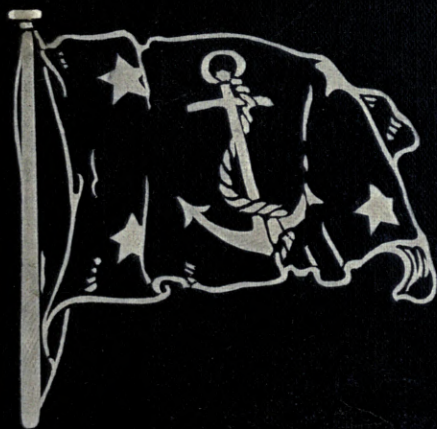


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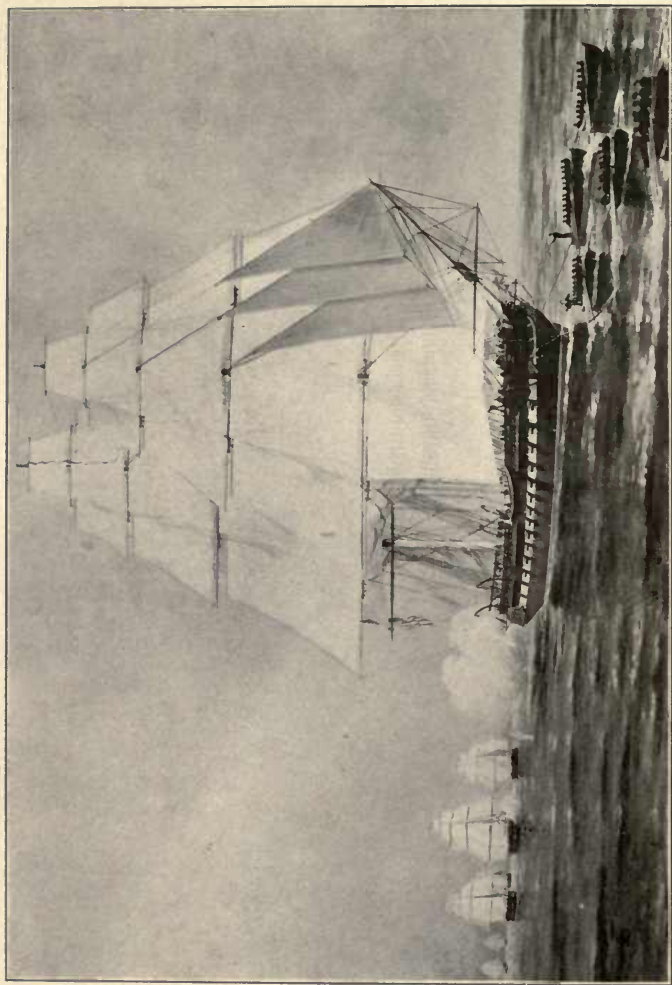
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The chase of the *Constitution* by an English squadron in the War of 1812. Due to a calm the ships were towed by their small boats. (From an old painting)

# THE UNITED STATES NAVY

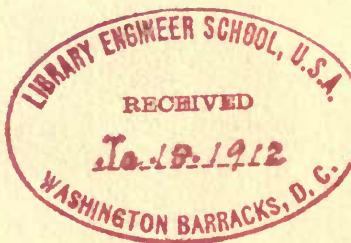
A HANDBOOK

BY

HENRY WILLIAMS

NAVAL CONSTRUCTOR, U. S. NAVY

*Illustrated from Photographs*



NEW YORK  
HENRY HOLT AND COMPANY

1911

H. E.


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## PREFACE

IN the course of the author's tour of duty in the Navy Department, he was called on frequently to prepare answers to letters requesting information about the Navy. These letters came from all parts and all classes. The widespread interest indicated in this manner, coupled with the absence of a book of general information regarding the Navy designed for general reading, induced him to undertake the preparation of this book. It is intended primarily for the information of persons having some interest in naval affairs but it is not technical. Only subjects of possible general interest have been discussed, and those only so far as they seemed to supply interest.

There is at all times a demand on the press for news of the Navy's doings. The author frequently has had the privilege of furnishing information and data to newspapermen for use in their paragraphs and has in this way also felt the need for a simple manual or handbook on the Navy.

Another inducement for the preparation of the book was the fact that the Navy's enlisted

men are drawn almost entirely from inland states; many of them previous to their enlistment never saw the ocean. The friends and relatives of these men have had no ready means of satisfying a natural desire to be informed as to the Navy.

H. W.

OCTOBER, 1911

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**THE UNITED STATES NAVY**





## CHAPTER I

### NAVAL HISTORY

THE foundation of the United States Navy was laid when, in 1775, during the War of the Revolution, the Continental Congress authorized the building of thirteen war vessels, and thus established the Continental Navy, with a roster of officers, Captain Esek Hopkins being Commander-in-Chief. One of the lieutenants was John Paul Jones, who, becoming a captain shortly after, did more than any other one person in organizing the young Navy and placing it on a recognized basis.

It was necessary to pattern the new naval organization after that of England; customs, regulations, and traditions taken in this way from the English are still retained in the United States Navy. Due largely to the abilities and courage of Captain Jones, the Conti-

mental Navy soon rose superior to the English Navy in point of efficiency, seamanship, and gunnery. Jones demonstrated the possibility of vanquishing in equal combat an English man-of-war, a feat that had been regarded as impossible. When, on several occasions, the most notable of which was the victory of the *Bon Homme Richard* over the *Serapis*, he gained victories over English ships of equal or superior force, the American Navy won its spurs, and from thenceforth the world was destined to recognize the new nation as a factor on the seas.

Besides the engagements of Captain Jones, and a few others, the activities of the Continental Navy consisted largely in preying on the English merchant ships. Similar feats and results, no less important, were achieved by vessels armed by the individual States or Colonies, and by the many privateers, authorized by the Continental Congress, and sent out by private enterprise. It has been stated on good authority that more men fought for their country's

liberty on the sea than on the land, and the results achieved are considered by many to equal, if not surpass, in importance those of the land forces under General Washington.

The naval war was carried by Jones and others into the enemy's home waters, and, for the first time in history, merchant ships plying between England and Ireland required a naval convoy for their protection from Yankee privateers.

Another important feature of the naval activities of the Colonies was the capture of British seamen, of whom no less than 16,000 were made prisoners on the high seas during the Revolution by American war craft. These seamen could not be replaced by the English, as could the mercenaries who fought their battles on land, and consequently their loss was felt more seriously. Added to the enormous losses inflicted on the commerce of Great Britain, these conditions contributed in no small measure to the willingness of the English to make peace. In all over eight hundred British ves-

sels of all kinds were captured by the American sea forces during the Revolutionary War.

At the close of the Revolutionary War other matters more pressing than the maintenance of a Navy absorbed the attention of the States, and for many years even after the "more perfect Union" had been formed, it was too poor to afford a Navy. The tendency, now observable, to neglect in time of peace to prepare for war, existed more strongly then. All the warships of the Continental government were sold, and for several years there was no national Navy, though many of the States had armed ships to protect their ports and to convoy their merchantmen.

During the general European War consequent on the French Revolution, the commerce of the United States grew very rapidly, and in almost every European port there was at least one trim clipper bearing the Stars and Stripes of the new nation. Piracy, privateering, and lawlessness on the ocean, and the outrages of the Barbary pirates in the Mediterranean, how-

ever, soon brought the country to realize the necessity for a war Navy. In 1794 Congress, no longer able to overlook the conditions, after listening to a message from President Washington, detailing the depredations of the Algerians, passed an act authorizing the construction of six frigates. This was the beginning of the present Navy and, though so many years have elapsed, two of the ships built then, the *Constellation* and the *Constitution*, still are afloat. Officers were chosen and an organization established based in large measure on that existing during the Revolutionary War, many of the officers being the same.

The ships designed at this time were, as was proved frequently in battle, the superiors in speed, manœuvering, and offensive power to similar vessels of their day. American naval constructors, even in those early days, aimed at a higher standard of warships than their foreign contemporaries. England, in self-defense, was forced later to build frigates on the same plans, and in this respect also

history has repeated itself to the present day.

Before the completion of these vessels peace was concluded with the Barbary nations, so that three only of the six vessels were finished and the materials for the other three were sold. This peace involved the payment of considerable sums of money and annual tributes to the pirates. Had the money so paid been devoted to defense rather than to tribute, a Navy that could have annihilated the pirates might have been equipped.

President Washington, in a speech before both houses of Congress in 1796, said: "To an active, external commerce the protection of a naval force is indispensable. To secure respect to a neutral flag requires a naval force organized and ready to vindicate it from insult and aggression."

In 1797 the depredations of the French men-of-war and privateers became unbearable, so much so that in spite of the disinclination of many Americans to make war against their

former allies, orders were issued by Congress to United States war vessels to capture French cruisers wherever found. Though there was at no time a formal declaration of war against France, the record of eighty-four French armed vessels captured, besides many American vessels recaptured, shows that the young Navy was emulating the example set during the Revolutionary War.

No sooner had the French obtained peace than there was found work for the Navy in the Mediterranean; the Barbary pirates, to whom tribute had been paid, grew in rapaciousness, demanding more and more. Accordingly it was decided in 1802 to send a squadron to bring them to terms, and operations were carried on against the various Barbary nations until 1805, when peace was signed.

Experience gained in the various engagements against the French and Algerians was destined to stand the American officers and men in good stead, for the United States soon declared war against the most powerful nation in

the world, which then was flushed with numerous victories over the other nations, and had on its navy list more than 1,000 men-of-war, of them 250 ships-of-the-line. Small wonder was it that the English, with memories of long years of conflict and of practically undisputed supremacy on the ocean, laughed at the idea of the Americans giving battle to their unconquered and, as they thought, unconquerable ships. Men and not ships carried the day for the Americans, superior marksmanship determining the result of many engagements. The war was decided on the sea, as the armies of the United States almost invariably suffered defeat. The activities of the ships of the Navy and of the various privateers resulted nearly in driving English commerce from the sea.

Commenting on the treaty of Ghent, which ended the war, the *London Times* of December 30, 1814, wrote: "We have retired from the combat with the stripes yet bleeding on our backs. Even yet, however, if we could but close the war with some great naval triumph



the reputation of our maritime greatness might be partially restored. But to say that it has not hitherto suffered in the estimation of all Europe, and, what is worse, of America itself, is to belie common sense and universal experience. Not only two or three, but many of our ships on the ocean, and whole squadrons on the lakes, have struck to a force vastly inferior; and the numbers are to be viewed with relation to the comparative magnitude of the two navies. Scarcely is there an American ship of war which has not to boast a victory over the British flag; scarcely one British ship in thirty or forty that has beaten an American. With the bravest seamen and the most powerful navy in the world, we retire from the contest when the balance of defeat is so heavy against us."

The Barbary States still smarted under the punishment they had received from the American squadron in 1804-05, so, believing that the small Navy of the United States would be annihilated by her formidable enemy, and encouraged by the English agents, they did not fail to

take advantage of the war with England to show again their animosity. The conclusion of the war found the Americans in no humor to submit to any insolence, and, in less than five months after the treaty of Ghent was signed, a squadron was despatched to the Mediterranean. This brought to terms promptly the Barbary rulers, and they were forced to agree to relinquish all claim in future to tribute, and to guarantee the safety of American commerce from Corsairs in those waters.

Upon the conclusion of this peace, the American squadrons under Captain Decatur and Captain Bainbridge, assembled in the harbor of England's great stronghold, Gibraltar. The presence of these squadrons, which included the captured British vessels *Guerrière*, *Macedonian*, *Epervier*, and *Boxer*, and the formidable appearance of the American vessels, caused no little chagrin in the British garrison.

With these incidents, the United States ceased for thirty years operations against an organized hostile nation.

The Navy was engaged, however, in other ways. The suppression of piracy in the West Indies required its services from 1821 to 1825. In compliance with the terms of the Webster-Ashburton treaty with England in 1842, there was maintained for many years a squadron to patrol the coast of Africa for the suppression of the slave trade. Many slavers were captured and much was accomplished toward ending the iniquitous traffic.

To avenge the treacherous murder by natives of Qualla Battoo, on the coast of Sumatra, of the crew of the American brig *Friendship*, the frigate *Potomac* was sent in 1832. A force was landed which attacked the natives in their strongholds, destroyed the strongholds, and put to flight the survivors of the garrisons.

When war broke out with Mexico, in May, 1846, the Navy played a most important part. Mexico had no navy of her own, so that the work of the United States Navy was confined to blockade duty and the capture of numerous cities and seaports. The operations leading

to the capture and occupation of California were carried out entirely by the naval forces in those waters, and consequently it is to the Navy that the country is indebted for the capture from the Mexicans of that territory. The naval forces in the Gulf of Mexico, acting in conjunction with the Army, aided in the capture of Vera Cruz and other seaports, and contributed largely to the success of the American cause.

The outbreak of the Civil War found the Navy entirely inadequate to cope with the task laid out for it, which consisted of maintaining a strict and effective blockade of the ports and harbors of the Confederate States. By purchasing every available merchant ship, however, and by constructing under hurry orders numerous other ships, the Navy soon acquired the necessary number of war vessels to keep the blockade. The effective blockade contributed materially to the final outcome of the war by locking up in the ports of the Confederacy vast stores of wealth in cotton. Had they been able to market this, the Confederates undoubtedly

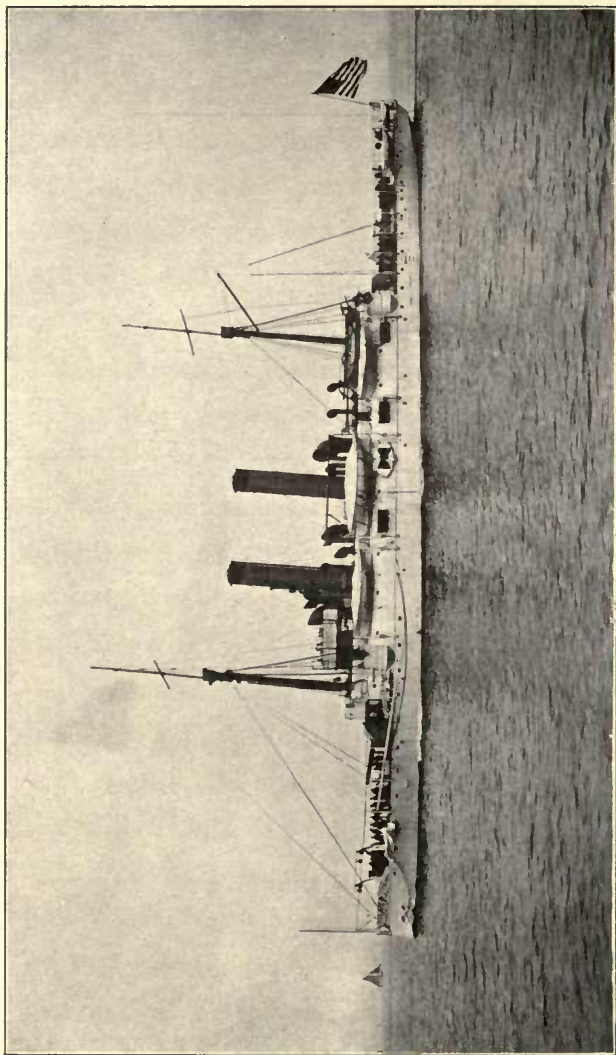
would have made a much more formidable struggle, and the war might have dragged on indefinitely. Of equal importance in this blockade was the fact that it shut out essential supplies, munitions of war, medicines, that the Confederacy could not furnish from her own resources.

Foreign powers expected that the South would win, and the idea was based largely on a comparison of land forces. Account was not taken of the remarkable development of the Union Navy, and of its unprecedented exploits. Had the resources of the South in naval matters been the equal of those in military matters, or had the South had mechanical resources to permit of building in an effective manner the vessels projected, many of these exploits of the Union fleets would have been impossible.

The work of the Navy in the Civil War was not confined to blockade duty, notwithstanding the fact that the Confederacy had few war vessels with which the Union ships might engage. The Navy assisted in land operations by cap-

turing a number of Southern seaports, the most important operations being those leading to the capture of New Orleans and the Mississippi River. These were regarded by many as the turning point of the struggle, as the Mississippi River is the key to the Middle West, and its control permitted the regulation of the commerce on it, and shutting off one of the Confederacy's chief sources of supplies.

The work of the Navy during the Civil War contributed greatly to the advancement of naval science. Steam propulsion, which before then had not been in favor for naval use, came to be regarded at its true value, and its availability to supplant sails entirely was recognized. The possibility of mounting guns in turrets and of using armor protection for vessels was first demonstrated, and the "monitor" type of war vessel, which was the forerunner of the great battleship of the present day, was developed. The navies of the world were not slow to profit by the lessons learned through the naval operations of the Civil War, and conservative writers have



The protected cruiser *Atlanta*, built in 1888, one of the first vessels in the "New Navy"





estimated that in the few years of the war an advance was achieved equal to fifty years' development under normal peace conditions.

At the close of the Civil War, the Navy was reduced without delay to a peace basis, and it was neglected in succeeding years to such an extent that in 1880 it could be said that the United States had no navy capable of making war. At this time the necessity for upbuilding the Navy was recognized, and since then new ships have been built at such a rate that to-day the United States is the second naval power of the world, although that place soon will be claimed by Germany, if the present rate of warship construction in that country is maintained.

The war against Spain in 1898 was almost entirely a naval war, and though there were some military operations, they were supplementary to those of the Navy. The fleets under Commodore Dewey and Rear-Admiral Sampson destroyed effectively the Spanish naval forces, and captured for the United States the Philip-

pine Islands, Guam, and Porto Rico, and achieved the independence of Cuba. Later the Navy contributed a considerable share toward suppressing the Philippine insurgents, who carried on a guerrilla warfare for several years after peace had been made with Spain.

The work of the Navy, however, has not been confined to waging war; it has performed distinguished services of a peaceful character, a few only of the most important of which may be mentioned. Through the Navy many scientific and exploring expeditions have been made, among them Antarctic expeditions in 1838-1842; the Dead Sea exploration in 1848, and, also, the expeditions sent out for the relief of Arctic explorers, notably the expedition in 1850 for the relief of Franklin, and that in 1882 for the relief of the Greely expedition. Difficult diplomatic duties have been intrusted to naval officers; probably the most celebrated was the Perry expedition, which resulted in opening Japan to the world's commerce, the treaty having been signed finally in 1858. This has been

called justly one of the greatest diplomatic triumphs of recent years.

Officers of the Navy, through their scientific abilities, have made many contributions to science. The founder of the sciences of physical geography and of hydrography was Lieutenant Maury of the Navy. In 1853 he suggested an international maritime congress which, under his guidance, adopted many rules as to the general study of matters of interest to navigators. Maury instituted the art of deep sea soundings, was the first to lay out definite routes for vessels crossing the oceans, and made exhaustive studies of the Gulf Stream. He issued many charts, and was the first to suggest the possibility of an ocean cable.

Naval officers since Maury's time have continued the work of hydrography and coast survey, and valuable work in these lines has been done up to the present time. In 1900 the Cable Survey vessel *Nero* made a sounding of over six statute miles near Guam, which is the greatest depth ever attained. The Coast Survey

steamer *Blake* and the Fish Commission ship *Albatross* carried out similarly important work, the latter having collected much information as to marine animals of all sorts.

The *U. S. S. Niagara*, co-operating with the British ship *Agamemnon*, laid and completed in 1858 the first successful ocean telegraph cable.

Officers of the Navy made a number of surveys of routes for the interoceanic canal, both by the Isthmus of Panama and by the Nicaragua route, and the information gained in this way is regarded as having contributed materially to the final solution of the question and the decision to build the Panama Canal, now nearing completion.

American citizens abroad must look to the Navy to protect them from oppression and enforce their rights. In time of great catastrophe, such as earthquake, massacres, pestilence or famine, the Navy is first to respond to calls for aid; notable instances have been the relief of Martinique, Kingston, San Francisco, and Messina, and the critical situation in China

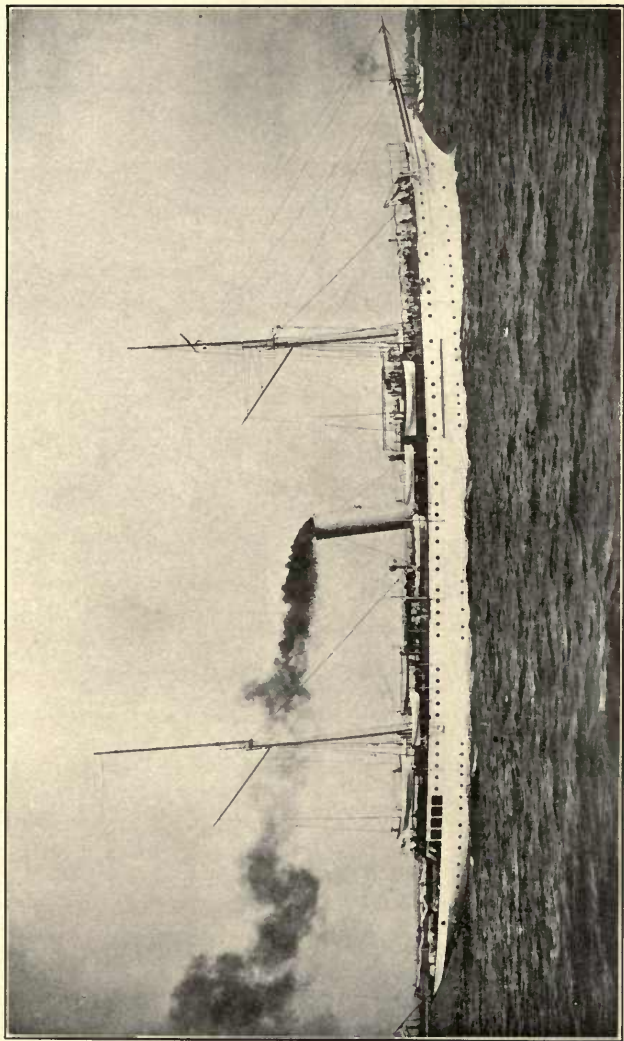
at the time of the Boxer uprising in 1900, when the combined naval forces of the Powers, by their presence and efforts, saved the lives of many persons who otherwise would have been victims of the massacre.

