shipbuilding industry it was possible to direct the purchase of supplies and allocate materials in accordance with the needs of the individual yards. The purchasing was carried on by the supply division, but it required the services of technically trained men of practical shipbuilding experience to pass upon the needs of the yards.

This necessity led to the establishment of the steel requirements branch. District representatives working in consultation with the officials of the shipyards and other contractors gathered information on the actual monthly steel requirements of the plants. Information thus obtained was used to fix the allotments for the various districts and shipbuilding yards and these allotments were distributed monthly to the plants holding contracts with the corporation. Often the requirements or requests for steel were greatly in excess of the allotments and the Fleet corporation was constantly limited in its supply by the requirements of other war industries.

The steel requirements branch was the connecting link between the shipyards and the war industries board which, during the war, had final authority in the distribution of material. The war industries board allotted steel tonnage to various

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mills according to the capacity and raw material supply of these mills. The demand for steel frequently made it necessary to cut the tonnage requested by shipyards. To make these curtailments intelligently, it was necessary to know the actual requirements of the yards, the steel tonnage on hand and en-route to the yards, and other conditions affecting ship construction. All this detailed work fell upon the steel requirements branch and led to the development of an important and responsible unit of the corporation.

Shipyards that fell behind the output desired by the corporation usually blamed their delays upon lack of steel. In many cases this was justifiable, but the work of the steel requirements branch enabled the corporation to know at all times the exact situation in the yards and this knowledge made possible a more intelligent criticism and supervision of production generally.

The growth of the shipbuilding industry as a national enterprise presented an opportunity for developing economies in operation which were impossible under private and competitive business conditions. The government sought to save money wherever possible and called upon the shipyards holding contracts with the Emergency Fleet corporation to give the benefit of any new devices looking to economy and speed to other plants. This policy led to the establishment of a standard practice branch of the corporation headed by Creighton Churchill, an experienced industrial engineer and technical investigator, and composed of a staff of industrial engineers.

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It was not until July 1918, that conditions warranted the establishment of a separate unit to develop the standard practice idea. In a short time, the branch had built up a field force of 10 men, placed in yards of the 10 districts, to make analytical studies of practices followed in the various yards. These men also were in position to act in an advisory capacity to the shipyard managements and help solve many troublesome questions of organization and management. Their services were particularly valuable in new yards where a full complement of experienced shipbuilders was not always obtainable.

The work of these men was constructive and served a patriotic purpose which appealed both to the officials of the Fleet corporation and those in the shipyards. There is no doubt that the disclosures which led to the adoption of standard practices in all the yards were a distinct economy for the corporation and resulted in an increased output of tonnage.

Soon after the establishment of the standard practice branch, it was decided that a permanent record should be kept of the recommendations made by the branch. To this end a bulletin was issued and sent to district officers and shipyard managers. It consisted of drawings illustrating standard practice designs with descriptive matter prepared by technical men of the branch. To give this matter wider distribution, the standard practice bulletins were reproduced in the *Emergency Fleet News and Shipbuilders Bulletin*, which circulated throughout the corporation and reached all the executives and foremen of the shipyards.

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The standard practice idea so proved its value that if another emergency should arise in which the nation would find itself compelled to enter upon a great shipbuilding enterprise a similar activity doubtless would be attempted.

After the ships were designed and constructed, the final work of the inspection and production section was to see to their practical operating efficiency. It was necessary to have competent men employed by the corporation to attend trial trips and observe the working of every vessel under conditions at sea. This involved a great amount of expert knowledge and resulted in the discovery of many defects. Such faults unobserved might have led to disastrous results after the ships were placed in operation. The work of the performance branch, however, brought remedies and avoided similar difficulties in other vessels.

The experts who attended trial trips paid attention not only to the hull construction, but particularly to machinery installations, to see that they were in accordance with the best practices in shipbuilding. After a new vessel had completed its first long voyage, the same men obtained detailed information as to the performance of the ship. They then made special studies of the defects which developed in operation and sought remedies that proved most valuable in future construction work.

These various activities of the inspection and production section were of value to other departments of the corporation. The engineering section, for example, was kept informed as to the success or failure of equipment on ships and was

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enabled to remedy the defects disclosed under operating conditions.

The operating section by working in co-operation with the division of operations was able to give the latter the benefit of the latest practices or designs to be followed in the repair or alteration of ships. The section also co-operated with the navy department. Many of the Fleet corporation ships were turned over to the navy for operation. Inspectors made frequent visits to navy yards and had access to the navy engineers' reports.

The inspection of vessels under actual sea operation also led to the correction of many faults in manufacturing equipment. Manufacturers situated in the interior of the country who were not in position to attend trial trips and see their apparatus work, obtained reports from the Fleet corporation inspectors and the engineers of the ships. The corrections thus made possible led to more efficiency and less delay as the shipbuilding program progressed.

CHAPTER IV

Manning the Shipyards

THE shipbuilding industry of the United States underwent a remarkable expansion between January, 1917, and October, 1918. It was at the latter date that the industry began to reach the stage of maximum production.

In January, 1917, there were 61 shipyards (37 steel, 24 wood) with 235 ways in existence in the United States. This figure includes only those yards capable of constructing seagoing ships (except navy yards). Between that date and Jan. 1, 1919, the number of shipyards had increased to 203 (77 steel, 117 wood, two composite, seven concrete) with 1020 shipways, completed or near completion, capable of building seagoing merchant vessels. In two years the number of shipyards had increased more than threefold.

All this expansion in the material size and equipment of the industry called for a corresponding growth in shipyard personnel. And, this growth came at a time when the shortage of man power was greater than ever before in the history of the country. The United States was preparing to send millions of fighting men to Europe. Every war industry was going night and day in a herculean effort to fulfill the demand for munitions. Employers were pyramiding wages to keep their employes and attract others.

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In the face of all this, the United States proposed to increase the number of men working in the shipyards from approximately 50,000 in 1917 to nearly 400,000 in 1919.* How it did actually build up such an army of shipbuilders is the story of one of the most important and interesting activities of the corporation.

There were several factors that tended to draw men to the shipyards when needed for government work. The chief lure, perhaps, was the high wages offered for skilled workers in shipbuilding trades. The Emergency Fleet corporation offered not only to take untrained men and give them jobs in the yards but held out the additional attraction of thorough training. The opportunity of learning a trade appealed to many men throughout the country.

Ships and all that belong to them hold a peculiar attraction for an imaginative people. Workers from the middle west particularly, responded to the appeal. Thousands of men who had never seen the ocean eagerly seized upon this chance to go into the shipyards and earn high wages. There was the additional lure of patriotism, for the whole country had come to recognize the importance of ships, and work in the shipbuilding plants was pictured as a patriotic duty second only in importance to the work of the soldiers on the firing line in France.

*The figures include employes in all yards, building not only seagoing merchant ships, but also tugs, barges and river craft. The men actually employed on Fleet Corporation ships in January, 1919, numbered 301,627. Besides, the Fleet corporation controlled the activities of about 375,000 men in industrial plants engaged in manufacturing ship parts and equipment. Thus nearly 700,000 men were directly or indirectly engaged on the merchant marine program.

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Another factor was the chance of military exemption offered to the men in the yards. No doubt many thousands of young men went into the shipbuilding trades to escape the draft. The success of this evasion on the part of many so-called draft dodgers is doubtful, however, because by the time American armies were participating in the fighting on a large scale the shipyards had begun to weed out the undesirables. Many men who had sought exemption in this manner were disappointed and had to enter the army. The "work or fight" rule made it necessary for men in nonessential jobs to seek work in war industries. This helped materially in building up the personnel of the yards.

At the outset of the Fleet corporation's program, existing yards were fully manned but were suffering from a labor turnover that in some cases amounted to more than 300 per cent a year. In building up the yard personnel for the government shipbuilding enterprise, the Fleet corporation had to keep a watchful eye upon this highly important subject of labor turnover.

Toward the end of 1917 when new yards were nearing completion and prospects were bright for a great increase in building operations the following spring, it was decided by Chairman Hurley of the United States shipping board that the time was ripe for a countrywide campaign to recruit shipyard labor.

Mr. Hurley organized the department of shipyard volunteers and called upon Robert D. Heinl, a Washington newspaperman and magazine correspondent, to take charge of the

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campaign for recruiting shipyard labor. Co-operating in this work was the United States public service reserve of the department of labor. The demand for labor growing out of the war had led to the building up of a nation-wide organization of the public service reserve and the new department of shipyard volunteers, therefore, had at hand fairly efficient machinery to aid in signing up shipyard workers. State directors of the United States public service reserve had been appointed in every state in the union and enrollment agents were at work in many of the cities and towns.

The department of shipyard volunteers organized a whirlwind campaign. Shipyard labor was represented as a patriotic duty to men trained in any one of a score of special trades. Every man who was able to help build ships and whose training qualified him to be of particular value to the shipyards was urged in posters, display advertising in magazines and newspapers, and news stories describing the need of shipyard labor, printed in newspapers throughout the country, to enroll for work in the yards. The leading magazines patriotically gave space for advertisements and issued full page editorials. The advertisements bore coupons to be filled out and returned by volunteers.

A poster, the first to be issued by the Emergency Fleet corporation, called "On the Job for Victory," showing a shipyard worker, rivet gun in hand, beckoning to imaginary workmen to join him, was distributed throughout the country. Another poster set forth the trades needed in shipbuilding. It was distributed through the local enrollment agents.



R. D. HEINI.

Head of publications section from December, 1917 to December, 1918

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The so-called four-minute men, organized for patriotic speecmaking, devoted two weeks to an appeal for shipyard labor and thousands of speeches were made throughout the country describing the importance of shipbuilding. At the enrollment stations, a pamphlet called, "The Man of the Hour," was distributed to show how different trades could be utilized in shipbuilding. The first edition of 100,000 of these pamphlets was exhausted in less than a month.

This campaign was undertaken in the face of a great publicity enterprise directed by the committee on public information in behalf of the food administration and the fuel administration. The task was to make ships as important in the public mind as food or coal. A chain of cigar stores volunteered to help and posters were displayed in the windows. An edition of 500,000 copies of "The Man of the Hour" booklet was distributed through these stores.

Through the Western Newspaper Union, small country newspapers were reached with the story of the shipbuilding program and the need for volunteers. Millions of theatergoers in moving picture houses were informed of the imperative necessity of "a bridge of ships for Pershing" and shown the processes of shipbuilding on the screen.

Even music was utilized to popularize the subject. John Philip Sousa, the famous bandmaster and composer, at the suggestion of Mr. Heinl, composed a new march, "The Volunteers" which he dedicated to Chairman Hurley and the shipbuilders of the country. That march later was sent to

Manning the Shipyards

shipyard bands throughout America and became one of the most popular works that Sousa ever composed.

The response to this campaign was tremendous. At that time, it was estimated that 250,000 men were needed in the shipyards. In a few weeks this number had been exceeded. Applicants were asked to call at enrollment stations and sign cards furnished by the department of labor and also a franked postcard addressed to Mr. Hurley bearing these words:

"Appreciating the nation's imperative need for skilled workmen to build merchant ships with which to overcome the submarine menace, I request to be enrolled as a member of the United States shipyard volunteers of the public service reserve. I realize that the world war will be won or lost in the American shipyards. Every rivet driven is a blow at the kaiser. Every ship turned out brings America nearer to victory.

"It is understood that if I am asked to enter shipyard employment my compensation shall be at the rate of wage prevailing in such yards."

Upon receipt of this card, which was filed in the office of the department of shipyard volunteers, the signer was sent a certificate of enrollment, an honorary acknowledgment of his patriotic service in volunteering for shipyard work. He also was presented with a shipyard volunteer bronze button to be preserved and handed down as a memento of the great war and the part he played in it. Each man was asked to hold himself in readiness to go to the shipyard if his services were

Building the Emergency Fleet

needed. Enrollment of the labor thus signed up involved a great amount of correspondence and tactful management to avoid discontent on the part of men who resented delays in obtaining work in the shipyards after they had volunteered their services.

The campaign had two distinct effects that were beneficial. It resulted in sufficient labor being enrolled to fill the immediate needs of the yards, and served to popularize the ship-building idea. Interest in ships and an intelligent appreciation of their importance in the war became nation-wide.

CHAPTER V

Work of Publications Section

THE addition of many thousands of men, most of them unfamiliar with shipyard work, to the industry made apparent the immediate need of some means of reaching the new workers with information and appeals. In a heterogeneous mass of men in which all nationalities and all walks of life were represented, a fertile field existed for enemy propagandists to work. A medium was desired through which the shipyard executives could be kept fully informed as to the aims of the government. This could not be done by ordinary correspondence because, early in 1918, more than 100 shipyards were in actual operation and the many and frequent changes in policy and management, the rapid growth of the corporation, and the shifting needs for material and labor made it impossible to picture conditions to far away yard executives by means of letters and telegrams.

It was found desirable, also, to keep the personnel of the Fleet corporation informed on matters of policy and methods. A large percentage of the employes was centered in Washington, but there were scattered in the 10 shipbuilding districts some 2500 to 3000 persons actually on the payroll of the Emergency Fleet corporation.

Building the Emergency Fleet

Mr. Hurley and Mr. Piez decided upon a weekly newspaper as a medium to reach the shipyard executives and personnel of the Fleet corporation. Out of this decision grew the establishment of the publications section, which was made up of the personnel of the department of shipyard volunteers. The publications section had charge of all matters dealing with the circulation of publications flags, pennants, and other insignia of the corporation.

The publications consisted of the *Emergency Fleet News*, a weekly paper of from eight to 16 pages; the *Shipyard Bulletin*, a broadside sheet posted in the shipyards, and the *Emergency Fleet Bulletin* similar to the *Shipyard Bulletin* but circulated in the industrial plants having dealings with the Emergency Fleet corporation.

The publications enumerated were intended primarily to create a spirit of patriotic endeavor in the yards and industrial plants engaged on work for the corporation. Among the hundreds of thousands of men employed in the industry there were many, of course, to whom the printed word carried no appeal, so the Fleet corporation, like the army, the navy, Red Cross, Y. M. C. A., and other active war agencies, turned to posters to stimulate industry and spread patriotism. This work was placed in charge of the publications section with Julius S. Holl, a Chicago advertising man, directing the program. The posters issued by the corporation have been declared among the finest examples of American war art. They included paintings depicting various phases of shipbuilding and the romance of the sea by a dozen or more famous artists. Among

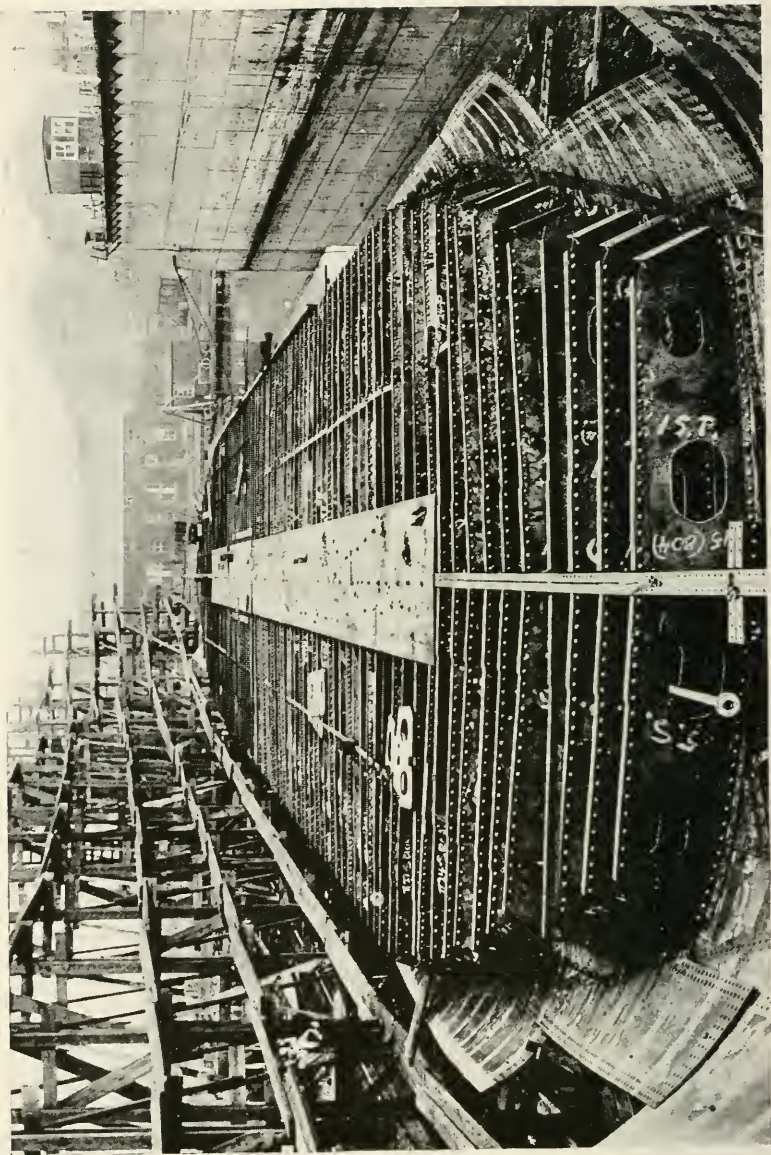
Work of Publications Section

these men were the following: Howard Giles, Jonas Lie, J. Scott Williams, Hibbard V. B. Kline, George Wright, Lucius W. Hitchcock, James Dougherty, Herbert W. Meyer, Charles B. Falls, James Montgomery Flagg, L. N. Britton, Adolph Treidler, Joseph Pennell, William Oberhardt, W. D. Stevens, J. E. Sheridan, F. J. Hoertz, J. C. Coll, and Clyde Forsythe.

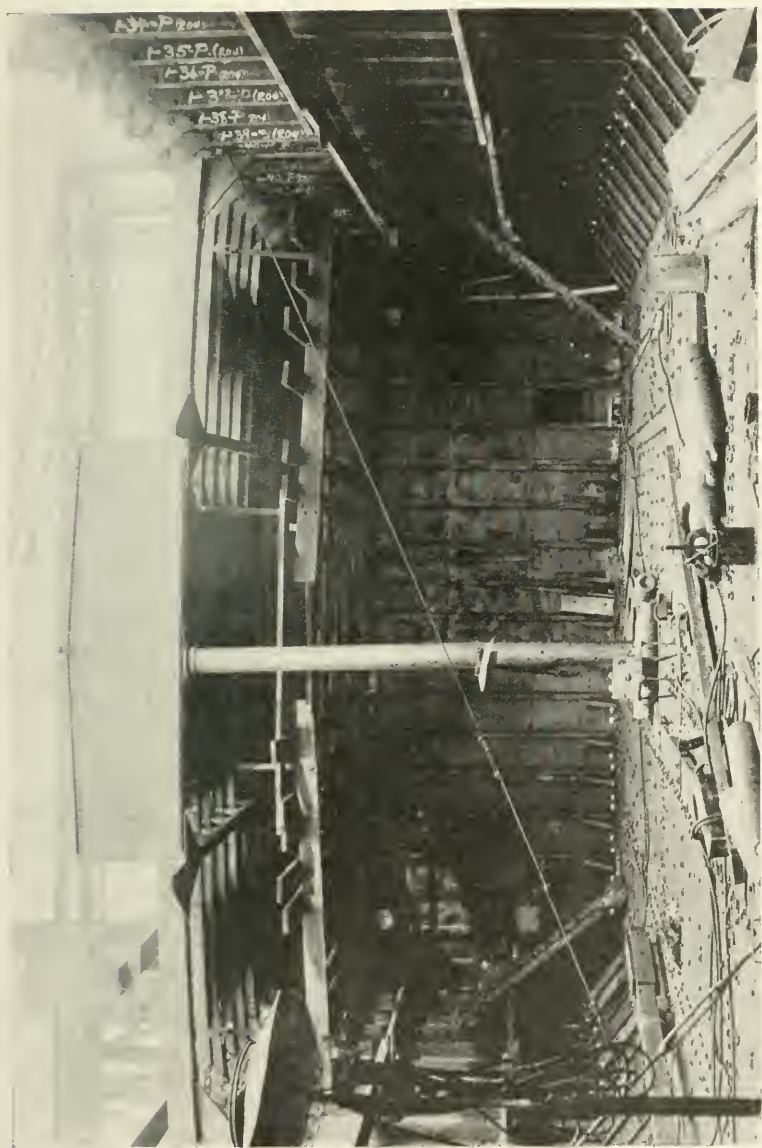
This phase of the work was made most convenient for all war agencies through the organization, early in the war, of the division of pictorial publicity as a unit of the committee on public information. The division consisted of groups of artists in various large cities, the chief work being done in New York City. Charles Dana Gibson was chairman of the division. The committee of artists held a meeting in New York each week at which numerous speakers of international fame addressed them. These artists devoted the greater portion of their time to posters and even bought their own paints and canvases in many cases to turn out inspiring appeals.

The contributions of the artists of America formed one of the unique features of the various campaigns for war funds. The Emergency Fleet corporation posters were sent out to all the shipyards and industrial plants. Their effect upon actual production, of course, is problematical, but the interest displayed in the paintings indicated that the pictured appeal for patriotic effort was a material factor in increasing the speed with which ships were built.

The *Shipyard Bulletin* was issued semimonthly and posted in the yards. It was printed in large type to make it easily



ONE DAY'S WORK ON RECORD SHIP CRAWL KEYS. KEEL, CENTER KEELSON, BOTTOM FRAMES AND PLATING IN PLACE



S. S. CRAWL KEYS ON THE FIFTH DAY. WORK STARTED ON DECKS AND TANK TOP

Building the Emergency Fleet

read by the workmen. Usually it was illustrated with some striking picture having to do with shipbuilding and almost every issue contained a challenge intended to spur the men on to better and faster effort.

The *Emergency Fleet Bulletin*, which went to the industrial plants, was similar to the *Shipyard Bulletin*. It was not issued until after the Fleet corporation's organization was built up sufficiently to permit of effective, working co-operation between the 1200 industrial concerns and the home office in the spread of propaganda. The *Emergency Fleet Bulletin* was discontinued soon after the signing of the armistice.

The *Emergency Fleet News* was intended to be a printed record of the chief accomplishments of the corporation. It emphasized speed and efficiency and featured articles which, in the opinion of the editors, helped all the yards in solving their problems. The *Emergency Fleet News* worked in close co-operation with shipyard plant papers, about 50 of which were established while the country was at war.

In the early spring of 1918 the first startling record in shipbuilding was announced when the TUCKAHOE was launched at the New York Shipbuilding Corp. yard at Camden, N. J. This 5500-ton steel collier was built, from keel laying to launching, in 27 working days. She was completed and turned over for operation in 37 days from date of keel laying. Shipyards throughout the country picked up the challenge.

Before the war, when the incentive to speed and the opportunities made possible by quantity orders were lacking, it required from nine months to a year to build a 3500-ton

Work of Publications Section

steel seagoing vessel; from a year to a year and a half to build a 5500-ton steel vessel and from a year and a half to two years to complete a vessel of 8000 tons or more. The sensational pace set by the builders of the TUCKAHOE led to the following unprecedented shipbuilding performances:

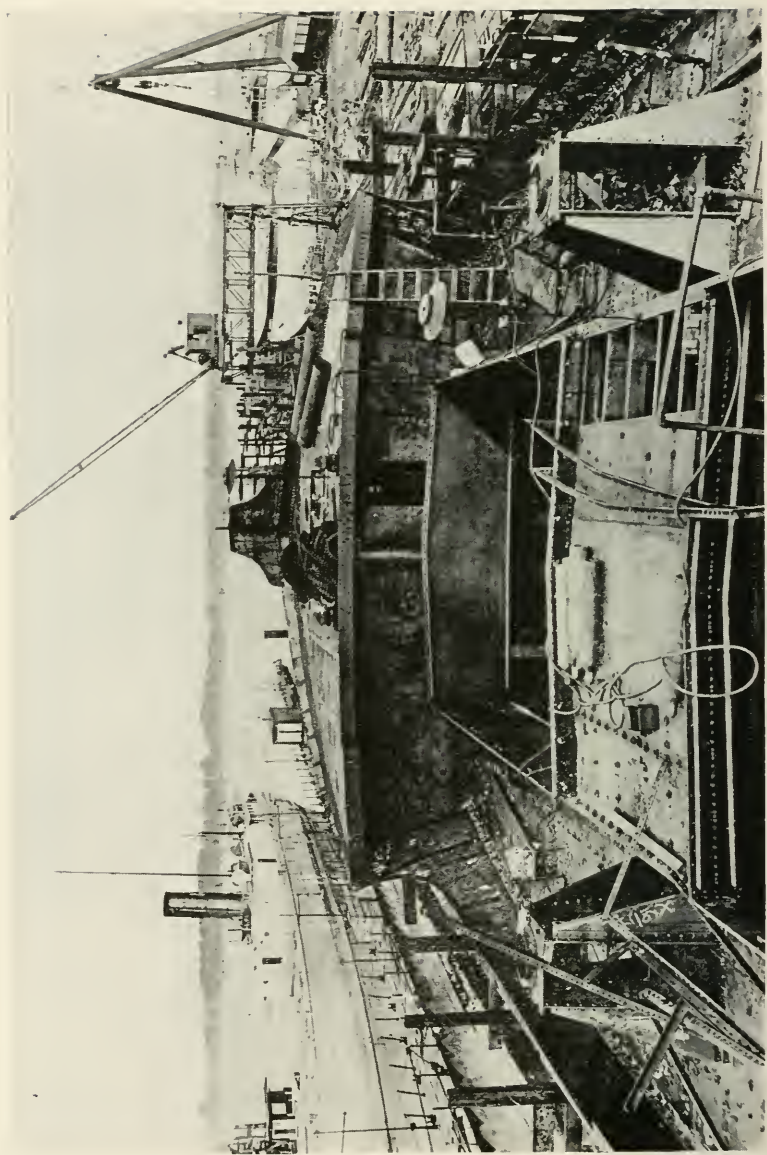
The CRAWL KEYS, a 3500-ton steel freighter, was completed by the Great Lakes Engineering Works, Ecorse, Mich., in 34 calendar days (keel laying to delivery).

The WEST LIANGA, a freighter of 8543 deadweight tons, was delivered by the Skinner & Eddy Corp., Seattle, in 78 calendar days.

The WEST HOSOKIE, a 8800-ton vessel, was delivered by the Skinner & Eddy Corp. in 79 calendar days.

The LAKE NARKA, a freighter of 3530 deadweight tons, was delivered by the American Shipbuilding Co., Cleveland, in 84 calendar days.

Other records in speedy deliveries were made but even these did not measure accurately the enthusiasm and efficiency with which the men in the best yards worked on the ships. Often actual delivery of a vessel was delayed by failure of the yards to receive outfitting equipment when needed. The speed in shipbuilding, therefore, was more easily judged by the record launchings than by the record deliveries. The most notable performance in launchings perhaps was on the steamship INVINCIBLE a 12,000-ton freighter constructed from keel laying to launching in 31 calendar days at the Bethlehem Shipbuilding Corp., Ltd., plant, Alameda, Cal., and the steamer



S. S. CRAWL KEYS ON TENTH DAY SHOWING PROGRESS ON FORECASTLE.



LAUNCHING S. S. CRAWL KEYS ON FOURTEENTH DAY AT ECORSE, MICH., PLANT OF GREAT LAKES ENGINEERING WORKS



S. S. CRAWL KEYS ON TWENTY-NINTH DAY STARTING FOR THE ATLANTIC. SHE CARRIED THE BANNER "I AM 29 DAYS OLD. LOOK ME OVER"

Work of Publications Section

CRAWL KEYS which was launched in 14 working days from the date of keel laying.

These records were carefully followed and the whole shipbuilding world became interested. That led to a quickening of all the various processes of ship construction. It is actually on record that one yard had a new keel laid down on a shipway within 11 seconds after another vessel vacated the ways. Such speedy performances were not highly important, of course, to the shipbuilding industry but they were illustrative of the spirit with which the men went about their work.

There was much material for propaganda in rules for economy and safety. The *Emergency Fleet News* served to bring ideas along these lines to the attention of shipyard managements with the result that the accident prevention plans worked out by the industrial relations division of the corporation became popular in most of the shipbuilding plants. New time saving and labor saving devices developed in various yards were brought to the attention of other plants of the Emergency Fleet corporation, frequently with the result that there were distinct economies effected.

Another important work of the publications section had to do with censorship, in which it worked in close co-operation with the plant protection section of the corporation. The idea was not so much to conceal American shipbuilding operations from the enemy as it was to prevent any information reaching enemy agents that would aid them in bomb plotting and arson activities. The corporation kept a careful eye upon publications dealing with shipbuilding operations to prevent

Building the Emergency Fleet

the reproduction of photographs giving details of plant construction and showing the geographical relation of various buildings. This particular work was taken over later by a committee consisting of representatives of different divisions of the corporation.

The section designed and issued United States shipping board and Emergency Fleet corporation flags, pennants, seals, etc. Every shipyard building vessels for the corporation and every industrial plant supplying ship parts or material was authorized to fly a United States shipping board flag. The section also designed the flag which was flown on all ships operated by the United States shipping board.

The official pin of the corporation consisted of a shield and anchor in blue and red on a background of white enamel with the letters, "U. S." in gold; this was encircled by a band of blue enamel with the words, "Shipping Board Emergency Fleet Corporation," in gold. The pin proved so popular that it was worn by practically every employe of the corporation and no doubt will be treasured by thousands of persons as a souvenir of their work.

Among other mediums for propaganda work in behalf of the corporation was the moving picture exchange. Films showing the shipbuilding idea, training of workmen, and actual construction methods were prepared under the supervision of the publications section and shown throughout the country.