Upon the Navy devolves the duty of showing the flag in the world's ports; in this manner foreign people become familiar with and impressed by the power of a nation. The recent cruise around the world in 1908-1909 by the fleet of sixteen battleships gave the country a prestige that it could not have acquired otherwise, and also went far in maintaining peace at a time when there was good reason to believe that hostile action threatened.

## CHAPTER II

### THE NAVY'S ORGANIZATION

THE President is the Commander-in-Chief of the United States Navy. Under his orders it is controlled and managed by the Navy Department, at the head of which is the Secretary of the Navy, a Cabinet officer. The Navy Department, through its various bureaus, administers the affairs of the Navy, its ships, navy yards, shore stations, and personnel; it directs the movements of all naval vessels, co-operating with the Department of State when diplomatic considerations require the services of men-of-war; it has charge of the construction of all new ships for the Navy, and the repairs to those in service; it assigns to duty the various officers and men of the Navy; it purchases all supplies needed for the naval service, including provisions and clothing for the enlisted men, am-



The converted yacht *Mayflower*, purchased during the Spanish War and now used as the President's yacht





munition, coal, and miscellaneous articles needed for the building, repairing, maintenance, and running of the ships; it has charge of the Naval Observatory, and, through that, of the telegraphic time service all over the country, and the preparation of the Nautical Almanac; it has charge of the Naval Academy and various naval training stations for the education and instruction of officers and enlisted men; also the Navy Department administers the affairs of the colonies of Guam, Mariana Islands, and Tutuila, Samoan Islands.

The Navy Department is responsible to Congress for the execution of its laws and the expenditures of the naval appropriations. The control of the Navy was vested in the Secretary of War until 1798, when the Navy Department was established, with Benjamin Stoddert, of Georgetown, D. C., as the first Secretary of the Navy. By reason of the priority of the secretaryship, the Army is the senior service, and on ceremonial occasions and in parades the Army contingent takes precedence over the Navy. In

England the opposite is true, the Navy being the senior service.

The Navy Department is housed with the War and State Departments in a building on Pennsylvania Avenue, adjacent to the White House. The present building has been occupied since 1879, and in recent years is much overcrowded.

In addition to the Secretary of the Navy, the organization of the Navy Department consists of a civilian Assistant Secretary and eight chiefs of bureaus. The chiefs of bureaus are naval officers, and, while so serving, have the rank and pay of rear-admirals.

The Assistant Secretary of the Navy performs such duties in connection with the administration of the Navy Department as may be assigned to him by the Secretary, and, in the absence of the Secretary, performs the duties of his office.

The chiefs of the bureaus are the deputies of the Secretary of the Navy, and, subject to his orders and instructions, they carry on the business of the Navy Department, each caring for

the matter directly under the cognizance of his bureau. All orders issued by the Assistant Secretary or the chiefs of bureaus are considered as having full force as orders of the Secretary.

The business of the Navy Department is distributed among the bureaus in such manner as the Secretary of the Navy judges to be expedient, certain limitations being placed by the annual appropriation bills, which provide the money for carrying out specified work by each bureau.

The different bureaus of the Navy Department and the duties of each are as follows:—

The Bureau of Navigation, the Chief of which is an officer of the line or seaman branch, is charged with the assignment to duty of officers and men; the enlistment and instruction of the men; the appointment and promotion of officers; the publication and distribution of charts, and with the conducting of ocean and lake surveys. This Bureau supplies navigational outfits and

libraries for ships. It administers the affairs of the Naval Academy, the Naval War College, the Naval Home, the Naval training stations, the Hydrographic Office, and the Naval Observatory. The officers of this Bureau are line officers.

The Bureau of Construction and Repair, the Chief of which is the Chief Constructor of the Navy, is charged with all that relates to the structural strength and stability of naval vessels, and with all that relates to designing, building, and repairing their hulls and auxiliary machinery. The officers of this Bureau are members of the Corps of Naval Constructors.

The Bureau of Ordnance, the Chief of which is a line officer, has charge of the design and building of naval guns, the purchase and manufacture of projectiles, armor, torpedoes, powder, and other explosives, and of the electrical apparatus connected with the installation of guns. It administers the affairs of the Naval Gun Factory, the Proving Grounds, the Torpedo Factory, and the magazines for storing ashore sup-

plies of ammunition. The officers of this Bureau are line officers.

The Bureau of Steam Engineering, the Chief of which is the Engineer-in-Chief of the Navy, has charge of designing and building the machinery for the propulsion of naval vessels, the boilers, pumps, distilling apparatus, and steam connections. It prepares specifications for the fuel used for the Navy, and controls the Engineering Experiment Station at Annapolis. The officers of this Bureau are line officers.

The Bureau of Supplies and Accounts, the Chief of which is the Paymaster-General of the Navy, is charged with disbursing and keeping an account of all money appropriated and expended for the naval service; with the purchase and custody of all stores and provisions for the Navy; with the manufacture and issue of clothing for the enlisted men, and with the purchase and preparation of the food for all enlisted men. The officers of this Bureau are members of the Corps of Paymasters.

The Bureau of Yards and Docks, the Chief of which is a civil engineer, has charge of designing, building, and maintenance of dry docks, wharves, quays, and buildings at navy yards, and at naval stations; also with providing furniture and accessories for the buildings. The officers of this Bureau are members of the Corps of Civil Engineers.

The Bureau of Medicine and Surgery, the Chief of which is the Surgeon-General of the Navy, is charged with maintaining the hygiene of the Navy and the health of the Navy personnel. This Bureau controls naval hospitals, purchases medicines and surgical instruments, and has charge of the naval pension records. The officers of this Bureau are members of the Corps of Surgeons.

Up to July 1, 1910, there existed also a Bureau of Equipment, the Chief of which was an officer of the line. The business formerly assigned to this Bureau has been divided tentatively by the Secretary of the Navy among other bureaus. That relating to electrical installations on board

ship, wireless telegraph stations on ship and on shore, and the maintenance and operation of coaling plants on shore, has been assigned to the Bureau of Steam Engineering. That relating to the supply of ships of navigational outfits, libraries, and charts, the carrying on of ocean and lake surveys, and the control of the Naval Observatory and the Hydrographic Office has been assigned to the Bureau of Navigation. The business of supplying anchors, chains, canvas, cordage, flags, and galley fittings has been assigned to the Bureau of Construction and Repair, and that of supplying mess outfits to ships has been assigned to the Bureau of Supplies and Accounts.

Each chief of bureau is answerable for the proper performance of his duties to the Secretary of the Navy, and, through him, to the President. Chiefs of bureaus are appointed by the President from among the officers of certain grades declared by law to be eligible for such appointments. The term of duty for each chief is four years.

In addition to the bureaus, the organization of the Navy Department includes the following:—

The Judge Advocate General, whose duties are to consider and report upon the legal features of all courts-martial, courts of inquiry, boards of investigation, boards for examination of officers for promotion or retirement, and, in general, all legal questions relating to the personnel of the Navy.

The Solicitor, whose duties are to consider and report upon all legal questions not relating to personnel that come before the Secretary of the Navy in connection with the business of the Department. This includes also the preparation and certification of contracts.

The General Board of the Navy, the duties of which are to devise plans and measures for the preparation and maintenance of the fleet in readiness for war, and to advise the Secretary of the Navy as to the disposition of the fleet, officers, and men. This board is required also to submit recommendations as to the military



characteristics of new designs for naval ships. The General Board at present is composed of Admiral Dewey, the Aid for Operations, the Aid for Material, the Chief Intelligence Officer, the President of the Naval War College, and other officers, all of whom are officers of the line.

The Office of Naval Intelligence, the duties of which are to collect and arrange, in form to be available when needed, information on all subjects of interest to the naval service. This includes information concerning foreign navies collected by naval attachés abroad.

To assist and advise the Secretary in administering and to co-ordinate the work under each of the four principal divisions of the Navy Department, there are assigned four officers of the Navy on the active list to act, respectively, as the Aid for Operations, the Aid for Personnel, the Aid for Material, and the Aid for Inspections. The duty of each of these aids is to advise the Secretary of the Navy as regards the work of his division.

The Division of Operations of the Fleet includes the Office of Naval Intelligence, the Naval War College, and all that relates to the movements of naval vessels.

The Division of Personnel includes the Bureau of Navigation, the Bureau of Medicine and Surgery, the office of the Judge Advocate General, and matters relating to the Naval Militia.

The Division of Material includes the Bureaus of Ordnance, Construction and Repair, Steam Engineering, Yards and Docks, and Supplies and Accounts.

The Division of Inspections includes the various boards of inspection and special inspecting officers.

#### GOVERNMENT OF THE NAVY

Officers and enlisted men of the Navy are subject not only to the civil laws of the community in which they are, but, also, to special laws relating to the naval service and to the Navy Regulations. The articles for the Government of the Navy, known also as the Articles of War,

are a part of the Revised Statutes of the United States. They specify the various crimes and misdemeanors, and the degree and method of punishment for each. Under their provisions, the commanding officer of a vessel, by his own order, may inflict certain punishment not to exceed, in the case of an enlisted man, confinement for ten days, solitary confinement for seven days, or a diet of bread and water for five days. More severe punishment may be inflicted on an enlisted man by a deck court, consisting of one officer, or by a summary court-martial, consisting of three officers. The deck court and the summary court-martial are appointed by the commanding officers. The deck courts cannot adjudge discharge from the service, nor confinement or loss of pay for more than twenty days. The summary courts-martial have the power to impose maximum sentences on enlisted men as follows: dismissal from the service, confinement on bread and water for one month, or confinement on regulation fare for two months, or loss of pay not to exceed three

months. Summary courts-martial may sentence offenders to reduction in rating, extra police duties, or deprivation of liberty on foreign stations. General courts-martial, consisting of not more than thirteen, nor less than five, commissioned officers, may impose any of the sentences, including that of death, mentioned in the articles for the Government of the Navy. Sentences of naval courts-martial are subject to review by the convening authority, and are carried into effect only upon approval by such authority. Those extending to loss of life or the dismissal of an officer are not carried into effect until confirmed by the President.

The proceedings of a general court-martial are very formal; the senior officer presides, and the other members take places in order of their rank. Each member is sworn to "try truly the case depending, according to the evidence which shall come before the court, the rules for the Government of the Navy, and his own conscience." The Judge Advocate of the court keeps the record, and also acts as attorney for

the prosecution, bringing before the court the witnesses and evidence necessary to prove the charge. All witnesses are sworn to tell the "truth, the whole truth, and nothing but the truth." Except for a sentence of death, which requires a concurrence of two-thirds of the members, the vote of the majority determines the findings of a court-martial. General courts-martial may be convened by the President, the Secretary of the Navy, or the Commander-in-Chief of a fleet or squadron in foreign waters on his own authority, or in waters of the United States on the approval of the President. Under the Articles of War, the sentence of death may be imposed upon any person in the naval service for mutiny, disobedience of orders, treason, desertion in time of war, sleeping on watch in time of war, cowardice in battle, wilful destruction or endangering a vessel of the Navy, or failure on signal for battle to use every endeavor to engage the enemy in battle; or failure to overtake and capture, or destroy any vessel which it is that person's duty to encounter; or

for striking the flag to an enemy without proper authority; or, when in battle, treacherously yielding or pusillanimously crying for quarter.

Other punishments of varying degree are specified, many of them imprisonment for terms of varying length. Others involve confinement on board ship, loss of pay, reduction in rank or rating. For certain misdemeanors an officer may be reduced to be a seaman. Desertion is one of the commonest crimes of enlisted men of the Navy; a greater number of the inmates of naval prisons are undergoing imprisonment for this offense than for any other. Desertion is punishable by confinement for terms of varying length, depending on the circumstances, and dishonorable discharge from the naval service, including loss of citizenship.

An officer placed under arrest for trial by court-martial is required to deliver up his sword to his commanding officer, and to confine himself to the limits prescribed. In time of peace no officer may be dismissed from the Navy except in pursuance of the sentence of a court-

martial or in mitigation of a more severe sentence.

Formerly punishment by flogging was permitted, and many suffered from this inhuman treatment. In many cases "flogging from ship to ship" was adjudged. This consisted in taking the offender in a launch and administering, alongside of each ship of the fleet in turn, the prescribed number of blows, all hands being called to witness the punishment. Now the Articles of War prohibit the punishment of any person in the Navy by flogging, branding, or tattooing the body.

One of the famous naval courts-martial in history is that which sentenced, in 1757, Sir John Byng, Admiral of the Blue in the English Navy, to be shot for failing to do his utmost to take, seize, and destroy the French ships with which the fleet under his command was engaged off Minorca in 1756. The members of the court-martial which sentenced Admiral Byng unanimously recommended him for clemency, stating that, under the Articles of War, this was the

only punishment they could adjudge for the offense of which he was found guilty. In spite of this recommendation, the sentence was carried out. Mutiny is a most serious offense against naval discipline, and many cases have occurred. In the English Navy in the eighteenth and early part of the nineteenth century, there were many such, punished invariably by hanging the offenders at the yard-arm of their ships, all hands on all ships present being called up to witness the punishment. In the United States Navy the most famous case is that of Midshipman Spencer, who was hung, along with a boatswain's mate and a seaman, for suspected mutiny on board the *U. S. S. Somers* in 1842. Mr. Spencer, who was a relative of the Secretary of the Navy, was not accorded a court-martial, but was hung by order of his captain.

Persons in the naval service, sentenced to imprisonment by courts-martial, are confined in prisons maintained under the control of the Navy Department. There are naval prisons at the navy yards at Portsmouth, N. H., Boston,



Mass., Mare Island, Cal., and Cavite, P. I. There are also prison ships at Portsmouth, N. H., and Bremerton, Wash. In these the general court-martial prisoners are confined to serve their sentences.

### THE FLEETS

The ships of the Navy are divided into squadrons and fleets for purposes of organization and drill; at the present time there are three fleets, or main divisions, which include all vessels of the Navy in commission, except "special service" ships. These fleets are the Atlantic Fleet, the Pacific Fleet, and the Asiatic Fleet. Each is commanded by a Rear-Admiral, there not being regularly any higher grade in our Navy. It is probable that were there officers of the grade of Vice-Admiral one would be in command of each fleet. Foreign countries with smaller navies than ours have in command afloat Vice-Admirals and even Admirals. It is expected that Congress will establish the grade of Vice-Admiral, if not that of Admiral, so that

this country will not be shamed further by having foreign officers commanding weaker fleets take precedence over its officers. Admiral Dewey and his predecessors in this grade, Farragut and David Porter, received the rank by special acts of Congress. Under present laws in this country, the grade and title of admiral cease with the death of the incumbent until again revived by special law.

It does not follow that four battleships are four times as strong as one battleship, for it might happen that, if not drilled properly and managed skilfully, four ships would be less formidable than a single well-drilled ship. For this reason warships are manœuvered in squadron and fleet formations, to teach their officers to perform the various evolutions that the commander-in-chief may order by signal, and also to make them effective as a whole against a similar hostile aggregation. There are many elements that enter into the question of disposing a fleet so as to present the strongest possible formation to an attacking force, naval tac-

tics being a complicated subject which changes with each type of ship brought out, and which offers continually new and difficult problems.

The headquarters of the Atlantic Fleet is on the east coast of the United States; that of the Pacific Fleet is on the west coast, and the headquarters of the Asiatic Fleet is in the Philippine Islands.

As at present constituted the Atlantic Fleet consists of twenty-one battleships, four divisions of five battleships each, and a battleship to serve as flagship for the commander-in-chief. There are fleet auxiliaries consisting of supply ships, a range ship, a hospital ship, a repair ship, and several tenders. There is also a cruiser division of four ships.

The Pacific Fleet consists of two divisions of three armored cruisers each and a fleet supply ship.

The Asiatic Fleet consists of three divisions, one of which comprises an armored cruiser and two protected cruisers, and the other two are

made up of small gunboats. There are two coast defense monitors attached to this fleet.

There are, similarly, three torpedo fleets, each consisting of the torpedo craft and submarines in the various waters.

There are a number of vessels not attached to any fleet, but assigned to special service. This includes several battleships in reserve, which are manned only with skeleton crews, but are maintained in condition to be placed in service at short notice. The arrangement of the various fleets and the number and character of vessels attached to each are subject to frequent change, depending on various considerations.

#### NAVY YARDS AND SHORE STATIONS

For the repair and maintenance of vessels of the Navy there are a number of navy yards and stations. The principal ones are at Portsmouth, N. H., Boston, New York, Philadelphia, Norfolk, Charleston, S. C., Mare Island, Cal., Puget Sound, Wash., and Cavite, P. I. There

are others, smaller ones, at Pensacola and Key West, Fla., and at New Orleans. There is also a navy yard at Washington, D. C., where the chief work is the manufacture of guns.

Each ship of the Navy is assigned to a "home yard," which it visits usually twice a year for docking and necessary repairs and overhauling. All of the navy yards have shops and other facilities for carrying out the work on the ships assigned to them. They have dry docks capable of docking ships for periodical cleaning and painting of the bottoms, and for such work on the underwater portion of the hulls as may be necessary from time to time.

Several of the navy yards are equipped for building ships, those at New York and Mare Island for building the largest size battleships. At the present time the New York Yard is engaged in building the 27,000-ton battleship *New York*. At this yard were built the battleship *Maine*, which was blown up in Havana harbor, and the battleships *Connecticut* and *Florida*. The greater number of the Navy's ships were

built, however, in private shipyards under contract.

All navy yards are provided with the necessary shops, machines, tools, and appliances for all classes of repair work on naval vessels. This includes the facilities requisite for work on engines and machinery of every kind, guns, boilers, electrical installations, foundry and pattern work, ship carpenter and joiner work, sheet metal, steel plate, and structural work, painting and plumbing, spars and rigging, anchors and chains, blocks, cooperage; for sail and flag making, and for building and repairing small boats.

Navy yards have also general storehouses for the reception, care, and issue of material required to carry on the work in the yard, and for stores and provisions for the maintenance of the ships. At the New York Yard there is a shop for the manufacture of the uniform clothing for the enlisted men of the Navy.

The administration of a navy yard is under the Commandant, who is responsible to the Secretary of the Navy for the proper performance

of the work assigned to it. A Rear-Admiral or a Captain in the Navy usually is assigned to each of the large yards as Commandant. Under the Commandant are the Captain of the Yard and the heads of the divisions of the Manufacturing Department, the former being a line officer of the Navy of the rank usually of Captain. On duty in navy yards there are also a General Storekeeper, who is a member of the Pay Corps of the Navy, a Yard Surgeon, a pay officer, detailed as Paymaster of the Yard, and a pay officer detailed as Accounting Officer, and charged with keeping the accounts of the cost of work. There is, also, a line officer, detailed as Inspecting Officer, who passes on work which has been performed by the manufacturing department.

The manufacturing department is divided into the machinery division, the hull division, and the public works department. The head of each is, respectively, a line officer, a naval constructor, and a civil engineer.

The machinery division carries out all work on the engines, boilers, auxiliary machinery, and

electrical plants of vessels; the hull division has work relating to hulls and their accessories, including docking of vessels. The public works department has charge of work on buildings and grounds, and the construction of public works. The General Storekeeper is charged with obtaining and issuing materials and stores necessary for carrying on the work, and to meet the requirements of ships in commission.

Navy yard employ es consist of two classes, clerks and draughtsmen forming one, and workmen another. The clerks and draughtsmen are appointed under the civil service rules, and hold permanent appointments during good behavior. The workmen are employed or discharged as required by the amount of work in hand. Formerly the employment of navy yard labor was a source of corruption for political purposes, but nowadays workmen are employed and discharged under a system that prevents any possibility of favoritism. The law requires that when additional workmen are needed they shall be called in the order in which their names



appear on a registration list, preference being given only to veterans of the Civil and Spanish Wars, and to honorably discharged enlisted men of the Navy or Army. There is also a requirement of law that no increase in the force of workmen at a navy yard may be made within sixty days preceding a national election, except in case of emergency, to which the Secretary of the Navy must certify.

Annually, a board of officers appointed by the Commandant, meets to determine the rate of wages that shall be paid to workmen of each trade and class during the succeeding year. The law requires that the rates of wages shall be based on those paid by private firms, in the vicinity, doing similar work. Navy yard workmen work only eight hours each day, have half holidays, with pay, on Saturdays during the summer months, are paid full wages for legal holidays, and are allowed, in addition, fifteen days' leave with full pay each year. Owing to these considerations, the Government is able to secure in its navy yards the best class of me-

chanics in each community, and the work done is of the highest character.

Boys between the ages of fifteen and eighteen years are employed in navy yards for apprenticeship in the various trades. These are paid liberal wages, are encouraged to study, and to learn their trades thoroughly, and, upon reaching the age of twenty-one, they are given certificates of completion of apprenticeship, and are rated in the regular yard force. This system gives a large number of boys an opportunity, that they might not otherwise enjoy, of learning a trade. At each of the principal navy yards there are several hundred apprentices.

In addition to the navy yards a number of other shore stations are maintained for various purposes in connection with the naval establishment; the most important and widely known of these, perhaps, is the Naval Observatory in Washington. The Observatory has, as one of its functions, the duty of sending out daily at noon, to points throughout the country, the telegraphic time signals; in its offices is compiled

“The Nautical Almanac and American Ephemeris,” for use of navigators all over the world; at this institution all chronometers and compasses for naval vessels are adjusted before being sent out. Also, at the Observatory naval officers may receive instruction in the management and use of chronometers and compasses.

Other naval stations are the Naval Proving Ground at Indian Head, Md., where all large guns for the Navy are proved, ballistic tests of armor plates are made, and smokeless powder is manufactured; the Naval Torpedo Station at Newport, R. I., where torpedoes are tested and some smokeless powder made. The Naval Training Stations, where newly enlisted apprentice seamen are given preliminary training, are: Newport, R. I., Norfolk, Va., San Francisco, Cal., and on Lake Michigan, near Chicago. The Naval Academy, where midshipmen are instructed, is at Annapolis, Md.

There are a number of coal depots along the Atlantic, Pacific and Gulf Coasts, and in the insular possessions; in these coal for use of naval

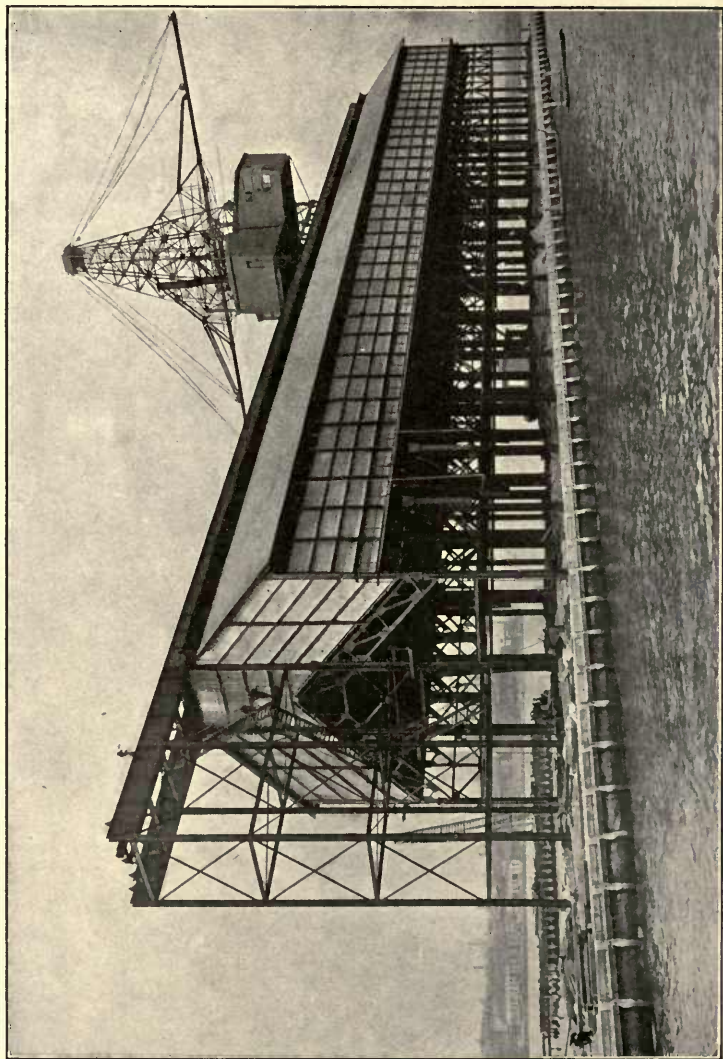
vessels is stored in varying quantities, ranging up to 40,000 tons at the larger depots.

The Navy maintains an intercommunicating chain of wireless telegraph stations at convenient points along the coast lines, and in Alaska and the island possessions, to insure prompt communication with vessels off shore. Wireless telegraphy, as well as being of growing importance to ship owners, has become an essential element in national defense.

There are naval hospitals located near each of the navy yards for the care and treatment of the sick among the officers and enlisted men of the Navy. There is also a naval hospital at Las Animas, Colo., for the treatment of those suffering with tuberculosis. At Hot Springs, Ark., the Army and Navy General Hospital treats naval patients for rheumatic and similar ailments.

There are naval powder depots, located at suitable isolated points, near each of the various navy yards, for the storage of ammunition.

The Hydrographic Office of the Navy Depart-



Naval Coaling Plant, Navy Yard, Brooklyn, N. Y. Intended for storage of coal and for its delivery to naval vessels



ment is charged with disseminating information of interest to mariners, with the preparation and printing of charts for navigation purposes, and sailing directions. It prepares and issues a monthly pilot chart of the oceans, showing the direction and force of prevailing winds and currents, location of derelicts, and giving the most advantageous sailing routes. There are branch hydrographic offices in the principal ports, where information of the above character is collected and disseminated.

## CHAPTER III

### THE NAVY'S PERSONNEL

#### COMMISSIONED PERSONNEL

THE officers of the Navy are divided into line officers and staff officers. All commissioned officers are appointed by the President in conformity with the requirements of laws relating to such appointments. These appointments must be confirmed by the United States Senate; that having been done, a commission, signed by the President and the Secretary of the Navy, and bearing the seal of the Navy Department, is issued to each officer.

The various titles, in the order of their rank, of the line officers are: Admiral, Rear-Admiral, Commodore,—a title existing only on the retired list,—Captain, Commander, Lieutenant-Commander, Lieutenant, Lieutenant (junior grade), Ensign, Midshipman, Chief Boatswain,



Chief Gunner, and Chief Machinist. Boat-swains, Gunners and Machinists are warrant officers of the line.

The staff officers are: Surgeons, Paymasters, Professors of Mathematics, Naval Constructors, Civil Engineers, Chief Carpenters, Chief Sailmakers, and Chief Machinists. Carpenters, Sailmakers, and Pharmacists are warrant officers of the staff. Staff officers of the Navy have rank for the purpose of determining their position in the service with relation to the line officers. Their commissions state their rank as well as their staff corps designation, but their titles are those of their corps designation.

Naval officers take rank with officers of the Army and Marine Corps as follows:—

The Admiral ranks with a general,  
Rear-admirals with major-generals,  
Commodores with brigadier-generals,  
Captains in the Navy with colonels,  
Commanders with lieutenant-colonels,  
Lieutenant-commanders with majors,

Lieutenants in the Navy with captains in the Army,

Lieutenants (junior grade) with first lieutenants, and

Ensigns with second lieutenants.

The Revised Statutes require that no person shall be appointed to any office in the Navy unless he is a citizen of the United States, and not until he has passed a physical, mental, and professional examination. The oath of allegiance to uphold the Constitution of the United States is required to be taken prior to an appointment.

### LINE OFFICERS

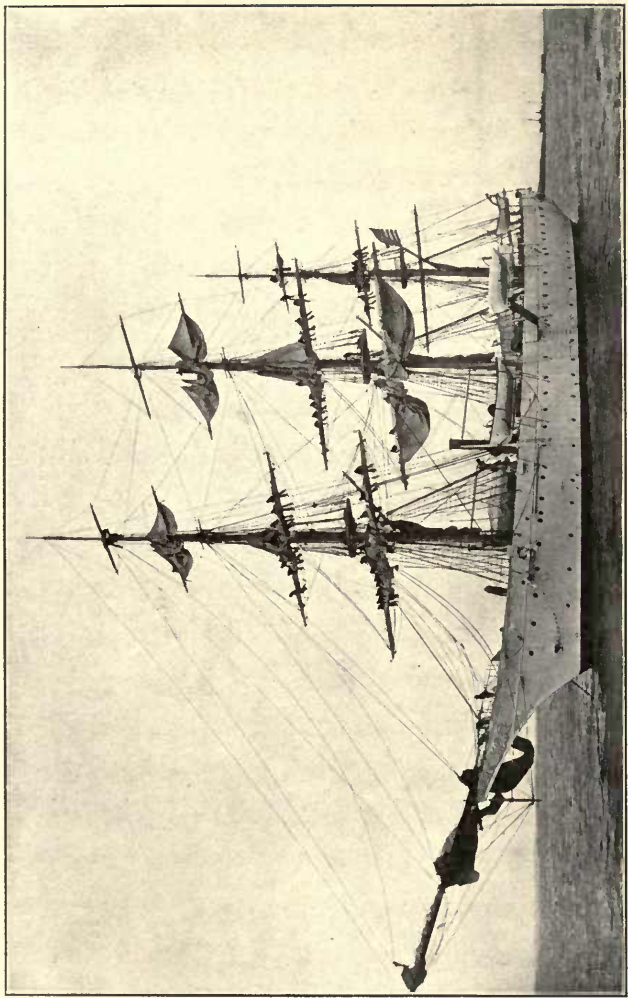
The line of the Navy is recruited almost entirely from among the graduates of the Naval Academy, but each year the law allows a number, not exceeding twelve, of boatswains, gunners, and machinists, who may be able to qualify by passing the prescribed examinations to be commissioned as ensigns.

All midshipmen, before they become ensigns,

must have passed a four years' course on probation at the Naval Academy, at Annapolis, and two years at sea in a cruising vessel. Appointments to the Naval Academy are made by the President, Senators, and Representatives. The President each year is allowed to appoint at large five midshipmen to Annapolis, and each Senator and Representative may have at one time two midshipmen from his respective State or District at the Naval Academy. In 1913 this number will be reduced to one for each Senator and Representative. The age of the candidates must be between sixteen and twenty years. Candidates, after receiving appointments to the Naval Academy, are examined thoroughly as to their mental and physical qualifications. Upon passing these examinations a candidate is admitted to the Naval Academy, takes the oath of allegiance, and becomes a midshipman. His pay is \$600 per annum, and an allowance is made him of thirty cents each day of ration money. Out of their pay and allowance midshipmen must meet the cost of their food, cloth-

ing, laundry, textbooks, etc., and they are required to keep sufficient money to their credit to purchase an outfit upon graduation. Their pay is not turned over to the midshipmen, but their accounts are kept, and all authorized expenses charged to them. The midshipmen are allowed to draw small sums for pocket money, and when they go on the one-month leave granted each year, usually each is allowed to draw a sufficient amount to defray his traveling expenses to his home.

The Naval Academy course covers four years; the studies embrace a wide range, and are very difficult, and many midshipmen fail to pass the semi-annual examinations and are dropped. Those who obtain an average of 62½ per cent. in each branch of study graduate and receive a diploma certifying that they have completed the course of studies. If a midshipman's total average mark for the four years is more than 85 per cent. of the maximum, the words "with distinction" are inserted in the diploma. If his average is 74 per cent., he is stated to



The sailing ship *Severn*, used formerly as a practice ship for midshipmen



have graduated "with credit." During the four years at the Naval Academy the corps of midshipmen is taken for three months, each summer, on a practice cruise. Formerly these cruises were made in wooden sailing ships, often to Europe and Madeira; of recent years modern men-of-war have been utilized, and the cruises have been along the coast, and, more recently, abroad.

Upon graduation midshipmen are assigned to duty afloat on board regular cruising vessels, and they take their place as junior officers of these ships and join the "steerage" messes. They are required to continue their studies, especially such as relate to practical work in navigation, engineering, and ordnance. At the end of two years they are examined again, and the marks obtained are averaged with those of the four years' course at the Naval Academy, and the total average, made by each midshipman, determines the order in which he will take rank, and in which his name will appear through life in the Navy Register, unless, by reason of

reward or punishment, he is advanced or reduced in grade.

When officers have served as ensigns for three years, they are promoted, subject to their passing a thorough examination, to be lieutenants of the junior grade, after which they can be promoted only in order of their standing on the Navy Register, after due examination, as vacancies occur, the number of officers allowed in each higher grade being fixed by law. At the present time there are large numbers of young officers in the Navy, and when these are promoted to the higher grades there will be what is called a "hump,"—a number of officers of about the same age filling the upper grades for several years before retirement, and promotion will become very slow.

The duties that may be performed by line officers of each grade are specified by the Navy Regulations, and are in general as follows:—

The Admiral of the Navy may command a fleet or perform other duty as assigned by the Navy Department.



A rear-admiral may command a fleet, squadron, division, or a naval station.

A captain may command a division or a squadron, a naval station, a battleship, an armored cruiser, or a ship not rated, or be chief of staff to a flag officer.

A commander may command a division or a squadron, a naval station, a battleship, a protected cruiser of the first rate, a ship of the second or third rate, a torpedo destroyer flotilla, or a ship not rated; be chief of staff to a flag officer; be fleet engineer or executive officer of a battleship or armored cruiser.

A lieutenant-commander may command a ship of the third or fourth rate, a torpedo flotilla, a torpedo destroyer, or a ship not rated. He may serve as executive officer, navigator, ordnance officer or engineer officer of a ship commanded by an officer of superior grade, except a battleship or armored cruiser commanded by a captain. He may serve also as fleet ordnance officer, or as flag secretary on the staff of a commander-in-chief.

A lieutenant may command a ship of the fourth rate, or torpedo division, a torpedo destroyer, torpedo boat, submarine, tug, tender, or ship not rated. He may serve as executive officer, navigator, ordnance officer, senior engineer officer or watch officer in a ship commanded by an officer of superior grade. He also may be flag lieutenant, or aide to a flag officer, or secretary to the admiral while on sea service.

A lieutenant (junior grade) may command a torpedo boat, submarine, tug, tender, or ship not rated, and may serve as executive officer, navigator, ordnance officer, senior engineer officer, or watch officer in a ship commanded by an officer of superior grade. He may be flag lieutenant or aide to the commander of a division.

An ensign may command a torpedo boat, submarine, tug or ship not rated, and may serve as executive officer, navigator, ordnance officer, senior engineer officer, or watch officer in a ship commanded by an officer of superior grade. He

may be aide to the commander of a squadron, or the captain of a ship.

A midshipman is required to perform such duty afloat, including watch and division duty, as may be assigned to him. He, however, may not be detailed for duty as an aide to the captain, nor on the personal staff of a flag officer.

Line officers perform engineering duties. Formerly there was a Corps of Engineers in the Navy, but the Naval Personnel Act of 1899 amalgamated the Engineer Corps with the line, and required that line officers should perform engineering duties in addition to their other work. A line officer, therefore, besides being qualified in navigation and ordnance, must be a skilled engineer capable of taking charge of the complicated machinery of a modern warship.

#### STAFF OFFICERS

**Medical Corps.**—The members of the Medical Corps of the Navy are appointed from civil life either as assistant surgeons or acting assistant surgeons. Candidates must be between the

ages of twenty-one and thirty, and must pass an extremely severe professional examination before a board of naval surgeons. Upon being commissioned, usually they are detailed to take the course of instruction at the Naval Medical School in Washington and, after completing that, they are assigned to general duty either as assistant to the surgeon of the ship on a sea-going vessel, or in one of the naval hospitals or navy yards, or on stations where there is a marine detachment.

Assistant surgeons rise by seniority through the successive grades of passed assistant surgeons, surgeons, medical inspectors, and medical directors.

The officers of the Medical Corps are charged with maintaining the health of the personnel of the Navy and the Marine Corps.

**Paymasters.**—The members of the Corps of Paymasters are appointed from civil life, preference being given to those applicants who have had some experience as accountants. Candidates must be between the ages of twenty-one

and twenty-six. They are appointed first as assistant paymasters, and are detailed for duty on one of the larger vessels as assistant to the paymaster of the ship, or as paymaster of a small ship, or as assistant to the general storekeeper in one of the navy yards.

Assistant paymasters rise by seniority to become successively passed assistant paymasters, paymasters, pay inspectors, and pay directors.

The officers of the Pay Corps are charged with disbursing all the money appropriated for the Navy, and with the purchase and care of stores of all kinds; also, the paymasters of ships are commissary officers, and general storekeepers of their ships. Members of the Pay Corps are required, as disbursing officers of the government and custodians of public funds, to file a bond for the faithful performance of their duty.

**Naval Constructors.**—The Corps of Naval Constructors is the only corps consisting exclusively of graduates of the Naval Academy,

nearly all the members having graduated with distinction.

Formerly it was customary to send, for special instruction, to schools in England and France, such midshipmen as were selected for assignment to the Construction Corps, but that plan of education and recruiting the Corps has been abandoned. Selections for the Corps of Naval Constructors now are made from the class of midshipmen upon the completion of their two years' cruise after graduation, and they are sent to Boston to the Massachusetts Institute of Technology to take a three years' special course in naval architecture.

Officers in the Construction Corps first are commissioned as assistant naval constructors, rising by seniority, after service of not less than eight nor more than fourteen years, from the status of assistant to that of naval constructor.

The naval constructors are charged with the design, construction, and repair of hulls of naval vessels.

**Professors of Mathematics.**—The members of the Corps of Professors of Mathematics are appointed from among officers of the Navy or from civil life. They are assigned either to duty at the Naval Academy, for the instruction of the midshipmen, or to the U. S. Naval Observatory for scientific work in connection with the preparation of the “Nautical Almanac,” and for the astronomical work that is done there. They are appointed by the President, who selects them with a view to the duties they are expected to perform.

**Civil Engineers.**—Members of the Corps of Civil Engineers are appointed from graduates of the Naval Academy, or from civil life, as assistant civil engineers. Candidates must be between the ages of twenty-one and twenty-six years, and must pass a professional examination before a board of naval civil engineers. They are promoted by seniority to become civil engineers. These officers are charged with the duty of designing and constructing various public works for the Navy.

**Chaplains.**—Chaplains are appointed by the President. Candidates must be between the ages of twenty-one and thirty-five, and must be regularly ordained ministers of good standing in their denominations. They may be assigned to duty on board sea-going ships, or at navy yards, or stations. They are permitted to conduct public worship according to the manner and forms of the churches of which they are members.

**Secretary.** — Besides the above-mentioned Corps of Staff Officers there is allowed as Secretary to the Admiral of the Navy, in the event of there being an admiral, a staff officer with the rank of lieutenant; this office holds only during the lifetime, and upon the recommendation of, the Admiral.

#### WARRANT OFFICERS

The warrant officers of the line are boatswains, gunners, and machinists; those of the staff are carpenters, sailmakers, and pharmacists. These officers are appointed or “war-



ranted" by the Secretary of the Navy and, excepting the pharmacist, after six years' service as warrant officers are promoted and receive commissions issued by the President, giving them a rank with but next after ensign, and adding the prefix "chief" to their titles, as chief boatswain, chief gunner, etc. Candidates for appointment as acting warrant officer must pass an examination, before a board of officers, to demonstrate their ability to perform the duties of the position, preference being given to enlisted men of the Navy who have good records. After serving one year under an acting appointment, an acting warrant officer is eligible to receive a permanent warrant. There are about six hundred warrant officers, the greater number of whom are ex-enlisted men.

The duties of the warrant officers are largely mechanical, each having the functions indicated by his title, and being a specialist in that line. It is possible for warrant officers to become ensigns by being nominated and passing the re-

quired examination, and thus come in the line of promotion for higher commissioned rank in the Navy.

### ENLISTED FORCE

The Navy requires men of varied knowledge to operate its ships. These men are enlisted for a term of four years, and are graded and paid according to their capabilities. Each man on enlistment is required to take an oath binding himself to support and defend the Constitution of the United States against all enemies, foreign and domestic, and to give true faith and allegiance to the same. Upon expiration of enlistment, each man, if recommended by his captain for fidelity, obedience, and ability, receives an honorable discharge, with travel allowance from the place of discharge to the place of enlistment. If he presents himself for re-enlistment at a recruiting station or on board a naval ship within four months from date of discharge, he is entitled to be paid for the four months at his regular rate of pay, and is further en-

titled to receive increased pay for each re-enlistment for four years.

At the present time no recruit is accepted unless he is a citizen of the United States. Men who are aliens and have had previous service must agree to take out citizenship papers before re-enlistment. More than 96 per cent. of the enlisted force of the Navy at the present time are Americans, there being no place in the Navy for any one except honest, conscientious, capable young Americans.

An enlisted man is designated by a title or rate indicating the work he does. The designations are: Seaman, carpenter's mate, machinist's mate, plumber, painter, ship-fitter, copper-smith, blacksmith, quartermaster, sailmaker, signalman, gunner's mate, electrician, yeoman, printer, hospital attendant, laundryman, musician, steward, baker, mess attendant, cook, and master-at-arms. According to their capabilities and the importance of the work, the men are graded into classes as follows: Chief petty officers, first, second, and third class petty of-

ficers. Below the petty officers there are three other grades, the designation depending on the branch; for instance, in the seaman branch, the recruit is known as an "apprentice seaman," his next promotion being to "ordinary seaman," and then to "seaman." In the engineer branch the recruit, unless he has had experience as a machinist, is a "coal passer," and is promoted to be a "fireman, second class," and then a "fireman, first class," and then is eligible to be promoted to be an oiler, a water tender, or a machinist's mate.

Many of the duties required of enlisted men are such that special training is necessary. For this purpose, in addition to the training stations for the apprentice seamen, schools are maintained at different navy yards for the training of enlisted men in the special line of work for which they have demonstrated fitness. The training given is thorough, and provides many enlisted men with a trade that serves them in good stead if, after the expiration of their enlistment, they decide to leave the Navy.

**Seamen.**—All newly enlisted men in the seaman branch who have not had previous service are enlisted with the grade or rating of “apprentice seaman.” The Navy maintains several training stations for the preliminary instruction of such recruits, the course lasting four months, during which the apprentice seaman is given lessons in the elements of navy life and duties. This includes teaching him to keep his outfit, sleep in a hammock, swim, row, sail a boat, make signals, and perform various drills. At the end of the course the apprentice seaman, who may be promoted to be an ordinary seaman, is transferred to a cruising warship, where he enters into his regular duties as a man-of-war’s-man.

An enlisted man of the seaman branch is eligible for promotion to petty officership, to be a master-at-arms, a coxswain, boatswain’s mate, gunner’s mate, quartermaster, gun captain, turret captain, or electrician.

There are at the Navy Yard, Washington, and at the Torpedo Station at Newport schools for

seaman-gunners. There enlisted men who show adaptability for the work are instructed so that they may qualify for positions as gunner's mates and turret and gun captains. For the training of electricians there are schools at the Navy Yards at New York and Mare Island. Men to go to these latter schools must be electricians by trade or show special aptitude for the work.

**Engineer Force.**—There are two divisions in this branch—that of the engine room and that of the fire room. In the former there are chief machinist's mates, machinist's mates, first and second class, and oilers. In the latter there are chief water tenders, water tenders, firemen, first and second class, and coal passers.