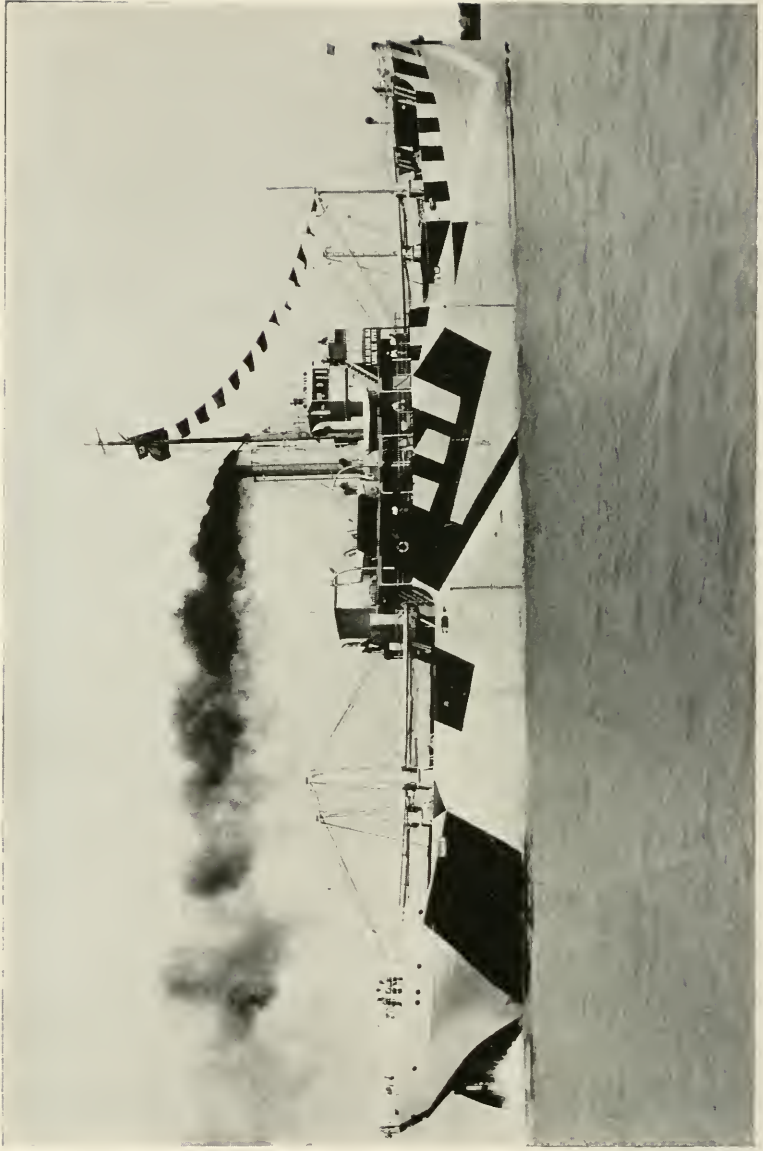
CHAPTER VI

Developing Methods of Ship Protection

ALONG with the growth in merchant tonnage due to the building program came an important wartime development—ship protection. The submarine campaign made it necessary for the government to investigate and experiment with means for the protection of ships. From the start of America's participation in the war, submarine sinkings appeared to be the outstanding danger and the whole nation was on the alert to suggest some means of thwarting the German undersea pirates.

The protection devices finally worked out can be divided roughly into two general classes. First was the defensive idea, adopted to deceive or thwart the enemy and to enable a threatened ship to escape. The principal and the most successful measures of defense were camouflage painting, and the equipment of vessels with the device known as the otter gear, by means of which ships were able to avoid contact with mines.

The other class can be termed the offensive means of defeating the submarine. American vessels were equipped with guns for actual battle against the enemy and with depth bombs to cause subaqueous explosions. The convoy system by which



STARBOARD VIEW OF S. S. CRAWL KEYS ILLUSTRATING CAMOUFLAGE DESIGN



S. S. ISANTI BUILT BY WESTERN PIPE & STEEL CO. IN AN UNUSUALLY EFFECTIVE PAINT COATING



MANY BOLD AND UNUSUAL DESIGNS WERE DEVELOPED AND TESTED IN SERVICE

Developing Methods of Ship Protection

merchant ships were protected by naval destroyers and cruisers and by airplanes equipped with bomb dropping apparatus also was developed. The entire offensive system was a part of the navy's work. With the so-called defensive ideas, the Emergency Fleet corporation was more concerned.

When American troops first began moving across to Europe, interest in means of protecting ships became universal. It seemed that everybody had an idea for beating the submarine and thousands were so certain of the merits of their suggestions that they either wrote to Washington or went there in person to submit their plans to experts in the navy or shipping board. These suggestions became so numerous and the need of developing real defense so important that the shipping board created a committee on ship protection as a clearinghouse for ideas of this sort. The suggestions took a wide range, fully half of them being schemes to make ships unsinkable. The vast majority of plans submitted were found to be impracticable.

The work of the committee offered a most fascinating field of research for the group of scientists engaged in it and involved a knowledge of ship designing, engineering, high explosives, technical and detailed mechanics, camouflage painting and other subjects.

Camouflage proved to be a most effective device for deceiving the enemy. Contrary to common belief it was deception of the enemy rather than actual hiding of the ship that camouflage sought to accomplish. Merchant ships, troop ships and fighting craft suddenly blossomed forth in weird designs

Building the Emergency Fleet

of most fantastic colors. These designs were worked out by expert camoufleurs, although it was difficult for the layman to detect any singularity of purpose or any particular model after which ships were camouflaged. The creation of designs was a scientific and painstaking art.

Within a short time after ship camouflage was begun, designs were perfected which were so perfect that it was impossible with the naked eye to determine at a distance of even a few miles the direction a ship was proceeding. This difficulty was made many times greater to a submarine commander whose only eye was the periscope and who had to examine a vessel with the horizon as a background.

Camouflage painting was considered so important that it became a part of the work of the construction division of the corporation. A nation-wide organization was built up, there being district camoufleurs in 11 different districts of the country, distributed according to the requirements of the work. The organization was started at the home office in Washington under the management of Henry C. Grover, and within a short time about 150 men were actively at work and graded as district camoufleurs, camoufleurs and assistant camoufleurs. There were also subdistricts in charge of resident camoufleurs who were stationed at Portland, Oreg., Los Angeles, Norfolk, Va., Providence, R. I., and Montreal, Can.

Early in 1918 a training school for camouflage painters was started in New York. From this school graduate camoufleurs were detailed to other districts when they were competent to



H. C. GROVER
Who had charge of the camouflage work on merchant ships

Building the Emergency Fleet

apply designs to ships and had a thorough understanding of the dazzle theory.

One of the most interesting and novel developments of the camouflage idea was the institution of camouflage theaters with periscope devices arranged for the observation of models. Students in this work were enabled to examine these models under conditions similar to those at sea. They drew their designs according to the ideas suggested by these experiments. The artists were given an opportunity for experimenting on the results of their observations and for working out dazzle problems and from these some of the best suggestions for ship camouflage developed. Each week three men from the Fleet corporation's camouflage section were sent to the bureau of construction and repair of the navy department at Washington to co-operate in making designs. Suggestions for new ideas on camouflage were brought forth frequently by field men and by experimenters in the miniature theaters. Some of the best schemes to deceive the enemy were originated by navigators, based on observations at sea. Had the war continued longer, the camouffleurs would have undertaken experiments in submarines to test out theories of dazzle under conditions actually paralleling those of the enemy.

Another means of defense, the "otter gear," was the invention of an Englishman. It was called the otter gear in America because of a fancied resemblance to an otter. The device attached to a ship in motion ran with its "nose" protruding from the water very like a swimming otter. The otter gear was called the "paravane" in England and the British

Developing Methods of Ship Protection

naval authorities thought highly of its efficiency. The inventor, incidentally, was knighted and given a large reward for his services.

The otter gear was attached to the stem of a vessel by means of cables and pushed along in front and on either side of the vessel by a "broom" arrangement.

A ship seldom strikes a mine squarely with its stem. The experience of the war, in fact, proved that most vessels destroyed by mines were blown up as a result of the sides coming in contact with the explosive. Thus it was assumed that a cable attached to the stem of a vessel would, in a large percentage of cases, come into contact with the moorings of a mine. With the otter gear arrangement, when such contact was made the mine was dragged along the cable to the otter gear and there a device severed the mine moorings, permitting the mine to float to the surface. Destruction of the mine by gun fire was then easily accomplished. It is on record that hundreds of ships were saved from damage and possible loss by the otter gear.

The use of the otter gear was kept secret up to the time of signing the armistice.

FIRST KEEL LAID

Requisitioned Steel	April 20, 1916
Contract Steel.....	July 29, 1917
Contract Wood	May 15, 1917
Contract Composite	Sept. 27, 1917
Contract Concrete	April 20, 1918

Record Month - Keels Laid - July, 1918
130 Ships --- 743,525 D.W.T,

FIRST SHIP LAUNCHED

Requisitioned Steel	April 21, 1917
Contract Steel	Nov. 24, 1917
Contract Wood	Dec. 1, 1917
Contract Composite	May 30, 1918
Contract Concrete	Dec. 4, 1918

Record Month - Ships Launched - May 1919
133 Ships --- 727,278 D.W.T.

FIRST SHIP DELIVERED

Requisitioned Steel	Aug. 30, 1917
Contract Steel	Jan. 5, 1918
Contract Wood	May 24, 1918
Contract Composite	Aug. 28, 1918
Contract Concrete	Oct. 23, 1919

Record Month -- Deliveries

Sept., 1919 - 145 Ships --- 788,053 D.W.T.

MAXIMUM PROGRAM

The Maximum Program was reached September-October, 1918 when 3148 ships of 17,493,286 D.W.T. had been requisitioned or committed for by contracts.

CHAPTER VII

Planning and Statistics Section

IN MANY great construction undertakings, statistical information is highly essential to the proper guidance and planning of the work. This fact was recognized by the Emergency Fleet corporation early in its career. Under the regime of Admiral Capps the compilation of statistical data was begun under the supervision of J. E. Spaulding, and by May, 1918, the demand for statistical information had increased to such an extent that it was necessary to create a separate section of the corporation to handle this phase of the work.

The statistical department of a government construction agency is necessarily largely a service station, not only for the other branches of the organization, but for the newspapers, magazines and writers generally. As the shipbuilding program progressed and public interest was intensified there was a constant demand upon the statistical section for facts and figures. The building of a ship involved so many varied activities and the entire program was such a mammoth undertaking that it lent itself peculiarly to statistical analysis. Volumes could be written upon studies made possible by juggling figures having to do with ship construction.

Three definite stages in the process of building a ship readily form the basis for statisticians to present figures by

Building the Emergency Fleet

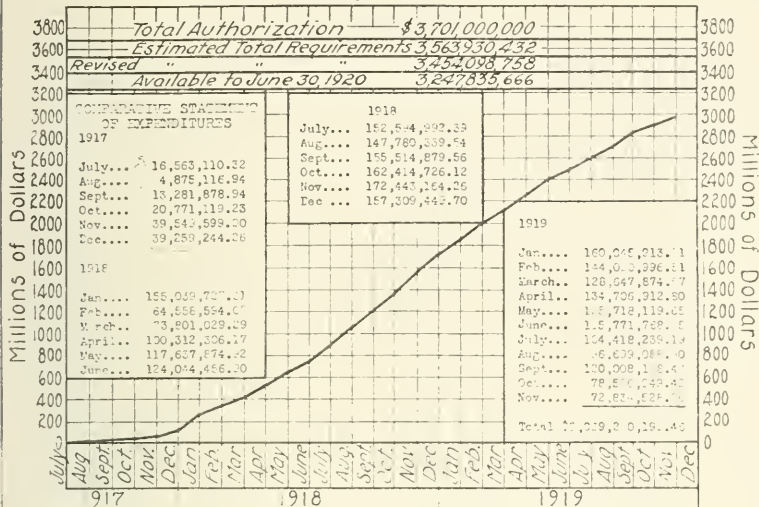
which any student can visualize progress. First is the keel laying, which represents the actual beginning of ship construction. Launching is the second stage, representing ordinarily about 80 per cent of progress toward completion. The final step is the delivery of the vessel ready for operation. With a given number of ships on the ways, their keels having been laid; a certain number in the basins undergoing machinery installation; and another figure representing deliveries, it is not a difficult task for a statistician to give a fairly definite estimate of work completed as measured by erected tonnage.

Knowledge of work completed, or past performance, gives a basis for scheduling future progress. This naturally fell to the statisticians so that when finally developed to its maximum activity this department of the corporation was known as the planning and statistics section. When first established, a force of 55 persons, including experienced statisticians, clerks, and stenographers, was required to perform the work, but the duties of the department developed so fast that between May and October, 1918, the number of employes increased to 102.

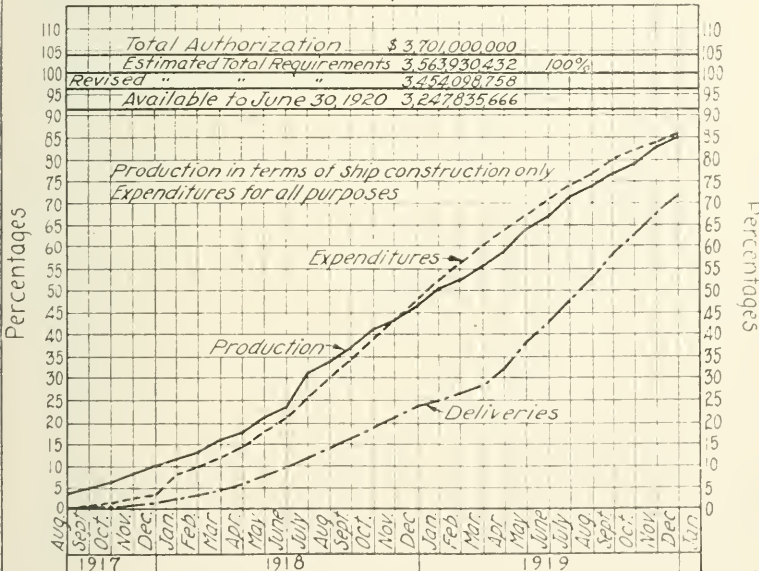
In the meantime, Frank J. Warne, statistician and economist, was designated as executive head of the section and he remained until July 1, 1918, when he was succeeded by Samuel M. Evans, Chicago, who, during the early part of 1918, had made a careful survey of the shipbuilding situation in the United States.

The section prepared and kept constantly corrected and up-to-date, a list of about 35 tabulations showing in concise and graphic form a great mass of information covering every phase of the shipbuilding program. This included not only

TOTAL EXPENDITURES



RATIO BETWEEN EXPENDITURES, PRODUCTION AND DELIVERIES



HOW EXPENDITURES WERE CONVERTED INTO SHIPS

ACTIVE PROGRAM BY TYPE OF SHIP

Class	No. of Ships	D.W.T.
<u>CARGO</u>		
Requisitioned Steel.....	298	1,910,939
Contract Steel.....	1118	7,546,745
Contract Wood.....	304	1,121,350
Contract Composite.....	18	63,000
Contract Concrete.....	4	13,500
	TOTAL... 1742	10,655,534

FINISHED HULL

Contract Wood.....	117	455,400
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TANKER

Requisitioned Steel.....	58	562,330
Contract Steel.....	80	767,500
Contract Wood (Converted).....	1	4,700
Contract Concrete.....	8	60,000
	TOTAL... 147	1,394,530

PASSENGER AND CARGO

Requisitioned Steel.....	4	28,772
Contract Steel.....	26	338,000
	TOTAL... 30	366,772

TRANSPORT

Requisitioned Steel.....	9	71,976
Contract Steel.....	13	107,800
	TOTAL... 22	179,775

DETAILS OF MAXIMUM ACTIVE PROGRAM

ACTIVE PROGRAM BY TYPE OF SHIP
(Concluded from preceding page)

REFRIGERATOR

Requisitioned Steel.....	11	86,200
Contract Steel.....	<u>8</u>	<u>75,200</u>
TOTAL....	19	161,400

COLLIER

Requisitioned Steel.....	9	70,350
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BARGE

Contract Steel.....	6	22,200
Contract Wood.....	28	71,000
Contract Wood (Converted).....	<u>59</u>	<u>217,250</u>
TOTAL.....	93	310,450

SAILING VESSEL

Contract Wood.....	10	34,500
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OCEAN TUG

Contract Steel.....	48	A
Contract Wood	<u>13</u>	<u>A</u>
TOTAL.....	61	A

HARBOR TUG

Contract Steel.....	8	A
Contract Wood.....	<u>56</u>	<u>A</u>
TOTAL.....	64	A

GRAND TOTAL..... 2314 13,628,711

Note: A - No tonnage given on tugs
data as of November 30th, 1910

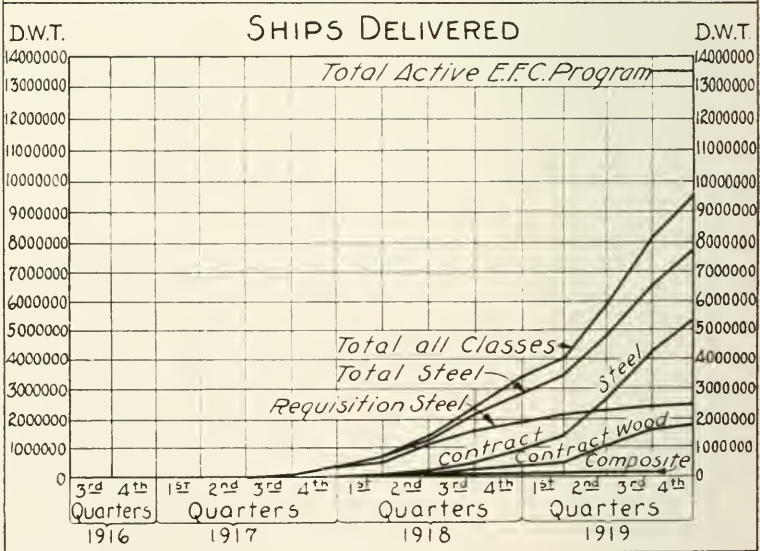
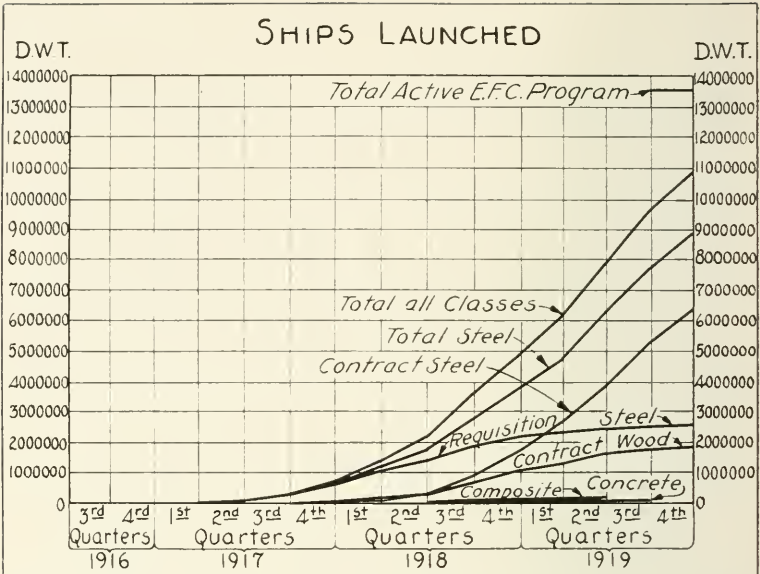
Additional Program
not originally included
in Maximum Program

Class and Type	Maximum Program Sept.-October 1918		Cancelled prior to Sept.-October 1918		Active		Accumulated Program	
	No.	D.W.T.	No.	D.W.T.	No.	D.W.T.	No.	D.W.T.
REQUISITIONED STEEL								
Cargo	109	1 970 939	2	10 600			311	1 981 539
Cargo (released)			6	67 800			6	67 800
Cargo (To Contract)			12	110 900			17	110 900
Tanker	58	562 330	2	20 200			60	582 530
Tanker (released)			1	6 980			1	6 980
Refrigerator	11	86 200					11	86 200
Transport	9	71 975					4	71 975
Collier	3	70 350					9	70 350
Passenger and Cargo	4	28 772	2	9 000			6	37 772
Ore Carrier (released)			6	68 260			6	68 260
TOTAL	400	2 730 566	31	283 740			431	3 014 306
Less to Contract			12	110 900			17	110 900
NET TOTAL	400	2 730 566	19	172 840			419	2 903 406
CONTRACT STEEL								
Cargo (U.S.)	71	8 761 030					1301	9 901 030
Cargo (U.S. Experiments)			32	254 800			32	254 800
Cargo (Japan)	30	243 290					36	243 290
Cargo (China)	4	40 000					7	40 000
Tanker	80	737 000	8	84 800	4	40 000	75	862 600
Tanker (Navy)	8	91 000			4	40 000	12	131 000
Refrigerator	8	76 200					8	76 200
Transport	21	831 800					21	831 800
Passenger and Cargo	26	338 000					26	338 000
Barge	16	49 200					16	49 200
Tur (Ocean)	104	A					104	A
Tur (harbor)	8	A					8	A
TOTAL	476	11 306 520	40	339 600	8	80 000	1724	11 726 120
CONTRACT WOOD								
Cargo	515	1 918 050	5	21 000			521	1 939 050
Tanker (Converted)	1	4 700					1	4 700
Finished hull	119	463 550					119	463 550
Sailing Vessel	10	34 500					10	34 500
Barge (Converted)	64	241 900					64	241 900
Barge	136	351 000	5	17 500			141	368 500
Tur (Ocean)	61	A					61	A
Tur (harbor)	100	A					100	A
TOTAL	1006	3 013 700	11	38 500			1017	3 052 200
CONTRACT COMPOUNDS								
Cargo	24	84 000	26	91 000			50	175 000
CONTRACT COILS								
Cargo	6	28 500	1	3 500			7	32 000
Tanker	36	270 000					36	270 000
TOTAL	42	298 500	1	3 500			43	301 500
GRAND TOTAL	3148	17 443 286	97	645 440	8	80 000	3253	18 119 626

NOTE: A - no tonnage given on tur.
Data as of November 30, 1919 -

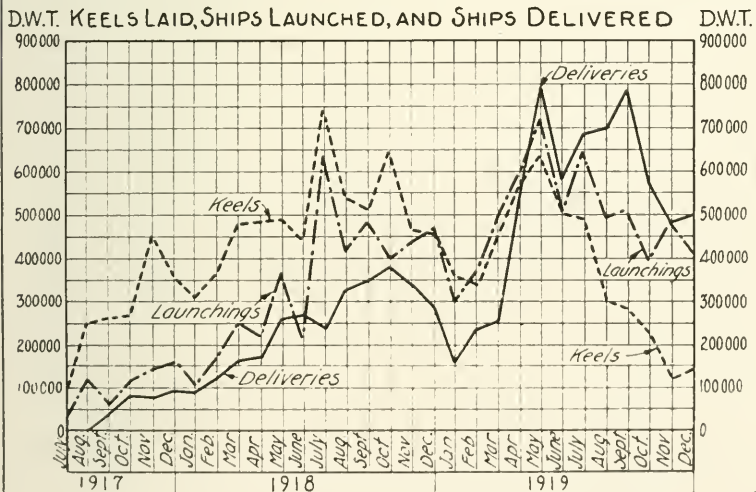
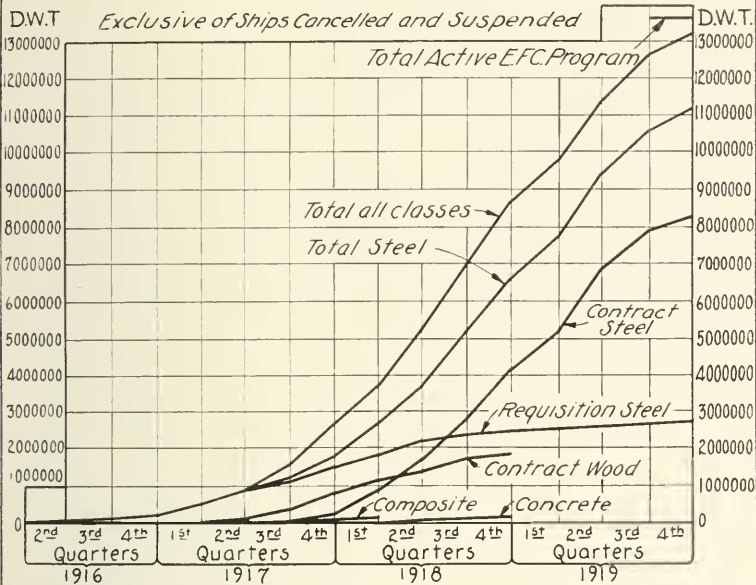
No.	Cancelled	Under Program	Total Under Suspension or Place led	Now active on Maximum Program	Active Addi- tional worker not origi- nally included in Maximum Program	Total Active Program	
							D.W.
13	70 000		13 70 000	298	1 910 939	298	1 910 939
6	57 800		6 57 800				
12	110 900		12 110 900	58	562 330	58	562 330
2	20 200		2 20 200				
1	6 980		1 6 980				
				11	86 200	11	86 200
				8	71 975	9	71 975
				9	70 350	9	70 350
2	9 000		2 9 000	4	28 772	4	28 772
6	68 260		6 68 260				
42	343 740		42 343 740	349	2 730 566	349	2 730 566
12	110 900		12 110 900				
30	332 840		30 332 840	349	2 730 566	349	2 730 566
175	1 420 925	42	2 086 657	210	637 075	1 064	7 263 455
32	164 800		32 164 800			30	243 290
				4	40 000	4	40 000
				30	243 290	68	636 500
21	136 100	3	30 280	24	200 100	4	40 000
				8	1 400	12	131 000
				6	70 200	8	75 200
74	724 000		74 724 000	13	107 800	13	107 800
				26	338 000	26	338 000
10	27 000		10 27 000	6	22 200	6	22 200
56	A		56 A	48	A	48	A
				8	A	8	A
372	3 231 625	42	2 086 657	117	3 976 245	1 097	8 857 445
217	817 700		217 817 700	304	1 121 300	304	1 121 560
				1	4 700	1	4 700
2	8 150		2 8 150	117	458 400	117	458 400
				10	34 500	10	34 500
4	24 650		4 24 650	59	217 250	59	217 250
113	297 500		113 297 500	28	71 000	28	71 000
48	A		48 A	13	A	13	A
38	A		38 A	56	A	56	A
47	1 104 200		47 1 104 200	588	1 904 200	588	1 904 200
32	112 000		32 112 000	18	63 000	18	63 000
3	18 500		3 18 500	4	13 500	4	13 500
26	210 000		26 210 000	8	60 000	8	60 000
21	228 500		21 228 500	12	73 500	12	73 500
688	4 353 125	51	237 657	180	4 540 818	730	13 648 911

ONE YEAR AFTER THE ARMISTICE



RECORD OF SHIP LAUNCHINGS AND DELIVERIES

KEELS LAID



COMPLETE MONTHLY RECORD OF FLEET CORPORATION WORK

RECORDS

The "Crawl Keys", a 3350 D.W.T. Steel contract cargo ship, built by the Great Lakes Engineering Works, located at Ecorse, Michigan, holds the steel ship record as being completed in the shortest length of time, which is 29 working days from date of keel laying to delivery.

The "Aberdeen", a 4000 D.W.T. Wood ship built by the Gray's Harbor Motor Ship Corporation, located at Gray's Harbor, Washington, holds the wood ship record as being completed in the shortest length of time, which is 27 days from date of keel laying to delivery.

STATUS OF CONSTRUCTION IN FABRICATED YARDS

American International S. B. Corp., Hog Island, Pa.

	No.	D.W.T.
Total Contracted for - Cargo	110	825,000
Total Contracted for - Transport	70	560,000
Total	<u>180</u>	<u>1,385,000</u>
Cancelled - Transport	58	<u>464,000</u>
Active Program	122	921,000

Submarine Boat Corporation, Newark, N. J.

	No.	D.W.T.
Total Contracted for	150	761,250
Under Suspension.....	<u>32</u>	<u>162,400</u>
Active Program	118	598,850

Merchant S. B. Corp., Bristol, Pa.

	No.	D.W.T.
Total Contracted for	60	540,000
Cancelled	<u>20</u>	<u>180,000</u>
Active Program	40	360,000

IMPORTANT PART PLAYED BY FABRICATED YARDS

Planning and Statistics Section

the rate of progress of the various yards, but estimates of future deliveries based on way capacity and rate of erection, tonnage erection per man, rivets driven per gang per hour, cost per deadweight ton, labor and steel requirements, and averages showing time element in different shipbuilding activities.

The statistical section was made the clearing house for all information involving figures on the performances of the corporation. The work of the steel ship, wood ship, and concrete ship construction units, was described in the semimonthly reports of the district representatives and forwarded by those departments to the statistical section for tabulation. There they became a permanent record and were kept in such form that the section was enabled to answer almost any question involving data on past performances. The use to which these figures were put was varied and far reaching.

Officials of the Fleet corporation were called upon constantly by magazine publishers for special articles dealing with shipbuilding progress. It was the part of wisdom and policy in many cases to respond to these requests. Various publications, of course, were interested in a particular phase of shipbuilding, such as labor, shipyard pay, steel consumption and requirements, the wooden ship and its possibilities, speed in erection, fabrication in the yards and industrial plants, etc.

Information on all such points always was available in the statistical section. Then, too, various government activities aside from shipbuilding demanded statistical data. The federal reserve banks, for example, were interested in the effect of the shipbuilding industry upon the country's financial status and

Building the Emergency Fleet

there were incorporated in the reports of the various federal reserve districts, facts and figures on shipbuilding activities and the results as they affected finance conditions in the districts.

Newspapers and magazines devoted to the Delaware river district were interested in the effect of the sudden boom in shipbuilding activities upon cities and towns in eastern Pennsylvania, Delaware and western New Jersey. It was possible from the information compiled in the statistical section to give an accurate report on the following points: The number of men employed in the Delaware river yards, the amount of money paid out by these yards in monthly payrolls, the amount of money involved in contracts held by the different shipyards, the sum expended on shipbuilding plants, the amount expended monthly on railway and traction fares by shipworkers journeying to the yards, etc.

From these figures it was possible to draw such estimates as the number of men living in the district who were attracted there by the increased activity in shipbuilding, the amount of money in circulation in the district due to the shipbuilding industry, the additional profits of merchants caused directly by the expansion of shipbuilding. Statistics reduced to facts having a bearing upon the financial interests of the various districts became highly pertinent and important to business men and bankers and the section's work became an important factor in many phases of the country's commercial activities.