There is a school for machinist's mates at the Navy Yard at Norfolk, Va., where men in the ratings of water tender, oiler, and firemen, first class, are entitled upon re-enlistment to be sent for instruction to fit them for advancement to be machinist mates.

**Artificers.**—This branch embraces carpenter's

mates, shipwrights, plumbers, painters, sailmaker's mates, shipfitters, coppersmiths, blacksmiths and boilermakers. There is a school at the Norfolk Navy Yard where men, enlisted in these ratings, are taught the application of their trades that they may work in war vessels. The men of the artificers branch are rated as petty officers, and accordingly they receive higher pay, and also have training in a trade that can be used to advantage in civil life.

**Hospital Corps.**—This branch provides apothecaries, attendants, and nurses for the naval hospitals on shore, and the “sick bays” on the men-of-war. The members are graded as hospital stewards and hospital apprentices, first and second class. The Hospital Corps Training School, located at the Norfolk Naval Hospital, gives the recruits ground work for the study of medicine; they are taught the elements of anatomy, physiology, pharmacy, materia medica, nursing, cooking, and clerical work, and they are given practical instruction in the care of the sick, first aid to the injured, etc.

**Musicians.**—These are enlisted for service in bands, one of which is stationed on each large warship, and as buglers. They are rated as bandmaster, first musician, musician first class, musician second class, and bugler. There are schools for musicians at the Navy Yard, Norfolk, and at the Training Station at Newport. There is a special band at the Naval Academy, and one known as the Marine Band, at Washington. The latter is considered by many to be the finest military band in the country.

**Commissary and Messmen Branch.**—The men of the commissary branch prepare and serve the food of the enlisted men, those of the messmen branch that for the officers. In the former there are two grades of commissary stewards, four grades of ship's cooks, and two grades of bakers; in the latter there are officers' stewards, cooks, and mess attendants. All of these are enlisted men, and have their stations at quarters just as do other members of the crew. There is at the Training Station at Newport a class for ship's cooks and bakers.



**Clerical Branch.**—For the clerical work on board ship and to keep an account of the stores there are chief yeomen, and yeomen first, second, and third class; some of these must be stenographers and typewriters, others must be expert bookkeepers or qualified to keep the ship's log. At Newport and San Francisco there are yeoman's training schools, where recruits in this branch are instructed in the clerical duties which they will be called on to perform on board ship.

The pay of enlisted men is comparatively high, ranging from about \$100 per month, for certain chief petty officers, to \$18 for apprentice seamen and landsmen. In addition to the regular pay of his grade, each man is offered the opportunity of earning extra pay for qualifying as gun pointer, or seaman gunner, or by performing special duty, such as signalman, coxswain of steam launches, seamen in charge of holds, lamplighters, etc. Each recruit on enlistment is given free an outfit to the value of \$60. Liberal allowance is made for feeding en-

listed men and, unlike the officers, who must meet their own mess bills, they are well fed at the public expense.

### THE MARINE CORPS

This Corps was established by the Continental Congress during the Revolutionary War, and since has taken part in every war in which the country has been engaged. At the present time the duties of the Marine Corps are to furnish guards for all of the large warships, and to form garrisons for the navy yards and some of the colonial dependencies, as Guam, the Philippines, and the Isthmian Canal Zone. The marine guard on one of the largest battleships consists of two officers and about seventy men. They perform sentry duty, and usually man several guns of the secondary battery, and are available for landing parties, etc.

The Marine Corps is under the immediate control of the Major-General Commandant, who is himself subject to the orders of the Secre-

tary of the Navy. The Marine Corps, notwithstanding it is under the Navy Department, strictly speaking, cannot be considered as a part of the Navy; its officers and men wear distinctive uniforms, and they are organized on a similar basis to the Army. The men and officers receive the same pay and allowances as are provided by law for the Army, and the various grades correspond to those in the Army. Thus, among the enlisted men there are: Privates, corporals, sergeants, first sergeants, sergeants-major, and gunnery sergeants, and among the officers there are: Second and first lieutenants, captains, majors, lieutenant-colonels, colonels, and the major-general commandant. Each grade among the officers corresponds to some certain grade in the Navy, and the officers take rank among themselves accordingly.

Recruits in the Marine Corps usually are sent to the barracks at one of the navy yards; there they are taught the elements of soldiering before being assigned to a regular station or ship.

Officers of the Marine Corps formerly have been appointed both from among graduates of the Naval Academy, and from civil life. At the present time appointments are being made from civil life, although it is expected shortly to resume the practice of appointing Naval Academy graduates. Applicants for appointment from civil life as second lieutenants of marines must be between the ages of twenty-one and twenty-seven years, and they are required to pass a thorough mental and physical examination. After appointment usually they are detailed to take the course of instruction at the Marine Corps School of Application, now at the Naval Station, Port Royal, S. C. The Marine Corps consists of about 300 officers and 10,000 enlisted men, of whom approximately one-third perform duty on board ship, the remainder being stationed at various naval stations.

#### RETIREMENT

Officers and enlisted men of the Navy have the privilege of retiring from active service un-

der certain conditions. Officers may be retired for disability incurred in the line of duty, or after the completion of thirty years' service. When officers reach the age of sixty-two years they are obliged to retire. Enlisted men may retire after having served thirty years, if they desire. Retired officers and men receive three-quarters pay, while enlisted men receive, in addition, allowances for quarters and subsistence.

#### NAVAL MILITIA

The Naval Militia now is organized only under the laws of various States, in all about twenty-three, and consists of about 600 commissioned and warrant officers, and about 7,000 petty officers and men. The United States Government, through the Navy Department, extends aid and encouragement to the various organizations so far as it is possible in the absence of any general law regarding a Naval Militia. An appropriation of \$100,000, increased recently to \$125,000, has been made annually for

providing arms and equipment to all of the various organizations. This meager allowance has been supplemented indirectly by the Department in loaning naval vessels, boats, and other equipment to the States for use in training their organizations.

The necessity for a law regarding an organized national naval militia or reserve is generally recognized, as in time of war many vessels are fitted out in addition to those regularly in commission. The needed crews could not be obtained at haphazard, and there must be some source of supply from which to draw the men and officers having the necessary training. Secretary Long, in his annual report for the year 1901, submitted strong recommendations, based on experience during the Spanish War, for the establishment of a national naval reserve. Succeeding Secretaries have repeated his recommendations, which were as follows:—

“ I have to call attention again to the pressing need of a national reserve force from which to draw for sea service immediately upon an outbreak of war. This

subject has received attention in previous reports, and recommendations have been made for the enrolment and organization of such a national body, to be under the general direction of the Navy Department and subject to the call of the Chief Executive in times of national emergency.

“ The results of the Spanish-American War were such as to assure every one having knowledge of naval matters that steps should be taken at once to meet the one certain and positive requirement which will face the nation upon an outbreak of war—the immediate necessity at that exigent time, if it comes, of a large increase in the men of the Navy from an existing reserve—an increase which must, in the main, be made from the seafaring class, who, having acquired the habit of the sea, are at home on the water. There is no better way of insuring such a reserve than by the measure now urged.

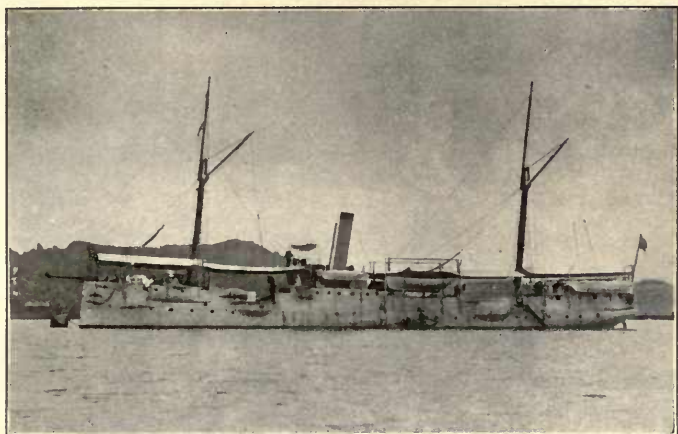
“ Our pressing need is for such a reserve—a body to go to the front on board ship at once upon the outbreak of war, or when it is imminent.”

The Naval Militia organizations, as they exist at the present time, consist of earnest men who desire to prepare themselves for the patriotic duty of rendering service to the country in time of war. These men deserve all encouragement,

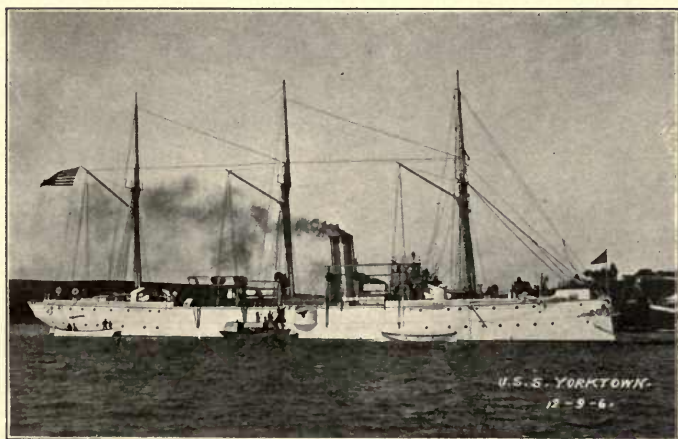
and should be placed on a proper status as regards their relations to the United States Government, which they are preparing themselves to serve. This has been done already for the land militia by a law enacted in 1903.

The Navy Department has loaned a number of vessels with skeleton crews from the Navy for use in training several of the various State organizations. Annually a cruise of vessels, loaned to the Naval Militia, is held for instruction purposes. Also a number of the battleships of the Atlantic Fleet are assigned to take out the various organizations for drill and practical experience.





The gun-boat *Don Juan de Austria*, captured from the Spaniards at Manila Bay. Now in use by the Michigan Naval Militia



The gun-boat *Yorktown*



## CHAPTER IV

### MAN-OF-WAR IN COMMISSION

THERE is a certain ceremonious routine which must be observed in commissioning a man-of-war. The vessel is placed in commission by the officials of the navy yard in which it is built, or to which it is delivered by the builder. The Captain of the Yard, under the direction of the Commandant, usually has charge of the ceremony. The Captain, officers, and crew of the ship assemble on the quarter deck at an appointed hour, the order of the Secretary of the Navy directing that the ship be commissioned is read, the colors and the commission pennant are then hoisted, the band plays the national air, and the ship is "in commission."

After the commissioning it devolves upon the officers and crew to prepare the ship for sea. Stores, coal, and ammunition must be taken

aboard, stations and duties must be learned, and the daily routine of a man-of-war established; station bills assigning duties and stations to each member of the crew having been prepared in advance. Each man is assigned to a division, under the charge of a division officer. Midshipmen are assigned to the various divisions as junior officers, and they aid the division officers in the drilling and instructing the men.

The crew for a ship about to go into commission usually is assembled somewhat in advance on the receiving ship at the navy yard. This permits the men to be drilled together and organized into a ship's company before the ship actually is commissioned. They are drafted from the various training stations and receiving ships, as may be necessary to form the required complement.

When the ship is ready for sea, sailing orders are sent to the Captain, and he proceeds to sea for a so-called "shaking down" cruise, which is intended to shake down every officer and man

to a proper understanding of his duties, and so that all may accustom themselves to the ship.

The following list of the various branches gives the complement of men and officers for a 27,000-ton battleship, a 14,500-ton armored cruiser, and for a 9,700-ton protected cruiser:—

	BATTLESHIP	ARMORED CRUISER	PROTECTED CRUISER
Wardroom officers	24	18	18
Junior       “	39	16	8
Warrant       “	14	8	7
Seaman branch (and ratings)	485	418	283
Engine-room force	274	298	278
Artificer branch	58	43	35
Commissary branch	18	17	14
Messmen	33	29	24
Special branch (yeomen, hospital attendants, and musicians)	38	37	16
Additional for flagship	48	23	37
Marine guard	77	67	52
	1108	974	772

### SHIP ORGANIZATION

The commanding officer or captain of a war-ship, under the Secretary of the Navy, has control of its movements and is held accountable for accidents and similar incidents. As has been seen, the Captain has the right to adjudge limited punishment and imprisonment for misbehavior. The next below the Captain, is the

executive officer, who has the rank of commander on battleships and armored cruisers, and lower rank on other vessels, depending on the rank of the commanding officer. He is, as his title indicates, the representative of the Captain in executing his orders and in maintaining the military and general efficiency of the ship. He succeeds to the command of the ship in the absence or death of the Captain. In time of battle he is fire-control officer, and as such directs and controls the fire of the guns, subject to the orders of the Captain.

On board battleships and armored cruisers, an officer of the rank of lieutenant-commander or lieutenant is assigned as "first lieutenant." This officer generally is next in rank to the executive officer, but always is senior to the watch officers. The first lieutenant is charged with the cleanliness, good order, and efficiency of the ship, and is thus the "housekeeper." In time of battle he assists the executive officer in his duties as fire-control officer.

On board vessels to which no first lieutenant

is assigned, the executive officer performs the duties usually assigned to that officer.

Next below the first lieutenant is the navigator, whose duty consists in navigating the ship when at sea. Also, he has charge of the chronometers. In case of the absence or death of the Captain and executive officer, the command of the ship succeeds to the first lieutenant or to the navigator, whichever is senior, and so on down the list, the senior line officer present always assuming command. In time of battle the navigator is ship-control officer, and is stationed in the conning tower to assist the commanding officer in handling the ship.

The ordnance officer, who ranks next to the navigator, has charge of the guns and ammunition. Upon him devolves the responsibility of conducting target practice, and to his efforts is due largely the credit for a satisfactory showing in that direction. Under modern conditions the duties of the ordnance officer are very important and arduous.

Next below the ordnance officer is the senior

engineer officer, known usually as the chief engineer. He has charge of the engines and boilers, the electrical generating plant, and auxiliaries operated by steam. Under him is the engineer division, which consists of the fire-room and engine-room forces, and constitutes a large percentage of the ship's company.

Below the chief engineer in rank are the "watch and division" officers, whose duties consist of taking charge of their respective divisions during drills, and of standing deck-watch in turn. When at sea the officer on watch, or the officer of the deck, as he is called, stays on the bridge and has charge of the ship, complying with instructions received from the Captain or navigator as to speed, course to be steered, etc. In port the officer of the deck stands his watch on the quarter-deck. The officer of the deck is the officer on watch in charge of the ship, and is regarded as the representative of the Captain, and his orders have to be obeyed accordingly.

Midshipmen are assigned to duty as junior



officers of the deck, and to assist various division officers in drills, etc.

All the above-mentioned are line officers.

The staff officers of the ship consist of the surgeon and assistant surgeons, the paymaster, assistant paymaster, and pay clerks. Staff officers have their specified duties as indicated by their titles, and, in case of the absence or death of all the line officers, would succeed to the command of the ship, in order of rank. The paymaster also is the commissary officer and the ship's general storekeeper, and has charge of messing the crew and cares for all stores on the ship.

The Captain is quartered in the cabin, and maintains his own table, or mess, as it is called. The executive, navigator, ordnance officer, chief engineer, watch and divisions officers, and the surgeon, paymaster, marine officers, and their assistants, above the rank of ensign, are quartered in the wardroom, and maintain the wardroom mess.

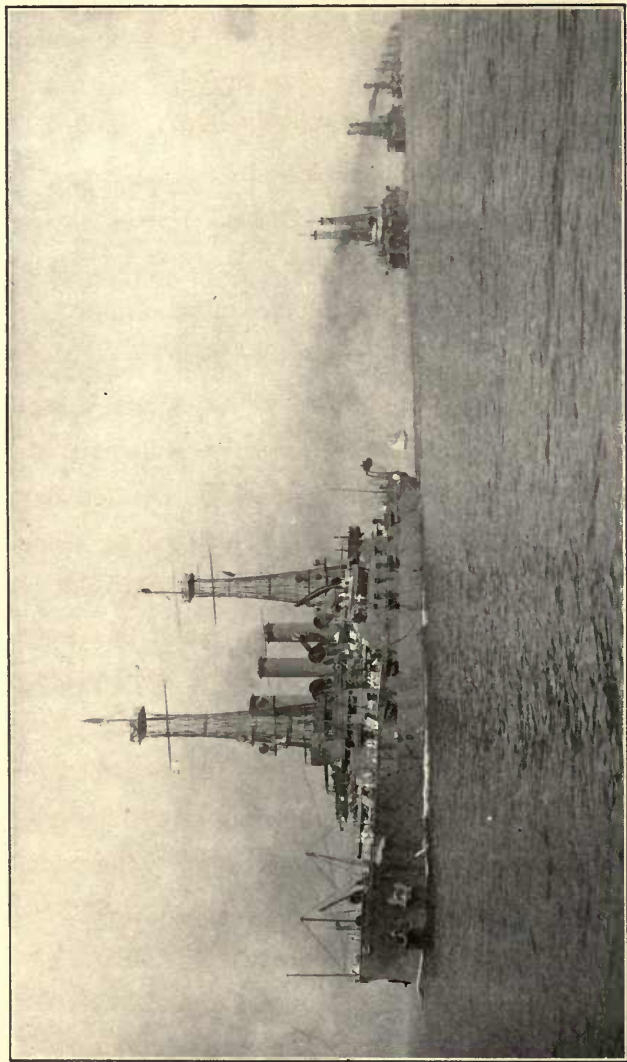
Ensigns who are not watch and division of-

ficers, and midshipmen and staff officers of the rank of ensign, are quartered in the junior officers' quarters, and maintain the junior officers' mess, commonly called the "steerage."

Warrant officers maintain a separate mess, which is called the warrant officers' mess.

Except the chief petty officers, who maintain a separate mess frequently, all the enlisted men are fed out of the general mess, which is run by the ship's commissary, usually under the direction of the paymaster. All officers must pay for their own food, no allowance being made them for this purpose. Each enlisted man is allowed a ration which has a value of about thirty-six cents per day. These rations are pooled, and all the men are fed from it. The ration allowance is liberal, and enlisted men of the United States Navy are fed extremely well. The men are assigned to messes by divisions, mess tables being placed about the decks wherever there is available space; when not in use they are hung out of the way to the deck above.

The problem of providing and serving food



The Atlantic Battleship Fleet under way in column, the flagship *Connecticut* leading



for 800 or 1,000 men on board ship, away from source of supplies, is by no means simple. Each of the large ships is fitted with a cold storage plant, and with electrically driven meat grinders, potato peelers, ice cream freezers, and dishwashers. A bakery, of adequate size, for supplying fresh bread, and laundry machinery of capacity to wash the clothes of the officers, are provided.

#### FLEET ORGANIZATION

Battleships and armored cruisers, as we have seen, are formed into fleets, which are divided into squadrons and divisions for drilling in fleet tactics. The Rear-Admiral, in command of the fleet, squadron, or division, has assigned to him one of the ships, as flagship. He occupies quarters on board, separate from the Captain, and maintains his own mess, usually in connection with the officers of his personal staff. Each rear-admiral transmits the orders of the Commander-in-Chief to the ships of his own division, and is responsible for manœuvering them

properly in the various tactics. In case of the absence or death of the Commander-in-Chief, the supreme command of the fleet would devolve upon the senior of the rear-admirals, and so on in turn through the other rear-admirals and the captains of the various ships, in order of rank. At the battle of Trafalgar, after the death of Lord Nelson, his second officer in command, Vice-Admiral Collingwood, succeeded to the command of the English fleet.

At stated intervals each commander of a ship or division inspects the ships under him. Certain specified drills are carried out, and upon the efficiency displayed and the condition of the ship depends the report of inspection forwarded to the Navy Department.

The staff of a rear-admiral in command of a fleet consists of a chief-of-staff, who is an officer with the rank of captain or commander, a flag secretary, and a flag lieutenant, and an aide. In addition there are a fleet ordnance officer, a fleet engineer, a fleet surgeon, a fleet paymaster, a fleet marine officer, and a fleet athletic officer.

Each of these officers, under the direction of the Commander-in-Chief, maintains supervision of his particular department in all the vessels of the fleet. Each of the junior rear-admirals, commanding squadrons or divisions, has a flag lieutenant and a flag secretary. These officers are aides to the rear-admirals and assist them in the performance of their duties.

#### SIGNALS, FLAGS, ETC.

Communication may be carried on among ships of the Navy in a number of ways, either by wireless telegraph, by visual signals, with flags or semaphores by day, or by electric lights, Roman candles, or rockets by night. In foggy weather sound signals made on the whistle or bell are used. For official messages, orders, etc., the wireless telegraph is used generally. For tactical drill signals, and for ordinary communication between ships not having wireless outfits, visual signals are used most generally.

The semaphore signals, which are made either by means of a semaphore with wooden arms, or

by the motions of the arms of the signalmen themselves, are used for spelling out messages. Semaphore signals, owing to the difficulty of seeing them, are not effective at any considerable distance.

Flag signals may be read many miles away, and ships are said to be within signal distance when it is possible to make out flag signals.

There are two kinds of signal flags, the alphabetical code flags and the numeral flags. The alphabetical code flags are the same as the International Code. By their use, with reference to the international signal books, ships of any nation or language can communicate. The numeral flags are used for tactical and routine signals.

Every ship flies flags of especial significance. Men-of-war carry the flag of their country at the peak or on a flag-pole at the stern. In England the man-of-war flag is white, with the red cross of St. George and the union-jack in the corner, the naval reserve flag is blue, and the merchant ship flag is red. In the United States,



however, no such distinction is made; all ships carry the national ensign, which has thirteen red and white stripes, and a blue ground with a star for every State. The union-jack is carried at the bow when at anchor only. A flag is carried at the masthead to show the rank of the officer in command, thus: an admiral has a blue flag with four stars, a rear-admiral a blue one with two stars, and the senior commanding officer present, where there is no flag officer, a blue triangular flag. The President of the United States, the Secretary and Assistant Secretary of the Navy, each has a distinctive flag which is flown by a man-of-war, if any of these officials is on board, to indicate his presence. Besides the flags mentioned, there are a great many others carried by men-of-war, a complete knowledge of which is a study by itself.