When the armistice was signed and it was decided in the interest of economy to curtail certain phases of the shipbuilding program, a tremendous task faced the corporation in connection

Planning and Statistics Section

with the cancellation of contracts and the financial adjustments due to such cancellations. The change in the corporation's plans resulted in the dismantling of some of the wood yards and a vast amount of material and equipment was accumulated which it was necessary for the government to salvage and dispose of. This put an added burden upon the statistical section which had to record the progress of the work of the new division and to disseminate statistical data regarding cancellations, adjustments and salvage to the divisions and officials requiring it.

The Emergency Fleet corporation like other war industries was subjected to congressional inquiries at which the investigating bodies searched for information of the most detailed character about the corporation's accomplishments. Here again the statistical section was called upon in the preparation of accurate reports for congress.

After the armistice, the statistical section became a part of the ship construction division. By that change it lost its identity as a mere chronicler of historical figures and entered more actively into the important work of planning and recording production. It became the progress and record section of the ship construction division.



S. S. DEFIANCE, 11,800-TON FREIGHTER, ONE OF THE LARGEST VESSELS BUILT DURING THE WAR. CONSTRUCTED AT BETHLEHEM YARD, ALAMEDA, CAL.

CHAPTER VIII

Buying for the Shipyards

IN ANY large industrial concern, buying supplies and seeing to their delivery promptly and in proper sequence, is an important responsibility. It requires the services of expert men who have been specially trained. Buying involves not only ability to select material and judge of its value, but knowledge of supply and demand, transportation, accounting, warehousing and production capacity of mills and mines. All this is essential to a good buyer in a single manufacturing plant. What then was involved in selecting the personnel of the division of the corporation charged with the purchase and transportation of all the material used in the construction of ships in nearly 200 yards, working under wartime conditions with the country urging maximum production?

The supply division of the corporation was the largest unit of the organization. It began operations as a division in July, 1918, when three large and formerly distinct departments known as the purchasing, production and transportation divisions were consolidated. It was after the consolidation that buying and transportation of material reached the maximum stage of efficiency.

Supplying the corporation's needs required the services of 1700 employes. Their work was complex and varied. Every-

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thing that a ship needs, from engines to frying pans, had to be produced and supplied in the right sequence, time and time again, to meet the requirements of the shipyards scattered along the coast from Maine to Oregon. The supply division had to be sure that ore from the iron mines of Minnesota moved swiftly and regularly to the blast furnaces in Pennsylvania and Ohio. It had to keep an eye on the production of fuel and timber—fir and yellow pine from the west and south, respectively. It had to commandeer great industrial plants, extend old ones and build new ones. It had to build warehouses and storage yards. It had to spend from \$5,000,000 to \$10,000,000 every week. Its work was affected by labor problems, weather, legislation, espionage and sabotage, the army draft—everything, in fact, that could have a bearing on production and transportation.

To do this work, the supply division drew trained men from every state and from many professions, industries and business channels. Some entered the employ of the corporation at the personal solicitation of supply division executives with whom they had had previous business relations, or to whom they were known by reputation. Others were obtained by canvassing large business or technical concerns, colleges and technical institutions, while in some cases positions were filled by drawing from applicants in person. To carry on the work properly it was necessary to have civil, mechanical and electrical engineers. Metallurgists, professors in technical schools, iron and steel men, public utilities experts, army and navy officers, lumber operators and dealers, railroad men, manufacturers and

Buying for the Shipyards

accountants were found useful. Building up this force of trained men, capable of directing such wholesale purchasing with intelligence, was an exacting and tedious task. The corporation sought the best men in the different professions and business circles.

For the first manager of the supply division, it called the vice president of a leading construction corporation, who had had years of experience in organizing, managing and expediting large construction enterprises. The assistant manager was at the head of a large manufacturing concern and the man who later became manager of the division was an attorney who had long been associated in both a professional and business capacity with huge industrial interests. It was found that knowledge of the law was a decided advantage in the adjustment of the corporation's obligations when cancellations covering millions of dollars worth of contracts for ship machinery and equipment were ordered. The Panama canal organization furnished numerous experienced men who had held government positions in the engineering, technical and inspection departments on the isthmus.

When the shipbuilding enterprise was undertaken the country's industrial plants were wholly inadequate to the task of supplying material and parts. It was necessary, therefore, to accept the offers of wealthy men to invest heavily in new plants and the corporation had to undertake the building up of shop organizations and managements. That called for expert advice from experienced men and added to the great number of duties imposed upon the supply division.

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Like the shipbuilding organization as a whole, the supply division had district organizations with managers stationed at the principal producing points, including Boston, New York, Philadelphia, Youngstown, O., Washington, Atlanta, Ga., Chicago, St. Louis, San Francisco and Seattle. The supply managers looked after the production, inspection, expediting and transportation of materials in their several districts. They made regular progress reports to the managers of the field sections stationed at the home office and kept fully informed as to the supply situation in their districts. Co-operating with these district managers were local purchasing agents stationed in Seattle, San Francisco, New Orleans, Jacksonville, Fla., Baltimore, New York, Boston and Cleveland. These agents were called emergency purchasing men. It was their duty to supply the deficiency in the event that materials or products were lost in transit or unforeseen shortages occurred.

In the field were managers of production and purchases whose duty it was to supervise the purchase and production of reciprocating engines, turbines, boilers, electrical machinery, outfitting equipment, pipes and valves, deck equipment, auxiliary machinery, machine tools and lumber. They also had charge of schedules, priority and inspection of purchases.

The proper management of such a great purchasing organization required the services, of course, of a large office personnel. Special staff assistants were necessary to supervise organization and employment. There was a manager of research who looked after the compilation of data covering

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resources in the way of manufacturing facilities; a manager of distribution and warehouses who supervised the storage and distribution of materials and equipment, and a manager of transportation who looked after the supervision and transportation of material by rail and water. The shipbuilding industry was such a mammoth undertaking that it put a strain upon the raw material resources of the country and the Emergency Fleet corporation had men in the field to purchase and allocate the steel requirements and to buy pig iron and other raw material of a miscellaneous character.

The supply division, in short, was the center of a highly organized system reaching out to hundreds of manufacturing plants and shipbuilding yards, to the ore mines and mills, to every important sawmill in the great timber belts, to railroad terminals and junctions throughout the United States. Its lines even stretched across the sea where manufacturers were supplying equipment for ships being built in the United States. Every phase of its work was made subordinate to one common purpose—that of preventing any delay in the building or outfitting of ships through lack of material or equipment. Upon the efficiency of the supply division depended the whole fabric of the shipbuilding industry. Failure in supply meant not only delay in the government's program, but idleness for thousands of men and the possibility of reverses for the American army in France, because first of all the whole energy of shipbuilders in America was directed at keeping the army supplied.

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When the United States entered the war and the ship-building program was inaugurated, America began to talk of "bridging the sea with a fleet of ships." Germany sneered and even some Americans were skeptical. It sounded like Yankee boastfulness. But it is a fact that when the war ended the Emergency Fleet corporation had accumulated enough wood ship material alone actually to span the Atlantic ocean. That does not mean a ship here and a ship there, with miles of water between, but sufficient material to make a bridge floor stretching from America to France. That bridge could have been made 25 feet wide and there would have been about 4,000,000 feet of lumber to spare.

The lumber department of the supply division filed a report with the home office just before the armistice was signed, giving the total lumber requirements for 275 wooden ships then in course of construction on the Atlantic and Gulf coasts. The estimated requirements were 425,000,000 feet. A foot, in lumberman's parlance, means a board 1 foot square and 1 inch thick.

If all this lumber could be transformed into a single board it would be 1 foot wide, 1 inch thick, and about 80,000 miles long. If the board could be cut in 26 parts of equal length and placed side by side, it would more than reach across the Atlantic and it would make a bridge floor 26 feet wide, 1 inch thick, and more than 3000 miles long. That represents the requirements for the ships then under construction. The lumber department's report at that time said

Bovina for the Shipyards

that nearly 400,000,000 feet of lumber actually had been cut and shipped for east coast construction.

The purchasing of lumber, however, represents a relatively small part of the supply division's work. The greater part of the tonnage produced by the Fleet corporation was in steel ships. The amount of steel handled by the supply division would build 31,600 miles of railroad, using standard 70-pound rails. Between Aug. 1, 1917, and Jan. 1, 1919, the Emergency Fleet corporation supervised the purchase, production, and distribution of steel valued at \$245,322,000.

The foregoing is a summary of the accomplishments of the purchasing and transportation departments, as they involved the supply of lumber and steel for ship construction. Even that, however, does not represent adequately the work of the Fleet corporation since every ship built had to be outfitted completely. Each vessel required a thousand and one different articles necessary for proper equipment. These articles ran from davits and auxiliary engines to lifeboats and chronometers. The story of how they were supplied and, to the best of human ability, kept arriving at their proper destination on time, is a romance of industrial achievement.

The origin of the supply division was the creation of the purchasing division in July, 1917. Maj. R. E. Wood, formerly chief quartermaster for the Panama canal, was the first manager of the purchasing division of the Fleet corporation, and Frank A. Browne, an engineer on the Panama canal, was his assistant. When Major Wood resigned, Mr. Browne was appointed to succeed him. Later Mr. Browne was named

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general purchasing officer at the time of the consolidation of the purchasing, production and transportation divisions. He was succeeded by A. L. Bell when he resigned in the fall of 1918 and Mr. Bell in turn was succeeded by F. Dupont Thompson.

M. C. Tuttle was the original head of the production division of the corporation and when the three units were consolidated he was appointed manager of the supply division. He remained in that position until after the armistice was signed when he was appointed a special assistant to the director general and was succeeded by Charles A. Goodwin. David L. Ewing, who was formerly in the traffic department of the Frisco railroad, was named head of the transportation department when it was organized. Mr. Ewing later became manager of the division of operations and was succeeded in the transportation division by F. C. Joubert. When the three divisions were consolidated, Mr. Joubert remained as head of the transportation department of the supply division.

In the early days of the corporation, Mr. Ewing had been appointed director of traffic of the shipping board and the Emergency Fleet corporation. His duties then embraced activities which later engaged the attention of several executives and scores of skilled employees. He had charge of and was responsible for the transportation of material for ship construction, the chartering and requisitioning of all ships, and in conjunction with the war department, assigned vessels for the movement of troops to Europe. He was responsible

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for the scheduling of freight movements in box cars, barges and lake and ocean steamships.

Mr. Ewing, realizing that the transportation or traffic activities of the corporation were destined to increase far beyond the limits originally foreseen, summoned Mr. Joubert, who had been assistant traffic manager of the Standard Oil Co., and prior to that time, associated with the traffic departments of the New York Central, Central Vermont, and Rutland railroads. Mr. Joubert became Mr. Ewing's assistant.

On Nov. 20, 1917, E. F. Carry was made director of operations and Mr. Ewing became assistant director of operations. It was at that time that a start was made in dividing the various activities formerly entirely under Mr. Ewing's direction.

On Jan. 1, 1918, the transportation division was created and Mr. Joubert named as executive head. This division was responsible for the railroad transportation of material purchased by the Fleet corporation. The transportation division's work was largely dependent upon the needs of the shipyards and it was found necessary to have field representatives. On April 1, 1918, the country was divided into 15 transportation districts which included the ship construction districts, with transportation managers in each district.

Each district transportation manager was thoroughly acquainted with the traffic conditions in his territory and this later proved to be a convenient thing for the Emergency Fleet corporation. In expediting shipments, the managers worked in

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their respective zones and their knowledge of the transportation systems and men enabled them to speed traffic in a way that otherwise would have been impossible.

An interesting example of how it was necessary for the transportation department to proceed under the conditions that existed in the midst of the war is contained in the story of the Chicago manager's arrangement for hastening shipments to the west coast. The expeditor's principal grief usually was inability to get shipments in trainload lots. Given a trainload of material to send to the west coast, it was not a difficult task for the transportation man in Chicago to send this shipment through on schedule time, but when material arriving from the east and destined for Pacific coast plants reached Chicago in carload lots, every carload had to take its chance on being attached to a convenient train westward bound.

Instead of awaiting such chances, the Chicago transportation men would gather all cars scheduled for the Pacific coast at some convenient point, such as Joliet, Ill., and there make up solid trains and send them on to the west. In the rush of work just before the armistice was signed, an average of 40 trains a week left the Chicago district for the Pacific coast—all of them bearing Fleet corporation material.

The bulk of the Fleet corporation's buying was in raw materials. So important did this phase of the supply division's work become that a separate department known as the raw materials section was established in July, 1918, under M. F. Brown, formerly in charge of steel production, as

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manager, and A. E. Goodhue, assistant manager. G. R. Jasper, formerly in charge of the purchasing of steel, was made purchasing officer.

The department was responsible for the purchase of steel, pig iron, and semifinished material such as copper and brass in the form of sheets and tubing, boilers, furnaces, spelter, and other material of a miscellaneous character. Purchases of pig iron alone ran into many thousands of tons.

More than any other material steel is needed in the business of waging war. The demand for steel from the time the United States entered the war until the conclusion of the armistice was so tremendous that the government was forced to take charge of distribution and allocate to the war industries their equitable proportion of the steel tonnage.

The Emergency Fleet corporation was subject to the rulings of the war industries board beginning with November, 1917. Upon receiving information from the raw materials section of the supply division as to where and when steel would be required and the quantity needed, the war industries board would designate the source of supply. This was necessary because the war industries board, receiving and reviewing the steel demands of a score of industries, knew the requirements of all government departments, including the army, navy and railroad administration. Supervision of steel distribution by this central governmental board undoubtedly resulted in materially quickening the shipbuilding program.

The raw materials section dealt with about 40 sources of supply and had as consumers every shipbuilding plant

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holding contracts with the corporation. It was not only for ship construction, however, that steel was used in these plants. Every yard which undertook extensions or enlargements in plant facilities looked to the Fleet corporation to keep the steel supply moving. Points of delivery were scattered along the two ocean fronts, the gulf and the Great Lakes. Later the field of the raw materials section broadened, because, to keep the manufacture of machinery and equipment up to the needs of the shipbuilding program, it was necessary for the corporation to supply steel for industrial plants engaged on ship equipment.

To prevent unequal and unfair distribution of the steel supply, the raw materials section had to work in close cooperation with the division of steel ship construction. It had to know at all times not only the amount of steel required, but the amount on hand and had to have exact knowledge as to the amount used. Yet, it was primarily a purchasing organization and its functions lay within the activities of the supply division rather than the construction division.

It is interesting to know that the raw materials section of the Fleet corporation was largely responsible for the steel distribution plan finally adopted by the war industries board. The section drew up the form of procedure adopted at a conference of the board, the Emergency Fleet corporation and other governmental departments. Thereafter all shipyards were required to send to the section estimates of their requirements each month. These estimates were to be on hand 60 days in advance of the time delivery was required. The

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requirements were compiled and the total for all yards and mills submitted to the director of steel supply. This plan worked so well that it was adopted by all departments of the government and also was applied to the French and British requirements from United States mills.

Buying steel for shipyards was not merely a matter of determining requirements, making estimates and notifying the mills to ship so many tons to certain yards on given dates. The raw materials section had to fix the order of priority or precedence to be given shipments. It had to battle embargoes and transportation problems which were multiplied by the pressure of war business generally. Some times orders had to be transferred from one mill to another to meet the requirements of the speeding up process. The Emergency Fleet corporation did everything within reason to expedite construction, in some cases even forwarding steel by express. One consignment of 700 tons was shipped by express from the east to the Pacific coast. Steel also had to be shipped to Japan and China to meet the requirements of shipbuilders in those countries holding contracts with the corporation.

The largest weekly shipment of steel for shipbuilding in the United States was 119,294 tons. By the time the armistice was concluded the total monthly shipments of all kinds of steel had reached 400,000 tons.

Of equal importance to the handling of raw material for the construction of hulls was the supply division's task of looking after the shipment of thousands of articles of every description and size included under the head of ship supplies.



GALLEYS OF NEW AMERICAN SHIPS ARE STANDARDS OF CLEANLINESS

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These articles included everything from a vestpocket package to large anchors. They could be shipped by parcel post or in solid trainload lots. Whatever the size and quantity, the supply division was always held to the task of getting prompt delivery.

To do this the transportation department of the division had not only to keep track of all shipments but had to be thoroughly familiar with every available channel or resource for shipping. In the records of this department were kept up-to-the-minute data on the number of cars arriving, departing, or awaiting unloading at each of the shipyards on the two ocean fronts, the gulf coast and the Great Lakes. The department had to see that every car was loaded promptly and if not had to inquire into and find the reason. It had to keep well informed on the movement of all trains carrying supplies to the shipyards—when each left a station or siding and when it arrived at its destination. It even kept track of single cars and of single items carried in cars.

This system was worked out so perfectly that any shipyard expecting a given shipment could inquire of the transportation department and learn exactly where its order was enroute at any hour of the day or night.

Every day from 300 to 500 shipping instructions were received by the transportation department and each shipping instruction might include many articles or only one, but as a rule it meant several. These articles might be lumber, steel, boilers, reciprocating engines, turbines, anchors, or ship stores.

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To systematize and expedite shipments the country was divided into 15 districts or zones, each in charge of a field staff, and some of the zones including four or five states. The heads of each field organization were stationed at large cities constituting the important gateways to the 15 traffic zones. Of these Chicago was the most important center or outlet for the great manufacturing industries of the Middle West.

The field agents worked in close co-operation with the home office. When the demand for certain equipment was sufficiently urgent to require expedition, a train carrying that particular shipment to its destination was followed from one district to another, each field representative notifying the representative in the adjoining district that the train had passed through his territory. The latter communicated with the man in the next district, and so on across the country. In this way the location of the car or train carrying equipment was always known to the home office.

The transportation system could be likened to a great trunk line railroad organization with a network of roads touching every important manufacturing center in the country. The vast detail involved in checking up on shipments and correcting freight charges called for the employment of a large force of clerks. Within the organization was a freight checking branch which was responsible for seeing to it that the carriers did not charge more than they were entitled to for transporting material on which the Emergency Fleet

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corporation paid the freight. This resulted in the saving of thousands of dollars a month to the corporation.

Some of the tactics resorted to by the supply division in its efforts to meet urgent demands were quite unusual. For example, if it were learned that a shipbuilding concern in Maine was in urgent need of certain machinery stored in a Baltimore warehouse, the department did not hesitate to employ extreme measures. At 3 o'clock in the afternoon, perhaps, the division was notified of the need of the machinery in question. An express car was obtained and loaded in all haste before that de luxe affair known as the Federal Express, due at Baltimore at 8 in the evening, pulled into the station. When the big train of Pullmans rolled in it was held up until the ordinary express car could be coupled on. The sensibilities of railroad men and the traveling public would have been shocked before the war began, and the harmony of things often was spoiled from the viewpoint of the Pullman people and there were vigorous protests, but the machinery arrived on time at its destination.

Building ships to win the war was marked by the breaking of many precedents and usages in transportation. With the government in control of all ocean going shipping and shipbuilding, it was in position to dictate priority as it affected different yards. There was the time when a turbine was being shipped from Trenton, N. J., to Los Angeles. Before it reached its destination, the discovery was made that time could be saved in the completion of a vessel by diverting that shipment to Seattle. The transportation department found the

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car carrying the turbine was broken down on the road between Des Moines, Iowa, and Omaha, Neb. Within 12 hours it was repaired and sent on its way to Seattle, where prompt arrival enabled the Seattle builder to deliver a vessel some days in advance of the time it could have been completed otherwise.

During the winter of 1917-18, when railroads were choked with freight, due to heavy snows and cold weather, the transportation department had a tremendous job to keep supplies moving. At that time, for example, the great shipyard at Hog Island was in process of construction and there were thousands upon thousands of piles needed daily at the yard. It was found that ice had stopped navigation on the Delaware river and there was such an accumulation of cars in the vicinity of Philadelphia that it was impossible to get through in normal fashion. Cars carrying piling were on the way from Georgia. Inquiries from the home office of the corporation brought information by telegraph, so that the transportation department headquarters soon had accumulated a serviceable train sheet. From this the department was able to suggest needed action on the part of the railroads and to "squeeze through" sufficient piling to keep work in the yard going.

Where the importance of a shipment warranted it, a transportation man accompanied a car from its start to its destination. On one occasion, when need for pattern lumber arose suddenly in a shipyard in Maine and a hurry call came, an expeditor rode on the car all the way from the west coast.

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taking advantage of every opportunity to put his shipment ahead of less important freight.

The department's problems were multiplied by the poor physical condition of the railroads in the United States at the time we entered the war. These difficulties were largely overcome, however, by the splendid spirit of co-operation on the part of railroad officials. Few differences arose between the Emergency Fleet corporation and the railroad administration. The problems of the corporation could never have been met, however, without the aid of experienced traffic men who knew every mile of railroad in the country, who were thoroughly conversant with shipping facilities at all the great rail gateways, and who were familiar with the intricacies of railroad management and operation.

One interesting feature of ship equipment work brought out by the war was developed when our ships began to be completed in large numbers and the need arose for supplying ship chronometers. A ship chronometer is an instrument of the finest adjustment, precision of movement and beautiful finish. Few of these instruments ever had been made in America. The art of chronometer manufacture apparently was confined to the British isles, some of the old English makers being masters of the craft. In precision of mechanical detail, artistic inscriptions and dial marking, the English chronometers could not be surpassed. To a seaman the best examples of English handiwork in chronometers are as satisfying as fine old English silver is to a *connoisseur*.

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With the decision to build a fleet to help win the war, it was found that we were short of many ship essentials ranging from raw materials to equipment. One of the greatest problems was to find chronometers. With these instruments a ship is enabled to find her position and determine her course. For this reason it had been considered necessary for a steamer to carry three chronometers.

There were no chronometer makers in America and few chronometers. The supply division, however, was called upon to find instruments for the new ships and responsibility for this work was placed upon the outfitting department. In the emergency the department introduced the business of manufacturing chronometers in America, searched the world for old instruments, and finally hit upon a scheme to reduce the number required and substitute ship clocks which were found to be nearly as reliable as the chronometers themselves.

In a certain vault the Emergency Fleet corporation had some of the most beautiful chronometers found in any part of the world. They were contained in cases of rosewood, mahogany, and other rare woods, with brass bound corners, and engraved name plates in brass or pearl. Now and then as occasion required, a woman went to this vault and carried away one or two, and some times three chronometers. She took them personally to some port on the coast of Maine or Georgia, or somewhere on the gulf. The instruments never left her custody until placed aboard ship. The chronometer was about the last thing delivered when the ship was finished. The woman was Mrs. H. B. Childers and she was as proud

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of her work and as precise about it as is a good chronometer in the matter of timekeeping.

Every chronometer had to be carefully overhauled and tested to insure accuracy. The search for instruments was a difficult task, but even more difficult was the attempt to find someone who had a thorough knowledge of chronometer mechanism and who was capable of examining and testing instruments. Finally, however, a Rhode Island watchmaker, whose hobby was chronometers, was obtained by the corporation. He came from a shipbuilding family and his nautical interests, combined with his business experience, made him capable of undertaking this vitally important task for the corporation. He became chronometer production examiner of the outfitting department, and received all instruments, made needed repairs and tests, and prepared them for installation on the ships.

Some American concerns now are making chronometers, but the Emergency Fleet corporation, to meet the shortage existing while we were at war, in a way characteristic of American enterprise, substituted good watches for two of the chronometers usually carried by steamships. These watches were used to compare with the one chronometer aboard and were found to be highly satisfactory. The watches were considerably larger than a pocket watch and were thoroughly tested by the United States bureau of standards for accuracy before being installed on ships. They cost much less than clocks and proved to be an economical substitution.

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War conditions brought about a great change in the country's distributing system. In peace time a shipbuilding plant, for example, could order supplies direct from the manufacturer who looked after details of shipment. But when the government undertook the shipbuilding program and raw materials and machinery and miscellaneous equipment for vessels were needed in large quantities and required such wide distribution, peace time practices were not adequate to meet the demands.

Materials and equipment formerly handled in less than carload lots were now bunched into carloads and trainloads. This involved the establishment of storage places where shipments were collected and from which they were distributed.

The supply division created the distribution and warehouse department to handle this particular phase of its work. The department established what it termed "concentration warehouses" at various large production centers. The warehouses were provided by the quartermaster department of the United States army which allotted space to the Emergency Fleet corporation, the corporation providing a representative of the supply division to look after storage and distribution. Each warehouse became an accumulation point for carload shipments from which the needs of shipyards were supplied as the occasion arose. Shipments went to the warehouses in carload lots where they were "broken down" into less than carload lot units for reshipment to the yards. The supply division also maintained distribution warehouses

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where all surplus materials were stored to meet the future demands of shipbuilding plants.

The concentration warehouses were located at Chicago, Metuchen, N. J., Baltimore, New Orleans, Los Angeles, and Erie, Pa. There was also a smaller service warehouse in each shipyard district from which the needs of individual yards for miscellaneous material and equipment were met.

Throughout the shipbuilding enterprise during the war, the demand for speed overshadowed the need for economy, but the Emergency Fleet corporation never lost sight of the fact that in building a fleet of merchant vessels with which to win the war it was also building for future American trade. It had, therefore, to carry on its construction program with an eye to every economy consistent with speed. High speed in ship construction, it found, was not necessarily inconsistent with low costs. On the contrary, by standardizing parts, the corporation could increase the speed with which those parts were produced and installed and at the same time reduce the cost.

Before the war the government was not building merchant ships and private enterprise in this industry was limited. But when the stress of war compelled the government to engage in the hurried construction of a large fleet of ships it developed that lack of standardization was a great obstacle to rapid progress and a serious factor in the multiplication of costs.

One of the tasks of the supply division was to correct this situation, so far as it lay within its power. Remarkable progress had been made in this direction when the armistice was concluded.

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It was found that in the past shipbuilders were able to order anchors, for example, and be reasonably certain of delivery on time. These anchors came in some 50 different sizes and weights, due to the fact that manufacturers had been accustomed to change or make new anchor molds to meet new requirements of individuals. This practice, of course, involved extra time and expense. The Emergency Fleet corporation succeeded in reducing the number of sizes to about three-fourths which brought a reduction in production cost to the manufacturers and a correspondingly lower price to the government.

One of the striking examples of standardization was in lifeboat manufacture. Lifeboats were available when the program was started in all sizes, shapes and degrees of durability. When the situation had reached the stage where lifeboats were needed in large numbers, steps were taken toward standardization and the supply division furnished the manufacturers with exact knowledge as to requirements in the way of materials and size. This brought about a minimum waste of materials by cutting according to standardized patterns. It also enabled the corporation to let contracts on a geographical as well as a cost basis and eliminated long distance hauls. It was, of course, much cheaper to buy lifeboats made by eastern manufacturers for installation on ships built in Atlantic coast yards than to follow the former practice under which, for example, lifeboats built in Vancouver, Wash., were actually known to have been shipped to Chester, Pa., for installation. The result

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under standardization was more and better lifeboats with a minimum of production and transportation costs.

In the beginning blocks for ships came in 200 different sizes. This number was reduced to 60 and it is estimated that the plant facilities were increased thereby at least 35 per cent. Manufacturers were enabled to concentrate on production where formerly an important part of the business included the making of new designs with attendant increase in cost. The same progress in standardization of lumber size and quality resulted in a distinct saving in the cost of building wooden ships, and in the case of expensive machinery, such as boilers and engines, standardization eliminated many intermediate sizes.

Had the war lasted longer this standardization idea would have been extended to include all nautical instruments, winches, windlasses, and the thousand and one other things that go into a fully equipped ship, so that everything used in the equipment of one vessel would have been just as serviceable to any other vessel of similar size and design built in an American yard.

If the emergency should ever arise again and this country be forced to enter upon a great shipbuilding program, the lessons taught by the war with Germany will emphasize particularly the value of standardization. Conditions made it impossible to apply this theory at the outset, but only the early conclusion of the war prevented carrying the idea into full practice.

To tell in detail all the activities of the supply division would require many volumes. Everything produced in a ship-

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yard was dependent upon the proper working of this important department of the corporation and its activities were identified with every step of the progress made in the shipbuilding program. The success of the division cannot be questioned. The personnel was imbued with the idea that "anything can be done" and it rose to every occasion with a determination to overcome all obstacles. It was due to this spirit almost as much as to the perfect organization that the division was enabled to keep the shipyards supplied with material and equipment under the extraordinary conditions prevailing while this country was at war.

CHAPTER IX

Housing and Transportation

THE movement of war labor to cities and towns where shipyards were situated brought forward a new and perplexing problem for the government to solve. In most of the so-called shipbuilding cities there was already a scarcity of houses, due to the plant expansions made to meet the increased demand for shipping resulting from the war. Foreign nations had placed large orders for ships with American builders and the yards in existence before America entered the war were working to capacity. The shipyard personnel had been bolstered to meet the increased demands and few towns which boasted of a shipyard had empty houses for newcomers when the Fleet corporation started upon its program.

This problem was emphasized particularly in cities where new plants were established. In such towns as Bristol, Pa., and Gloucester, N. J., practically no houses were available for newcomers. At Bristol, the Merchant Shipbuilding Corp. yard was built and the city suddenly found itself confronted with the necessity of housing some 12,000 workmen. At Gloucester and in Camden, both centers of war industry, houses were at a premium. When the shipbuilding plants in these cities were expanded and they entered upon a maximum production program, the housing situation became most critical. Conditions

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similar to those at Bristol, Camden, and Gloucester, existed early in 1918 in scores of towns and cities along the entire stretch of coast. The Emergency Fleet corporation program of construction was threatened with failure because of the inability to find homes for workmen. Hundreds of thousands of men had volunteered to work in the shipyards but were unable to move to shipbuilding communities with their families because they could not find homes.

In many towns the "rent gouger" became active. Rents went soaring and even a man earning the high wages paid in the shipyard was unwilling to meet the cost of house rent. The rent gouger was a type of war profiteer that proved particularly obnoxious and gave rise to one of the most difficult problems growing out of the country's internal condition between April, 1917, and November, 1918. Probably no war industry suffered at the outset as much as the Emergency Fleet corporation.

In March, 1918, congress having recognized the immediate need for proper housing facilities in shipyard cities, that body approved an act authorizing the expenditure by the Emergency Fleet corporation of \$50,000,000 for housing projects. The corporation was empowered "to purchase, lease, requisition or otherwise acquire, and to sell or otherwise dispose of improved or unimproved land, houses and buildings." On July 1, 1918, there was included in the sundry civil appropriation bill, an act specifically appropriating \$75,000,000 to carry out the provisions of the former act.

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In the meantime, however, the corporation had entered upon a most extensive housing program under a scheme by which the cost was divided between the corporation and the shipbuilding company benefiting from each project. The shipbuilding company was required to buy the land necessary for a housing project and to place the title to such land in a realty company to be incorporated and owned by or in the interests of the shipbuilding company. The government, on the other hand, stood ready to lend to the realty company government funds to the amount of the cost of each development exclusive of the land.

These loans were secured by bonds and first mortgages given to the realty company covering the land and improvements to be built with principal repayable on or before 10 years. The loan bore interest at the rate of 5 per cent per annum. The entire capital stock of the realty company was assigned to the Emergency Fleet corporation as collateral with the guarantee of the shipbuilding company as to all obligations of the realty company other than as obligor to its bonds.

This plan was followed except in cases where housing projects were built on land acquired and owned by the Emergency Fleet corporation. More advantageous terms were obtained in such cases by modifying the plan. In certain other instances, too, modifications were made without affecting the substance of the project. The housing projects which were built upon land owned by the corporation included those at St. Helena near Baltimore, for the service of the Bethlehem Shipbuilding Corp. yard at Sparrows Point, Md.; at Phila-



TYPICAL CREWS' QUARTERS ON FOREIGN-OWNED VESSEL



LIGHT, WELL VENTILATED CREWS' QUARTERS ON AMERICAN WAR-BUILT FREIGHTER

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delphia for the service of the Hog Island yard; at Bristol for the service of the Merchant Shipbuilding Corp.'s yard, and at Essington, Pa., where the corporation built dormitories for employes of the Westinghouse Electric & Mfg. Co.'s plants. The Westinghouse company built turbines and reduction gears for the corporation.

Long before these housing projects actually were under way and even before money had been appropriated for the building operation, the corporation had in December, 1917, established a housing department under the division of general service with J. Roger Flannery as head. Under Mr. Flannery's direction, designs were drawn and contracts let for housing projects at Hilton Village (near Newport News, Va.); Tinicum Island Road, near Hog Island; Camden, N. J.; York Ship Village, near Camden; and St. Helena, near Sparrows Point, Md.

On May 7, 1918, A. Merritt Taylor, a financier and traction operator of Philadelphia, was appointed executive head of a new division of passenger transportation and housing. With the creation of this division two activities of the corporation were consolidated. They were passenger transportation, which involved transporting workmen to the shipyards, and the housing enterprises already enumerated. Mr. Taylor immediately entered upon an exhaustive analysis to disclose the conditions at yards where production was being seriously retarded due to the inability of such yards to obtain necessary labor.

A separate appropriation of \$20,000,000 had been made by congress to finance the building of extensions to existing

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transportation facilities to the shipyards or the placing of steamboats or special trains in service to carry workmen to and from the yards. This was undertaken in communities where all existing housing facilities were unavailable to the shipyards by reason of the lack of proper and necessary railway or traction service.

It was found necessary for the division to purchase 320 new street cars and to buy up 35 used cars for the service of 17 different shipyards. In 11 other yards, street railway extensions were built or the corporation financed the building. In the case of 16 yards, it was found that in order to make transportation facilities adequate changes in the tracks and building of loops were necessary and the corporation financed this work. The added strain put upon existing traction lines made it necessary for power plant facilities to be enlarged in the case of 17 shipbuilding plants. The corporation purchased 30 steamboats to carry workmen from their jobs in 20 shipyards, and for 26 yards, 60 special steam railroad trains were placed in service.

Besides this work of financing and building, the division had to undertake the revision of street railway schedules to suit the convenience of workmen in 40 of the yards, and steam railway schedules for 12 yards. It was found that systems in vogue at some plants resulted in overtaxing transportation facilities at certain hours of the day. To avoid this, the division suggested changes in working hours by which they were "staggered" at 10 shipyards.

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The work of the division is summarized by the statement that as a result of the additional passenger transportation facilities established, 125,000 more shipyard employes were being transported daily in January, 1919, than would have been possible before the improvements were made.

After all existing housing facilities which could be made available by improvements in transportation systems were exhausted, the division began another survey to determine the number of additional men required for the production of ships at each yard, and number and character of ships under contract, and the extent of delay in ship production which was due to inadequate housing facilities. These facts served as a guide to the extent and character of the housing project required for the service of each shipyard. The needs were gone over carefully by executive officers of the Fleet corporation and they formulated a policy with regard to each building project.

The same arrangement was followed in these separate building enterprises as was adopted to guide the corporation in its earlier housing projects. Negotiations were opened with the shipbuilding company affected and the company was required to purchase land for the houses at its own cost. This was taken to constitute a substantial certificate on the part of the shipbuilding company as to the necessity of building the houses requested.

As soon as the shipbuilding company agreed to purchase the land and the site had been selected, the board of trustees of the Emergency Fleet corporation was requested to make an

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appropriation for the establishment of each building project and corporate action was taken in each case. This procedure resulted in 24 separate housing projects being undertaken. An idea of the extent of the building program involved in these enterprises is given in the following summary of work under way or completed in December, 1918: 8949 substantial individual houses, 1119 apartment buildings, 19 dormitories and eight substantial hotels.

These buildings had a capacity to shelter 27,732 actual workers in the yards or 55,324 individuals, that is, the workers and their families. The allotments for the entire group of projects aggregated \$65,883,845. When the armistice was concluded substantially all of these buildings were either completed or in advanced stages of construction.

Commitments from the total of \$75,000,000 authorized by congress were made to certain public utility companies to enable them to construct the required public facilities for the service of each newly built "shipyard town" and to pay for necessary street improvements and public utilities for which certain municipalities agreed to reimburse the Fleet corporation with interest at 5 per cent. Loans aggregating \$850,000 were made to public utilities companies and reimbursements to the amount of \$2,000,000 are to be made by cities to which loans were advanced. Thus the Fleet corporation by lending funds placed the ultimate cost of public utilities and improvements upon the companies which built the projects and the municipalities which benefited from them.

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It was not only the building of new houses and the handling of transportation problems that the division directed, but also the various kindred problems growing out of the shipbuilding program. For example, in many shipyards where the government's program brought a great influx of labor, house owners advanced rents. This resulted often in labor displacement. Men refused to pay the excessive rentals charged by their landlords and there was a tendency on the part of the workers to keep moving from one shipyard town to another in the hope of finding cheaper places to live. More than 3000 such cases were brought to the passenger, transportation and housing division and dealt with, a majority of them on the Atlantic and Gulf coasts. In most cases these complaints were settled by negotiation, but in some instances the division had to request the temporary use of dwelling houses.

Mr. Taylor resigned as manager of the division in January, 1919, and he was succeeded by J. Willison Smith, who had been assistant manager of housing.

CHAPTER X

Problems of Handling Shipyard Labor

THE war shipbuilding program created a new American industry overnight. Shipbuilding in this country hardly had merited the name of an American industry, but with the outbreak of the war literally hundreds of thousands of men in a score of skilled crafts were drawn from other lines of work and were sent to shipyards, or employed in industrial plants on manufacture of ship parts or materials.

They suddenly found themselves in a new trade where the rules were not well defined. Their activities were directed by several different departments of the Emergency Fleet corporation. They were enrolled for shipyard labor by one; subject to the policies and direction of a second, which also tried to work in co-operation with a government agency entirely separate from the corporation; advised and urged on by a third department of the corporation; and instructed by still another. If a shipyard workman happened to be engaged in plant construction he was under the supervision of the shipyard plants division. If he were building wood ships, he was under the direction of the wood ship division. Thus each of these

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departments worked in ignorance of, or at least independently of, the activities of all the others.

In the early days, units of the corporation having to do with the labor problem apparently were created without due regard for the vital connection between them. They began their work in five different divisions including the division of construction, shipyard plants, shipyard volunteers, finance and labor. These disjointed agencies, passing on such questions as labor supply, adjustment and administration, could not formulate nor enforce uniform policies. The labor problems at the outset of the shipbuilding program, therefore, were troublesome indeed and it was not until all these various activities were brought together under a single administrative head that the work of directing shipyard labor was systematized and made effective.

To understand the shipyard labor problem during the war, it must be remembered that all workmen were subject to the ruling of a federal board having jurisdiction over wages, hours and working conditions. The government took the labor problem out of the hands of the yards and undertook to direct it itself. There was confusion, however, from the start relative to the jurisdiction of the shipbuilding labor adjustment board, which was selected to pass upon and settle labor disputes, and the division of labor which was created to act as a mediating body in labor matters. There immediately arose a need for a clear conception and definition of the jurisdiction of these two agencies. Until their respective jurisdictions were defined it was impossible to develop and enforce a consistent labor policy.

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The industrial service department tried to operate in the early days without any functional relation with the health and sanitation department or with the safety engineering branch, with both of which it was closely related in its activities.

It was not until many difficult problems had arisen in regard to labor, it appears, that the corporation suddenly awoke to the realization that it was necessary to co-ordinate all the conflicting activities of the departments dealing with labor under a single head. When 250,000 men enrolled for shipyard labor and plans for their transportation, placement and employment in the yards, never materialized, there was good cause for dissatisfaction and disappointment. And, when the Emergency Fleet corporation tried to enroll the nation's available labor to build ships, without regard for the needs of other war industries, there was more trouble. Obviously there was needed a central agency of control for all branches of labor administration and a concise and workable arrangement by which the Emergency Fleet corporation could handle its labor problem with due respect to the needs of other war industries.

The first step toward centralization of labor control was taken in February, 1918, when the division of general service was created. This was headed by J. Rogers Flannery and included the five general service units which had been separated—the departments of welfare and sanitation, shipyard volunteers, industrial service, national service, and housing and transit facilities.

This was a step in the right direction but it fell short of the purpose intended to be accomplished because the con-

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solidation was limited in scope. There still remained as separate and independent departments, or as parts of other divisions, the division of labor, the industrial training department, and the safety engineering branch. It remained for further experience with the griefs of independent departments, working often at cross purposes, to demonstrate the necessity for thorough reorganization and consolidation.

It developed that each of six departments handling phases of labor administration had its own field representatives in various districts of the country. These representatives were responsible only to their separate departmental headquarters, to which they reported directly for action on all questions of policy and administration. They paid no attention to representatives of other departments and in many cases their activities overlapped. The consequences were irritating delay, waste of energy and inefficiency.

The situation had become so troublesome by the spring of 1918 that in May there was formulated a plan for bringing together all the labor administration agencies. The industrial relations division was created and it absorbed the five units under the division of general service, together with the safety engineering, the education and training, and labor departments. At the same time two definite policies were formulated. The home organization was to be the policy fixing agency. The field organization was to enforce decisions and policies on matters of general application and to act directly on all questions that could be settled on the ground.



S. S. AGAWAM, FIRST FABRICATED SHIP LAUNCHED

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Only the department of housing and transit facilities remained as a separate unit of the corporation, and it became later the passenger transportation and housing division. The activities of this division are described elsewhere.

The labor supply section of the new industrial relations division showed, after a short time, the wisdom of the consolidation. There was no longer need for actually recruiting labor because the United States employment service had effective machinery in operation and offered to the Emergency Fleet corporation many advantages through co-operation.

The problem was to get away from the "hit or miss" policy and to make the available supply of shipyard labor more effective by guiding it according to schedules or labor requirements. This the labor supply section undertook to do. It also was charged with finding new sources of labor that might be available and assisting in the dilution of shipyard labor by introducing women into the plants. So far as female labor was feasible and desirable, women took the places of men in industrial plants.

In the midst of the work of building up the personnel of the yards, operation of the military selective service law resulted in the corporation finding its efforts involved by the draft. This brought into being the draft classification and transfer branch of the labor supply section, to administer what was known as the Emergency Fleet list. This list bore the names of men who were exempt from military service, or because of their skill in shipyard crafts, even released from the army. The branch also supplied information to the military

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authorities as to industrial classification of men subject to the draft, and later, during the demobilization, assisted in placing discharged and disabled soldiers and sailors in the shipyards.

Under the old division of labor which was headed by W. H. Blackman, afterward appointed to a position in the department of labor, it was the intention to handle problems of wages, hours and working conditions in the shipyards directly. But when the shipbuilding labor adjustment board, known as the Macy board, was created by agreement in August, 1917, there arose considerable confusion as to the functions and jurisdiction of the division of labor and the newly established board.

The shipbuilding labor adjustment board was agreed upon by international officers of unions employed in shipbuilding trades, the Emergency Fleet corporation and the navy department. It consisted of three members, one named jointly by the Emergency Fleet corporation and the navy department, another selected by Samuel Gompers, president of the American Federation of Labor, and a third appointed by the President of the United States, to represent the public.

It was agreed that this board should decide all questions and disputes involving wages, hours and working conditions in the shipyards and that its awards should be effective for a period of six months. It was agreed that all decisions should be made with full consideration of the rising cost of living. During the life of an award, the shipyard workers were not to strike for an increase in wages or a change in working conditions or hours and the decisions of the board were to be equally binding upon all parties to the agreement.

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The first award was found unsatisfactory, particularly to workmen on the Pacific coast who appealed to the executive officers of the Emergency Fleet corporation for a revision. A temporary increase of 10 per cent was granted by the officials of the corporation subject to ratification by the shipbuilding labor adjustment board and at the same time steps were taken to amend the agreement creating the board so as to provide for a board of appeal and revision to which either side affected by an award could appeal in the event of dissatisfaction. Decisions by the appeal board were binding upon all parties.

During the progress of the war, the shipbuilding labor adjustment board made three wage awards, finding it necessary because of local conditions in the various shipbuilding districts to fix a different scale of wages as between the Pacific coast and other sections of the country. Each award was made after a careful and searching inquiry into living costs and conditions. The awards were found to be generally satisfactory to the shipworkers, although the workmen on the Pacific coast, following an award of August, 1918, appealed for a revision and an increase in the wage scale to the appeal board. The board was unable to agree. The men remained at their posts until after the signing of the armistice in November. There were no serious labor disputes in the yards between the time the shipbuilding labor adjustment board was created and the time that fighting ceased.

The operations of the shipbuilding labor adjustment board relieved the industrial relations division, which had come into being in the meantime, of the duty of fixing wages, hours and

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working conditions in the yards. The relations between the division and the adjustment board were on a definite, easily understood, and efficient working basis. The industrial relations division undertook only the administration of the board's rulings and worked in close co-operation with the board throughout. The field organization of the division was made to serve the shipyards as field representatives of the shipbuilding labor adjustment board and this enabled the corporation to avoid the confusion that formerly marked its dealings with the labor in the yards.

Power to fix wages and conditions in auxiliary plants producing supplies and equipment for ships remained with the Emergency Fleet corporation. All contracts drawn by the corporation contained a clause reserving that power and the auxiliary plants were not included within the jurisdiction of the shipbuilding labor adjustment board. It was found necessary to constitute a new labor adjustment branch to handle disputes in such plants. This branch was formed partly out of the old division of labor.

A representative of the branch, called a senior examiner, was placed in most of the supply districts to assist in carrying on the conciliatory activities to which the work of the branch was confined. The Fleet corporation did not attempt to exercise the power which it had to fix wages and conditions of employment in these plants, but in certain industrial concerns it did allow reimbursements for wage increases deemed necessary to hold the workmen at their posts. This was done in very few cases and always through the supply division. The

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action was taken to enable the plants to complete their supply contracts with the corporation.

One of the big results of the industrial relations division's work was the formation of a definite labor policy which led to the organization of a workable scheme for centralizing the administration of labor matters. Co-operation of the various sections of the corporation permitted the use of similar methods and interpretation of policy and avoided duplication of effort such as marked the administration of labor under the former scheme of things. There was also a budgetary control of the labor administration policy under the new organization and this resulted in certain economies.

It was found that the administration of labor problems would be handicapped in its operations without a properly directed field organization for enforcing policies and decisions. The industrial relations division, therefore, built up a district organization very similar to that of the construction division. In each shipbuilding district, a district representative of the division was appointed to have charge of the activities of the division and to serve as examiner or adviser for the shipbuilding labor adjustment board. Under each of these district representatives as assistants were field agents representing the various sections of the division who worked in co-operation and were guided by the policies and decisions laid down by the division.

There was also in each of the large shipbuilding plants a yard representative whose duties were similar to those of the field agents. He was under the direction of the district

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representative and acted in the capacity of a man on the ground to help the workmen and management in every possible way.

Results of the district organization soon made themselves apparent. The division was able to make known its general policies and decisions to the men much more expeditiously and hence these findings could be better enforced. Local questions which were often permitted to go unsettled or to develop into serious controversies were brought to a speedy and satisfactory settlement under the new arrangement.

It was also possible for the local field representatives to correlate their work with that of the home office in such a way as to establish a national policy with reference to varying shipyard conditions. Shipyard workers and managements were brought into closer contact and to a better understanding of the constructive results possible through a centralized administration of labor.

It was not alone with shipyard wages and hours that the industrial relations division was concerned. The quick growth of the shipbuilding industry as a national enterprise, being under the direction and supervision of the government, placed upon the Fleet corporation, morally at least, a vast responsibility involving not only the health and welfare of the workmen but even their recreation. This responsibility was assumed to a large extent, especially in those communities where new yards were established and where the congestion in population was beyond the ordinary facilities of the town for proper sanitation and housing. It was just as much to the interest of the corporation that the workmen should live in comparative comfort

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and be satisfied with their surroundings as it was that they be provided with housing facilities and transportation. A vast majority of the men went to shipyard communities from large cities where their children had schooling facilities and where the adults could enjoy the usual recreations of the city.

In the new shipyard towns, along with dwellings, there appeared churches, schools and motion picture theaters. These were natural accompaniments to the development of a new town and they received the encouragement and support of the Emergency Fleet corporation through the industrial relations division. The division, however, did not finance the establishment of such enterprises as motion picture theaters.

It did undertake, however, a comprehensive program to insure the health of workers in the shipyards through industrial hygiene and sanitation improvements in the shipyard towns, and the safety of the men through education in safety engineering.

The natural result of the sudden rush of workmen to shipyard communities was overcrowding which, in turn, led to insanitary surroundings. The effectiveness of the work in the yard was endangered by conditions which threatened the physical vigor of the men and a situation existed which might at any time have led to serious epidemics that would have been disastrous to the general population as well as to the shipbuilders themselves.

It was a formidable task, therefore, which was faced by the department of health and sanitation, organized soon after the ship construction program got underway. Chairman Hurley



LIEUT.-COL. PHILIP S. DOANE
Head of the health and sanitation activities in shipyards during the war

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of the shipping board, realizing the need of a special department to protect the health of the shipworkers, requested the secretary of war to supply a qualified medical officer for that purpose. The request was referred to General Gorgas of the United States army medical corps, who detailed Maj. (later Lieut. Col.) Philip Schuyler Doane, formerly a Chicago physician, for duty with the shipping board. Colonel Doane later was assigned to service with the Emergency Fleet corporation as the director of the department of health and sanitation.

The department's jurisdiction extended over all matters relating to sanitary conditions in the yards and in the living and eating places of the shipworkers; the establishment and maintenance of dispensaries and hospitals and medical and sanitary supervision of territory surrounding the shipyards. At first certain phases of the care of seamen in the merchant marine were undertaken, but in view of the jurisdiction of the United States public health service in this field these activities were dropped. Thereafter the efforts of the department were confined to such measures as directly affected the Fleet corporation in its construction program.

A survey of the shipyards revealed that there was a great need for sanitary work on a comprehensive scale. The problem was entirely new and this fact called for a great deal of organizing skill. The survey brought to light some interesting conditions. In a few yards there were first aid medical cabinets covered with dust. In others there was not even this pretense at health conservation. A large number of the yards had no medical attendants whatever and they were so

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absorbed in a feverish attempt to rush their ships to completion that they either disregarded sanitary and medical matters or relegated them to a subordinate place.

The first task of the department of health and sanitation was to enlist the co-operation of shipyard officials by convincing them of the necessity for the work. There was a feeling that shipbuilding, being an outdoor pursuit in which the nature of the work kept the men tough and healthy, could take care of its own sanitation problems. In the few yards that had dispensaries, the efficiency was found to be low and the physicians and nurses were often incompetent or inadequate.

The building of new yards and the reconstruction and expansion of old plants meant that in practically every place where shipbuilding was attempted close supervision was necessary to guard against contamination of the water supply and to look after proper drainage, sewage disposal and general sanitary environment. The problem was complicated by the fact that men of all types and nationalities, unused to the conditions of work and climate in which they suddenly were placed as shipbuilders, were subject to the spread of contagion. To inculcate habits of cleanliness and to protect such men from the strain that comes from exposure and unaccustomed conditions of work, taxed the energies of the department.

Just as in nearly every other phase of the corporation's activity, there was need in the health and sanitation work for rapid organization of an administrative force, a pledging of financial support and vigorous prosecution of many local campaigns of sanitation. All this involved the problem of business

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administration no less than that of sanitary engineering and medical and surgical supervision. Colonel Doane set about first to obtain the services of sanitary engineers of energy and competence and medical men familiar with the problems involved.

The army had urgent need of retaining all the medical personnel who had joined the colors and the surgeon general, therefore, requested that the shipyard doctors and sanitary experts be recruited from civil life. Most of the doctors in the country were being drawn into the military or naval service and this made it extremely difficult to build up an efficient organization for shipyard duty. The problem became so acute in the fall of 1918 when an epidemic of influenza swept the country that the department was forced to request the suspension of the granting of military commissions to medical men on the Pacific coast for two weeks so that doctors could be obtained to care for influenza patients. This request was generously complied with.

In spite of the difficulties of obtaining experienced and competent men, the department was highly successful and obtained the services of some of the best sanitary engineers and doctors in the country. Two engineers and one medical man were placed in the home office to assist the director, and a field force of sanitarians, physicians and nurses was stationed throughout the country, all of them reporting to the home office for instruction.

An investigation into the sanitary and health conditions in all the yards was completed by May, 1918, and provided

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the basis for a book of standards embodying the principles of the department of health and sanitation to be drawn up for the guidance of the yards. This book gave complete specifications for the medical care of workers, the treatment of wounds, the suppression of contagious diseases, the construction and outfitting of first-aid stations, hospitals and dispensaries, the extermination of mosquitoes and flies, the examination of food and water for impurities, and the maintenance of healthful housing conditions.

The department lacked direct authority to enforce its rules except at Hog Island, Bristol and Newark where in the so-called agency yards the government had the status of direct controller. Some of the yards were only partly engaged on work for the Emergency Fleet corporation and were dealing largely with naval contracts. This led to a difficulty involving legal control. At one time it was proposed to insert in contracts between the corporation and the yards a clause which would have compelled observance of sanitary standards, but this contractual authority never was fully developed.

The department thus had to rely largely upon the force of moral suasion to bring about its purposes. When conditions called for improvement, the department prepared recommendations to be presented through the district manager to the yard officials, and with very few exceptions the recommendations were acted upon promptly.

In a great majority of the yards resident physicians were stationed and gave their full time to the work of caring for the health of the shipyard workers. In some places outside

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physicians were engaged to make regular visits. Employees were required to report even minor ailments. This resulted in many working hours being saved to the management.

The health and sanitation section also carried into effect a plan for the conservation of the health of corporation employes at the home office. A free dispensary was maintained by the corporation and medical service and rest rooms provided under the jurisdiction of the section. The employes were in many cases "war workers" with no permanent residence in Philadelphia and in the event of illness were without personal connections and did not know where to go for assistance. The health and sanitation officials saw to it that patients were given early treatment in their homes or lodging places, and in the event of serious illness that they were sent to hospitals. Special attention was given to the large number of women workers employed by the corporation. In co-operation with the army authorities, the health and sanitation experts carried out a campaign of education against venereal diseases in the yards. One of the most effective of the educational methods was the presentation of a moving picture play prepared under the direction of the medical department of the army. Isolation wards were established in city hospitals to care for women who were spreading disease and the shipyard workers were treated in isolated clinics. In addition, the corporation encouraged clean-up campaigns in various cities where vice conditions were particularly bad. This was carried out through the aid of local publicity campaigns. The activities of the department in this direction had their effect in many seaport towns, the stringent

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methods employed during the war being followed by local authorities after the return of peace. Especially good results were noted at Bath, Me., where the Emergency Fleet corporation installed an officer whom the city of Bath empowered with full authority to act in a clean-up campaign. His vigorous methods are declared to have brought about lasting reforms in the city.

The most serious situation that the health and sanitation department confronted was during the month of September, 1918, when the alarming epidemic of Spanish influenza swept throughout the country. The regions most affected in the shipbuilding industry were Quincy, Mass., and the Delaware river district. The Emergency Fleet corporation made arrangements in handling the Delaware river situation to use a large quarantine station for immigrants at Marcus Hook. This station contained accommodations for 3000 patients and influenza cases from Chester and Bristol, and the overflow from Hog Island were taken to Marcus Hook for treatment. These accommodations did not prove to be sufficient for the emergency, but they were of material assistance.

Chester, Pa., which had grown from 38,000 in 1917 to about 125,000 in 1918, was the most severely stricken city in the country. The department of health and sanitation had no real authority in Chester, but the director went before the town council and outlined a definite program of preventive measures. He demanded that the schools, theaters and other places of congregation should be closed at once. The council took immediate action and Chester was closed three days

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sooner than any other city in the state of Pennsylvania. Hospitals were established in the city armory and one of the large fraternal halls. Ambulances were put into service and a number of devoted young women worked day and night to relieve the city's fearful condition.

The epidemic swept through Philadelphia and caused the illness of many hundreds of employes in the home office of the corporation. This threw immense difficulties upon the department's staff, every member being already occupied with the situation in the shipyards. However, arrangements were made for opening a special hospital which was fitted out with trained nurses, a house staff, and physicians. As a result of the vigorous action of the department, the death rate was comparatively low, not only in the corporation, but throughout the shipbuilding districts.

The health and sanitation department had many other activities bearing upon the physical well being of men employed in the yards. Scientific measures were adopted to insure an adequate supply of pure water to the yards. In at least two yards serious epidemics of dysentery had developed due to the men drinking polluted water taken from a river or coming into contact with unpurified river water.

The war against the disease carrying mosquito involved drastic measures in the field of safety engineering, the most comprehensive undertaking being that at Hog Island where a low swampy mosquito infested district which had been practically uninhabited was selected as the site of the largest shipyard in the country. The eradication of mosquitoes from

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this region was as important to the shipbuilding program as the extraordinary sanitary measures on the isthmus of Panama were to the construction of the Panama canal. The elimination of the disease-carrying fly was another problem tackled by the department of health and sanitation. Especially good results were shown at Hog Island, where foreigners, living in a community of miserable shanties raised hogs on garbage which was carted from the city. To get quick action the Emergency Fleet corporation had to call upon the Pennsylvania state police to put these piggeries out of business.

Near the Submarine Boat Corp. yard, there was a great refuse heap which was infested with millions of rats. This was a serious nuisance to the shipbuilding plant and also to a large ordnance supply depot close by. The services of an expert in rat extermination were obtained from the department of agriculture, the rats were poisoned, the pile burned and dug over, and this nuisance eliminated.

While these various agencies were at work to safeguard the health of shipbuilders, another unit of the corporation, the safety engineering section, also under the industrial relations division, sought to protect the men in the yards from accidents. Nothing was spared to preserve the industry's manpower and the importance, therefore, of providing for the safety of thousands of workers engaged in ship construction was realized by the corporation's officials. They established a policy which provided for every attention being given to the safety of the workers in the yards. This policy was put into practical operation by the establishment of the safety engineering section, with

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the appointment of a chief safety engineer in January, 1918. He was given instructions to organize the safety engineering work and built up an effective accident prevention system.

In January, 1918, a field force consisting of a safety engineer in each of the 11 shipbuilding districts, was appointed, every such representative being a man of broad knowledge and long experience in safety and compensation practices.

The purposes of the section were to conserve the industry's manpower by establishing better and safer working conditions. It was a theory, obviously sound, that the industry would profit by holding sound and healthy men at their work. The section was prepared to co-operate with and render every assistance to shipbuilding plants and industrial concerns working under the jurisdiction of the corporation in the establishment of efficient safety organizations. Each one of these plant organizations was capable of conducting an active and effective accident prevention campaign.

Closely related to the work of the safety engineering section was an activity aimed at assisting to establish amicable relations between employer and employe. Throughout this work the safety engineers were careful never to impede operations but rather to contribute to the efficiency of the industry through the improvement of practices and general physical conditions. Employes were educated to be careful and to think ahead, each man to contribute to his own welfare and that of his fellow workmen. In this work, the Fleet corporation was closely allied to similar organizations in the federal or state

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governments, insurance companies, and national organizations or individuals interested in accident prevention.

Working through the district offices and district safety engineers, the home office conducted systematic campaigns. These were assisted by the use of accident prevention propaganda in shipyard papers and in publications issued by the corporation.

Under the direction of the district engineers surveys were made of shipyard plants to bring about improvements and to eliminate accident hazards. Expert engineers were authorized to conduct investigations of the industrial practices at the different plants and among the various occupations employed in shipbuilding.

Under the influence of such activities there were founded in all the shipyards central safety committees which were chosen from department heads and superintendents in cooperation with the departmental safety committees representing the various occupations. As the industry grew and the safety engineering work became well established, meetings were held at frequent intervals in the shipyards at which suggestions and recommendations were made for new safety devices. Many practical and needed reforms were brought about as a result of the suggestions made by employes and the value of the safety movement became so obvious that a large number of plants voluntarily employed safety engineers and undertook to educate their employes in principles covering accident prevention work.

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The means used to reach the workmen were varied. In most cases, companies or the safety engineers issued literature bearing on the subject and distributed it in the form of leaflets and pamphlets to the men. Bulletin boards were available in most of the yards and safety-first posters helped along in the work. Probably the greatest influence was brought to bear through the use of plant publications, nearly all of the large shipbuilding companies having weekly or monthly journals devoted to their interests and the cause of the workers.