At night signals are made by the "winker" light, by flashing different combinations of red and white electric lights, each light and combination of lights indicating a letter, or by the Very night signals, which consist of rockets and

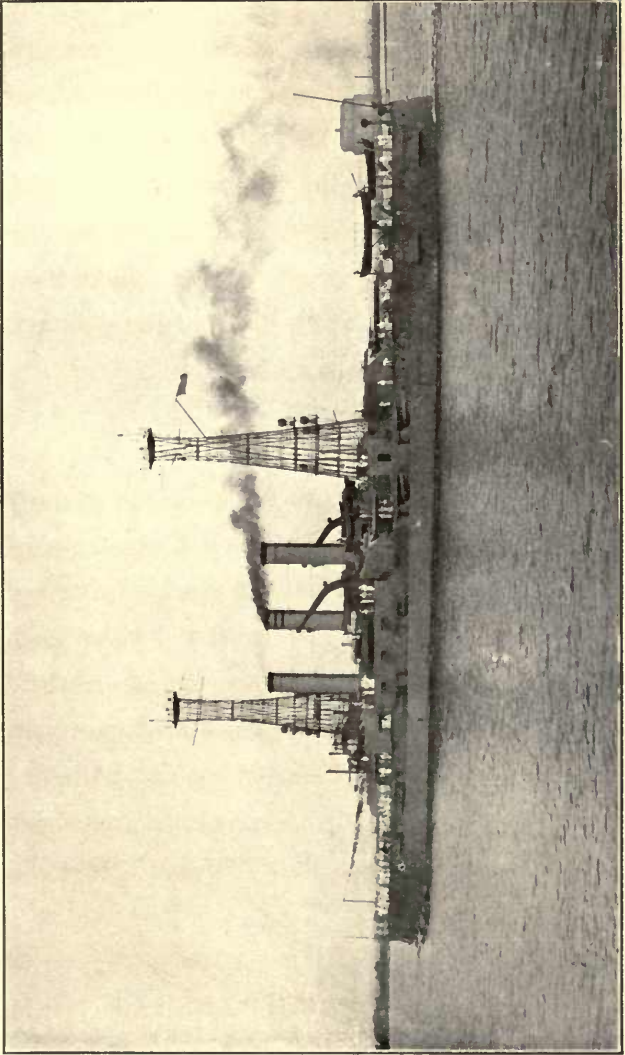
green and red stars, like Roman candles, discharged into the air. Signals may be made at night by illuminating the arms of the semaphore or by means of the rays of a searchlight.

Signal men acquire great skill in making and reading signals; the celerity with which their work is done is taken as an index of the "smartness" of the ship.

#### SHIP ROUTINE

Routine on board ship may be classed as daily routine and weekly routine, and is systematically followed on all vessels of a fleet. It is fixed by the Commander-in-Chief, who decides each day what shall be the uniform, whether white clothes or blue, and what drills and exercises shall be carried out. Usually special drills are assigned for each day of the week, though these may be varied on occasion. This is called the weekly routine.

With only occasional exceptions, the daily routine is as follows: all the men and certain of the officers are called at five o'clock; the



The battleship *Kansas*



men, after having been served coffee and cocoa, clean decks, paint-work, boat gear, wash their clothes, etc. At 7:30 the crew goes to breakfast. At 8 o'clock "colors" is sounded, and all hands stand at attention while the ensign is being hoisted and the national air played by the band. At 9:30 the divisions are inspected at quarters, and the forenoon is passed in drills or exercises. At 12 dinner is served, and after that is finished afternoon drills are gone through. At sunset "evening colors" are held and the ensign lowered. At 5:30 supper is served, at 7:30 hammocks are given out, and at 9 o'clock, the flagship fires the evening gun, "taps" is sounded, and all hands, except those on watch, must turn into their hammocks. Officers and others having special watches are not affected by the routine hours for turning out in the morning and turning in at night.

Athletics are encouraged; the men are helped to form football and baseball teams, and boat crews, and to have matches between different ships. Trophies are provided for the winning

teams of each fleet, and a healthy state of rivalry in athletics exists among the crews of the different ships. Match games also are arranged with outside organizations, and many amateur baseball and football teams can testify to the excellence of the teams from the men-of-war.

Clubhouses for enlisted men have been established in several of the larger cities; in these liberty men can find amusements, as well as food and lodging.

Life on shipboard is not rigorous, and the men are well looked after, are given reasonable opportunity to go ashore when off duty, and are well fed and clothed, and provided with comfortable, well-ventilated quarters. Any monotony that may be about the ship routine is counterbalanced by the constant change of scene and climate. When sick, the men are placed in comfortable sick quarters, and receive the best medical attention and nursing.

The drills are of different character and designed to prepare the crew for various duties.

The most common is "general quarters," when the guns are manned and the men rehearsed in their duties for a battle. Fire drill, boat drill, battalion drill as infantry or light artillery ashore, collision drill, abandon ship, landing force, swimming, signaling, steering, sounding, etc., are other drills that make a part of the weekly routine.

The enlisted men are paid once a month and are granted liberty to go ashore when their behavior has been such as to justify according that privilege, and when their services can be spared from the necessary ship-work. In this respect there has been a great change from the old Navy. Then it was not possible to pay the men at regular intervals, many months sometimes elapsing between pay days, while cruises of several months' duration were made without the men being allowed ashore. In old Navy times, or up to about ten or fifteen years ago, a man-of-war's man would land with his pocket full of money, get into the hands of the numerous land-sharks, and in a few days he would find

himself penniless. The American bluejacket of the present is a self-respecting citizen, amply able to take care of himself and his money.

Arrangements are made so that any person in the Navy can allot a portion of his pay to his wife, dependent relative, or other person at home, with the assurance that it will be paid regularly, no matter where he himself may be.

### TARGET PRACTICE

Target practice is one of the essential features of the preparation for war, as no shots count except those that hit. It is designed to afford a practice for the gun-pointers, in their important duties of aiming and firing the guns, and for the gun crews, in reloading the guns after each shot, and for the "spotters" in determining the ranges, thus developing a ship's ability to hit an enemy rapidly with all guns firing.

By a system of preparation and practice, adopted in 1902, the accuracy and rapidity of fire of naval gunners has been increased to a



wonderful degree. This system consists first in training the men in pointing the guns by means of the "dotter" and the "Morris tube" attachments to the guns, which enable the pointers to practise aiming at a small target, and to familiarize themselves with operating the mechanism of the guns. Later, shots are fired from each gun at a full-size target placed at some distance from the ship.

As a final step in the course of instruction, battle practice is held; during that all guns are fired at a moving target at an unknown distance from the moving ship, which is manœvered as in battle.

The result of the annual record target practice determines which ship of each class shall have the trophy; the desire to secure it creates a great and healthy rivalry among the various ships' companies. In addition to the incentive of a trophy, the men are encouraged to become qualified gun-pointers by extra pay and privileges offered to those who qualify.

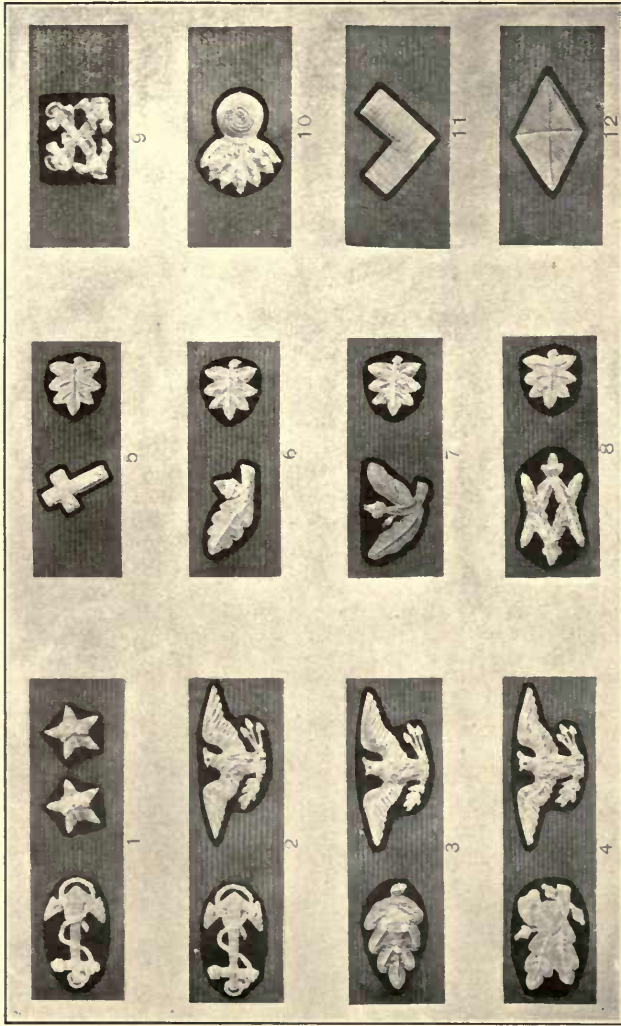
An important feature of target practice is

the fire-control system, by which the range is transmitted to the sight-setters at each gun, and the fall of the shots "spotted," to determine whether the range is "over" or "short." The fire-control towers, or cage masts, as they are called, are intended to provide suitable stations from which the spotters can see the fall of the shots. By means of telephones and voice tubes they transmit the results of their observation to the fire-control officers, who in turn transmit the range to the sight-setters.

### UNIFORM

All persons in the naval service are required to wear uniform on shipboard, when on duty in navy yards, and on certain other occasions. Each grade has distinctive uniforms and marks to indicate duties, rank, etc. There are different uniforms for occasions of ceremony, for ordinary wear, and for work, and white uniforms for warm weather.

Officers have special full dress, full dress, evening dress, mess dress, and white and blue



COLLAR DEVICES ON SERVICE COAT OF OFFICERS, SHOWING RANK AND CORPS

- 1. Rear-Admiral ; 2, Captain ; 3, Medical director, with rank of commander ; 4, Pay director, with rank of commander ;
- 5, Chaplain ; 6, Professor of mathematics, with rank of commander ; 7, Naval constructor, with rank of commander ;
- 8, Civil engineer, with rank of commander ; 9, Chief boatswain ; 10, Chief gunner ; 11, Chief carpenter ; 12, Chief sailmaker



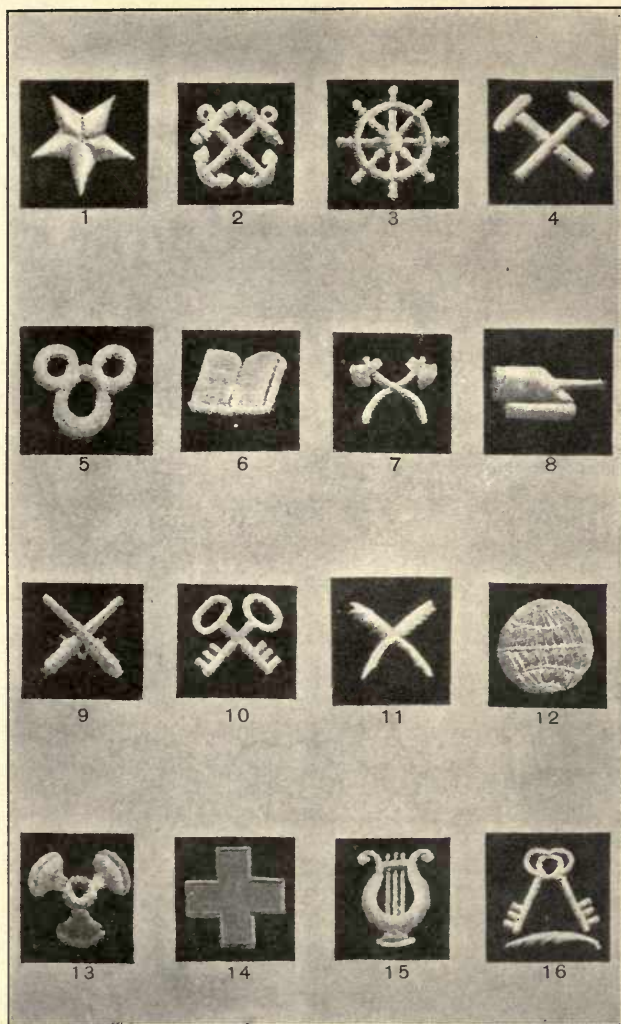
service dress uniforms. Each uniform is intended for particular occasions. The senior officer present designates the uniform to be worn each day, and on special occasions, in order that all officers may appear in the same dress.

The rank of an officer is indicated by stripes of gilt, so-called "lace" or braid on his sleeves; the higher the rank, the greater the number of stripes. Thus an officer with the rank of ensign has one stripe, while a lieutenant has two stripes. A captain has four stripes on each sleeve. The corps to which an officer belongs is indicated for a line officer by a star on each sleeve above the stripes, and for a staff officer by colored cloth between the gold lace stripes. These colors are different for each staff corps and are as follows: dark maroon velvet for surgeons, white cloth for paymasters, olive-green cloth for professors of mathematics, dark violet cloth for naval constructors, and light-blue velvet for civil engineers. In addition to the stripes on the sleeve the rank and corps are indicated by devices on the collar of the service

blouse and on the shoulder straps and epaulets of dress uniforms. The corps devices consist of an anchor for line officers and various forms of oak leaves for the different branches of the staff corps. The rank is indicated further on the collar of the service blouse and on shoulder straps and epaulets: no mark for a midshipman or ensign, one bar for a lieutenant, junior grade, two bars for a lieutenant, a gold leaf for a lieutenant-commander, a silver leaf for a commander, an eagle for a captain, one star for a commodore, two stars for a rear-admiral, three stars for a vice-admiral, and four stars for the admiral.

The sword is worn by all commissioned and warrant officers as a part of dress uniforms and on certain occasions, such as infantry drills, parades, and when on military duty. Epaulets and shoulder straps are worn only by commissioned officers.

The mourning badge is worn by officers when attending funerals in uniform, and on other occasions when so ordered on account of the death



### SPECIALTY MARKS ON RATING BADGES

- 1, Master-at-arms; 2, Boatswains' mates, coxswains; 3, Quartermasters; 4, Blacksmiths, ship fitters; 5, Sailmakers' mates; 6, Printers; 7, Carpenters, plumber and fitters, painters; 8, Turret captains; 9, Gunners' mates; 10, Chief yeomen; 11, Yeomen, first, second, and third classes; 12, Electricians; 13, Machinists' mates, boiler makers, water tenders, coppersmiths, oilers; 14, Hospital stewards, hospital apprentices (red cloth); 15, Bandmaster, musicians; 16, Commissary stewards





of a public official. It consists of a band of crape on the left sleeve, and a knot of crape on the sword hilt.

The enlisted men have blue and white dress and undress uniforms. Chief petty officers have a distinctive uniform from other enlisted men; it consists of a double-breasted sack coat with brass buttons, and a cap with a visor. All other enlisted men wear a shirt with broad collar and a blue flat cap. Different grades and duties among enlisted men are indicated by rating badges and distinguishing marks, which are of cloth, except in certain special cases of petty officers, when the chevrons may be of gold lace instead of scarlet cloth.

The rank of a petty officer is indicated by chevrons and his branch by the specialty mark placed between the chevrons and the eagle. There are sixteen specialty marks indicating the various branches among the enlisted men. In addition there are distinguishing marks worn on the uniform to indicate those men who have qualified as seaman-gunner, gun captain or gun-

pointer, and a mark for those who are ex-apprentices or hospital attendants. There are also continuous service stripes of red that are worn on the left sleeve, and show the number of complete terms of enlistment served, one for each enlistment.

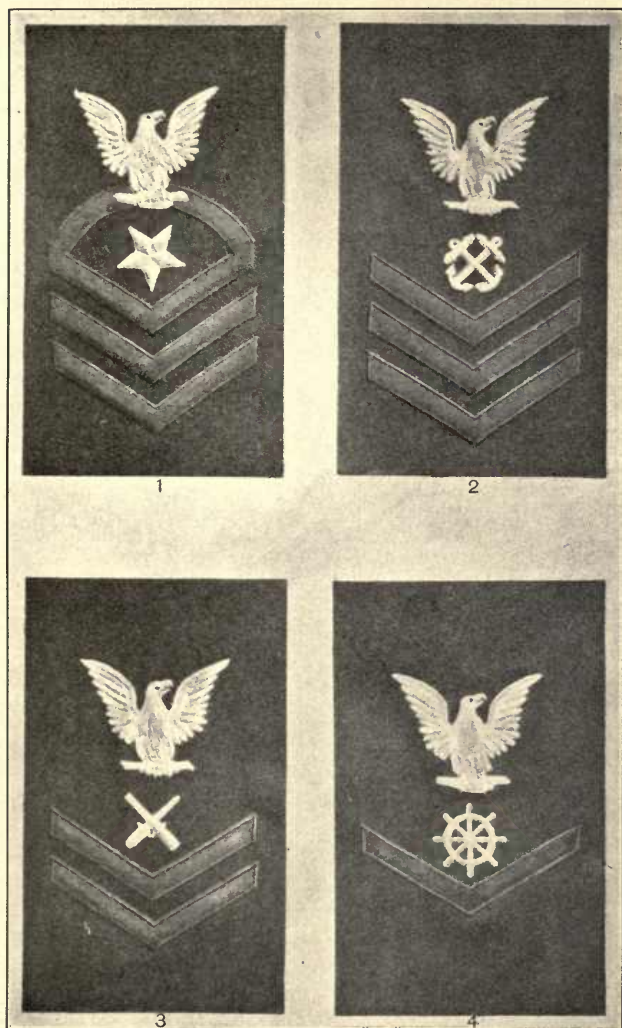
All enlisted men of the seaman branch, except chief petty officers, are required to wear a jack-knife on a knife lanyard as part of the uniform.

A "watch mark," of white or blue, for the deck force and red for the engine-room force, is worn on the shoulder seam of all, except petty officers, to indicate whether the man is in the starboard or port watch, the mark being worked in the right shoulder in the former case and the left in the latter.

Petty officers wear their rating badge on the right or left sleeve to indicate to which watch they are assigned.

#### CEREMONIALS AND DISTINCTIONS

In all military services there are many ceremonial observances. This is especially true of



**RATING BADGES FOR PETTY OFFICERS**

1, Chief master-at-arms ; 2, Boatswain's mate, first class ; 3, Gunner's mate, second class ; 4, Quartermaster, third class



the Navy, and the procedure to be followed on each occasion requiring ceremonial or other observance is specified in great detail. An entire chapter in the Navy Regulations is devoted to the subject "Honors and Distinctions." It covers the ceremonies to be observed on board vessels of the Navy and at naval stations in honor of the President of the United States, the Vice-President, an ex-President, the president or sovereign of a foreign state, members of royal families, Cabinet officers, the Chief Justice of the United States, governors, members of Congress, diplomatic representatives, consuls, and naval and military officers. A section of the chapter is devoted to honors and distinctions in general and specifies the formalities to be observed in ordinary official intercourse and the details of other ceremonies.

The most elaborate ceremony is that followed when the President of the United States visits a vessel of the Navy. All officers of the vessel are required to assemble in special full dress uniform on the side of the quarter-deck on

which the President boards, the yards and rail are manned by the crew, and the marines and band are paraded on the quarter-deck. When the President reaches the deck, officers and men salute, the marine guard presents arms, the drum gives four ruffles and the bugle four flourishes, followed by the national air, played by the band. The President's flag is displayed at the mainmast-head, and kept flying as long as he is on board, and a national salute of twenty-one guns is fired immediately after the President and his suite have been received. The same ceremonies are repeated at his departure, and all other United States warships present are required to man the rail and fire a national salute at the same time as the ship visited.

Similar honors of different degree are paid to other officers, varying with the rank and importance of the person honored, the minimum honors prescribed being those for commissioned officers of the Navy or marine corps below the rank of commander. For these officers the "side is piped"; that is, a boatswain's mate

stands at the gangway and blows a call on his whistle, or "pipe," as it is called, and two "side-boys" attend the gangway, saluting as the officer reaches the deck.

When a naval ship enters a foreign port, a national salute of twenty-one guns is fired, but no United States ship is allowed to fire such a salute in honor of a foreign nation unless there is assurance that it will be returned gun for gun.

All officers and men are required to salute the national ensign upon reaching the quarter-deck of a man-of-war, or on leaving it to go over the side; they must stand at attention when the "Star Spangled Banner" is being played, and during morning and evening colors, when also the marine guard is paraded.

Every officer and enlisted man of the Navy, when buried, receives military honors in accordance with his rank or rating.

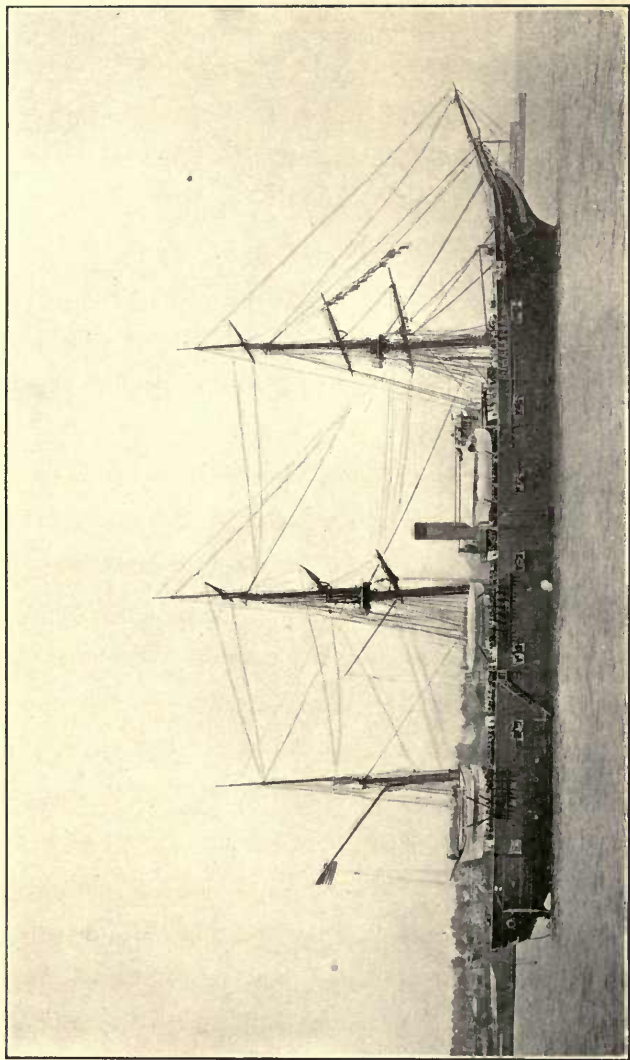
The most impressive and affecting of all ceremonies is that of burial at sea. The body is sewn in a hammock, weighted at the foot to

make it sink, and placed on a slide on the starboard side of the quarter-deck. The flag is half-masted for an appropriate length of time, depending on the rank of the deceased, and, at the appointed hour, the ship is stopped and the boatswain's mates call, "all hands to bury the dead." After the funeral ceremonies, which are conducted by the captain if there is no chaplain on board, the end of the slide is raised and the body thus consigned to the deep. Three volleys of musketry are fired by the escort, the bugler sounds "taps," and the boatswain's mates "pipe down."