Before the war, very few shipbuilders were paying much attention to the subject of accident prevention. After the Fleet corporation's campaign of education, there were few, if any, yards which did not have safety engineering departments, safety contests, or some similar accident prevention organization. The work of the safety engineering section of the corporation promises to be of permanent benefit to the shipbuilding industry.

One of the most common injuries in shipbuilding work is due to flying particles of steel hitting the eyes of workmen. In riveting, reaming, chipping, caulking, and drilling, the eyes are in constant danger unless protected by goggles made especially for such work. Every shipyard surgeon has found that most accidents involve injuries to the eyes. At Hog Island one doctor and a trained nurse were employed constantly at removing foreign substances from the eyes of workers. Even after the safety campaign had been carried on for months the average number of "eye cases" at the Hog Island hospital was about 150 daily. Thousands of men were

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saved from perhaps permanent injury to their eyes by using goggles.

Careless throwing of rivets was another frequent cause of injury. By paying particular attention to this phase of the work on the shipways the safety engineers were enabled to reduce materially the number of minor accidents. In the old days, workmen were inclined to pay scant attention to carelessly placed material despite their knowledge that if a large plate were to fall from the top of a hull it might cut away the scaffolding along the shipway and cause the injury or death of many workmen. When the safety engineers had carried their gospel of accident prevention to the yards such carelessness disappeared almost entirely.

Technical experts on the staff of the safety engineering section prepared, for the benefit of shipbuilding plants, safety specifications for plant construction and equipment of vessels, as well as other safety standards of a technical character. These have proved valuable to the engineering departments in the shipyards, enabling them to include proper safety features and facilities in the planning of new buildings and the installation of machinery. This has obviated the necessity which previously had been quite common of rearranging buildings or machinery so as to meet the requirements of insurance companies or state laws. All this work resulted in considerable monetary saving.

The frequency and severity rates of accidents were variable in the yards, but it was a rule that in these plants where concerted effort for safety was made the rates were low while

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in other plants they were higher. Before the war, the bureau of labor statistics prepared a report showing that in the shipbuilding industry there was a yearly frequency rate of 21.8 per cent and a severity rate of eight working days lost per thousand 300-day workers. During the latter months of 1918 the frequency rates in shipbuilding plants under the control of the Emergency Fleet corporation ran as low as 2.7 per cent for several of the largest yards and the severity rate showed a loss of two days per thousand 300-day workers.

There was no systematic plan for recording and compiling statistics on accidents in many of the yards prior to the establishment of the safety engineering section's work, but it is quite fair to say that this section's activities prevented thousands of injuries to shipworkers within the year. The obvious conservation of manpower through the reduction of accidents and the elimination of lost time on account of accidents played an important part in shipbuilding efficiency during the war.

Largely as a result of the accident prevention campaign, many shipbuilding companies have established voluntary insurance of employes. The premium for compensation charged by companies also was reduced in accordance with the safety activities and many workmen have taken advantage of this reduction.

The safety engineering section was organized by H. A. Schultz, an expert of long experience in such work. When Mr. Schultz resigned from the corporation soon after the signing of the armistice, he was succeeded as head of the section by P. J. Brand, who had been his assistant.

CHAPTER XI

The Corporation and the Law

EVERY move of importance that the Emergency Fleet corporation made from the time that it came into being was under the guidance and advice of a corps of legal minds, brought together into the legal division. The corporation, as has been mentioned, was a singular departure in the machinery of government. While in form, and in many respects in effect, it was a private corporation, yet the ownership of its stock by the United States and the delegation of power and duties by the President, made the organization also a government agency. This dual character resulted in many novel questions of law and procedure being raised and brought unusually heavy demands upon the legal division.

The corporation's activities embraced many different fields and reached into every state in the union. In these states, in its character as a private corporation, it came within the jurisdiction of state laws. At the same time as a quasi-government agency it was subject to federal legal jurisdiction. As the corporation's work developed, many perplexing questions involving the jurisdiction of federal and state courts arose.

The legal division grew from a corps of seven lawyers, originally assigned to the corporation, to a staff of 32 scattered throughout the country. Of these, 23 were at the home office

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in Philadelphia, three in San Francisco and one each in Washington, Boston, New York, Cleveland, Seattle and Portland, Oreg. In addition it was found necessary to have assistant counsel at the principal shipbuilding centers and local counsel at various points to give advice to the corporation when necessary.

The production of ships in the quantity and with the speed required by the emergency of war entailed numerous legal problems. Every time a contract was drafted legal services for the corporation were necessary. These included the drafting of contracts not only for ships, but for practically everything that went with the ships. They included the extension of shipyards and other facilities necessary for the production of vessels in large numbers. Every paper bearing upon the activities of the corporation had to be drawn with a view to the dual character of the organization. It was at one and the same time a document carrying federal authority and yet subject to state laws governing corporate activities. Thus it is easily seen that the legal division's work was most complicated and difficult.

Every division of the corporation depended upon the legal division for advice and assistance and the attorneys were called upon to meet innumerable questions that arose in the prosecution of the work, in nearly all of which the dual character of private corporation and government agency was involved.

The requisitioning order of Aug. 3, 1917, placed upon the legal division a responsibility of far-reaching importance. The corporation was bound by law to reimburse all parties who suffered financial reverse as a result of the government's

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requisitioning of ships. When every vessel of more than 2500 deadweight tons then building in the United States was taken over by the Emergency Fleet corporation, a multitude of legal questions was opened up. The technicalities involved were myriad in number. Many of these vessels had been contracted for by private owners both in America and abroad and after the contracts were let, they were sold to investors. Contracts oftentimes changed hands repeatedly even before the keel of the vessel had been laid.

At that time ocean tonnage was in such demand that prices were greatly inflated and a vessel which had been contracted for at \$140 per deadweight ton may have been sold (on paper) to the last buyer at \$300 a deadweight ton. The question that the legal division confronted was whether each one of the parties through whose hands the contract had passed was entitled to compensation from the government by reason of the Fleet corporation's having requisitioned the vessel.

Suppose a ship had been contracted for in a Pennsylvania shipyard by an English shipowner. When the contract was drawn the yard may have had all its ways occupied and before the keel of the ship in question had been laid the Englishman sold his right in the vessel to a Frenchman. The Frenchman in turn sold his to a Chinese merchant, each man realizing a paper profit as the price advanced with each transaction. Now, was the Frenchman who had not contracted for the ship and who could not actually have owned a vessel that did not exist as yet, entitled to compensation for his loss of profit? If so, what was just compensation? That is a sample of the ques-

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tions which confronted the legal division and which had to be decided with all fairness to the Emergency Fleet corporation as a corporate body and as the government's agency, and also to the shipyard concerned, the original contractor, and the various brokers through whose hands the contract may have passed.

In most cases the corporation attorneys were able to arrive at an agreement with the various parties concerned and make the just compensation which the law specified. In the event of litigation to cover damages, however, another fine question arose. The plaintiff might seek to place a lien upon a vessel to protect his claim. Under the law a lien is not valid upon government property. A given ship was built for the corporation as a corporate body subject to laws governing all corporations. It was delivered to the United States shipping board and turned over by that body to the operations division of the Fleet corporation. This division's power had been delegated to it by the shipping board and although a part of the Emergency Fleet corporation in theory, it was more readily identified as a government agency, perhaps, than the corporation itself.

When the corporation's housing projects were started new legal tangles developed. These houses were government property inasmuch as they were paid for by government money and although the deeds were in the name of realty companies they were covered by mortgages held by the Emergency Fleet corporation amounting to more than their mortgage value. These properties received police protection and the benefit of city lighting and street improvements. But, as government property, were they subject to city taxation?

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Corporation attorneys had to steer a course through many legal pitfalls always giving proper regard to the rights of the public as represented by municipal and state governments, and yet exercising the powers given to the Fleet corporation which were so necessary to speed the program of shipbuilding. Appropriate methods of legal procedure for each step in exercising these powers had to be formulated and every claim for just compensation had to be given proper consideration. Despite these difficult problems, however, the legal division worked with a great degree of success as proved by the fact that practically all claims and matters of difficulty were settled by negotiation in a friendly spirit and litigation resulted in only a few instances.

One of the most difficult situations confronted by the legal division developed after the conclusion of the armistice when it was found expedient and economical to the corporation to cancel many contracts. Most of these contracts contained a cancellation clause, yet the question of just compensation to the shipbuilder remained and had to be settled by the legal division, when claims amounted to more than a certain minimum cared for by the division of cancellations, adjustments and salvage. It was the corporation's policy in this work to follow a rule of absolute fairness in dealing with shipbuilders who may have lost by reason of the cancellations.

Judge John Barton Payne was the first general counsel for the Emergency Fleet corporation. His assistant was Chester W. Cuthell, a young New York lawyer. Early in 1918, Judge Payne desired to be relieved of the many responsibilities

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devolving upon him as general counsel, but his services were regarded as of so great value to the corporation that he consented to remain in an advisory capacity. Mr. Cuthell succeeded Judge Payne as general counsel. Incidentally, Mr. Cuthell at that time was only 35 years old and doubtless was one of the youngest men ever to hold a legal position of such importance in government service.

After the conclusion of the armistice, Mr. Cuthell resigned to become the special assistant to the secretary of war and was succeeded as general counsel by William H. White Jr., who had been assistant general counsel. It was upon Mr. White that the responsibility for the work growing out of cancellations and adjustments fell.

CHAPTER XII

Problems of the General Office

WHEN the United States entered the war, office space in Washington was at a premium. Many new war organizations came into being almost over night. Even before the war started the national capital was suffering because of lack of adequate space for government work and the sudden burst of business due to war preparations caused the government to take energetic measures. Entire buildings in the business section of Washington were commandeered for government needs and even the homes of wealthy Washingtonians were taken over and transformed into offices. The government immediately launched upon a program of building, but the demands of the army and navy were such as to require virtually all the space which it was possible to provide by new building projects.

The Emergency Fleet corporation faced the problem of obtaining office space where none existed, of finding hundreds of clerks, messengers, stenographers and typists; of building up and maintaining automobile transportation service; of providing office stationery and supplies; of establishing a system for handling the voluminous correspondence; of maintaining a watch over the corporation's property—a very necessary undertaking in wartime; of arranging for repair to buildings

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and office equipment; of building up and organizing a filing system, mailing department, and many other necessary activities which ordinarily fall to the office management of any business enterprise. This was far different, however, from the ordinary business because the corporation attained its full growth within a few months. New divisions, departments and sections were created as the need arose and the general office was called upon to obtain office space for each. During the first year from April, 1917, to April, 1918, the corporation had spread out in Washington until it occupied 21 buildings, in whole or in part, aggregating 232,319 square feet of office space.

Carrying on the work of the Fleet corporation in Washington was an expensive and laborious process. These 21 buildings were in different parts of the city. The home office, so called, in the United States Shipping Board building at 1319 F street N. W., was separated by two blocks from the Munsey building, the largest and best of the buildings occupied by the corporation. Other structures which the corporation had leased or which had been loaned for an indeterminate period were scattered throughout the city. Communication between these places was necessarily slow and awkward. Mail arriving at the home office building and distributed there often would require a whole day to reach its proper destination in another office a mile away.

Lodge rooms, theaters and residences were converted into offices in which to conduct the business of the corporation. The corporation, however, kept growing and the time came

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finally where there was no more space available in Washington. Several months prior to this it had been suggested that the corporation be moved to Philadelphia. Admiral Harris, during his term of office, considered the proposal to take the entire personnel from Washington to Philadelphia and in December, 1917, he instructed George E. Oller, office manager, to make a survey of the building at 140 North Broad street, Philadelphia, with a view to possible occupancy. The survey was made and a detailed report submitted, but the board of trustees of the shipping board rejected the proposition.

When Charles M. Schwab was appointed director general of the Emergency Fleet corporation and assumed office on April 11, 1918, he announced his immediate intention of removing the entire corporation to Philadelphia. Mr. Schwab visited the premises at 140 North Board and selected it as the new Emergency Fleet home office. This building was occupied by an automobile firm with storage space on eight of the 10 floors. The ninth and tenth floors were occupied by the executive offices of the American International Shipbuilding Corp. Mr. Schwab arranged for the removal of the offices of that corporation and on April 27 the Emergency Fleet corporation took formal possession of the property. Contracts were let for its alteration and the entire building with the exception of the east half of the first floor, was made available for occupancy on the first of June, 1918.

There followed an exodus from Washington probably without a parallel in American history. The home office of the corporation at that time had a personnel of approximately 2400 men and



S. S. KASOTA, WOODEN STEAMER OF FERRIS TYPE BUILT AT PORTLAND, OREG.

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women. These people came from every state in the Union. Many of the employes were married men with families. A large number had arrived recently in Washington and obtained furnished rooms. Others had brought their household effects from distant parts of the country and were occupying leased quarters in Washington. There were many others who had been residing in Washington for a long time and who did not favor moving to Philadelphia.

The situation was rendered more difficult by reason of the fact that the scarcity of housing accommodations in Philadelphia was acute. That city, on account of its great industrial resources, had become a center of war activity. The ship-building industry alone had attracted thousands of workmen to Philadelphia. Many thousands more, both men and women, had gone to Philadelphia and entered munition works, clothing manufacturing concerns, and other plants busy on war work. Houses of the character desired by Emergency Fleet corporation employes were at a premium.

The corporation undertook, in the time between Mr. Schwab's decision to move and the first of June, not only to find homes in Philadelphia, but also to care for the interests of Washington tenants who were forced to cancel their leases because of the order to move. And, at the same time, it had to see to the preparation of the new office building, to remove all material which was in the structure at 140 North Broad street, Philadelphia, to install passenger elevators and, in short, to put the entire property in shape for the use of the corporation in the shortest possible time.

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The extent of some of the improvements necessary in the new home office of the corporation is indicated by the following facts: Seventy-two miles of electric wire were installed in the building, together with 2200 electric lamps, 500 electric fans, and 500 telephones; 2500 yards of linoleum were required to cover the concrete floors; 2000 individual lockers were put in for the use of men and women employes and 5000 lineal feet of partitioning and railing constructed to provide for private offices and to subdivide the floors of the building.

The actual removal of the offices from Washington to Philadelphia was commenced on May 25 and completed on June 7. Army trucks were used to transport the office furniture and files. Two hundred loads were transported by these trucks in addition to the loads carried to Philadelphia by more than 20 furniture vans, provided by private transfer companies. By buying 3000 new desks and chairs in Philadelphia and disposing of a large quantity of similar pieces of furniture in Washington, the corporation was enabled to curtail the extent of the move very largely.

The entire force of the corporation was transported to Philadelphia in approximately two days' time. Most of the employes had succeeded by this time in obtaining permanent quarters. They were relieved of all responsibility for the removal of household effects. Each employe was asked only to see to the packing and tagging of personal effects in Washington, the corporation even crating goods where necessary, calling at the homes for shipments and delivering them to railroad freight stations, and upon arriving in Philadelphia

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delivering the goods at the proper addresses. The bulk of the corporation's personnel came to Philadelphia on Saturday and the following Monday morning began work in the new home office.

Just prior to moving day it was discovered that the building at 140 North Broad street was not large enough to accommodate the entire force of the corporation. It was necessary, therefore, to rent the building at 253 North Broad street for housing a great number of the clerical force; five floors of the building at 329 South Broad street for the accommodation of the automobile, office equipment, printing and supply branches; and the fifth floor of the Bulletin building for the use of the plant protection section. Later when the corporation continued to expand, the fifth and sixth floors of the building at 142 North Broad street, adjoining the home office, were obtained. The wisdom of the removal from Washington to Philadelphia was proved by the fact that in its new home the corporation had nearly 400,000 square feet of office space in buildings easily accessible to each other. This undoubtedly resulted in a vast saving of money and time in the conduct of the corporation's business.

Another saving made possible by the removal from Washington may be traced to the location of several large shipyards in the immediate vicinity of Philadelphia. The great plant at Hog Island where 50 shipways had been built, the Bristol plant with 14 shipways, the New York Shipbuilding Corp., the Cramp shipyard, the Sun shipbuilding plant, the Chester shipyard, the Traylor (wood) plant, all were within a short dis-

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tance of the home office of the corporation. As a matter of fact, almost one-quarter of the entire program contracted for was to be built along the Delaware river. It was the natural thing that the Fleet corporation should be on the ground to supervise the handling of this great enterprise.

The removal from Washington did not stop the growth of the corporation and although approximately 80 per cent of the employes, including a thousand or more families and involving between 3000 and 4500 persons, moved from Washington with the corporation, there were many vacancies to fill in Philadelphia. At that time a great many persons were trying to get into war work and the offices of the corporation were besieged by applicants, the majority of them stenographers, typists and clerks. The comparatively high salaries offered in the government service were an attraction for hundreds of girls in Philadelphia who were drawing nominal salaries in private industries. Several hundred new employes were added to the payroll immediately. After the removal the general office of the corporation was faced with the task of training these new employes in their work.

CHAPTER XIII

Concrete Ship Experiment

WHEN the shipping situation early in 1918 became acute and German submarines threatened to sink from 7,000,000 to 9,000,000 tons during the next 12 months, the shipping board turned its attention to the advisability of attempting to build concrete ships to meet the emergency. This had been advocated strongly before the United States senate commerce committee by men who were thoroughly familiar with concrete construction, who had investigated concrete shipbuilding in Europe and who declared that concrete would save the situation.

Among these men was Roy H. Robinson, a Chicago building contractor, who went before the senate committee in January, 1918, and presented a very convincing argument in favor of the concrete ship idea. Mr. Robinson cited statistics to show there were 10,000,000 tons of transatlantic shipping then available; that estimates of possible destruction during the year went as high as 7,500,000 tons. Against that new construction aggregating 4,500,000 tons could be safely counted upon, making a deficit of about 3,500,000 tons per year. The result would be if the war were continued for three years that transatlantic shipping would disappear. Mr. Robinson proposed that the shipbuilding problem be met by building concrete ships.

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At that time concrete barges had been built in France, Sweden, Norway, Denmark and England, and had proved highly satisfactory. In Norway, a concrete ship equipped with diesel engines had proved satisfactory in a trial trip of 2000 miles. Denmark also had made some progress in concrete ship construction and in San Francisco the keel had been laid for a 5000-ton concrete steamer, the largest vessel of that material yet attempted.

There were certain advantages in concrete ship construction that made the proposal highly alluring to the United States shipping board. Of first importance, perhaps, was the material question. This was more easily solved in the case of the concrete than in that of the steel or wooden ship because one of the prime requisites for concrete construction, namely sand, was to be had at any waterfront.

Almost a year before, a concrete ship section of the Emergency Fleet corporation had been established as a part of the wood ship division. Prior to that, all matters bearing upon the subject of concrete ships had been referred to the bureau of standards. When the concrete ship section was established, R. J. Wig and a small organization from the bureau of standards were transferred to the Emergency Fleet corporation. Mr. Wig became chief engineer and L. R. Ferguson, assistant engineer. Mr. Ferguson remained with the corporation until April, 1918, when he was succeeded by H. J. Brunnier, who, in turn, left the corporation soon after the armistice was signed and was succeeded by R. W. Boyd.

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With the assistance and co-operation of several architects of the navy department and representatives of the American Bureau of Shipping, Lloyd's Register, steamboat inspection service, and the bureau of lighthouses, plans were drawn for concrete vessels of standard design.

During 1917 while work was proceeding on the plans for ships, the section was carrying out a series of investigations and experiments. It was found that as a cargo carrier the concrete ship is admittedly less efficient than the steel ship, but the experts were convinced it could prove more efficient than wooden ships and could be constructed at less cost than either steel or wooden vessels. The theory was that concrete ships should be constructed in large numbers for reasons of economy. Labor for building concrete ships was more easily to be obtained than for wooden or steel ships.

The program, however, had to be limited because the hull producing capacity of the country had been built up to such a point that there were serious difficulties in the way of obtaining machinery, engines, boilers and the like to equip more vessels. It was useless to build concrete hulls if the equipment for them was not forthcoming when needed. The power and equipment producing capacity of the country was limited. Then, too, the labor necessary for the installation of equipment is most highly skilled and at that time was most difficult to obtain.

Nevertheless, the corporation experts and those of the bureau of standards continued their experiments and developed a concrete aggregate which was so light that it would float on water and yet had strength and toughness greater than that

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ordinarily used in concrete construction. As finally designed, the carrying capacity of a concrete ship was reckoned at 8 per cent greater than wooden ships of equal size and only 5 per cent less than steel ships.

In the meantime, the San Francisco Shipbuilding Co. was building a concrete vessel of 5000 deadweight tons on its own account by special permission of the Emergency Fleet corporation. This vessel was the famous steamship FAITH, which was launched March 14, 1918. The FAITH went on her trial trip and encountered very severe weather through which she passed with an excellent showing. Later, loaded with cargoes of various descriptions, the FAITH steamed from San Francisco to Seattle, from Seattle to the west coast of South America, through the Panama canal, and thence to New York. In New York harbor she was visited by experts of the Emergency Fleet corporation. These men went over the ship from stem to stern seeking particularly for evidences of damage that the ship might have encountered in her voyages. Beyond certain slight cracks in the interior of the hull there was nothing to show that the vessel had been under any strain. No deep cracks were found.

This vessel had been swept by gales that reached a velocity of 85 to 90 miles an hour. There was no doubt in the minds of the officials that the FAITH was an unqualified success, although certain architectural imperfections were pointed out.

It was the opinion of the experts that the ship was as economical in carrying bulk cargo as a steel ship of the same size. The cost of operation of the FAITH was probably slightly



JAMES O. HEYWORTH
Manager of the wood ship division

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more than that of a steel ship and officials were unanimous in their belief that the whole future of the concrete ship industry depended upon the cost of construction.

The armistice came before concrete shipbuilding was fairly under way. The urgent necessity for ships was removed and inasmuch as the concrete ship, despite the success of the *FAITH*, was still regarded in the light of an experiment, the corporation saw fit to cancel most of the concrete ship projects. Contracts had been let for building a fleet of 7500-ton tankers and a few cargo vessels of 3500 tons each. Had the war lasted longer, America undoubtedly would have taken the lead in concrete ship construction.

Certain yards situated on the Atlantic coast proceeded with building operations. Interest in the subject of concrete ships had become widespread as a result of the Fleet corporation's investigations and future development promised to be pushed by private interests. The experiment of the Fleet corporation resulted in great progress toward the production of a concrete mixture highly suitable for ship construction. The corporation, therefore, was instrumental in adding considerable knowledge to the science of shipbuilding which promises to be of value to later experimenters.

Accounting for Billions Spent

THE Emergency Fleet Corp. was entrusted with the expenditure of more than \$3,500,000,000, all but about \$1,000,000,000 of which was appropriated by congress for special purposes. The bulk of this vast sum of money was apportioned to the cost of ship construction. To keep account of every dollar and cent of expenditures was doubly important because the very size of the sum made caution imperative, and because it was the people's money and they were entitled to a strict accounting.

The task of the auditing division of the corporation, therefore, was one of first importance. The corporation from the start gave this subject the closest attention and procured as auditors men of established reputation who had held executive positions as accountants in some of the country's most important and largest commercial and manufacturing industries. Under these men were assistants, all of them of wide experience, and they in turn had the services of a large number of skillful auditors and clerks recruited from banks and business houses throughout the nation.

A machinery for auditing accounts was set up and it extended to every activity of the corporation. Nothing was

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left undone that could be done by the auditing division to help keep accounts tallying.

Generally speaking, the activities of the corporation in which the auditing division was deeply concerned were confined to the construction of steel ships for which the corporation contracted directly with the shipbuilders; steel requisitioned ships which were commandeered on Aug. 3, 1917, by the government while under construction, or the contracts for which were assumed by the government on that date; wooden ships for which the corporation contracted directly; concrete ships, tugs and barges; shipyards and plants; housing facilities and transportation facilities. In addition to these the corporation operated its own insurance department, an activity that involved considerable auditing and accounting work.

For the purposes of auditing, expenditures were divided into six principal items as follows: Ship construction, administration, salaries, traveling expenses, insurance and housing.

The corporation's auditors undertook not only to keep an account of all expenditures, but also to keep an accurate record of every purchase and of every item of property for which money was spent. Two organizations, therefore, were necessary, one of men and one of records. The auditing division which in the early days was situated above a 5 and 10-cent store in Washington, was the fountainhead of a stream of millions poured out to every state in the Union. Up to the signing of the armistice, the gigantic total of \$1,897,640,-391.20 had been paid out. It was the boast of the auditors that every penny could be accounted for.



GORDON WILSON

General auditor of the Emergency Fleet corporation when its activities were heaviest

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An elaborate system by which payments and records were checked against each other was worked out by D. H. Bender, who as general auditor, was largely responsible for the organization of the division. Mr. Bender later became comptroller of the corporation and was succeeded as general auditor by Gordon Wilson, who served during the most critical period of the corporation's activities. Reporting directly to the home office were four, and later five, traveling auditors. They covered all territory in which the Emergency Fleet corporation operated. That included not only the north Atlantic and south Atlantic coasts, the Great Lakes and the Pacific and Gulf coasts, but also many interior points where ship parts were manufactured and raw material provided. Special auditors were in charge of the accounts of the so-called fabricating shipyards at Hog Island, Bristol and Newark bay.

Under these traveling auditors were local or district auditors each with an office staff, and at every shipyard or plant working for the corporation resident auditors were stationed.

The general, or master, ledger of the corporation at the home office was the center from which radiated lines of communication and control to the hundreds of subsidiary records kept in the offices of the local, district, and traveling auditors. Each district and local auditor had a similar ledger covering all transactions within his territory and these were controlled by and kept in balance with the general ledger at Philadelphia. Similarly the district ledgers controlled the subsidiary ones in the shipyards and industrial plants which carried minute details

Accounting for Billions Spent

showing the construction cost of every part of each ship, the value and location of every engine, auxiliary, and every pound of raw material purchased and owned by the corporation. In these subsidiary ledgers every cent of expense had to be properly accounted for.

As a further check upon expenditures, the ledgers of the corporation were kept in balance and control with the accounts of the shipbuilders. Also there were subsidiary ledgers in the home office which controlled certain sections of the district ledgers so that the whole structure of auditing was protected against errors and slackness.

This system was similar to that followed in a great many commercial and manufacturing concerns throughout the country, but it involved such a vast expenditure that the undertaking was unique. Never before had a single organization spent so great a sum in a single industrial enterprise. The accomplishment of the auditing division of the Emergency Fleet corporation, therefore, offers a study in auditing methods that should be of interest to business men generally.

During the war it was said that Great Britain spent as much as \$25,000,000 a day. The Emergency Fleet corporation spent \$3,000,000 to \$5,000,000 every day on one detail of this country's war program. On some occasions expenditures were as much as \$10,000,000 to \$12,000,000 in a single day.

An analysis of the corporation's expenditures shows that the bulk of the cost was in ship construction in the United States. This item was divided into three main divisions: cost of contract steel ships, requisitioned steel ships, and

Building the Emergency Fleet

wooden and composite ships. The peak of expenditures for contract steel ships was in December, 1918, when \$86,000,000 was paid out. In January, 1918, a total of \$97,000,000 was expended for requisitioned steel ships. The height of expenditures for wooden and composite ships was reached in December, 1918, when a total of \$22,500,000 was expended.

The auditing accounts covering administrative expenses throw light upon that phase of the corporation's expenses that may prove surprising to the public. Although during the time from October, 1917, through January, 1919, the total of \$10,646,758.28 was paid out in salaries, the actual monthly average of employes of the corporation was only \$133.70. Considering the fact that the corporation personnel was built up in wartime, that most of the employes left other positions to take up war work and that there was a great demand for help of the character needed by the government, this average is quite low. At one time there were 8110 persons on the payroll of the corporation. That was in October, 1918, and the payroll for that month was \$1,065,042.44, and average of \$131.31 per month per employe.

The auditors' records of the corporation's traveling expenses also are interesting because they refute the impression that seems to prevail that once a man gets on the government payroll he becomes free with expense money. A great deal of traveling was necessary to carry on the corporation's work. At one time, during the week ended Sept. 7, 1918, there were 459 officials and employes in travel status. They covered the territory on all the seacoasts, the Great Lakes, and widely

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scattered interior points, and the actual weekly expense per man was only \$29.76. The average is for general rather than local conditions and in view of the fact that it was wartime and expenses of ordinary life were abnormally high, this average was looked upon by the corporation as proving that there was no justification for charges of extravagance.

Running the Emergency Fleet corporation was more expensive than other government organizations, perhaps, for the reason that its activities were so widely scattered. There were 50 offices and 29 warehouses located in 31 cities, and administrative activities were necessary in all of the widely scattered shipyards. The high mark in office expenses was reached in December, 1918, with a total expenditure of \$3,009,884.78. The total cost for 18 months' administration of the Fleet corporation was \$22,587,333.05, an average monthly expenditure of \$1,254,851.84. These payments included all current office expenses such as rent, office supplies, salaries, etc.

The insurance department of the corporation organized in December, 1917, as a unit of the auditing division, was established with the idea of centralizing all the insurance affairs. The department administered all matters pertaining to insurance in connection with properties in which the corporation was interested and also operated a scheme of self-insurance to protect vessels being built and in operation. This plan of self-insurance, also referred to as fund insurance, contemplated the assumption of insurance risks on shipyard plants and other construction and extension projects under-

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taken by the corporation as owners. These risks included the manufacture and transportation of materials used in shipbuilding where such activities were solely at the corporation's risk.

Before the insurance department was organized, officials of the corporation made an exhaustive study of the marine insurance and plant insurance field. It had always been the practice when a vessel was in course of construction for the owners to require the shipbuilder to furnish insurance of the broadest nature to protect the owner for cash advancements or other investments made during the process of building. The method of self-insurance adopted by the corporation, therefore, constituted a distinct departure in the protection of shipbuilding risks.

In view of the fact that builders were relieved of the necessity of placing insurance, the entire risk being assumed by the corporation's insurance fund, a deduction was made from the contract purchase price paid for each vessel. This deduction was equivalent to the sum that would otherwise have been paid for the customary insurance protection. The sums so deducted were held in reserve to cover any losses that might occur. There was a distinct gain in this for the corporation inasmuch as the vessels had the advantage of full insurance protection but at a much lower rate than would have been required had private insurance firms assumed the risk.