When the interment is on shore, the exercises are more elaborate. The funeral *cortège* on its way to the cemetery marches at slow time, the band playing a dirge and the mourners marching in inverse order of rank; the ensign is draped in mourning, and the drums are muffled.

The size of the funeral escort is determined by the rank of the deceased. For an admiral it consists of four battalions of infantry and two battalions of artillery; for an enlisted man,





The *Hartford*, built in 1858, flagship of Admiral Farragut at the battle of Mobile Bay



not a petty officer, it consists of eight men commanded by a third-class petty officer. Officers and petty officers of intermediate rank have funeral escorts varying in size between the above extremes. At the grave, after the burial service, the usual three volleys of musketry are fired, and " taps " sounded as in the burial at sea.

The most elaborate burial ever given any one who had served in the United States Navy was that given Admiral Farragut, whose death took place in Portsmouth, N. H. His body was taken to New York on a naval vessel. The funeral escort through the streets of New York consisted of the President of the United States and members of his Cabinet, many naval and military officers of high rank, sailors, ten thousand soldiers, the New York Fire Brigade, and numerous civic bodies. Public schools and offices, the Customs House, the Stock Exchange, and leading mercantile houses were closed. Bells were tolled and minute guns fired. Admiral Farragut was mourned sincerely by the

people at large, not only on account of his distinguished service to the country, but for his admirable personal qualities.

After the death of Admiral Nelson at the Battle of Trafalgar, where he won an overwhelming victory over the French and Spanish allies, his body was taken to England on his flagship the *Victory*. The grateful people, in a desire to render him all possible honors, accorded him a funeral that probably never has been surpassed. He was buried in a coffin made after the battle of the Nile of a part of the mainmast of the vanquished French flagship *Orient*. His body rested in state in Greenwich Hospital, and then was carried, covered by the *Victory's* battle flag, through the streets of London by sailors from the fleet, and was followed by England's highest naval and military officers. Bells were tolled and minute guns were fired, and all of England was abroad to pay a last tribute to England's greatest naval hero, whose genius had prevented frequently the invasion of his country, and who had won many decisive vic-

tories over its enemies. He was buried in St. Paul's Cathedral and a monument indicative of his genius and achievements marks his tomb.

### THE WATCH BELL

Time is indicated on shipboard by striking the " watch bell " each half hour. Watches on ships are generally of four hours' duration, so that the bells are arranged to mark clearly the divisions of time in four-hour intervals. These divisions are from midnight to 4 A. M., then to 8 A. M., then to noon, then to 4 P. M., then 8 P. M., and then to midnight. A half hour after the beginning of each watch one bell is struck, and an additional bell is struck for each succeeding half hour that elapses up to eight bells.

As the crew is divided usually into an even number of watches that alternate with each other, and in order that the men may not be on watch at the same periods each successive day, the period from 4 P. M. to 8 P. M. is divided into two watch periods of two hours each, that from 4 to 6 o'clock being the " first dog watch," and

that from 6 to 8 o'clock the "second dog watch." In the United States Navy the bells in the dog watches are struck the same as for any other four-hour period. In the English Navy, at half-past six o'clock, one bell only is struck, at seven o'clock two bells, and at half-past seven o'clock three bells are struck. This custom arose from the fact that a mutiny in a British fleet was planned at one time to take place at five bells (half-past six) of the second dog watch. The officers learned of the plot, and to avoid giving the signal, struck only one bell at that hour.

The Navy Regulations require that the starboard or right-hand gangway of a ship is to be reserved for the use of commissioned officers and their visitors when going on board or leaving the ship, while the port gangway is used by others. When naval steam launches approach the side of a man-of-war at night or in day time, when the canopy is spread, they are required to indicate the rank of the highest officer on board by short blasts on the whistle.

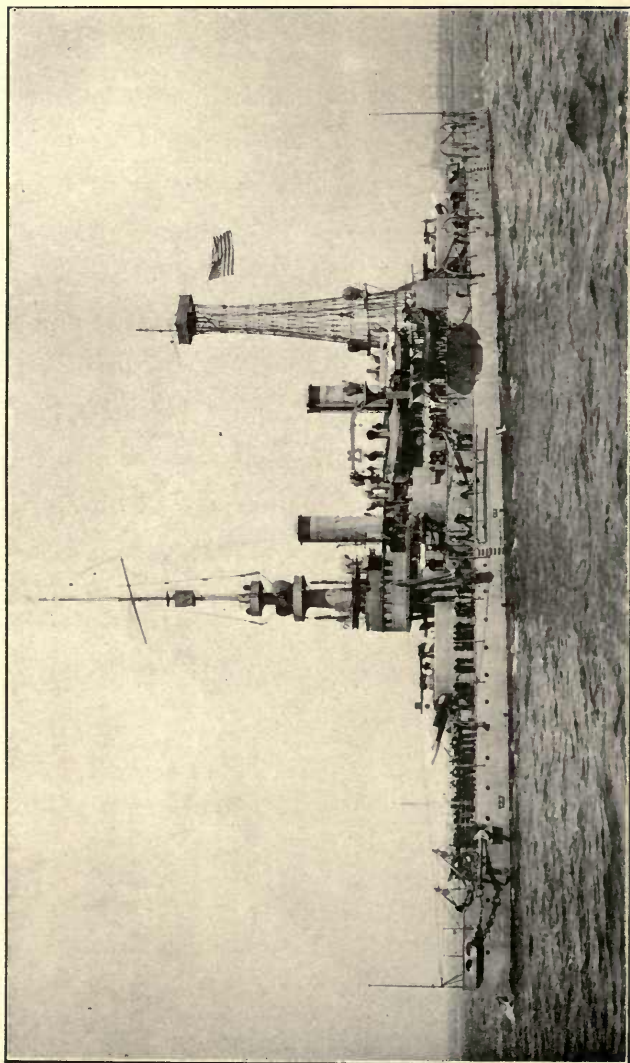
This is sounded four times for a flag officer, three times for a commanding officer, twice for other commissioned officers, and once for any other person. Pulling boats reply to hails from a man-of-war by answering "flag" if there is a flag officer on board, the name of the ship commanded by him, if a captain is on board, "aye, aye" for other commissioned officers, "no, no" for other officers, and "hello" for enlisted men or marines. Officers in boats passing one another are accorded specified honors according to their rank. Pulling boats toss their oars and steam launches stop their engines for flag officers, while the officer in charge of the boat salutes. Similar honors of less degree are accorded to commanding officers, while other commissioned officers simply exchange salutes with the hand, the junior saluting first. Juniors in boats are required to give way to seniors, and to show deference by abstaining from crossing their bows or in any manner ignoring them.

The Navy Regulations prohibit the giving of cheers as a compliment to any officer.

## GROG

Formerly grog, which consisted of a mixture of rum, sugar, and water, was issued to enlisted men of the Navy each day as a part of their ration. On September 1, 1862, this was discontinued by law, and now the Articles for the Government of the Navy prohibit the introduction on board naval vessels of distilled spirits, except upon the order and under the control of medical officers, and to be used only for medical purposes. The sale or gift of malt or alcoholic liquors to enlisted men on board ship or at naval stations also is prohibited by regulation.





The battleship *Massachusetts*, sister ship of the *Oregon*, and one of the first American battleships



## CHAPTER V

### CLASSES OF SHIPS IN THE NAVY

IN former days of wooden ships, the largest and most powerful men-of-war were called "ships of the line," or "line of battle" ships, and were classed according to the number of their guns; the smaller ships were frigates, corvettes, gunboats, sloops-of-war, etc. To give an idea of the classification at that period two well-known examples may be mentioned. They are Lord Nelson's flagship the *Victory*, which was a three-decker, first-rate ship of the line, and the *Constitution*, which was a frigate. The United States possessed only a few ships of the line, and none of these ever were in battle.

At the present day warships may be separated into two broad divisions, and be subdivided further into classes. The main divisions are armored and unarmored ships. The first in-

cludes battleships, monitors, and armored cruisers; the second, cruisers, gunboats, scouts, torpedo destroyers, torpedo boats, and auxiliary vessels, such as transports, supply ships, repair ships, colliers, etc. Armored ships include all those that are fitted with side armor to protect the hulls from being pierced by projectiles; unarmored ships may be fitted with protective decks, but have no armor on their exterior surface.

**Battleships.**—This is the most formidable type of war vessel, and combines powerful weapons with the greatest protection possible under the limitations involved by floating warfare. To carry the heavy guns and massive armor requisite to meet the above conditions, a battleship must be of the largest possible size, and this tends to increase continually, and is limited only by the draft of water in the harbors, the size of dry docks, and the width of the locks of the Panama Canal. In recent years the size of battleships has increased from a displacement of 11,000 tons for the *Oregon* class, to

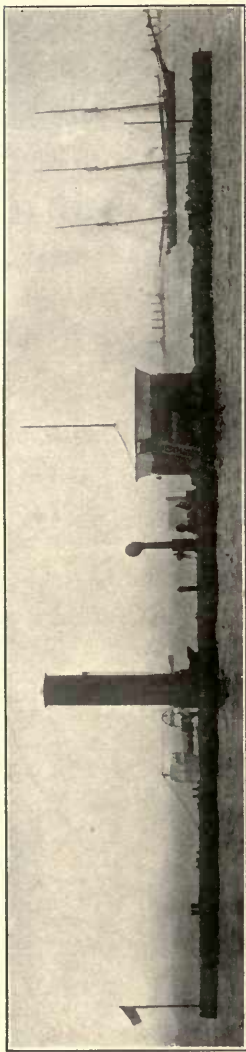
28,000 tons for the *Texas* class, recently commenced. The armament, armor protection, and speed have increased correspondingly with the size; speeds of over 21 knots, that formerly were considered high for protected cruisers, now are attained by battleships.

**Armored Cruisers.**—An armored cruiser may be defined as a battleship in which armament and armor, to a certain extent, have been sacrificed to speed; thus an armored cruiser has the essential characteristics of a battleship, but its armor is lighter and extends over a comparatively smaller area, its guns are fewer in numbers and of smaller caliber; its speed, however, may exceed by three to five knots that of a battleship of the same class. United States armored cruisers vary in displacement from 9,000 to 15,000 tons. In foreign navies greater displacements than those given have been adopted for recent armored cruisers. The purpose primarily of armored cruisers is for advance skirmishing, and they are capable of taking place in the line of battle. They bear

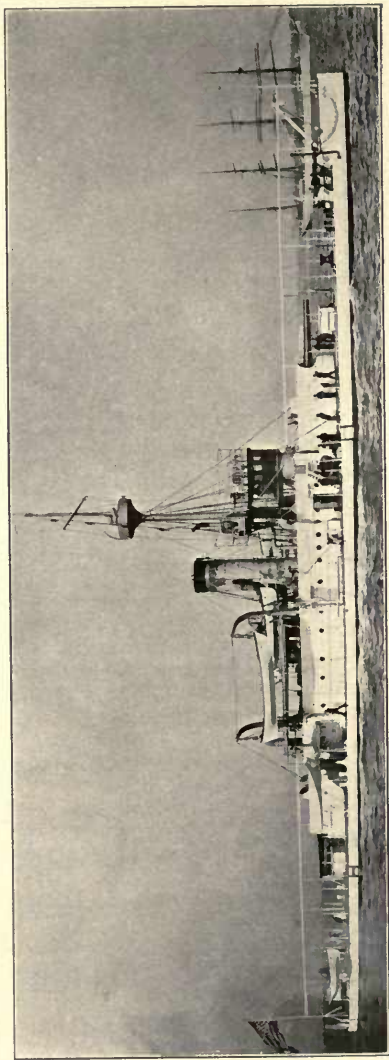
essentially the same relation to war on the sea that heavy cavalry bears to that on land, and, if emergency called for armored vessels for distant service, a squadron of armored cruisers would be sent, which, if it could not meet the enemy in equal battle, could harass and annoy, and, by superior speed, avoid definite engagement with the foe.

**Monitors.**—These vessels are heavily armored and carry a limited number of guns of the largest caliber. The type is distinctly American, no other nation ever having adopted it, and in recent years it has fallen into disfavor in this country. Monitors vary in displacement from 3,000 tons to 8,000 tons. They carry one or two turrets, with guns of large caliber; their sides, which extend only a short distance above the water, are heavily armored, and their main deck also is armored. Over the armored deck they are fitted with an unarmored superstructure, which, if shot away, would not affect the vitals of the ship.

The two great defects in monitors as a type



The civil war monitor *Canonicus*, one of a number built after the success of the *Monitor* against the *Merrimac*



Monitor *Amphitrite*, commenced in 1874, finished in 1895





are that, owing to their form, they are quick rollers, and are so unsteady in a seaway as to prevent accurate firing of their guns, and, on account of their not being habitable, they are unsuited to cruising, and therefore are available only for coast and harbor defense. The true function of a man-of-war being to seek and destroy the enemy's fleet wherever it may be, there is no place in a fighting navy for harbor defense vessels. That purpose can be effected more surely by fortifications.

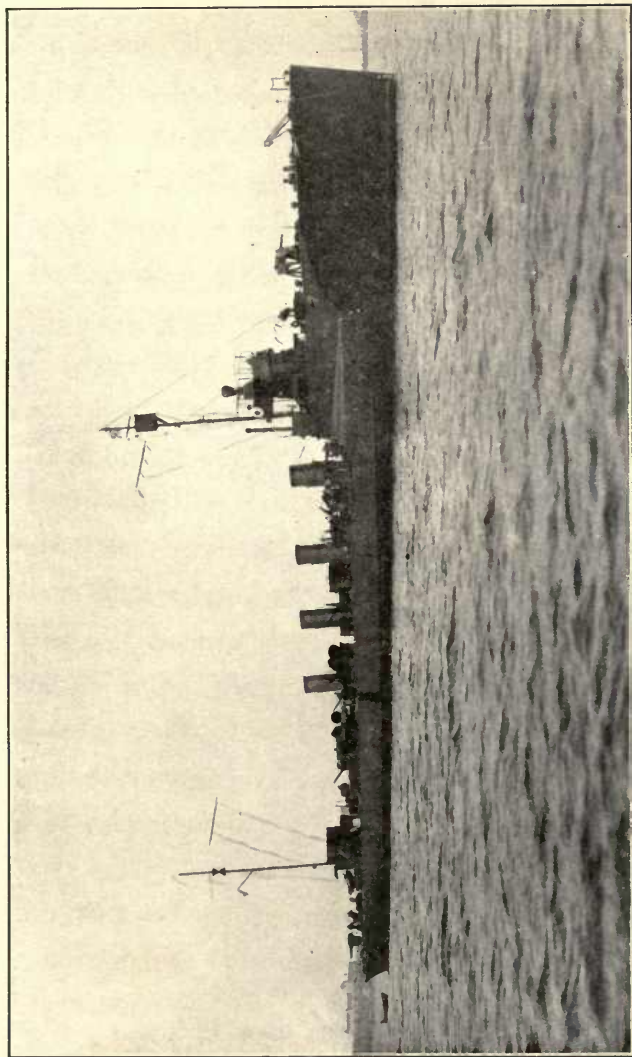
**Cruisers.**—Protected cruisers differ essentially from armored cruisers in having no side armor, the protection consisting, exclusively, of a protective deck. They vary in size from 3,000 to 8,000 tons. Their purpose is to patrol the ocean, convoy merchantmen, prey on the enemy's commerce, and, in peace time, to show the flag and serve as international police. They are usually of moderate speed, and of large coal capacity and steaming radius.

**Scout Cruisers**, which have higher speed than any ships except torpedo craft, are intended to

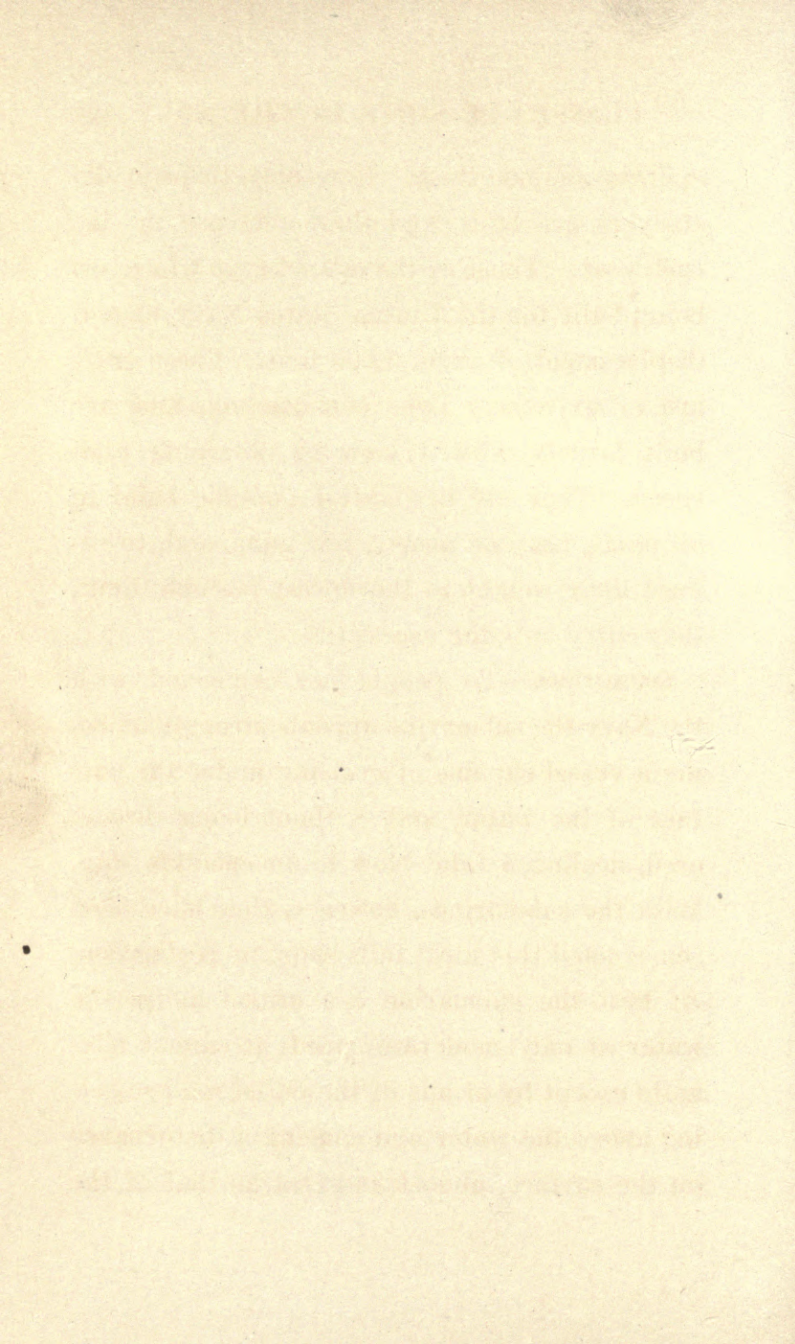
cruise in company with the fleet, precede it for scouting, and to keep the Commander-in-Chief informed by wireless telegraph of the results. They are of light construction, and armed with guns of power adequate only to repel small craft. It is probable that, in the future, scout cruisers will be equipped with aeroplanes for scouting purposes.

Gunboats may be classed as small cruisers. They range in displacement from 800 to 1,200 tons, have small armament, and no armor; they serve in peace time for patrol and police duty, and, in war time, for picket duty, etc. There are special types, called river gunboats, which are built with light draft for service up rivers and in shallow harbors. This type has proved especially useful for operations against the insurgents in the Philippines, and for police and patrol duty in Chinese waters.

**Torpedo Craft.**—This class includes torpedo destroyers, torpedo boats, and submarines. Torpedo boats are smaller and appeared first. So-called torpedo destroyers were built later to



The torpedo boat destroyer *Preston*



operate against them. Now only torpedo destroyers are built, and these increase in size each year. Those of the newest type which are being built for the United States Navy have a displacement of about 1,000 tons. These craft are of extremely light construction, and are built largely with a view to obtaining high speed. They are of lightest possible build in all parts, have no armor, few guns, and, to reduce their weight to the lowest possible limit, they carry only the necessities.

Submarines.—To people not connected with the Navy the submarine appeals strongly as being a vessel capable of cruising under the surface of the water, and, without being discovered, dealing a fatal blow to an enemy's ship. With the submarines, however, that have been constructed this ideal falls short of realization. At best the submarine can cruise under the water at only moderate speed; it cannot navigate except by means of the periscope projecting above the water and causing a disturbance on the surface, almost as great as that of the

boat itself when awash, rendering the discovery of its whereabouts comparatively simple. A submarine's movements, even with the aid of the periscope, are uncertain, and many persons who have considered the subject seriously in all its phases, believe that a submarine under modern conditions of warfare would not present any considerable danger to a battleship. It is believed by many that the presence of submarines in a harbor would prevent effectually the blockading of that port by an enemy. A submarine is fitted with no armament except torpedo tubes, which are in the bow, or nose, of the boat. It is intended to approach the hostile warship awash, until within several thousand yards, and then to submerge, and, when within range, to fire its torpedo. As we have seen, this plan is difficult of realization.