The protection afforded by the insurance fund on vessels in course of construction included all the risks that usually were carried by shipbuilders. This form of insurance or

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policy was known as "institute builders' risk clauses" and it provided security against losses of the most liberal character. The risk covered the plant properties and all materials including the loss or damage caused by fire and lightning and also the customary risks of transportation where movement of material was made. Marine floating equipment owned by the corporation also was subject to the protection of self-insurance against loss caused by perils of the sea. Proper reserve funds were maintained for all these risks.

The insurance department also co-operated closely with the shipbuilding companies in their campaigns against personal injury to workmen before the safety engineering section of the industrial relations division was established. After that, the insurance department gave up supervision of accident prevention work but maintained a system of workmen's compensation for which more than \$57,500 worth of premiums was written between March 1, 1918, and Jan. 31, 1919.

The insurance department was under the management of Gilbert A. Hays, assisted by H. L. Kriess, both men of broad experience in insurance matters. H. A. Schultz, who later became head of the safety engineering section, was chief safety engineer in charge of the pioneer safety work under the supervision of the insurance department.

The insurance department wrote up to Jan. 31, 1919, a total of \$9,348,555.21 worth of premiums. Out of this volume of insurance written there was a total of only \$21,612.96 losses paid. The insurance department did not write protection from submarine attack during the war. It was straight marine insurance only.

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Insurance also was written for automobiles owned by the corporation amounting to \$48,384.22 and fire insurance covering the property of the corporation was written for a total of \$627,695.56. No losses were paid either on fire, workmen's compensation, or automobile insurance in the period mentioned.

CHAPTER XV

Building Shipyard Plants

EXPANSION of the American shipbuilding industry in the months between April, 1917, and November, 1918, was the greatest ever known in any nation. From a place near the bottom of the list of shipbuilding countries, America sprang suddenly to the top.

Shortly after the armistice was signed a statement issued by Lloyds of England credited the United States with being in the lead. During the year of 1918, according to this statement, the United States launched a greater tonnage of merchant ships than all the nations of the world turned out in any year prior to the war, and produced during that year more merchant tonnage by 25 per cent than all the rest of the world combined. This figure of 1918 production was more than the entire output of American shipping during the 10 years preceding and more than double the output of Great Britain for 1918. The United States at that time was in position to maintain the lead so long as a shortage in world tonnage continued to exist.

The 1918 output was a notable achievement because of the relative insignificance of American ocean shipping for many years prior to the war. Shipbuilding is a complicated process.

Building the Emergency Fleet

The machinery for constructing an oceangoing vessel cannot be picked up at random and assembled hurriedly. Special plants must be constructed, the building of which involves months of work and highly scientific knowledge.

The United States entered the war with 37 shipyards for building steel vessels and 24 for building wooden vessels of more than 3000 deadweight tons carrying capacity, in existence. Eighteen months later, just prior to the signing of the armistice when the maximum number of shipyards was in operation, there were 216 plants in which 970 ways were being used for the construction of ships for the Fleet corporation. One hundred and eleven of these were new yards and 558 of the ways had been built since the war began. This number includes yards devoted to building tugs and barges as well as those constructing steel vessels and wooden, concrete and composite ships. The new yards were built at an expenditure of approximately \$210,722,293. These plant building projects included such yards as the American International Shipbuilding Corp. at Hog Island, Pa., the Merchant Shipbuilding Corp. plant at Bristol, Pa., and the Submarine Boat Corp. yard at Newark, N. J. These three large plants alone added 90 shipways to the nation's construction facilities.

The Fleet corporation also enlarged existing plants wherever that was possible and practicable. In addition it authorized loans for financing the construction of drydocks and marine railways. Altogether the expenditures and obligations of the Fleet corporation on such projects amounted by April 1, 1919, to approximately \$237,000,000.



REAR ADMIRAL H. H. ROUSSEAU
Manager of the shipyard plants division

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To build a plant for ship construction or to enlarge or extend such a plant requires not alone an organization of proper managing and financing, but a technical knowledge fully as competent as that required for shipbuilding itself. The plant construction work of the Fleet corporation was placed, therefore, under a separate division.

The division of shipyard plants, or shipyard plants division, as it was called later, was established by Rear Admiral Capps, as general manager, Aug. 19, 1917. Up to that time, comparatively little had been done to decentralize and specialize the executive functions of the home office, although in the latter part of May, 1917, a memorandum had been issued, stating that it was "essential that the work in the executive offices be subdivided as much as possible under the different departments," to bring about efficiency and co-operation.

This earlier plan of organization provided for a purchasing department, an engineering department, an auditing department, a traffic department, a contract department, and a chief clerk's division, and those subdivisions were recognized in a general way until the reorganization of Aug. 19. In addition to the general manager and his executive aide, the organization of Aug. 19 provided for an executive and administrative division, a construction division, shipyard plants division, contract division, purchasing division, auditing division and legal division.

Rear Admiral H. H. Rousseau (C. E. C.), U. S. N., had been detailed by the navy department from the bureau of yards and docks to the Fleet corporation in May, 1917, and

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was appointed assistant general manager of the corporation by Major General Goethals, then general manager, in June. In the reorganization of Aug. 19, he was made manager of the newly established shipyard plants division. Rear Admiral Rousseau is a graduate of Rensselaer Polytechnic institute, Troy, N. Y., and was associated with General Goethals in the construction of the Panama canal.

On Aug. 27, 1917, Captain, then Commander, Reuben E. Bakenhus (C. E. C.), U. S. N., of the bureau of yards and docks, was detailed to the corporation by the navy department, and appointed by Rear Admiral Rousseau as assistant manager of the division of shipyard plants. He was charged specifically with the duties of organization and personnel.

A memorandum issued by the general manager under date of Aug. 20, 1917, defined the jurisdiction of the new division of shipyard plants. There were four phases of activity, under the following headings: New plants department, plant extension department, housing department, and plant inspection department.

This was a comprehensive outline, in view of the earlier statements issued by the corporation, the legislation then existing, and the fact that the corporation had no specific appropriation either for new plant work or for housing purposes. Plans, however, were taking shape rapidly at that time. The original shipping act of Sept. 7, 1916, contained no provisions for the construction of shipyard plants at government expense. The shipping board was authorized, with the approval of the President, to have merchant vessels constructed in American

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shipyards or navy yards, or elsewhere, and was instructed to give preference to domestic yards "other things being equal," but no money was appropriated, except a sum for salaries and office expenses, and the \$50,000,000, which was turned over to the Fleet corporation in payment for its capital stock.

When the Fleet corporation organized, the powers conferred upon it by its charter were broad, but the laws of the District of Columbia, under which it was organized, and the revised statutes of the United States prevented it from purchasing and holding the necessary real estate to carry out the shipping program finally entered upon. Besides it had only \$50,000,000 with which to do business. That was a meager sum, compared with later authorizations for the ship-building program, aggregating \$3,671,000,000.

To appreciate the effect that the great increase in the original building program, from approximately 3,000,000 dead-weight tons to more than five times that amount, had on the expansion of shipyards, the following paragraphs are quoted from one of the first circulars issued to district officers on May 24, 1917:

"When any launching ways become empty at any plant executing contracts for the Emergency Fleet corporation, in case the contractor desires to lay down another ship, application should be made to the district officer who will forward the application with his report and recommendation to the home office where, if the application is approved, the contract for the hull or completed vessel will be executed. This general method of contracting for vessels, one at a time, as the ways become empty, is the only one that will be followed.



COMMANDER R. E. BAKENHUIS
Assistant manager, division of shipyard plants

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“Undoubtedly it will be more economical for the Emergency Fleet corporation to get the required number of vessels built by a joint use, if necessary, of existing ways and plants, than by a large extension of these facilities, the great cost of which would have to be distributed over the ships built thereon, and which might, for the most part, be not required commercially, after the present emergency has ceased.”

The wording of the emergency shipping funds section of the urgent deficiency appropriation act of June 15, 1917, might seem to indicate that the Emergency Fleet corporation could spend the money turned over to it for anything its charter authorized it to do. Nevertheless, there was grave question as to whether the corporation, acting as agent, could use the money for any purpose other than that for which the President specifically was authorized to use it. Under the act of June 15, 1917, the President had no specific authority to construct new shipyard plants. That congress never intended that the money appropriated by it should be used for purposes other than those specified in the appropriation acts is evidenced by the fact that all subsequent appropriations to the President, for carrying on the shipbuilding program, have specified the purposes for which the sums were to be spent. The first appropriation for shipyard plants was made in the urgency deficiency appropriation act of Oct. 6, 1917, which appropriated \$35,000,000 “for the acquisition or establishment of plants suitable for shipbuilding, or of materials essential thereto, and for the enlargement or extension of such plants as are now, or may be hereafter, acquired or established.”

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The act of July 1, 1918, appropriated \$87,000,000 and the act of Nov. 4, 1918, added \$34,662,500, for shipyard plant purposes. In all these acts a distinction likewise was maintained between the appropriations for the construction of new ships and the construction of requisitioned ships. Not until Nov. 4, 1918, was the President authorized directly and explicitly "to acquire, construct, establish or extend any plant and in pursuance thereof, to purchase, requisition, or otherwise acquire title to or the use of land improved or unimproved."

By executive order, dated Dec. 3, 1918, the President conferred his powers under that act, as well as all powers that had been vested in him by virtue of the appropriation acts and amendments passed since his order of July 11, 1917, upon the Emergency Fleet corporation, and ratified all acts done by it that he properly could have done under such statutes. It was largely because of the lack of authority of the Emergency Fleet corporation to purchase land in its own name or in the name of the United States, and build shipyards thereon, prior to November, 1918, that the policy of operating through agency yards and financing shipbuilding corporations by investments, advances or loans, had been so extensively pursued.

Whatever the interpretation of the law may have been, German submarines were sinking the allies' ships at an alarming rate in 1917, and a crisis was threatened. The public was calling for ships and more ships, and ships had to be provided. Many of the established yards were building ships either for our navy or for neutral countries. In estimating what those yards could do in the way of merchant marine con-

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struction, their contracts with the navy department had to be taken into account. Contracts for ships building for neutral countries were, as told previously, requisitioned, or "commandeered." German vessels, seized in our ports, were repaired and put into commission. But in spite of all that could be done, the existing tonnage and the facilities for increasing it were entirely inadequate to meet the needs. The country was awakened. Ambitious and patriotic citizens, even though they had had no experience in building ships, rushed in, ready to promise to build them and to construct new shipyards, provided the necessary financial assistance was forthcoming from the government. This assistance was provided generously on the best terms obtainable at the time.

The adoption of the wooden ship program tended greatly to enlarge the shipbuilding industry, and to increase the number of shipyards. Of the 88 contracts made prior to Sept. 15, 1917, for the construction of 487 ships, 63 were for 344 wood ships, and 25 involved expenditures for plant construction from Emergency Fleet funds. Twenty-one of the 25 contracts provided for the construction of new shipyards. Negotiations for the purchase of Hog Island by the American International Corp., and the construction of a shipbuilding plant thereon by the Fleet corporation, were concluded Sept. 13, 1917. It is evident, from the foregoing, that the work of the division of shipyard plants was increasing rapidly.

The most promising field for shipbuilding at high speed and in vast quantity was in the so-called fabricating yards, Hog Island, Bristol and Newark bay. At these three places

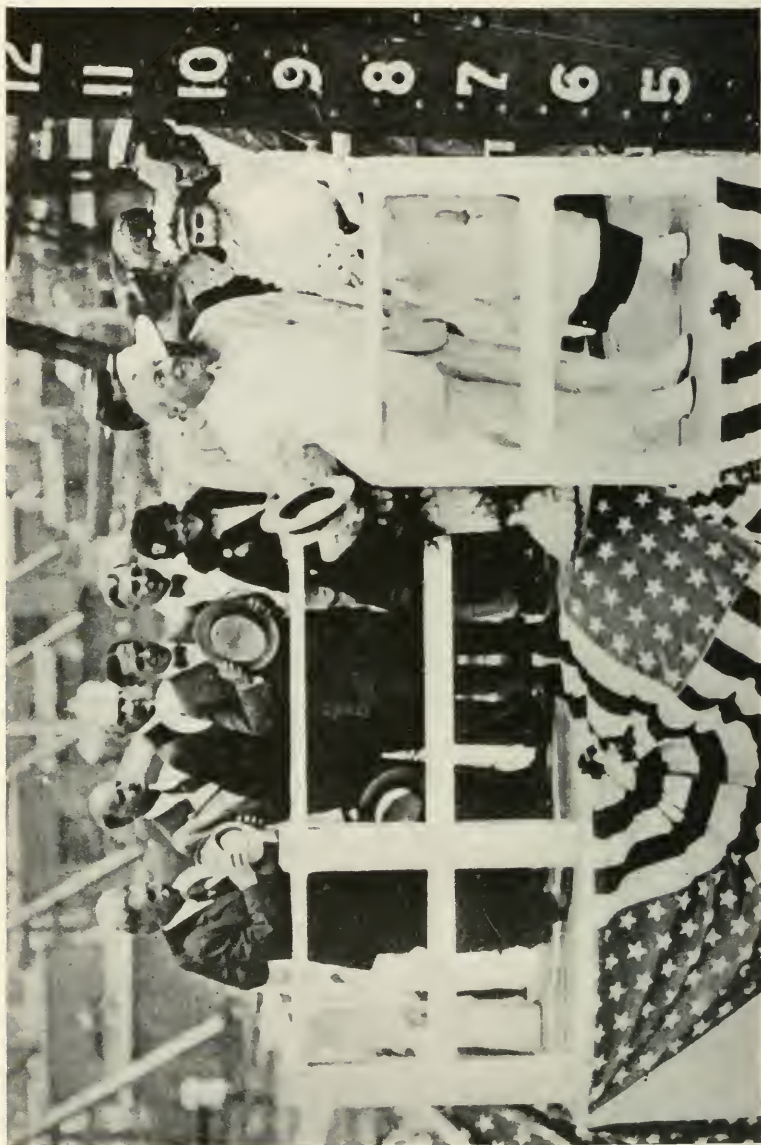
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the government undertook its greatest plant construction enterprise.

Hog Island was the largest of the three yards built. It was laid out on marshy ground just south of Philadelphia—a tract of something less than 900 acres which, in September, 1917, when the contract was let, was covered with underbrush and was a muddy tract to which there were practically no approaches fit for vehicle traffic. The task of the builders was to change this stretch of waste land, in the shortest time possible, into a modern plant employing more than 30,000 workers fully equipped with shipways, storage yards, administration building, such shops as were necessary to ship construction, highways, street car and steam railroad facilities, houses for the workmen, etc.

Conditions for plant construction were almost as bad at Newark bay where the ground also was swampy and sanitary conditions were discouraging. At Bristol where the Merchant Shipbuilding Corp. plant was built, there was higher ground and better surroundings, but at all three plants a tremendous task confronted the Fleet corporation or its agencies charged with construction work.

To carry on the work intelligently the shipyard plants division decided upon an organization of field agents to act as resident engineers at the various projects. Commander Paul L. Reed (C. E. C), U. S. N., was detached from duty as public works officer at the Charleston, S. C., navy yard and assigned as resident engineer at the Bristol plant and the Hog Island plant. His principal assistants were G. H. S.



PRESIDENT AND MRS. WILSON AT LAUNCHING OF QUISTCONCK, FIRST HOG ISLAND SHIP

Building Shipyard Plants

Rollason, an office engineer on both contracts; John W. Towle, plant engineer on the American International contract at Hog Island, and Robert E. Kline, plant engineer on the Merchant contract.

It was soon found, however, that work on the Hog Island project demanded Commander Reed's entire time and attention and in October, 1917, he was relieved of his duties in connection with the Merchant Shipbuilding Corp. plant. Wilson Fitch Smith was appointed resident engineer at Bristol and Mr. Rollason remained with Commander Reed on the Hog Island work until April 15, 1918, when he was transferred to the home office to assist Commander Bakenhus, who was in supervisory charge of installation plant contracts. Mr. Rollason later became assistant to the manager of the division in October, 1918, and when Admiral Rousseau resigned, effective May 1, 1919, Mr. Rollason succeeded him as manager of the division. Mr. Towle was appointed resident representative at the plant of the Carolina Shipbuilding Corp., Wilmington, N. C., another new yard, and Mr. Kline became eventually plant engineer for the New England district.

Lieut. Commander Greer A. Duncan (C. E. C.), U. S. N., who had been stationed at the navy yard at Puget sound, was detailed for duty with the Fleet corporation and assigned as resident engineer at the Submarine Boat Corp. plant at Newark, N. J.

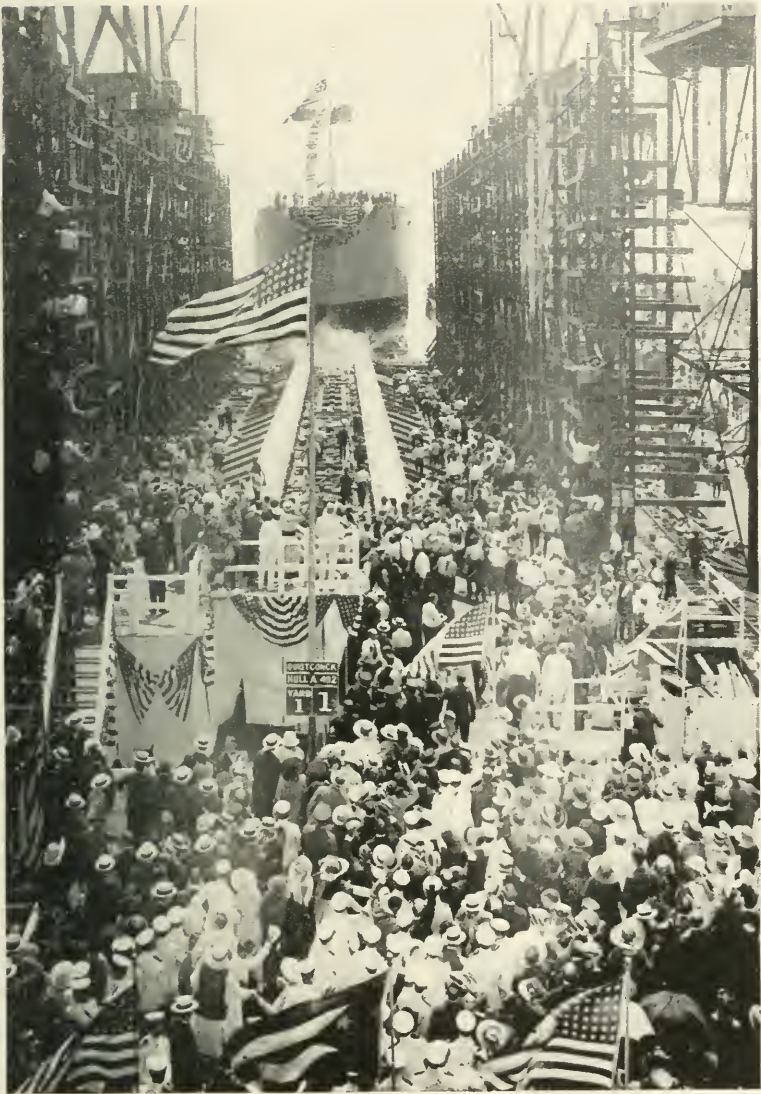
Aside from these large fabricating yards supervision of plant construction was carried out under a district system of organization. Resident engineers were appointed to represent

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the division in five of the shipbuilding districts. Their activities were under the direct control of the home office, but this scheme of organization tended to decentralize the work and relieve the home office of many of the details of construction management.

The shipyard plants division's work was, in a way, an enterprise that stood apart from the other construction work under the direction of the corporation. It was found convenient, therefore, to build up an organization at the home office very similar to, but largely distinct, from that of the remainder of the corporation. For example, the shipyard plants division had a records and progress section which corresponded to the planning and statistics section of the corporation as a whole, and to the records and progress section of the ship construction division. This section within the shipyard plants division was charged with establishing and systematizing methods of recording, tabulating and reporting data in regard to shipyards and other plants in which the corporation had a financial interest. The section charted plant locations and layouts, analyzed contracts for the construction of yards, plants, drydocks and marine railways, recorded and criticized the periodical progress reports made by field representatives concerning construction and development of yards and plants, and compiled general data dealing with all shipyard plants building vessels for the corporation.

How extensive was the ground covered by the records and progress reports is shown by the first memorandum of instructions issued to resident engineers by Admiral Rousseau in



S. S. QUISTCONCK LEAVING WAY NO. 1 AT HOG ISLAND

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September, 1917. In this memorandum he outlined the principal duties of the engineers and defined the jurisdiction of the division, as follows:

The work of the division of shipyard plants comprises that part of the contracts with the Emergency Fleet corporation applying to grounds, waterfront, wharves, shipbuilding ways, handling equipment at ways, railroad track and equipment, fixed and movable cranes, shops, buildings, power plant, distributing systems, installation of tools, in fact all the plant and equipment necessary for the construction of the ships.

General plans, general outlines, and proposed general expenditures for shipyard plants must first be approved by the home office. This will include the general layout of the plant, the character and types of buildings, ways, handling equipment, etc. After such approval the supervision of the execution of the work will be left with the resident engineer, who will approve all detail plans and orders for materials which are in accordance with the original approval of the plant by the home office.

Alterations or additions to the plant may be authorized by the resident engineer, who will promptly report his action, with reasons, to the Washington office. Approval of plans must be in writing and a copy of all the general plans as approved must be sent to the division of shipyard plants for file.

The resident engineer will forward monthly reports of progress of work showing graphically the percentage completed of each branch of the work.

Many complicated problems in engineering arose as the shipyard plant projects developed. To handle these the home office had a staff of engineers and additional resident engi-

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neers in the field. There were not many persons outside the ranks of the corporation who were capable of directing the technical phases of shipyard plant construction. Many contractors, thoroughly patriotic and willing men, lacked previous experience and were unable to cope with the difficulties they encountered. These men looked to the shipyard plants division for assistance. Moreover, the division was responsible for all money expended on plants and it was its duty to see that it was properly expended. Accordingly, engineers were given supervision of the details of construction in the various districts.

The services of a technical engineer were necessary also to check designs for certain plant structures, particularly those of structural steel shipbuilding ways, floating drydocks and marine railways. Also this engineer had to make launching calculations as the shipyard plants were in process of construction. Harold B. Miller, a lieutenant of engineers, U. S. A., was released from active service in November, 1917, and assigned to this work. Mr. Miller's compilation of launching calculations and plans of launching ways were of particular aid to the shipyards. In February, 1918, Mr. Miller was given the title of designing engineer and several draftsmen were employed under him on technical work. Still later his department was called the designing section and he continued to have charge of it until Sept. 1, 1918, when he was made head of the drydock and marine railways section, having been made acting engineer of this section on June 22.

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Gordon B. Canaga, who had been Mr. Miller's assistant, thereupon was appointed head of the designing section.

An important phase of the shipyard plants division work had to do with drydock construction. At first the division's jurisdiction was limited. Preliminary negotiations had been conducted by the division of steel ship construction and contracts were let for the drydocks by the contract division. Later, in April, 1918, all negotiations in connection with drydock contracts and construction were placed under the shipyard plants division. Drydock and marine railway work first was under the supervision of Capt. F. T. Chambers (C. E. C.), U. S. N., who later became chief engineer of the port and harbor facilities commission. Mr. Miller succeeded him in charge of the drydock and marine railways work.

Closely allied with the building of drydocks, shipyards and marine railways, was dredging. At many shipyard sites the water at the launching ways was not deep enough to float an oceangoing vessel and often it was found that in building fitting out piers a great amount of dredging was necessary.

Early in November, 1917, representatives of the principal dredging companies met in New York and formed an emergency dredging committee to co-operate with governmental and port authorities along the Atlantic and Gulf coasts. This committee also recommended methods, plans and prices for emergency dredging work, and in December, 1917, representatives of government departments interested in dredging met in Washington and accepted the services of the committee.

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Admiral Rousseau attended the Washington conference for the Emergency Fleet corporation and on Feb. 16, Ellis D. Thompson was appointed an engineer in the division of shipyard plants and placed in charge of the dredging work.

An idea of the scope of dredging operations necessary in the shipbuilding program is contained in the statement that dredging operations were carried on at 108 shipyards. This involved the handling of about 18,420,000 cubic yards of material at an approximate cost of \$4,775,000.

No dredging operation in history approaches the building of the Panama canal, but perhaps the Fleet corporation dredging for the shipyards compared with the Panama canal work may give an adequate idea of the scope of the former. Material removed in building American shipyards during the war represented about one-twelfth of that removed in digging the Panama canal. The dredging operations of the Emergency Fleet corporation were carried on not alone in the 45 yards in which the corporation was directly interested, but in 63 privately owned plants where assistance had to be rendered. The total figure of 18,420,000 cubic yards does not include the Hog Island work which was the major operation carried out under the supervision of Rear Admiral Francis T. Bowles. At Hog Island, 6,244,752 cubic yards of earth were removed and deposited at a cost of \$2,858,888.68.

As a result of this work no ship was delayed in launching. In every yard an approachable channel was dredged successfully and shipbuilders were enabled to take vessels from the plant to deep water.

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The division's services were offered to and used frequently by newly established shipyards where technical staffs had not given or were not qualified to give proper attention to the details of ground sites and launching arrangements. Shipyards furnished information from which the home office experts were enabled to determine the questions involved. This work undoubtedly assisted materially in hastening the launchings in new plants. There was, in short, gathered into the personnel of the shipyard plants division a highly efficient staff of experts on shipyard construction. Few such men were to be obtained at the outbreak of the war, their number being confined in fact almost wholly to the navy department. The instruction received in Emergency Fleet corporation service has equipped a large staff which will be available in the event of another emergency during the present generation.

Like other departments of the corporation, the shipyard plants division was thrown together hurriedly and new branches were added as specific tasks arose. There was, of course, some duplication of effort and conflict, not so much between different branches of this division as between the division and other departments of the corporation. During the spring and summer of 1918, the division underwent certain organization changes designed to increase the effectiveness of the work and bring about economies in operation. The office force was divided into sections and responsibility was centered upon section heads. As finally established, the division included the shipyard plants construction section, drydock and marine railway section, designing section, record and progress



LIEUT. COL. JAMES A. BLAIR JR.

Head of plant protection section and in charge of secret service work of the Fleet corporation

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section, property inventory and custody section, dredging section, contract and site investigation section, power section, and ultimately the cancellations and salvage section. The latter was formed for close co-operation with the cancellation and salvage division when the necessity arose after the armistice to cancel certain contracts and to salvage material.

Despite the steady increase in the volume of work and the enlarged scope of the division's activities there was no marked or violent fluctuation in the total number of its personnel.

One of the interesting phases of the shipyard plants division's work was the construction of concrete shipyards. Special investigators examined sites along the Atlantic coast from Wilmington, N. C., south; then along the Gulf and Pacific coast. They also inquired into the sources of supply for the construction of concrete ships. On the basis of their reports concerning 36 proposed sites, five shipyards for building concrete vessels were located, one at each of the following cities: Wilmington, N. C.; Jacksonville, Fla.; Mobile, Ala.; San Diego, Cal., and Oakland, Cal. On May 10, 1918, Charles A. Pohl was appointed an engineer of the division and given supervision of the work of constructing these concrete shipbuilding yards. On Oct. 14, a concrete yard construction section was established with Mr. Pohl at its head. On completion of the concrete yards in February, 1919, the section was abolished and its remaining activities transferred to the shipyard plants construction section.

Building Shipyard Plants

Providing power for the shipyard plants was another important phase of the division's activities and formerly was under the jurisdiction of the vice president in charge of construction with F. W. Ballard as its head. An idea of the amount of power necessary in shipbuilding may be gained by the statement that at Hog Island a voltage of 6600 was carried to the plant for power purposes. Special powerhouses were built at some plants where the power facilities at hand were not sufficient. In September, 1918, the activities and duties of the power specialists were transferred to the division of shipyard plants and a power section was established with Mr. Ballard in charge.

In many cases, the corporation made advances or loans to the various shipbuilding companies for plant extensions and for the acquisition of tools and equipment. It was usually provided in the contracts that the title to property purchased with such funds should remain in the Fleet corporation. To keep account of all such corporation holdings, the property inventory and custody section of the division was formed with J. Lee Allen as its head. Jurisdiction of this section included shipyard plants, outfitting yards, storage yards, manufacturing properties, drydocks, marine railways, transportation and housing facilities and equipment and, in short, all kinds of property in which the Fleet corporation had funds.

After the armistice it was necessary to take inventories and appraisements of plant property and equipment. The data already obtained by the property inventory and custody section proved valuable. The inventory covered 65 steel ship-

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yards, 83 wood shipyards, seven concrete shipyards, 18 manufacturing plants, 40 storage and warehouse projects, 25 transportation projects, and 25 housing projects. It also included a lot of miscellaneous equipment—automobiles and launches, and the furniture and fixtures in 73 branch offices.

At the outset of the shipbuilding program, as related heretofore, there were many wildcat schemes for financing and building new plants. A number of sites proposed for shipyard plants were wholly undesirable. At some places where it might have been possible to launch a ship, getting the vessel into deep water was practically impossible. It is reported that one prospective shipbuilder selected a site on a river where it would be necessary to tear down a railroad bridge in order to get his ships to the ocean. It was evident that the shipyard plants division must make careful surveys and use the utmost care in selecting the sites. The contracts and site investigations section was established to inquire into the desirability of building new plants on sites selected by a contractor or of extending plants, and to report to the manager of the division. Alexander Murdock was appointed engineer in charge of this section.

As soon as contractors began to assemble material and to build ships the question of obtaining builders' risk insurance arose. The contracts with the Emergency Fleet corporation provided for such insurance and at first the corporation tried to aid contractors by creating an insurance committee to deal with insurance companies and to obtain reduced rates for the necessary protection. Insurance underwriters made representa-

Building Shipyard Plants

tions as to the danger of fire in the shipyards and it happened that several fires occurred about that time. This coincidence militated against low rates for shipyard insurance so that when the national board of fire underwriters, in September, 1917, tendered its services and the facilities of its nationwide organization of inspectors and experts, the corporation accepted the offer. District officers were instructed to give representatives of the board free access to all shipyards so that they might inspect conditions and recommend the form of fire protection. The services of the national board of fire underwriters were tendered without cost to the corporation for salaries except for the nominal sum of \$1 per year per man.