Submarine boats may be classed as torpedo craft, their sole armament being torpedo tubes. There are forty built or building in the Navy. Their displacement and speed vary considerably, the largest being about 500 tons with

a maximum speed submerged of about 10 knots.

## LIST OF SHIPS IN THE NAVY

There are in the United States Navy 38 battleships in service and building, 12 armored cruisers, 10 monitors, 20 protected cruisers, 2 unprotected cruisers, 3 scout cruisers, 29 gunboats, 32 torpedo boats, 50 torpedo-boat destroyers, 40 submarines, 46 tugs, and a number of other vessels of various classes—a total on the Navy list of 380 vessels of all classes.

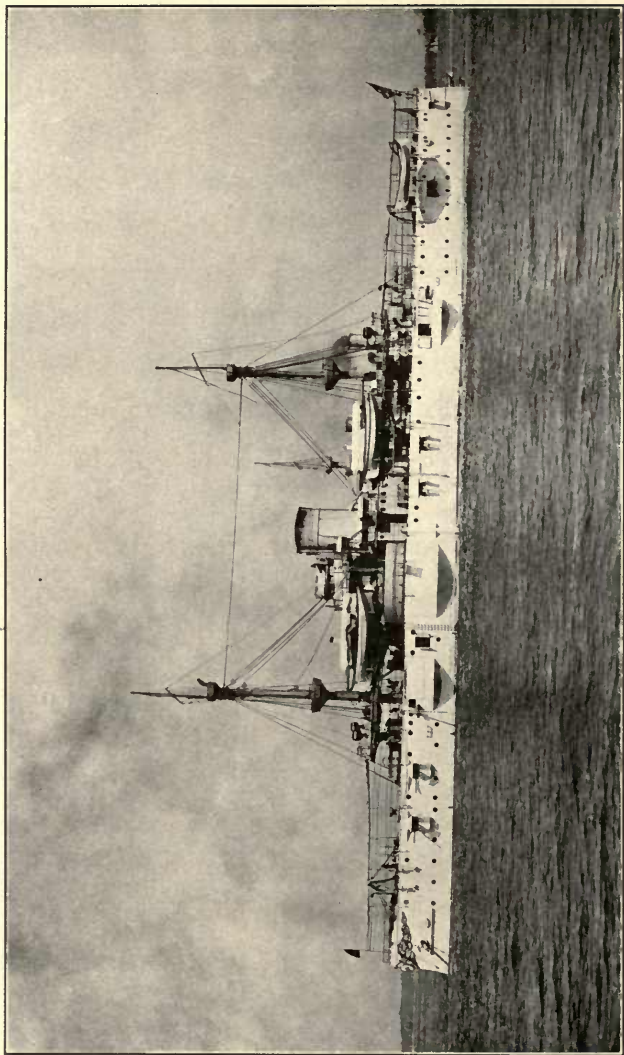
**Battleships.**—The *San Marcos*, formerly the *Texas*, is the oldest battleship in the Navy, having been commissioned in 1895. She is rated as a second-class battleship, and has a displacement of 6,315 tons, a designed speed of 17 knots, and carries a main battery of two 12-inch and six 6-inch guns, the 12-inch in turrets. The *San Marcos* was assigned as station ship at the Navy Yard, Charleston, for a number of years.

Recently, she was utilized as a target for experimental purposes, primarily with a view to

determining the effect on modern armored vessels of gun fire at extreme ranges. This destroyed the vessel so that she will never float again. The *San Marcos*, then the *Texas*, took an active part in the Spanish War, and at the battle of Santiago was brought into prominence by the humane action of Captain Philip, who was in command, in stopping the cheering of his crew on account of the pitiful condition of the Spanish prisoners that had been brought on board.

The next oldest battleships are the *Massachusetts*, *Indiana*, and *Oregon*, which were commissioned in 1896. They are rated as coast defense battleships, being of slow speed and small coal capacity, and consequently not suited for operations far from base. They have a full load displacement of 11,688 tons, have a designed speed of 16 knots, and carry a main battery each of four 13-inch and eight 8-inch guns, in turrets. These ships would be available in war time for coast and harbor defense, and for operations with the fleet not far from a base.





Battleship *Texas*, used recently as a target in gunnery experiments



They would have been unable to make the cruise around the world with the other battleships on account of their slow speed and small coal capacity. All three ships served during the Spanish War. The *Oregon* in particular won distinction by her hurried trip from the west coast to the east coast of the United States around South America.

The *Iowa* was commissioned in 1897, and was the finest battleship we had in the Spanish War. She has a full load displacement of 12,647 tons, has a designed speed of 16 knots, and carries a main battery of four 12-inch and eight 8-inch guns, in turrets, and four 4-inch, in broadside.

The *Kentucky* and *Kearsarge* were commissioned in 1899, have a full load displacement of 12,320 tons, a designed speed of 16 knots, and carry each a main battery of four 13-inch and four 8-inch guns, in turrets, and fourteen 5-inch guns, in broadside. These battleships were the first to have the so-called superposed turrets, that is, to have four 8-inch guns in two turrets superposed on two 13-inch gun turrets, so that

each pair of turrets turns four guns; this arrangement has not proved a success.

The *Alabama*, commissioned in 1900, and the *Illinois* and *Wisconsin*, in 1901, have a full load displacement of 12,150 tons, a designed speed of 16 knots, and carry each a main battery of four 13-inch guns, in turrets, and fourteen 6-inch guns, in broadside.

The *Maine*, *Missouri*, and *Ohio*, commissioned respectively in 1902, 1903, and 1904, have a full load displacement of 13,500 tons, a designed speed of 18 knots, and carry each a main battery of four 12-inch guns, in turrets, and sixteen 6-inch guns, in broadside.

The *Virginia*, *Rhode Island*, *New Jersey*, and *Georgia*, commissioned in 1906, and the *Nebraska*, in 1907, have a full load displacement of 16,094 tons, a designed speed of 19 knots, and carry each a main battery of four 12-inch, eight 8-inch guns, in turrets, and twelve 6-inch guns, in broadside. The two 12-inch turrets have each a turret containing two 8-inch guns superposed on them, the other 8-inch guns being car-

ried in turrets one on each side in the waist or middle of the ship.

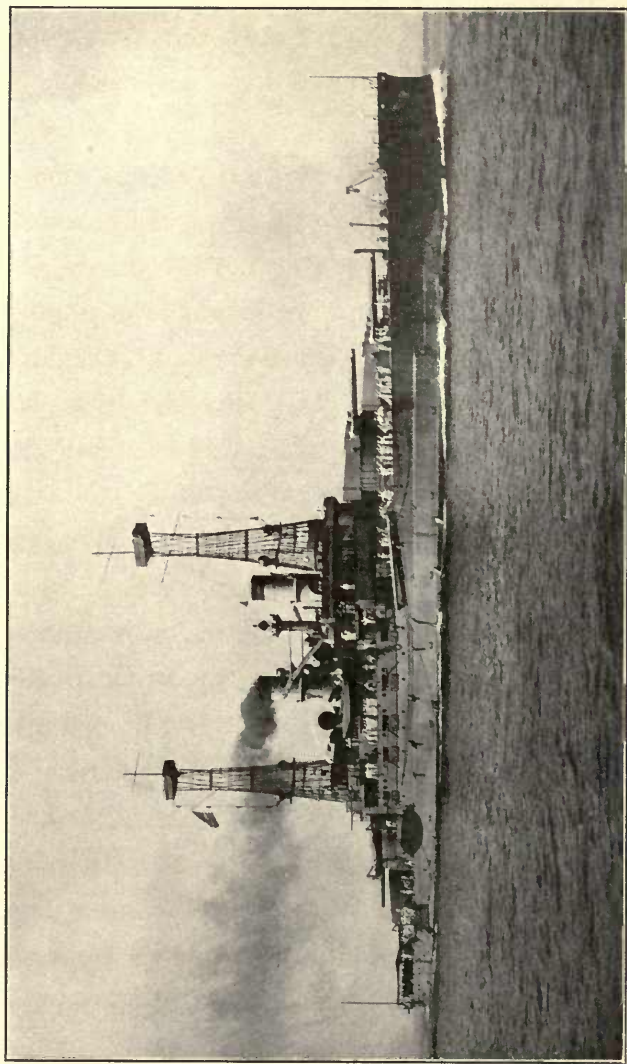
The *Connecticut* and *Louisiana*, commissioned in 1906, the *Minnesota*, *Kansas*, and *Vermont*, in 1907, and the *New Hampshire*, in 1908, have each a full load displacement of 17,650 tons, a designed speed of 18 knots, and carry each a main battery of four 12-inch and eight 8-inch guns, in turrets, and twelve 7-inch guns, in broadside. The *Connecticut* for five years has been the flagship of the Atlantic Battleship Fleet.

The *Mississippi* and *Idaho*, commissioned in 1908, have a full load displacement of 14,465 tons, a designed speed of 17 knots, and carry each a main battery of four 12-inch and eight 8-inch guns, in turrets, and eight 7-inch guns, in broadside. These ships, which were undertaken after the *Connecticut* type had been developed and undertaken, are regarded as a less efficient type, because, owing to their smaller size, they have less speed, smaller battery, and shorter coal endurance—three vital features in

warships that, with adequate armor protection, can be obtained only by means of large displacements.

The *South Carolina* and *Michigan*, commissioned in 1909, have a full load displacement of 17,617 tons, a designed speed of 18½ knots, and carry each a main battery of eight 12-inch guns, in turrets. These ships are the first battleships in the United States Navy embodying the so-called "all big gun" idea, that is, all of the guns of the main battery are of uniform size of 12 inches, the maximum size current in naval ordnance at the time of their design. These guns are mounted in four turrets on the center line of the vessel, and so arranged that all can be fired on either side, and four forward and four aft. These ships, developed contemporaneously to the English *Dreadnought*, are regarded as being superior to it as a type, as through having all turrets on the center line, they are able to fire all guns on either beam.

The *Delaware* and *North Dakota*, commissioned in 1910, and the *Florida* and *Utah* in



The battleship *South Carolina*, the first American "all-big-gun battleship"





1911, are said to be the finest and most powerful vessels of their date in the world. They have a full load displacement of 22,060 tons, a designed speed of 21 knots, and carry each a main battery of ten 12-inch guns, in turrets, and fourteen 5-inch guns, in broadside. All the 12-inch turrets are on the center line, and it is possible to fire ten 12-inch guns on either side, and to fire four forward and four aft. The *Delaware* is fitted with the old style reciprocating engines; the three others have turbine engines.

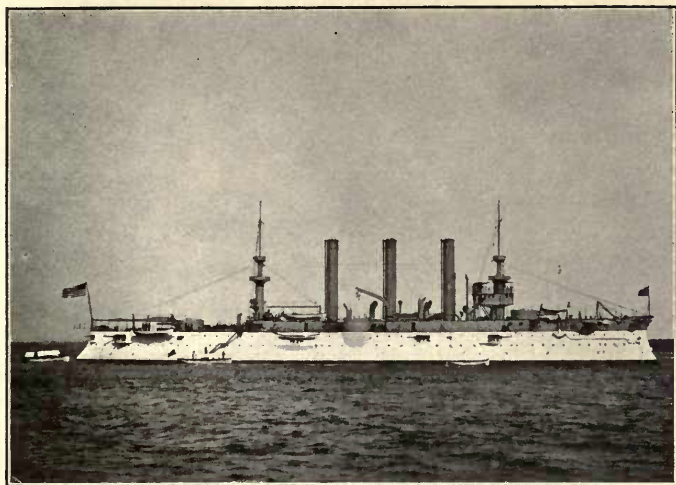
The *Arkansas* and *Wyoming*, contracted for in 1909, and expected to be commissioned in 1912, will have a full load displacement of 27,250 tons, a designed speed of 20½ knots, and will carry each a main battery of twelve 12-inch guns, in turrets on the center line, and twenty-one 5-inch guns, in broadside. Both will be fitted with turbine engines.

The *Texas*, contracted for in 1910, to be built by a private shipyard, and the *New York*, commenced in 1911 at the Brooklyn Navy Yard,

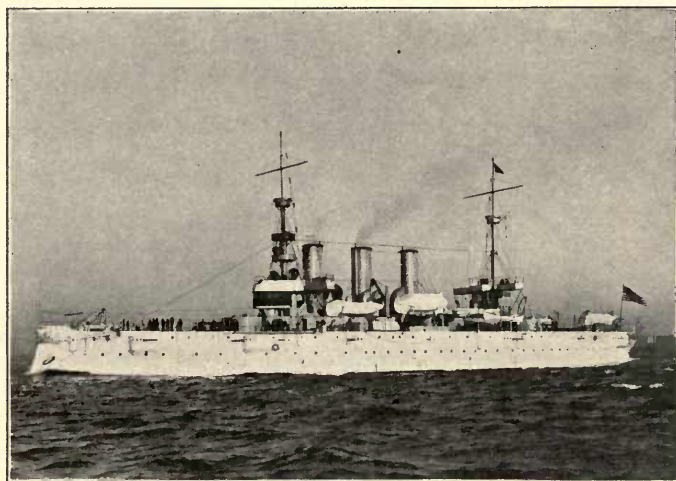
will have a full load displacement of 28,367 tons, a designed speed of 21 knots, and each will carry a main battery of ten 14-inch guns, in five turrets, and twenty-one 5-inch guns, in broadside. They will be fitted with reciprocating engines. They will be commissioned early in 1914. These are the first American battleships to carry 14-inch turret guns.

Two battleships were authorized by Congress in act passed March 4, 1911. For the present these will be known as battleships Numbers 36 and 37, though later the usual names will be assigned. They will carry ten 14-inch guns, in four turrets, two of which will have each three guns, and the other two turrets will have each two guns. These ships will burn oil fuel exclusively, and will be the first battleships ever built having this characteristic. It is expected that they will be commissioned in 1915.

**Armored Cruisers.**—On account of the limited amounts of money available for new ships, and of the greater fighting value of battleships, the United States never has regarded with great



Armored cruiser *Brooklyn*, flagship of Commodore Schley during the Spanish War



Armored cruiser *New York*, flagship of Rear-Admiral Sampson during the Spanish War



favor the armored cruiser type as compared to battleships, and consequently has few of them on her navy list.

The *Saratoga*, formerly the *New York*, is the oldest armored cruiser in the Navy, having been commissioned in 1893. She has a full load displacement of 8,900 tons, a designed speed of 20 knots, and carries a main battery of four 8-inch guns, in turrets, and ten 5-inch guns, in broadside. She was regarded in her time as being the finest ship in the Navy, and was sent under the command of Captain Robley D. Evans to represent this country at the opening of the Kiel Canal in Germany in 1895, and was inspected and highly complimented by the German Emperor. She was the flagship of Admiral Sampson during the Spanish War.

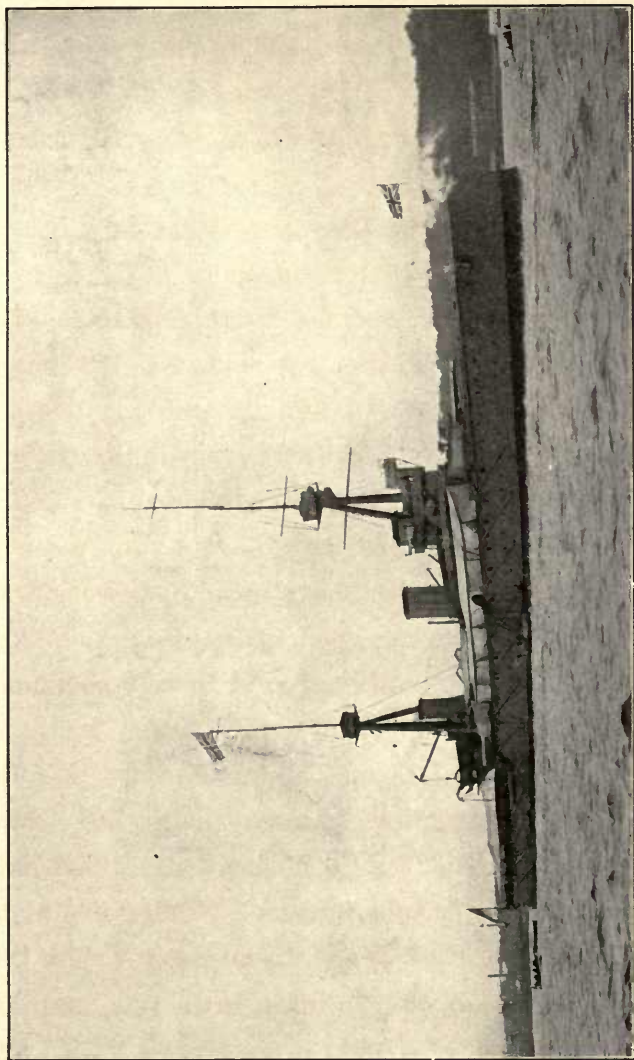
The *Brooklyn*, commissioned in 1896, has a full load displacement of 10,068 tons, a designed speed of 20 knots, and carries a battery of eight 8-inch guns, in turrets, and twelve 5-inch guns, in broadside. The *Brooklyn* is known best as the flagship of Commodore Schley during the

Spanish War. In July, 1906, she was assigned to bring to this country from France the body of Captain John Paul Jones, after it was disinterred in Paris.

The *Maryland*, *West Virginia*, *Colorado*, and *Pennsylvania*, commissioned in 1905, the *California* in 1907, and the *South Dakota* in 1908, have a full load displacement of 15,138 tons, a designed speed of 22 knots, and carry each a main battery of four 8-inch guns, in turrets, and fourteen 6-inch guns, in broadside.

The *Tennessee* and *Washington*, commissioned in 1906, have a full load displacement of 15,712 tons, a designed speed of 22 knots, and carry a main battery each of four 10-inch guns, in turrets, and sixteen 6-inch guns.

The *North Carolina* and *Montana* are the same in essential features as the last-named vessels. They were commissioned in 1908, have a full load displacement of 15,981 tons, a designed speed of 22 knots, and carry a main battery of four 10-inch guns, in turrets, and sixteen 6-inch guns, in broadside.



The British armored cruiser *Inflexible* in North River, New York, during Hudson-Fulton celebration in 1909





**Monitors.**—The monitors are classed according to whether they have one or two turrets, all of the older ones being of the latter type. The older monitors, commissioned between 1891 and 1896, are the *Amphitrite*, *Miantonomoh*, *Monadnock*, *Monterey*, *Puritan*, and *Terror*, ranging in displacement from about 4,000 to 6,000 tons, and in speed from 10 to 12 knots. All except the *Puritan* and *Monterey* carry each four 10-inch guns, in turrets; the *Puritan* carries four 12-inch guns, and the *Monterey* two 12-inch and two 10-inch guns.

The single turret monitors are the *Ozark*, *Tonopah*, *Tallahassee*, and *Cheyenne*. They were commissioned in 1902 and 1903; they have a designed speed of 12 knots, a full load displacement of 3,356 tons, and carry each a main battery of two 12-inch guns, in the turrets, and four 4-inch guns, in broadside.

**Protected Cruisers.**—There are in the Navy 20 protected cruisers, two unprotected cruisers, and three scout cruisers. The number is so large and the types so different, that in a lim-

ited space it is possible to examine in detail only the more important.

The oldest vessel of the so-called New Navy is the protected cruiser *Atlanta*. She was commissioned in 1886, and now is used as a station ship, serving as headquarters for the crew and officers of the Reserve Torpedo Flotilla, at Charleston. She has a displacement of about 3,000 tons, a designed speed of 15 knots, and carries a main battery of two 8-inch and six 6-inch guns.

The *Boston*, the next oldest vessel, was commissioned in 1887, has a displacement of about 3,000 tons, a designed speed of 15 knots, and carries a battery of two 8-inch and six 6-inch guns.

Others in order of construction are the *Chicago*, *Baltimore*, *San Francisco*, *Newark*, *Detroit*, *Marblehead*, *Montgomery*, and *Cincinnati*, ranging in displacement from 2,000 to 4,500 tons. All of these took part in the Spanish War, and are well known in connection with the early history of our new Navy.

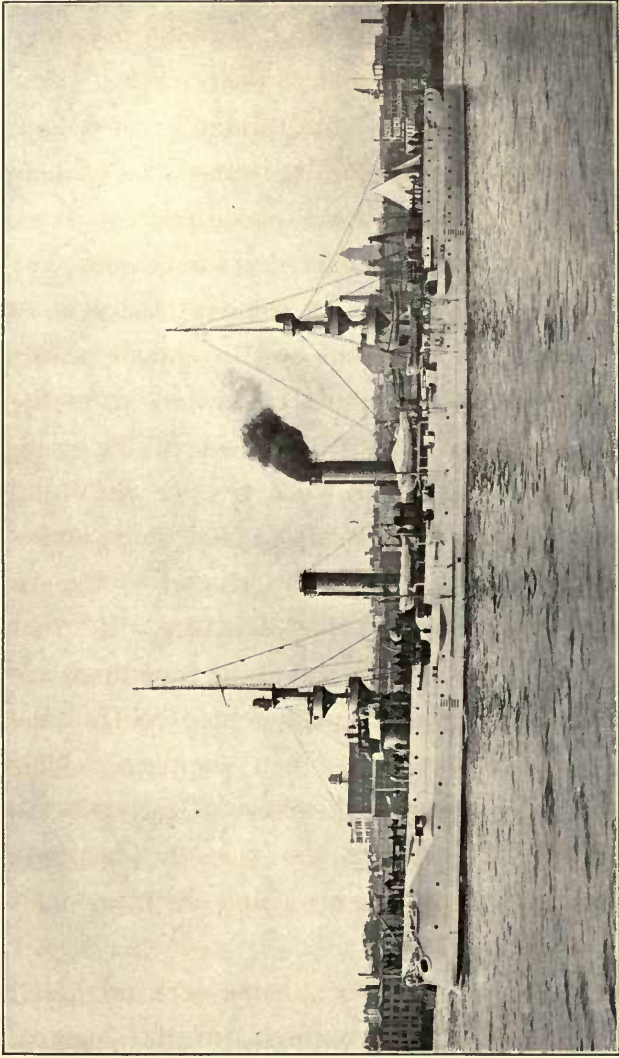
The *Columbia* and *Minneapolis* are the first of the so-called commerce destroyer type, being intended for that purpose in war time. They were commissioned in 1894, and were at that time regarded as fine ships. They had a designed speed of 22 knots; the *Minneapolis*, on trial, made 23 knots. The main battery of each is small as measured by modern ideas; it consists of one 8-inch, two 6-inch, and eight 4-inch guns. The full load displacement of each is 8,270 tons.