Fire protection engineers were detailed to the division of shipyard plants to prepare plans for water mains, hydrants and other equipment to be installed in the yards. C. T. Bissell was appointed advisory engineer on fire protection, Dec. 20, 1917. Robert C. Dennett was detailed to the division as fire protection engineer the same month and he succeeded Mr. Bissell in November, 1918, as head of the fire protection section. The work of the section was so thorough that there was comparatively small loss from fire in the shipyards during the war, notwithstanding the fact that shipbuilding plants were constantly the mark for enemy plotters. The corporation, too, was able to carry builders' risk insurance itself at very low cost.

An attempt to get contractors to install fire protection systems at their own expense proved impracticable in most cases and after Feb. 15, 1918, the Emergency Fleet corpora-

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tion, undertook to make such installations at its own expense. The public was not in the mood to have ships, urgently needed for the transportation of troops and war supplies, subjected to any unnecessary risk of damage or delay by fire. The insurance money could not take the place of ships. The government, therefore, felt that assumption of the expense of installing fire fighting equipment and apparatus was justified.

In the early days of the corporation's work, activities such as providing houses for workmen, guarding shipyard plants from damage by enemy plotters, and health and sanitation, were under the direction of the division of shipyard plants. Later, however, separate units of the corporation were created to direct those different phases of the work, as told elsewhere.

Contract Division's Work

IT HAS been related previously how contracts for building ships were let in the early days when the need for speed was so great that there could be little time or thought given to formal agreements and special direction. These contracts were crude, being in fact little more than orders from the Emergency Fleet corporation to the contractors to go ahead with contracts. At that time Joseph P. Cotton, a New York lawyer, who had volunteered to get the contracts into better shape, also acted as legal adviser of the Fleet corporation. A bureau or division to negotiate and bring to final conclusion contracts for all the corporation's work obviously was necessary and General Goethals, then general manager, appointed a committee on contracts under the supervision of Samuel L. Fuller as chairman.

In August, 1917, a circular letter was issued outlining the organization of the Fleet corporation and the committee on contracts was designated the contract division with jurisdiction which included the examining and negotiating department, the credit department and progress department. Capt. Elliott Snow, construction corps, United States navy, who was executive aide to the general manager, was placed in charge of the contract division and later, Sept. 4, he became the first manager of the

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division. Captain Snow served in that capacity until Sept. 24, when Capt. George S. Radford, United States navy (resigned), was appointed manager. There was another change in the office in February, 1918, when Captain Radford resigned and Joseph Y. Underwood became manager. He, in turn, was succeeded June 1, 1918, by Morris Douw Ferris.

The contract division had jurisdiction over the letting of all contracts for the construction of steel, wooden, composite and concrete vessels, tugs, shipyards, etc. Since the organization and up to April, 1919, there were negotiated 526 contracts in addition to supplemental contracts based on original agreements for construction. These 526 contracts, including tugs for which no deadweight tonnage was computed, aggregated 2572 vessels with a total of 16,482,611 deadweight tons. They involved the expenditure of \$2,867,792,024.40 plus \$553,794,812.60, estimated additions due to higher wages and other items of expense. The types of vessels included cargo carriers, tankers, troopships, coal and lumber barges, oil tank barges, seagoing harbor tugs, refrigerator and hospital ships.

As the construction program advanced, the Emergency Fleet corporation undertook the construction of drydocks and marine railways, the installation of machinery and equipment in hulls and the conversion of cargo carrying hulls into oil tank vessels. All this called for new work in the contract division. It was also the duty of the division to renegotiate contracts and to readjust others for the refinancing of drydocks and marine railways under construction by companies which required additional loans.

Contract Division's Work

All correspondence relating to the transfer of registry of vessels and applications for permits for the construction of ships on foreign and private account were received by the contract division for analysis. They were either recommended or disapproved as the circumstances directed and then submitted for final action to the chairman of the United States shipping board. This work continued under the control of the division until Oct. 9, 1918, when a division was created by the shipping board for handling it.

A vast amount of detailed investigation work and correspondence was involved in the activities of the contract division. Not only were contracts necessary for the actual building of ships, but every offer of a shipbuilding site made to the corporation had to be passed upon and given the most careful and searching consideration. All correspondence of this character as well as that relating to the creation or extension of other shipbuilding facilities and plants was acted upon by the contract division.

The division also had entrusted to it at various times the duty of soliciting proposals for building vessels for other branches of the government aside from the Fleet corporation. There was considerable detail involved in this work, connected with the collection and preparation of data.

When a contract was proposed, the division undertook to make first an inspection of the shipbuilding, drydock and marine railway facilities of the prospective contractor. This inspection took in both the proposed facilities and those already in operation. Then a careful investigation was made of the

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financial status of the contracting company. Also an inquiry was necessary as to labor conditions in the plant. Action by the division was subject finally to the approval of the vice president in charge of administration and this action was based upon recommendations as to the acceptance, modification or revision of the proposals made. The division made weekly and bimonthly reports of the work accomplished or in process and also statements to the vice president in charge of administration upon the final completion of any construction program. The collection of this data enabled the division to be of special value, too, in the preparation of information for the special and annual reports of the director general to congress.

To carry out the work of the division a staff of specially trained men was maintained. These men included lawyers and engineers who were able to safeguard the interests of the corporation both by careful analysis of engineering problems involved in contracts and by the attainment of regular standardization of contract forms.

After the cessation of hostilities the work of the contract division was reduced materially. With the signing of the armistice the corporation began to reduce its program and instead of entering upon more enterprises the tendency was to cancel, to some extent, those already in existence.

Field Organization Problem

NO PRIVATE enterprise ever faced the tremendous organization problem which confronted the Emergency Fleet corporation in 1917 and 1918. Every industrial executive today recognizes the importance of proper control of the various activities for which he is responsible and in the large corporations of America, staffs of experts are employed permanently to study, analyze, perfect and maintain a proper organization set-up. Their problems, however, are much simpler than those of a wartime body like the Emergency Fleet corporation with a task of the gigantic proportions involved in supplying ships to meet the submarine menace and transport an army to Europe.

As has been pointed out previously, the various subdivisions of the home office came into being as specific need arose. In the haste of getting the task performed, too often there was not enough thought of relationships and responsibilities with the result that frequent conflicts of authority and duplication of effort developed. All this was expensive and wasteful and it was not until the spring of 1918 that the corporation succeeded in shaping the organization into a compact and efficient body.

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The activities of the corporation as a whole were duplicated, in a small way, in each of the shipbuilding districts. These districts were geographical divisions, created for convenience in handling the many problems of ship construction. There were 11 such divisions, including the agency yards—Hog Island, Submarine Boat and Merchant—as follows: Upper Atlantic, including all shipyards north of the Delaware river on the Atlantic seaboard; Delaware River district, including all the shipbuilding plants on the Delaware river, except the agency yards; Delaware River agency yards; North Atlantic district, including all plants on the Chesapeake and south to and including Wilmington, N. C.; South Atlantic district, including all plants south of Wilmington, N. C.; the Southern district, including all plants on the Gulf to and including New Orleans; the Gulf district, including all shipbuilding plants on the Gulf west of New Orleans; Southern Pacific district, including all plants in California and the Oregon Coos Bay yards; the Middle Pacific district, including all the wood shipbuilding plants in Oregon, except the Coos Bay yards; the Northern Pacific district, including all the shipbuilding plants in Washington and the steel shipyards in Oregon; the Great Lakes district, including all the shipbuilding plants on the Great Lakes. These various districts originally were numbered from 1 to 11.

Just as in the home office, the district organizations were built up to meet the exigencies of the hour. As indicated, some of the districts confined their activities to building wooden ships, but in others both wooden and steel ships were under



CAPT. W. B. HOLTON JR.

Acting vice president, succeeding Mr. Coonley in charge of administration

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construction. At the outset of the program, it was considered necessary to have a man acquainted with wooden ship construction to devote his energies to that particular phase of the work, while in districts where steel ships were to be built experts in steel ship construction were placed.

Unfortunately, however, the wood and steel shipbuilding territories overlapped in some instances, and it was natural for the steel ship and wood ship men, called the district officer and district supervisor respectively, to come into conflict. Frequently the shipbuilders and supply men in such a district did not know to whom they should look for authority. The instructions of the district supervisor would be contrary to those of the district officer. It was not possible for each to work independently of the other and the continued clash in jurisdiction was certain to cause extravagance and loss of time. In the stress of the wartime necessity, extravagance might have been forgiven, but delay in building ships was not to be condoned a minute. The dual organization in the field, therefore, brought itself forcibly to the attention of the executive officers of the corporation.

It is not difficult to perceive the reason for this organization error. Admiral Bowles, it will be recalled, was in charge of construction activities in the early days and, to put it mildly, he did not believe that the country would ever realize much from the wooden ships. When James O. Heyworth was made manager of a separate division of construction, in charge of the wooden vessels, he naturally desired men in charge in the field who were in sympathy with the wood construction program.

Field Organization Problem

For the most part, these district men were construction experts and it was not contemplated, at first, that they should concern themselves with other activities. Soon, however, the work piled up in Washington at such a rate that the need of decentralization became quite apparent and before Admiral Harris retired as general manager, definite plans were afoot to remedy the field organization ills.

The actual working out of this remedy was slow because there were so many angles to consider. As the work progressed in each of the districts, various units of the home office found it necessary to send their representatives in the field. Although these men worked within the territory and jurisdiction of the district officer or the district supervisor, they looked for authority directly to their chiefs in the home office. In other words, the man who bore the responsibility for everything done within a district, had no control over agents of the corporation who represented the housing department or the shipyard construction division, or the plant production section or any one of a dozen departmental groups. There were as many agents practically as there were units in the home office. Their presence in the field was necessary but the organization which did not permit a single control over all activities was at fault. All of this naturally resulted in piling up work at the home office. Details of plant construction, of transportation, of plant protection and a multitude of other activities were sent to Washington and later to Philadelphia for solution. The Fleet corporation was being buried under an avalanche of

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mail and as time went on it became more and more apparent that something had to be done to decentralize the work.

The obvious remedy was to create a district organization under the control and authority of a single head. That was done and in the spring of 1918, the district manager came into being. He was supreme in his territorial district and all agents of the corporation, whether they represented the transportation, purchasing, housing or any other separate activity, were primarily responsible to the district officer and subject to his instructions. Such instructions as were sent to these agents from the home office were in written form and a copy went to the district manager who held a veto power under which he could stop any work that did not meet with his approval. It is interesting to note that this authority was very seldom resorted to by any district manager. The district manager was a little director general of the Emergency Fleet corporation in his geographical division.

The new organization chart was consistent with scientific principles of functional control, but there were certain considerations entering into the Fleet corporation make-up not to be found in the private industrial organization. Each division manager in the home office naturally had his own specific interests at heart and his contribution to the construction of ships, however indirect a bearing they might have upon actual construction, was, to him, pre-eminent.

Jealousies between departmental heads were natural and inevitable and this condition was likely to be exaggerated to an embarrassing degree in the field, where the district manager

Field Organization Problem

was in supreme command. The outcome of this situation was a compromise. Representatives of the home office, who, it should be remembered, were experts in their individual capacities, were, in case of dispute with the district manager, enabled to appeal to the home office, directly to their departmental chiefs. And, if the cause justified such action, the departmental managers carried the appeal to the general manager. Then the district officer either was upheld or overruled.

In theory this would seem to make for endless controversies and petty difficulties. Actually it worked out well and there were surprisingly few disagreements between the various district executives and field representatives of the home office.

The new organization scheme centralized final authority in the field in the district manager, who was the "last word" in all phases of ship construction, whether it was in a wood shipyard or in a yard constructing steel vessels. Only the general manager could give him orders, but as a matter of fact, he, in nearly all cases, accepted instructions directly from the construction divisions to which the general manager delegated authority covering technical construction details. The system brought about a better understanding between the field organization and the home office and made possible a tremendous financial saving by simplifying procedure and reducing the necessary personnel. It also avoided delay in the yards, occasioned previously by long waits for decisions at the home office. The district manager was on the ground to make decisions and his authority in the district was limited only by

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the general policy of the corporation and the direct rulings of the general manager.

In the later months of the war, the Fleet corporation was divided into two large functional departments. They were the production and the administration groups, with the district management group a combination of the two. The make-up of the corporation as a whole was duplicated on a similar scale in each of the districts. The district manager controlled a planning section, requirement section, steel ship construction, wood ship construction, supply department, etc., in his territory. In each district there were auditors, plant engineers, inspectors and disbursing agents all working under the general instructions of the home office, but responsible directly to the district manager.

The Fleet corporation was particularly fortunate in the selection of men for district managerships. In each case a manager possessing a high degree of executive ability and a thorough understanding of shipbuilding practice was in charge. Each one of them, too, was imbued with a spirit of enthusiasm which caused him to watch progress in his district with a jealous eye.

CHAPTER XVIII

U. S. Ships in Operation

SHIPBUILDING, during the war, was a subject of fascinating interest to the American public and the Emergency Fleet corporation's program was followed closely and critically by public press and magazines. It would be supposed that the people were well informed about the problems of the merchant marine, but since the armistice it has become evident that there is a misapprehension that is quite general. There seems to be a feeling that American merchant ships are, for the most part, nothing more than emergency vessels built for war purposes, and not at all of the quality of foreign ships.

The cause of this belief is due to several happenings, chief among which, perhaps, is the series of investigations conducted by the senate committee on commerce. Careful reading of all the testimony brought out at these hearings would allay any fear in the mind of a fair-thinking critic that the shipbuilding program was in any sense a failure. Some points were developed which would seem to reflect discredit upon certain phases of the enterprise, particularly upon the wooden ship as a permanent part of the American merchant marine. The daily accounts of these hearings, however, exaggerated in the mind of the public the errors and the

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extravagances which attended the program of ship construction by the government.

The truth is that the ships built in American yards since April, 1917, have been equal, if not superior, in quality to foreign built vessels. The wooden ships, it is universally admitted, are not the equal of steel vessels. On the other hand, they have not been the failure that the public generally suspects. A statement, issued soon after the signing of the armistice, by an authority on the subject, declared that the wooden ships were 97 per cent good. In other words, 3 per cent of the wooden ships were regarded as failures. That does not mean that these ships were able to compete with steel vessels in transoceanic trade, but it does mean that as coastwise cargo carriers they are an asset to the American merchant marine.

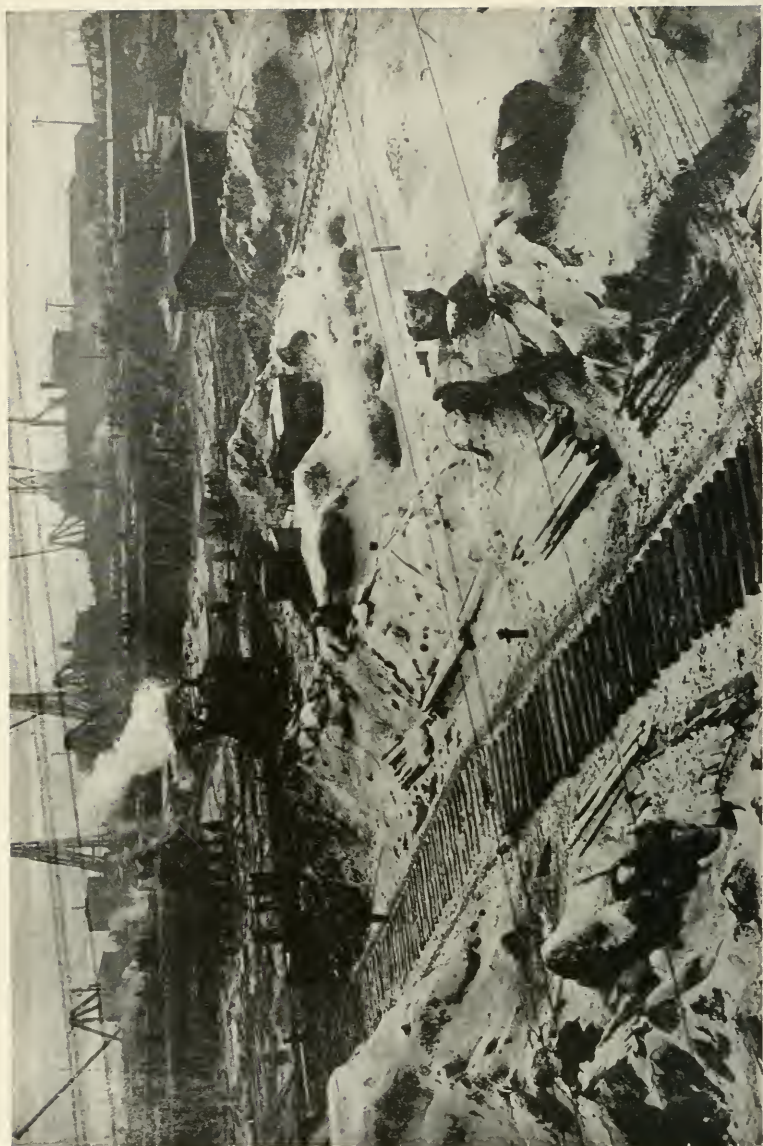
A feeling that American steel ships are not of the best is due in part to a belief that modern steel cargo vessels of good quality can not be constructed in the short time in which some of the "war babies" were built. The answer to this is the official approval by the American Bureau of Shipping, Lloyd's Registry and the experts of the Emergency Fleet Corporation of every vessel produced. The shipping board required an A-1 classification for all its steel ships. Lloyds agents were in every American yard and inspected every ship built, assuming responsibility for quality of hull material and equipment and for the operation of the vessel for a period of four years from time of delivery. That responsibility meant that if, for any reason, a ship passed

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upon by Lloyds developed faults due to poor construction, the agent who rated the vessel had to answer to Lloyds.

The captain of one of the ships built at the Skinner & Eddy yard at Seattle in record time, told me of his experience when his vessel, having crossed the Atlantic for the first time during the war, arrived at an English port. The fame of this ship had gone ahead of her. She was a 8800-ton vessel built in the remarkable time of 65 days from keel laying to delivery. The English experts in shipbuilding, with many years of experience behind them, were ready to criticize. They asked the captain of the American vessel if they could go over her for an inspection. He readily agreed and a group of experts examined the ship from stem to stern, expecting to find the hull full of water and the ship leaking at hundreds of faulty rivet holes. To their amazement they found her perfectly dry and they left the ship declaring she was as good a vessel of that type as English yards could produce. Doubtless many other episodes similar to this can be found to illustrate the real quality of American ships. The files of the operating division of the Emergency Fleet Corporation contain a great number of unsolicited testimonials from sea captains and operating companies telling of the sterling work of their vessels.

The winter of 1919-20 was exceptionally stormy upon the Atlantic and many ships met with disaster. All merchant ships flying the American flag, except a few which had been returned to their original owners, were operating as United States shipping board vessels. This included certain ships



RAPID CONSTRUCTION WORK UNDER WAY AT HOG ISLAND DESPITE INTENSE, COLD

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which were built abroad and were commandeered during the war, some of them of very poor construction. They included, too, certain vessels which had been in operation on the Great Lakes before the war and which were cut in two and taken through the Welland canal for sea service.

Since nearly all vessels under the American flag were controlled by the shipping board, it was a natural thing in news dispatches, heralding disaster to an American ship, to designate it a shipping board vessel. Thus the heading "Another Shipping Board Steamer Wrecked" became familiar to newspaper readers throughout the country and created an impression that many of the American merchant ships were unseaworthy. As a matter of fact, a majority of the vessels which met with disaster were either ships which had been commandeered, or were old vessels which had been taken out from the lakes. The latter, according to experts, were not fit for heavy sea service and it is generally recognized now that the shipping board's attempt to remake certain types of Great Lakes vessels for ocean service was an economic mistake, although the venture was justified by the emergency.

Curiously enough, the public belief that our merchant ships are of poor construction has centered criticism upon Hog Island, which, because of its great size and tremendous cost, was the natural butt of censure and ridicule. There is no intention here to enter into a defense of the cost of Hog Island. Doubtless extravagance occurred and it cannot be denied that the final expenditures amounted to double the sum that had been estimated originally. Many factors

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entered into this, among them the change in the size of the yard and the ways and the decision of the shipping board to build larger vessels at Hog Island than had been intended originally. Then, too, the severe weather conditions in the winter of 1917-18, which, at times, were so bad that it was necessary to thaw the contents of gravel and cinder cars before they could be unloaded, had much to do with running up the cost of this gigantic venture. Be that as it may, when reports began to come in of shipping board vessels in disaster at sea the belief became widespread that many of the ships were Hog Island craft. This country paid nearly \$70,000,000 for the Hog Island yard and something like a half billion for the ships constructed there. The public, therefore, is entitled to an accounting.

The plain truth is that the ships built at Hog Island during the war are among the finest examples of American merchant vessels turned out. When this is written, nearly 80 Hog Island ships are in operation and not a single one has been in trouble due to faulty construction. One vessel struck a mine and was wrecked off the coast of Holland. Another caught fire in her berth at Philadelphia and was damaged. None, with the exception of the vessel wrecked, has been unable to complete a voyage.

The idea of "manufacturing" ships, just as automobiles are manufactured, by having the material fabricated at the mills hundreds of miles way and assembled on the shipways was a new thing in marine construction. The New York Shipbuilding Corp. had tried it to a limited extent, but until

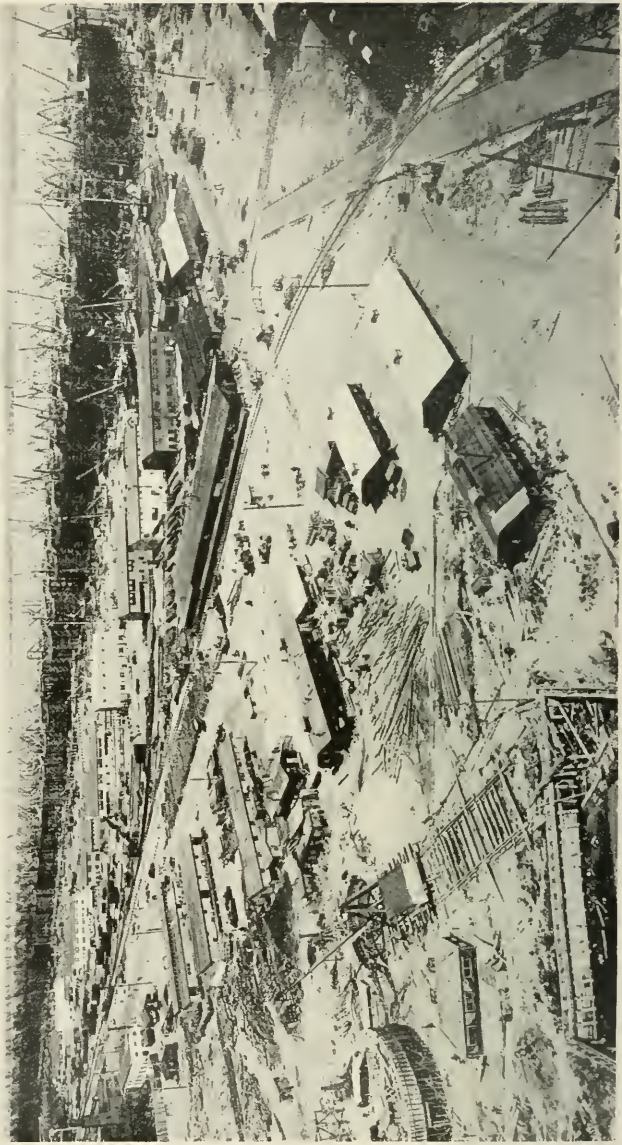
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Hog Island was built, there had never been an attempt on a wholesale plan to assemble a ship from material cut and fashioned entirely in the mills. It was, frankly, an experiment and nothing short of wartime necessity could have warranted such an undertaking. Men at the head of going yards, experts in the navy department, representatives of Lloyds and the American Bureau of Shipping were frankly dubious. Even if the parts were fabricated correctly and exactly (as they must be) in the several shops, how could it be expected that green men could do the riveting and assembling? That, in brief, was the basis for a storm of criticism that greeted the Hog Island project at the beginning.

The case of the *LIBERTY GLO*, the vessel which struck a mine and was wrecked, illustrates the quality of these fabricated vessels in a striking manner.

The *LIBERTY GLO*, under command of Capt. J. Stousland, hit the mine at 2:15 p. m., Dec. 5, 1919. She was bound from New York to a Dutch port with a cargo of cotton and 10 hours later would have arrived at her destination. She was off Ameland light ship and was making 11½ knots in a quiet sea when the explosion occurred under the after part of No. 2 hatch—well forward on the ship.

Fuel oil from the double bottom of the vessel was sent flying to the tops of the masts, accompanied by bales of cotton, barrels, bolts and miscellaneous pieces of steel and broken pipes. The screech of escaping steam created a fearful noise. The ship's back was broken and Captain Stousland ascertained in a few minutes that his vessel had been cut in



HOW HOG ISLAND LOOKED SIX WEEKS BEFORE FIRST LAUNCHING

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two from the waterline on one side, under the bottom and to the waterline on the other side. Ships thus seriously injured have been known to go down in a few seconds. The crew was panicky and started to rush for the lifeboats. Captain Stousland, however, wanted to stay by the ship and, as he wrote later to the shipping board, "It was only by using strong language that I succeeded in getting them away from the boats." The skipper ordered the anchor lowered from the forward end of the vessel, hoping that if the sea calmed, she would remain afloat until help arrived.

Now that vessel was held together only by the bulwarks and the deck plates. On these comparatively flimsy pieces of steel were suspended the weight of the vessel itself and about 5,000 tons of cargo. It was to be expected that, even if the plates held, the rivets would give way and the ship would founder almost instantly. Yet for nearly eight hours the ship held together; then, at 10 p. m. the bulwarks gave way. Now only the deck plates held her together.

Meanwhile Captain Stousland was sending out calls for help. He said afterward that he knew, if he could have succeeded in getting a tug boat under the stern of the *LIBERTY GLO*, he could have made port. But in the evening the weather began to thicken and no help had arrived. The crew was insistent upon getting away and finally the master could hold them no longer and gave permission for them to board the lifeboats. But like a true skipper, he decided to remain with his ship until all hope was gone. He told the crew to keep the boats under the stern and, if the vessel remained afloat, to

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return. But in the confusion and the noise of escaping steam, it was impossible to understand orders accurately and immediately after the boats were lowered, the crew cut the painters and disappeared in the darkness.

There was a heavy sea by this time and the crippled ship was rocking perilously, reminding Captain Stousland of a seasaw as he stood on the forward part of the lower bridge, watching the straining deck plates and wondering how long they could hold. In the distance he heard the roar of breakers and presently could see the white streak on the shore where the waves were pounding upon the rocks.

"They looked like the gleaming white teeth of a wolf about to devour his prey," wrote the skipper in his report.

At 4 a. m. the expected break occurred. With a tremendous roar of protest, the afterpart divorced herself from the bow and gradually began to drift away, toward the breakers. Time and again the combers swept over the decks. The night was dark; there were no lights on the vessel. Steam from broken pipes continued their deafening screech and over it all, the breakers roared a menace. And the skipper, alone, for all he knew, on the after part of the vessel, watched the breakers, wondering if his end of the derelict would remain afloat until she hit.

At 6:30 the vessel struck in the breakers, seas washing clear over her and "every time she hit, one would expect her to break in two." But she finally settled broadside, with no further damage, but making bad weather of it. For six hours longer, Captain Stousland remained on deck, setting off

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a rocket now and then, but not daring to attempt to swim the breakers. In the meantime he had discovered that he had company, the deck engineer and the third cook having remained aboard, saying, in explanation, that the life boats would not wait for them.

It seemed impossible for a life boat to weather those breakers, but at 9:30 a. m., the skipper saw a boat coming toward him, bobbing like a cork over the heavy combers. He had no idea that the crew—a Dutch life saving squad—could get alongside, but they succeeded in drawing near enough to throw out a net and he jumped into that and was hauled aboard the lifeboat.

Safely landed, the captain started for the nearest town and had the surprise of his life. Scarcely a mile and three-quarters from where the after half of his vessel had been driven ashore, he found the prow, resting easily on the sand. The forward part of the ship had drifted with the after part and had it not been for the drag of the anchor she may very well have come ashore much nearer the stern.

With the exception of the cargo in hold No. 2, under which the explosion occurred, the ship was intact. The boiler room, engine room and Nos. 4 and 5 holds were practically undamaged. No. 1 hold and the forepeak, on the forward half of the ship, were found to be full of water, but whether this was due to broken pipes or to the carrying away of the bulkhead, Captain Stousland was unable to determine. This water later was pumped out with the ship's own engines.

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After withstanding the poundings of North sea gales all winter, the ship was salvaged and brought into port.

That account is taken from the reports sent in by her master and from the records of the American International Shipbuilding Corp. and of the Emergency Fleet Corporation. It is a case that probably never has been duplicated in the operation of merchant vessels and the account deserves a place here because it so well illustrates the worth of these fabricated ships.

Operating troubles which have developed in American merchant vessels since the war have been due almost entirely to machinery failures. Some of the turbines manufactured in this country for the Fleet Corporation were not satisfactory and although every effort was made and expense was not spared, it was impossible up to the signing of the armistice to get satisfactory turbines for all of the Fleet Corporation vessels. This condition was remedied later and today the turbine manufacturers in America are said to be able to meet any emergency that may arise in the future.

CHAPTER XIX

Conclusion

THE Emergency Fleet corporation had a great asset in the ability of its leaders. These men, comparatively few in number, deserve unlimited praise and should receive a large share of credit for the corporation's success. They were selected with no reference to their political beliefs, the choice of executive officers being based absolutely upon their peculiar fitness to undertake the task in hand. This was true throughout the personnel of the corporation. Actual experience and proved ability were required of every man appointed.

One man among them all stands out as the real leader of the Fleet corporation's chief activity—the building of ships. Charles Piez, who became director general upon the retirement of Charles M. Schwab soon after the armistice, had been, since the resignation of Admiral Harris in December, 1917, in the position of vice president and general manager. Mr. Piez was the real pilot during the most important period of the corporation's history. He carried the burden of responsibility. He was the complete master of every detail of the corporation's work and he met unflinchingly every attack and every problem that arose.

He assumed the office of vice president and general manager in the darkest days of the corporation's early career.

Building the Emergency Fleet

It will be remembered that from April, 1917, until December of the same year the Emergency Fleet corporation was buffeted about in a maelstrom of conflicting elements. Congress apparently could not arrive at a definite policy and there was lacking a clear line of authority by which the great undertaking of building ships to meet the emergency of war could be directed intelligently and with precision. Through the change in the by-laws of the corporation, this situation was remedied. It might be said that that was the only advantage that the new general manager had over his predecessors. The corporation at that time was not organized for efficient direction of the shipbuilding program. Merely the skeleton of an organization was at hand to help in the tremendous task. Upon the general manager fell all the details of getting the machinery in working order, of seeing to the proper handling of contracts, directing the supply of materials and of meeting the constant flow of criticism emanating from congress and the public press.

Charles Piez worked day and night and he succeeded in bringing a high degree of order out of the confusion that had existed before his appointment. In the spring of 1918, the first contract ships were being delivered and much progress had been made toward providing skilled workers in the yards. For the first time it began to appear hopeful that the Emergency Fleet corporation would fulfill its obligations to the public and show results in time to be of aid in winning the war.

But the burden upon the general manager was too great. There were in the early months of 1918 indications of labor troubles. It became apparent that one of the things needed

Conclusion

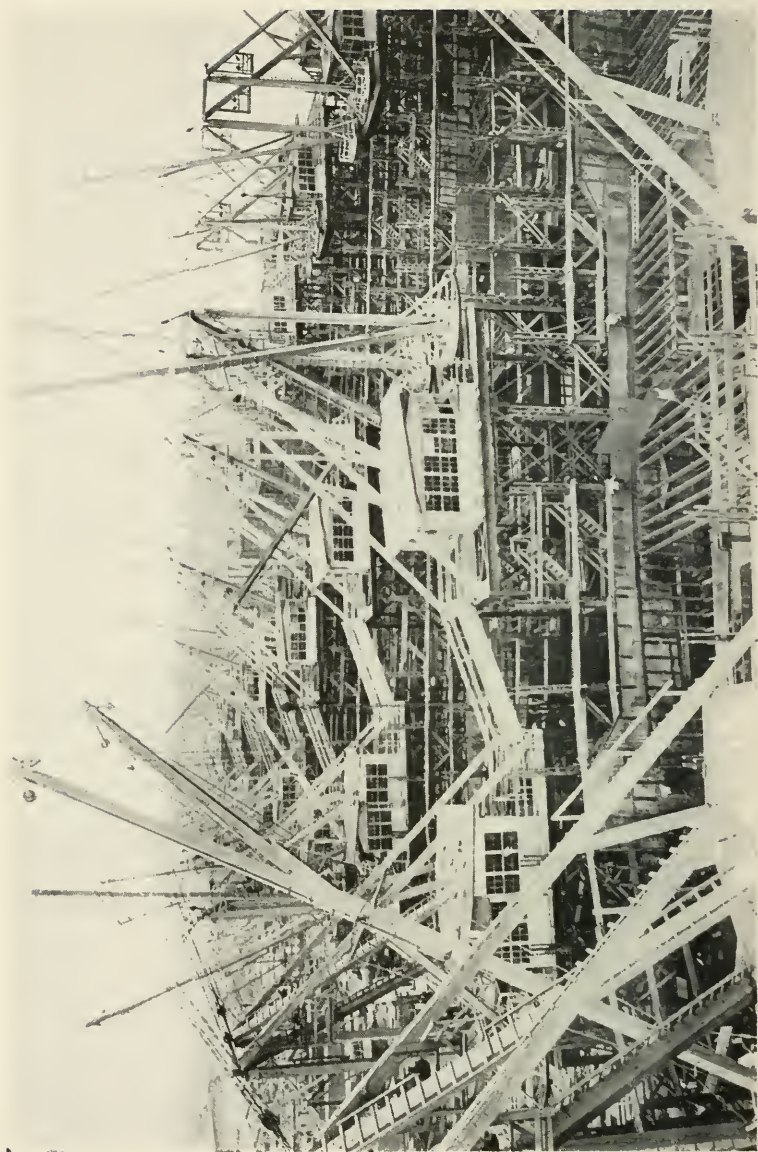
was strengthening the morale in the yards. Mr. Hurley, whose duties as chairman of the shipping board occupied so much of his time that he was forced to delegate practically all of his authority as president of the Fleet corporation to the general manager, saw the need of the services of a man widely and favorably known to the public to take command of the Fleet corporation's activities. Mr. Hurley consulted the President and, at the solicitation of the White House, Charles M. Schwab came to the corporation as director general.

Mr. Schwab is primarily an organizer and a builder of morale. His task was not to assume the details of administering the program of shipbuilding, but to popularize the enterprise, to create enthusiasm and loyalty among the workers. Mr. Schwab came to the corporation as a "moral influence," rather than as actual manager, although he was in supreme charge. He wisely remained, however, in a position of independence, so far as the details of management were concerned, and applied himself to the much needed task of imbuing the shipworkers with a spirit of accomplishment and patriotism. Mr. Schwab's success in this direction cannot be measured. He brought to the corporation an enthusiasm and energy that was contagious.

His theories of industrial relationship, already known to workmen throughout America, are epitomized, perhaps, best in his own words:

"I never ask a man to work for me. I want him to work with me."

The time came when "working with Schwab" was a shipyard slogan. The popularity of the director general spread



VIEW DOWN LONG SWEEP OF 50 WAYS AT HOG ISLAND SHOWING FOREST OF DERRICK MASTS

Conclusion

swiftly through the yards and shipbuilding seized upon the imagination of the public to such an extent that it was accorded a place second only to that of the American army in France.

When Mr. Schwab was asked to become director general, Mr. Piez felt that the new chief should have an absolutely free hand to work out his own theories of management. He, therefore, presented his resignation, which was promptly rejected by Mr. Schwab. The latter declared that he would assume office only on condition that "Charley Piez stays on the job." The two thereafter worked hand-in-hand and there was never a serious difference between them. The vice president and general manager remained in full control of the actual work of construction, with no interference from the director general. On the other hand, Mr. Schwab stood ready at all times to offer his ripened judgment on matters of policy and his advice was found of invaluable aid on all occasions.

In the early summer of 1918, the director general made a tour of the shipyards on the Pacific coast, accompanied by Mr. Piez. Throughout the war the western yards maintained a lead in ship production over their rivals in the East, South and Great Lakes region and the visit of the executive officers of the Emergency Fleet corporation was a tribute to their prowess. During the tour, Mr. Schwab and Mr. Piez were heard by hundreds of thousands of workmen. Everywhere they had words of praise and encouragement to the men employed in the yards. It was sincere praise and well merited—and it had the added virtue of being diplomatic. Everywhere that Schwab and Piez appeared, the men caught the enthusiasm of the

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leaders and went at their tasks with renewed vigor. The "two Charleys," as the pair was popularly known, succeeded in speeding up output to such an extent that world records were sent tumbling and America became the greatest tonnage producer ever known.

Schwab was a tonic and an inspiration. Had he taken no part whatsoever in directing the details of policy and management of the Fleet corporation, his services would have been invaluable, because of their moral effect.

Soon after Mr. Schwab came to the aid of the nation, Mr. Piez succeeded in obtaining the services of Howard Coonley. Mr. Coonley was president of the Walworth Mfg. Co., Boston, a director in numerous other manufacturing and financial institutions and a thoroughly successful business man. He was an expert in matters of organization and administrative procedure and it was in that field that he made his most conspicuous success with the Emergency Fleet corporation—though other phases of his activities were fully as valuable, if not so conspicuous.

The corporation, in the spring of 1918, was suffering from many ills. The rapid growth of the organization and the pressure under which every task had to be performed permitted little time or opportunity for careful assembly of the proper units, so as to avoid overlapping of authority, unnecessary expense and waste of effort. Mr. Coonley, coming into the corporation as vice president in charge of administration, turned his attention straightway to regrouping various departments according to related functions and authority. At the same time,

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he relieved Mr. Piez of active control and administration of certain divisional groups and gave the general manager more freedom to devote his attention directly to problems bearing upon ship construction.

Under Schwab, as director general, Piez as vice president and general manager and Coonley as vice president in charge of administration, the organization assumed "fighting form." Mr. Piez was not, in a technical sense, a shipbuilder. Although a graduate in engineering at Columbia university and an experienced and successful executive of a large manufacturing company, he laid no claim to knowledge of marine architecture and he had to depend, therefore, upon a capable and experienced shipbuilder of technical training.

Lieut. Commander J. L. Ackerson, United States navy, who had been connected with the Emergency Fleet corporation since the early days, when he came as an aide to Admiral Capps, then general manager, was appointed vice president and assistant general manager and relieved Mr. Piez of the responsibility for technical details of production. Mr. Ackerson, as naval constructor, had wide experience in shipbuilding and he proved a thoroughly competent and able man.

There was created, during the process of reorganization, two distinct fields of activity within the corporation, which may be designated as the construction side and the administrative side. Both, of course, dealt with ship construction. Operation of ships, which was delegated to the corporation by the shipping board, was carried on as another distinct activity, with headquarters in Washington, under the management of

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John H. Rosseter. No attempt will be made here to deal with the intricacies of ship operation. This is intended to be a record, only, of the development of ship construction activities.

Throughout the war, the scope of the Emergency Fleet corporation shipbuilding work was subject to the needs of the war department. Through Chairman Hurley, of the United States shipping board, the general staff of the army kept in close touch with building operations and the corporation, in turn, was constantly in touch with the needs of General Pershing and his army in Europe. Thus the Emergency Fleet corporation became a vital instrument for carrying on hostilities and this fact gave a patriotic fervor to the task that proved highly valuable.

When October, 1918, arrived, the Emergency Fleet corporation was producing ships at a rate that was undreamed of before the war. One month before the war ended, the corporation had "hit its stride." There were delivered in October a total of 77 vessels, of all types, aggregating 398,000 deadweight tons. Compare that with the total output in America in 1916—the best prewar year—285,000 deadweight tons! It was an achievement in which all America took pride and there can be no doubt that it had a great bearing upon the outcome of the war.

America's ship production doomed the German submarine war to failure and broke down Germany's reliance upon her most effective weapon.

As if in answer to America's shipbuilding triumph in October, the armistice was sought by Germany in November.

How the Big Corporation Was Organized

By Howard Coonley

OF THE many problems faced by the great emergency activities undertaken by the government during the war, none was more important than that of organization. Starting over night with the responsibility thrown on a single individual, there was only one method of improving the situation, and that was to requisition the ablest men of the country to take up each in his own fashion, without the opportunity to study, the peculiar activity for which his training fitted him. Each in turn brought about him a group of men in whose ability he had confidence. So there was erected a structure of distinct, unco-ordinated activities, each being accomplished, and in almost all cases, ably accomplished, by the methods outlined according to the characteristics and temperament of the managing head.

For the immediate exigency no other procedure would have been possible. The results obtained were remarkable. The same reasons, however, that made the starting of the component parts of the great machine by this method successful, destroyed its efficiency when it was in motion. While the multitudinous activities were in their inception, diversified methods of management were possible. When the time came to merge these units and cause them to function with each

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other, it became essential to set up a uniformity of standards and practices, which is the natural basis of organization.

None of these great agencies of the government provided a more interesting organization problem than the United States Shipping Board Emergency Fleet Corp. Its function including the construction of shipyards, building of equipment plants, designing of vessels and machinery of all types, training a vast army of skilled workmen, building villages and railroads, converting swamps and waste places, ran the gamut of human endeavor. To lead these arteries, extending not only throughout the country but throughout the world, into a controlling organ was the problem about which the administrative work largely centered.

Although actually there was no corporate separation of the construction division and the operating division of the Emergency Fleet corporation, the work was so differentiated and the physical separation of the offices such as to obtain the same results. The work of Mr. Schwab's group concentrated entirely on the actual building of ships, shipyards and equipment plants, and it is with this branch of the activity that we treat.

Many times the shortest distance between two points is not a straight line. This is particularly true of the work of organization. It is very wise to set up a finished program to shoot at, but the path toward this finished product should be a series of steps planned with care and taken smoothly, rather than at a single plunge.

The fine results of Mr. Schwab's work were obtained

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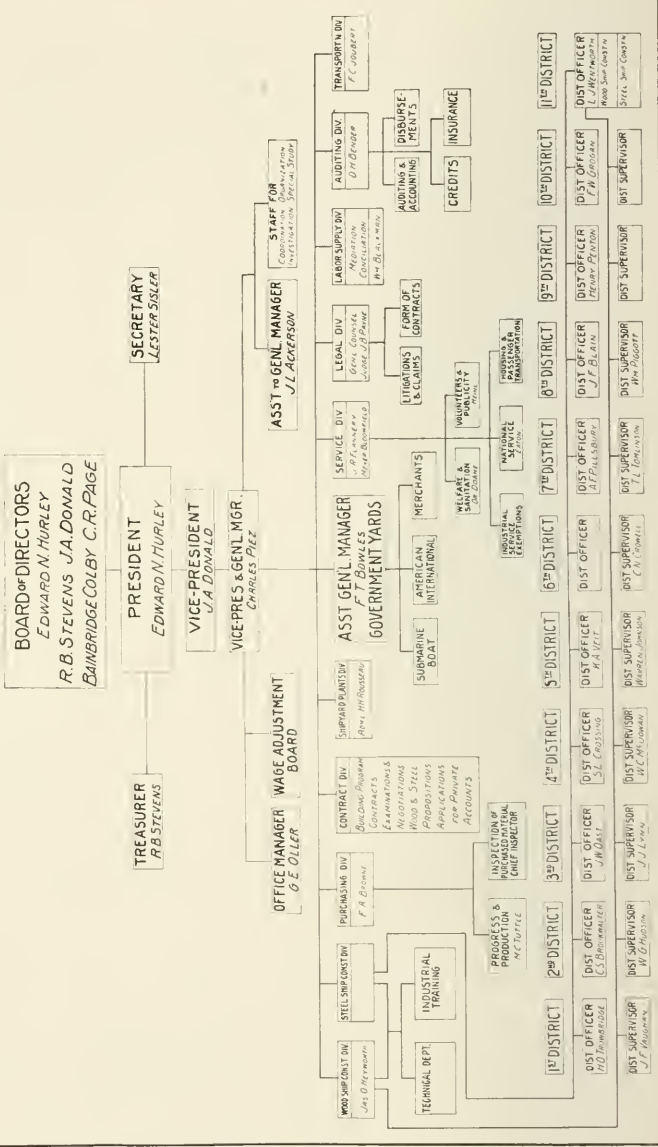
through his ability to inspire enthusiasm and co-operation. It was with the employment of his own tools that we could secure the best results. Therefore, through the organization and methods section, an intensive study was made of a proper finished program best fitted to handle the work of the great volume and diversity of the Fleet corporation. With this program finally definitely outlined, the first step was planned. The advice and co-operation of each department affected was sought, and as each stage of our development was set up, the results to be obtained were carefully explained to all major executives and their advice and approval secured so far as that was possible.

It would take an entire volume to cover in detail our procedure. The two accompanying charts will possibly give a better idea than could be done otherwise. The aim of our efforts was to establish a direct line of authority and responsibility and to bring into uniformity and close co-operation the efforts of all the departments.

In brief, the organization set up was that of two active vice presidents reporting to the director general. One vice president was placed in charge of the activities having to do with plant or ship construction, the other in charge of the duties of administration and finance. Under these two vice presidents were grouped the managers of all the divisions and sections in the home office.

Probably the most difficult problem that we undertook was the method of setting up and controlling our district offices. Here we had an unusual situation because of the fact

ORGANIZATION CHART OF THE EMERGENCY FLEET CORPORATION



ORGANIZATION CHART OF FLEET CORPORATION PRIOR TO MAY 1, 1918

EMERGENCY FLEET CORPORATION

CHAS. SCHWAB, President; CHAS. PIEZ, Director; W. H. HARRIS, Secretary

OFFICE OF THE PRESIDENT

OFFICE OF THE DIRECTOR

OFFICE OF THE SECRETARY

CHAS. SCHWAB, Director General

SHIP PRODUCTION

ADMINISTRATION

DISTRICT MANAGEMENT GROUP

LOCAL DIVISIONS

ADMINISTRATIVE DIVISION

CONTRACT DIVISION

GENERAL DIVISION

FINANCIAL DIVISION

AUDITORS OFFICE

GENERAL OFFICE

SHIP PRODUCTION DIVISIONS

COMPTROLLER'S OFFICE

GENERAL OFFICE

GENERAL OFFICE

SHIP PRODUCTION DIVISIONS

COMPTROLLER'S OFFICE

GENERAL OFFICE

GENERAL OFFICE

SHIP PRODUCTION DIVISIONS

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SHIP PRODUCTION DIVISIONS

COMPTROLLER'S OFFICE

GENERAL OFFICE

GENERAL OFFICE

SHIP PRODUCTION DIVISIONS

COMPTROLLER'S OFFICE

GENERAL OFFICE

GENERAL OFFICE

GREAT LAKES DISTRICT

NORTH PACIFIC DISTRICT

SOUTH PACIFIC DISTRICT

GULF DISTRICT

SOUTHERN DISTRICT

PUBLIC ATLANTIC DISTRICT

DELAWARE RIVER PLANTS

SHIPBUILDING PLANTS

ORGANIZATION CHART OF FLEET CORPORATION AT THE TIME OF ITS GREATEST EFFICIENCY

Building the Emergency Fleet

that in our districts were miniatures of every one of our major home activities, each activity at first being handled as a separate unit by the home office. It was important in view of the speed with which we were operating that there should be direct communication between the executive in the home office and his representative in each district, and yet it was essential that there should be harmony and co-operation in the district itself.

After much consultation and deliberation, it was decided to create in each district a manager who would have general supervision and authority as far as local questions were concerned. At the same time, the work of each department was handled direct from the executive in the home office to his representative in the district, a copy of all important orders clearing through the district manager. With daily information as to what each district representative was doing and a close physical contact with this representative, it was possible to anticipate any action that might cause friction.

Another of the major problems that was successfully and rather uniquely handled was that of standardization of salaries and titles throughout the whole organization. Out of the chaos that was bound to result from the hurried assembling of individuals from all walks of life and from all parts of the country, was developed a plan which set up a definite standard of work, a firm control of salary payments and an approximation to a budget system of departmental expenses, yet one providing considerable flexibility.

How the Big Corporation Was Organized

It is not such a far cry as would at first seem the case, from the problems forced upon us by the emergency of a world war, to the daily exigencies which any great industry must meet. The demand upon the individual industry is increasing steadily, not only for production, but to meet its obligation to its employes, to the community and to the country. It is possible and desirable to apply the same principles to the individual organization as have proved of service in the emergency.

Whether a business be great or small, the fundamental problems are the same and can be controlled by identical methods. It is in the detailed carrying out of the principles that the treatment should differ, according to the size and complicity of the undertaking. Just as the manager of a small institution lays out years in advance his plans for physical development, so will he more and more realize the equal importance of providing long in advance a sales campaign, a financial program and development of personnel competent to handle this future expansion.

The setting up of an administrative organization is not the complex problem most business men seem to fear. First of all, unless it be flexible, easy to mold to fit the individual characteristics of the men who are to operate it, the plan is of no value. As the small institution is always building to the great, the latter alone need be treated.

In the administration of a great industry there are three major activities—production, distribution, finance. To obtain the greatest value out of each of these vital activities requires

Building the Emergency Fleet

that each be responsible to a single head and that in authority and importance all three be placed on a parity. For my own part, I am convinced that 100 per cent efficiency can only be attained by having a single individual in command, working within restrictions imposed by the board of directors alone. An executive committee, if acting in more than an advisory capacity, slows down the wheels by delayed decisions and divided authority, and destroys the *esprit de corps* that comes as the organization learns the character and methods of its chief executive and single navigator.

Under its head, or president, as he is generally named, the organization should have three major deputies or vice presidents—one a vice president in charge of production, another vice president in charge of distribution, or as we now commonly term it, sales, and the third a vice president in charge of finance and administration.

There is nothing unusual in having production and sales activities under the direct supervision of two of the major executives holding positions of equal authority. The advisability of creating a third position of parallel importance to production and sales, which covers most of the other problems of industry, is a more modern development.

Unfortunately the days of the "short lines" are over. With all the marvellous inventions of today has grown a demand on the part of the consuming public for all sorts of shapes, sizes and designs which the manufacturer has not been strong enough or wise enough to withstand. This has not only multiplied by a very considerable amount the value

How the Big Corporation Was Organized

and variety of the finished stock, work in process and raw material inventory the manufacturer must carry, but has created the necessity of a very intricate system of accounting and control to avoid the financial quagmire. It is no longer safe to operate without an intelligent estimate in careful detail of the possibilities of distribution of your particular merchandise and to base your production plans and financial requirements upon this estimate.

The gathering of the data necessary for such an estimate and its readjustment from month to month to meet the constant fluctuations that arise, is one of the principal duties of this third vice president. To this may be added the general supervision of accounting and expenditures, the oversight of the functions common to all the departments, such as clerical, stenographic, filing, etc., and the direction of the personnel problems.

In a brief sketch such as this, it is impossible to do more than draw in the faintest outline the method of working out a proper organization. Yet it would fail entirely in its purpose if it did not prove the necessity of the chief executive attaching to himself an individual or group of individuals to act as a staff to study and recommend the proper steps in the development of this organization work. Without its "organization and methods section" the Fleet Corporation would have been totally unable to carry out its working program. Without an "organization staff," whether composed of one man or one hundred, having the proper intelligence and ability to set up procedures, obtain the assistance of and recon-

Building the Emergency Fleet

cile the differences between the various departments affected and to advise and assist in the installation after the procedure is settled, any attempt at organization would be doomed to failure.

These are days of rapid movement and quick change. That executive is wisest who is best prepared to adapt himself without hesitation to any contingency that may arise. Unless his house is in order, unless he is equipped with a well organized, smoothly running machine, following a program that is intelligently planned, he cannot hope to make the most of his opportunity.

HOWARD COONLEY.

Suggestions on Establishing an American Merchant Marine

By Charles Piez

THE achievement of the Emergency Fleet corporation, signal as it was, will be negative in large part if lack of courage and vision prevent the organization and successful development of a real American merchant marine.

The members of the Emergency Fleet corporation took pride in the fact that their work was really constructive and that the fruits of it would find permanent and profitable employment in carrying American products to the far reaches of the earth. To them, the failure on the part of the United States shipping board to develop, during the past year and a quarter, any really definite policy for the establishment of a merchant marine, seems little less than tragic.

The repeated changes in the headship and personnel of the shipping board since E. N. Hurley retired, more than a year ago, account, in part at least, for the lack of progress. Congress has gone the limit in legislation to aid in the establishment of our merchant marine, but legislation without effective executive action is fruitless.

We started at the wrong end of the problem and will have to begin over again before we can hope to launch America's new merchant fleet on a successful career.

Building the Emergency Fleet

Mr. Hurley, in the plan submitted by him in the spring of 1919, voicing an almost universal popular sentiment, declared positively for private ownership and private operation. As defining our ultimate policy, that declaration was sound, but Mr. Hurley failed at that time to indicate the steps by which the heterogeneous and illy balanced fleet, which the exigencies of war had brought to the government, could be converted into an effective aid to American overseas commerce.

Soon after the armistice, the officials of the fleet corporation and its then board of trustees, in an endeavor to determine upon a wise plan of cancellation, called together some of the leading shipping men of the country. These men, after several conferences with the officials of the corporation, and after a survey of the fleet then under construction, submitted a report, under date of Feb. 10, 1919, recommending that "the wooden, composite and concrete vessels, completed or otherwise, be sold with the privilege of transferring the flag, as fast as they can be disposed of, and that of the steel vessels of 5000 tons or under, approximately one-half be sold with the right to transfer the flag, and that in their stead, a higher type of cargo steamer, or combined cargo and passenger ship, be built."

Both the President of the United States and Mr. Hurley were in Europe at the time the report was submitted, but the board of trustees of the Fleet corporation so fully approved of the report of the committee, that it sought permission from the President to sell steel ships with the right of transfer of flag, so that the fleet then under way could be balanced to meet the operating needs of our overseas commerce.

Establishment of an American Merchant Marine

But the desire for an American merchant marine which would rival the commercial fleet of England was, at that time, so strong in administrative circles that it was impossible to secure from the President permission to sell any steel ships for foreign account although there was an active market for vessels of small size at that time. The failure to appreciate that our fleet as it then existed had a very much larger proportion of small vessels than we could handle successfully, has added seriously to the problems confronting the shipping board.

Very strenuous efforts were made before I left the Fleet corporation to balance the fleet, and these efforts had the hearty approval of Chairman Hurley and the board of trustees, and the aggressive support of John R. Rossiter, who was then director of the division of operation.

But these efforts apparently died of inanition, in spite of the fact that a wise and constructive merchant marine policy could only be arrived at through the determination of what to keep and what to sell.

The American people are conscious of the necessity of establishing a merchant marine. They are not informed, however, as to the size and character of the fleet which we ought to maintain and are not, therefore, prepared to lend active pecuniary support to a policy which is intended to maintain a fleet of indefinite proportions and indefinite specifications.

The Jones act is a very wise piece of legislation and grants to the United States shipping board all of the authority and most of the advantages necessary to establish a successful merchant marine. The act recognizes the necessity of predetermin-

Building the Emergency Fleet

ing the character of the fleet, for in Section 6 it provides that "the board is hereby authorized and empowered to sell to aliens, at such prices and on such terms and conditions as it may determine, such vessels as it shall, after careful investigation, deem unnecessary to the promotion and maintenance of an efficient American merchant marine."

The first step that the board, when it is reorganized under the Jones act, should take, is the step that should have been taken a year and a half ago, namely, determine the size and character of the American merchant fleet. In reaching this determination, it will be well for the shipping board to remember that the act itself provides "that it is necessary for the national defense and for the proper growth of our foreign commerce, that the United States shall have an American merchant marine of the best equipped and most suitable type of ships, to carry the greater portion of its commerce, and serve as a naval, or military auxiliary in time of war, or national emergency, ultimately to be owned and operated privately by American citizens."

The act, as it will be seen, in specifying the need for the establishment of a merchant fleet, gives precedence to the defensive and offensive needs of the nation in time of war, or other national emergency, and it would be wise to follow that order in determining the character and size of the fleet which we are to retain, or construct, to serve as a nucleus for the greater American merchant marine of the future.

The first step to be taken should be to call on the navy and the general staff of the army to submit to the shipping board the character and size of a fleet necessary to keep our

Establishment of an American Merchant Marine

naval vessels in foreign waters, and to transport quickly and to maintain on foreign shores an army of, say, one million men. The specifications thus arrived at should then be submitted to our leading shipping men, to determine what changes they would suggest, so that the fleet, thus determined upon, would prove a useful and profitable instrument for American needs. The reports thus submitted should include the vessels that will be necessary to carry nitrates, sugar and other essential raw materials, during time of war, and those necessary to take care of the export of our surplus food products during a national emergency.

The coastwise fleet need not be given consideration in this program, because it will grow as our needs will appear.

The fleet, determined as above indicated, would I am sure, represent a well balanced one, judged both from our shipping needs and from an operating standpoint, and would prove an excellent standard by which the fitness of vessels in our existing fleet could be judged.

All vessels that would not conform within certain prescribed limits to the general specifications set down for the ideal fleet should be sold with the right to transfer the flag and should not be permitted to participate in any exemptions, preferences, or other advantages which legislation has created, or may create, for the purpose of establishing and maintaining our merchant fleet.

The steps advocated consist, therefore, in ascertaining which of the vessels now included in our fleet are unnecessary to the promotion and maintenance of an efficient merchant marine

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and in disposing of these ships so that such privileges and pecuniary advantages as are provided by law for the upbuilding of our merchant marine will go only to those vessels upon the operation of which the success of our merchant marine will depend. Our merchant marine, if it is to succeed at all, can succeed only during its earlier period by the fostering care and concessions given by the government and it is essential, therefore, that this care and these concessions be not extended to vessels which would not be able to maintain themselves in a competitive field, even under favorable conditions.

Our overseas commerce must be built up in competition with strongly entrenched and widely experienced foreign shipping interests, and on that account the United States shipping board will have to exercise direct control and supervision over the entire merchant fleet, so as to prevent harm to American interests from internal competition. And the board must extend to our merchant fleet as a whole, the advantages resulting from the development of proper feeder lines and the construction of properly located fueling stations.

I believe that in order to insure that unity of policy, without which American shipping interests will not succeed against world competition, it would be advantageous for the United States shipping board to have minority representation on the boards of shipping companies for a period of not to exceed five years, or until at least 50 per cent of the purchase price of the vessels has been paid. It should be understood that the presence of such representation on the boards of these various shipping companies is intended only to insure unity of policy

Establishment of an American Merchant Marine

and harmony of action in the face of foreign competition and not for the purpose of restraining initiative or enterprise on the part of the shipping corporations.

If we are going to live against British competition during these early years of our shipping experiences, we must develop a national policy and secure the cordial co-operation of all of our overseas shipping interests, to the maintenance and extension of that policy.

The shipping board will, I am sure, fail in its purpose if it delegate to each individual shipping unit the development of a policy based on the selfish interests of that unit. For a number of years, or until our commercial fleet becomes really established on the seas, the shipping board must, of necessity, exercise general supervision of all shipping activities, in order to insure unity of action under a wise national policy.

Our early years cannot be too ambitious. We must content ourselves with the establishment of a moderate-sized but efficient marine and rely for its extension upon the successful and profitable use of this merchant fleet in our own foreign commerce. Let us have a strong, well balanced, but moderate-sized nucleus fleet to begin with. Let us develop it to strength and maturity under such government care as the Jones act provides and, after that, this nucleus fleet will take care of its own expansion in such a way as will best serve American interests.

September, 1920.

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