The *Olympia*, perhaps, is best known of the protected cruisers, as she was Commodore Dewey's flagship at the battle of Manila Bay. She was commissioned in 1895, has a full load displacement of 6,558 tons, a designed speed of 20 knots, and carries a main battery of four 8-inch guns mounted in turrets, and ten 5-inch guns, in broadside.

The *Chattanooga*, *Denver*, *Des Moines*, *Galveston*, and *Tacoma* are comparatively modern cruisers, having been commissioned from 1903 to 1905. They have a full load displacement of

3,500 tons, designed speed of 16 knots, and carry a main battery of ten 5-inch guns. These cruisers are intended for foreign service, and, to render frequent docking unnecessary, their bottoms are sheathed with wood and coppered. Ships with steel bottoms require to be docked at least once every year, in some instances more frequently; wooden ships with copper sheets can go for years without being docked, as the copper prevents the attachment of barnacles and other marine growth. Copper sheathing cannot be applied directly to steel ships on account of the galvanic action, caused by the sea water, which eats the steel structure with great rapidity. Steel ships, therefore, sometimes are sheathed with wood to protect the steel from the galvanic action, and then coppered. This method has not proved successful, owing to the difficulty of keeping the wooden sheathing water-tight, and no more ships are being built in this manner.

The *Albany* and *New Orleans* were purchased from Brazil at the outbreak of the Spanish



Protected cruiser *New Orleans*, purchased from the Brazilian government just prior to the Spanish War



War. They were built in England, have a full load displacement of 3,954 tons, a designed speed of 20 knots, and carry a main battery of ten 5-inch guns. Their bottoms are sheathed with wood and coppered.

The *Charleston*, *Milwaukee*, and *St. Louis* are the most modern type of protected cruiser. They were commissioned in 1905 and 1906, have a full load displacement of 10,839 tons, a designed speed of 22 knots, and carry a main battery of fourteen 6-inch guns.

The *Birmingham*, *Chester*, and *Salem* are scout cruisers. They are designed especially for high speed and large steaming radius. They were commissioned in 1908, have a full load displacement of 4,687 tons, and a designed speed of 24 knots; the *Chester*, on trial, made a speed of 26½ knots. These vessels represent, probably, the only type of cruiser that in the future will be built for the U. S. Navy.

Gunboats.—There are twenty-nine gunboats in the Navy, of which number nine are of less than 500 tons displacement.

The oldest of these, the *Yorktown*, *Bennington*, and *Concord*, were commissioned in 1889 to 1891, have a full load displacement of 1910 tons, a designed speed of 16 knots, and carry a main battery of six 6-inch guns.

The *Castine* and *Machias* were commissioned in 1893-1894, have a full load displacement of 1,293 tons, and a designed speed of 13 knots. The *Machias* carries a main battery of eight 4-inch guns. The *Castine* recently was converted into a tender to submarines, and was fitted with a torpedo tube for use in training submarine crews. She carries a battery of only two 6-pounder guns.

In addition to these are the *Helena*, *Nashville*, and *Wilmington*, which are light-draft gunboats for river service; the *Petrel*; the *Don Juan de Austria*, *Isla de Luzon*, and *Isla de Cuba*, which were captured from Spain; the *Annapolis*, *Dubuque*, *Marietta*, *Newport*, *Paducah*, *Princeton*, *Vicksburg*, and *Wheeling*, which are so-called "composite ships," having steel frames and upper works combined with wooden



bottoms. All of these each have a displacement of about 1,000 tons, and most of them carry main batteries of 4-inch guns.

The nine gunboats of less than 500 tons displacement were captured from Spain; they are the *Alvarado*, *Callao*, *Elcano*, *Pampanga*, *Panay*, *Samar*, *Sandoval*, and *Villalobos*. They are serviceable only for patrol duty around shore and were very effective in connection with the operations during the Philippine insurrection. Their batteries consist of small guns, three- or one-pounders, and automatic 6-millimeter guns.

**Steam and Sail Propelled Vessels.**—Before sail power was abandoned entirely for men-of-war many steam vessels were fitted with it as auxiliary and for use when it was not desired to burn coal. The most important of these vessels now remaining in the Navy is the *Hartford*, which was Admiral Farragut's flagship during the Civil War, and was the one in which he fought the battle of Mobile Bay. She was built in 1858, has a displacement of 2,790 tons, and a

speed of 12 knots. She is being used at the Naval Academy as a training ship for midshipmen.

In addition to the *Hartford*, there are the *Alert*, commissioned in 1873; the *Ranger*, in 1876; *Wolverine* (formerly *Michigan*), in 1844; *Adams*, in 1876; *Enterprise*, in 1876; *Essex*, in 1876; *Gopher*, in 1871; *Mohican*, in 1883, and *Yantic*, in 1864. None of these last-named ships are in active service, except as training ships, or for the use of naval militia.

**Sailing Ships.**—A number of ships of the old Navy remain in service, chiefly as receiving ships at the Navy Yards. The *Constitution* and the *Constellation*, both built in 1797, are in their original form; the others have had their masts removed and are housed over. These latter are the *Franklin*, completed in 1865; the *Independence*, in 1837; the *Lancaster*, in 1858; the *Pensacola*, in 1862; the *Portsmouth*, in 1843; the *Richmond*, in 1858; the *Wabash*, in 1854; the *Nipsic*, in 1879; the *Granite State* (formerly

*New Hampshire*), in 1814, and the *Jamestown*, in 1845.

There are four modern sailing ships in the Navy, the *Severn*, *Cumberland*, *Intrepid*, and *Boxer*. All of them are used for training ships, although the idea of training officers and men of the Navy on board sailing vessels has been abandoned almost completely; it having been realized that the knowledge and training so acquired are of little value in comparison to the more important work in a modern steam vessel.

**Torpedo Craft.**—There are thirty-two torpedo boats in the Navy, all of them contracted for prior to 1898; some, however, were not completed until a number of years later. Their displacements range from 50 tons to 378 tons, and their speed, from 20 to 30 knots. Their armament consists exclusively of torpedo tubes and small-caliber guns. This type of torpedo vessel has not been a success, and it is not likely that more will be constructed; as in battleship construction, the tendency is to in-

creased displacement, and, developed in that line, torpedo boats become torpedo-boat destroyers. There are fifty torpedo-boat destroyers built and building, ranging in displacement from 450 tons to 1,000 tons, and, in speed, from 28 to 32 knots. The sixteen older destroyers were contracted for in 1898; after that no others were undertaken until 1907; since then 34 have been taken in hand, five of which were completed during 1911. All the new destroyers will have turbine engines, and 29 of them will burn fuel oil exclusively. The armaments of the latest vessels will consist of five 4-inch semi-automatic guns and three twin deck torpedo tubes.

Torpedo destroyers form an important feature of the Navy, and one in which it is somewhat deficient, although the deficiency is being made up. Other navies have many more torpedo vessels in proportion to the number of their large ships.

**Auxiliary Vessels.**—This class includes hospital ships, converted cruisers, transports, colliers,

supply ships, and repair ships. Practically all the older auxiliary vessels in the Navy are converted merchant ships which were bought and rearranged to suit the Navy's requirements. Recently there has been authorized from year to year the construction of a number of naval colliers, and also a vessel to act as a tender for submarines; it is to be hoped that in the near future Congress also will authorize at intervals the construction of vessels especially designed for carrying ammunition, for repair ships, and for hospital ships.

At the present time there are 27 colliers built or building, 8 transports and supply ships, of which one is fitted as a repair ship, 4 auxiliary cruisers, and 2 hospital ships.

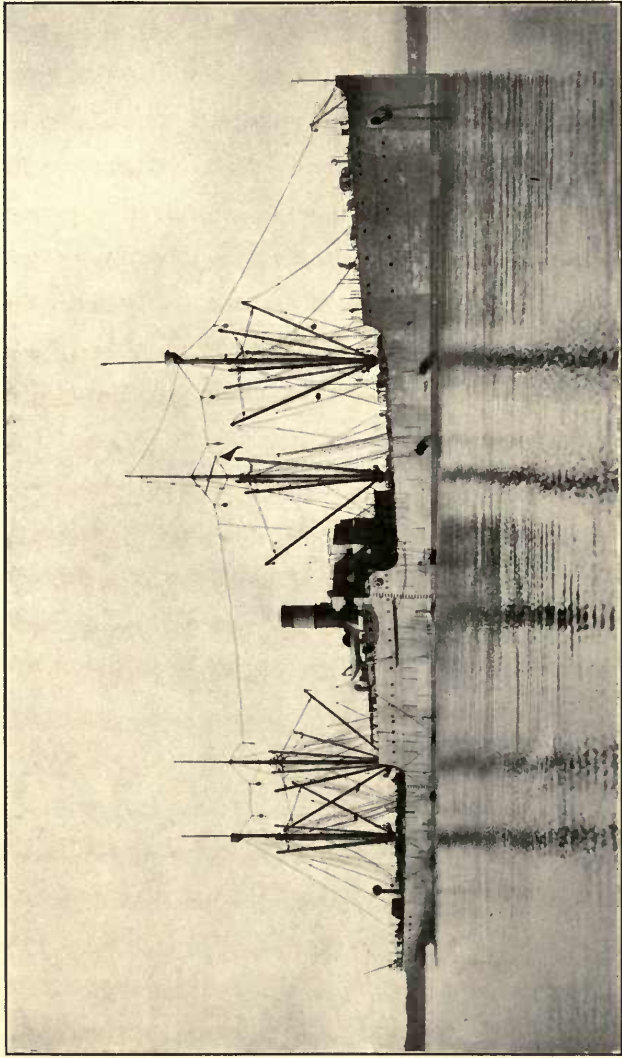
It must not be supposed that the number of colliers now in the Navy is sufficient to provide coal for the fleet on an extended cruise, as, for instance, the recent one around the world. On such a cruise it becomes necessary to charter merchant ships to carry the coal. The number of suitable merchant ships flying the United

States flag is very limited; therefore it is likely that in the event of war with a foreign country the United States, without infringing on the neutrality of some foreign country, would be seriously embarrassed over obtaining vessels to carry coal. Before the declaration of war with Spain, it was only by great foresight and prompt action that a sufficient number of colliers were obtained to permit of the United States waging the war.

At the outbreak of the war with Spain the United States purchased a large number of yachts, which were converted into gunboats. Seventeen of these still remain on the Navy list, most of them being loaned to naval militia organizations.

#### NAMES OF NAVAL VESSELS

There is a law which requires that all battle-ships shall be named after States, and that they shall not be named for any city, place, or person until the names of the States have been exhausted. Beyond this requirement the Secre-



U. S. naval collier *Vestal*





tary of the Navy is authorized to name vessels of the Navy as he sees fit. At the present time the policy in assigning names to men-of-war is that battleships and armored cruisers be named for States, protected cruisers and gunboats for cities, or places, torpedo craft for distinguished deceased officers of the Navy, submarines for fish or aquatic animals, and colliers for mythological persons; tugs are given Indian names, and such sailing vessels as have been constructed recently were named after distinguished vessels formerly in the Navy. When vessels are acquired by the Navy, their names usually are changed.

It has become necessary recently to change the names of four monitors that had been named for States, to permit the use of those names for new battleships. Also the names of the cruiser *New York* and the battleship *Texas* were changed for the same reason.

The names of distinguished officers assigned to torpedo craft commemorate many brave men and their heroic deeds. Such names as Hull,

Decatur, Farragut, Porter, Rodgers, and Cushing are well known to all students of naval history. Others not so well known recall deeds no less heroic, many of them having gone without previous recognition. One of the most obscure, but no less striking for that reason, is the case of the *Jarvis*, named after a midshipman of that name. Midshipman Jarvis was in the maintop of the *Constellation* during an engagement with the French frigate *Vengeance* in February, 1800. The supports of the mainmast were shot away, and even though warned to save himself, this officer refused to leave his post. When the mast fell, he was carried with it and killed.

The *Monaghan* was named after Ensign Monaghan, who was killed in an engagement with hostile natives in Samoa in 1899, while attempting to save a fellow officer, who had been wounded.

## CHAPTER VI

### DESCRIPTION

THE press of the United States, through comprehensive pictures and paragraphs, continually keeps the entire public in touch with the Navy. Therefore, as the interest of so many has been aroused, it has been suggested that a somewhat detailed description of a battleship, and explanation of its points, would be both interesting and instructive. The details given apply in general only to armored vessels, though some of the features are included also in the smaller ships.

### DIMENSIONS

The size of a ship generally is expressed in displacement, given in tons. It is a well-known fact that a floating body displaces a volume of water equal in weight to the weight of the float-

ing body; thus a ship displaces a volume of water equal in weight to itself, making the number of tons displacement the number of tons weight of the ship. A vessel's weight may be determined by calculating the volume of its underwater body in cubic feet, and from that the weight of the corresponding volume of water.

The length given for a battleship is that measured along the water line at which the ship would float when fully loaded, called the "length on load water line," or as the extreme length, or "length over all." The breadth or beam is given as the "extreme beam at the load water line." The draft is the distance below the water line that the keel is immersed; obviously this varies with the condition of loading and, for purposes of comparison, the draft usually is taken at some fixed displacement. As the vessel does not always float on "an even keel," that is, with the keel immersed an equal depth along its length, the draft may be taken as the "extreme draft," or as the "mean

draft," which is the draft at a point midway between the ends.

### SPEED

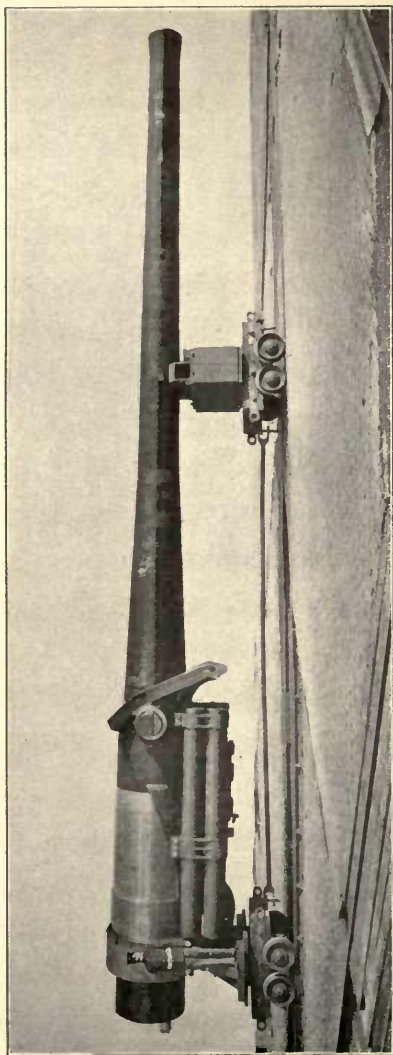
The speed of a ship is given in knots per hour. A knot or nautical mile equals 6,080.27 feet, while a statute mile is 5,280 feet; thus 5 knots equals roughly 6 statute miles, and a 20-knot vessel has a speed of about 24 statute miles.

### BATTERY

The guns and torpedo tubes collectively of a warship are called the battery, the larger guns constituting the main battery and the smaller ones the secondary battery. As has been seen, only battleships, some few armored cruisers, and monitors carry the largest size guns, but the division between main and secondary battery is maintained in all classes of ships. Thus in a battleship the main battery may consist exclusively of 14-inch or 12-inch guns; in an armored cruiser of 12-inch, 10-inch, or 8-inch guns; in a protected cruiser it may consist ex-

clusively of 6-inch guns, while on a gunboat the main battery may be of 4-inch guns that hardly would be large enough to be included in the secondary battery of a large battleship.

The largest size guns, those above 7-inch, are mounted generally in pairs in electrically controlled, elliptical, balanced turrets, which inclose entirely the rear ends or breeches of the guns, the muzzles only projecting. It is expected that in the future three guns may be mounted in each turret; this arrangement will require firing the three guns in each turret simultaneously. The turrets are built of armor, with inclined fronts, and arranged so they can be turned, carrying the guns with them; the guns, however, under the present system, are elevated and fired independently. In the crew of every turret there are three gun-pointers, one of whom keeps the turret turned so that both the guns point in the direction of the target. The two others, one for each gun, bring them to bear in elevation and fire them when loaded and aimed. The turret is turned and the guns are



Modern 14-inch naval breech-loading rifle





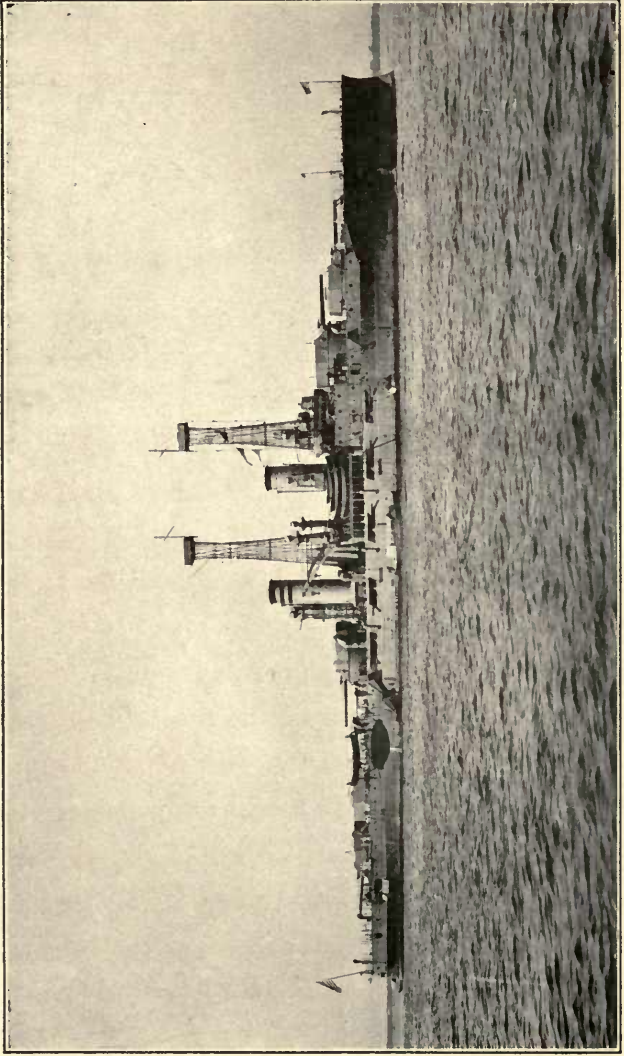
elevated by electric motors, so arranged that they can be controlled readily and exactly from sighting stations. The turrets are balanced, that is, the weight of the turret is so distributed as to compensate for the weight of the guns which extend from its front side.

At the present time only 14-inch turret guns are being installed in the main batteries of battleships, though formerly 12-inch and 8-inch guns were installed for many years, and prior to that 13-inch turret guns were also installed, the usual arrangement being two turrets with 12-inch or 13-inch guns on the center line, and four turrets having 8-inch guns, two on each side of the ship. On some ships 8-inch guns have been installed in superposed turrets over the 12-inch guns—that is, two 12-inch guns and two 8-inch guns are installed in superposed turrets, all rotating together. This arrangement has not proved satisfactory, and has been abandoned. In addition to the turret guns, main batteries of battleships include 5-inch, 6-inch, or 7-inch; these are installed as “broadside guns,” to fire

through openings in the side or "gun ports." Broadside guns have no protection other than that afforded by the armored sides of the ship, and by "gun shields" which they themselves carry, and they can be fired only on one side through a comparatively limited arc.

The modern idea, however, is to have, as far as possible, the main battery consist of guns of the maximum caliber and of the same size, all mounted in turrets, smaller guns being installed only for use against torpedo craft. The term "all-big-gun battleship" was coined to describe a ship with such a main battery.

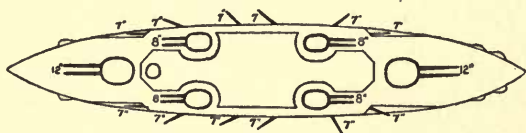
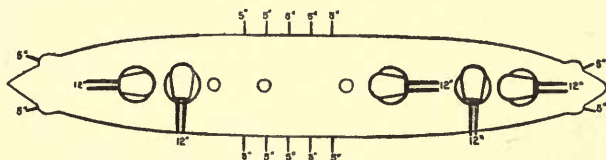
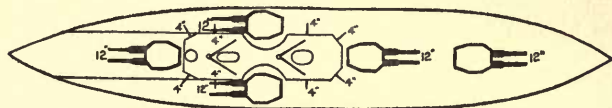
Future naval battles probably will be fought at extreme ranges beyond the reach of any except the largest guns of the main battery. Small-caliber guns, however, are a necessity as a protection against the swift torpedo destroyers and boats which move too rapidly and in too large numbers to be attacked by the comparatively slow-moving guns of the main batteries.



The battleship *Delaware*, said to be the most powerful "all-big-gun battleship"



Field guns and machine guns are included in the ship's battery for use when it is necessary to land a force from the ship for operations ashore; these guns are comparatively small, and



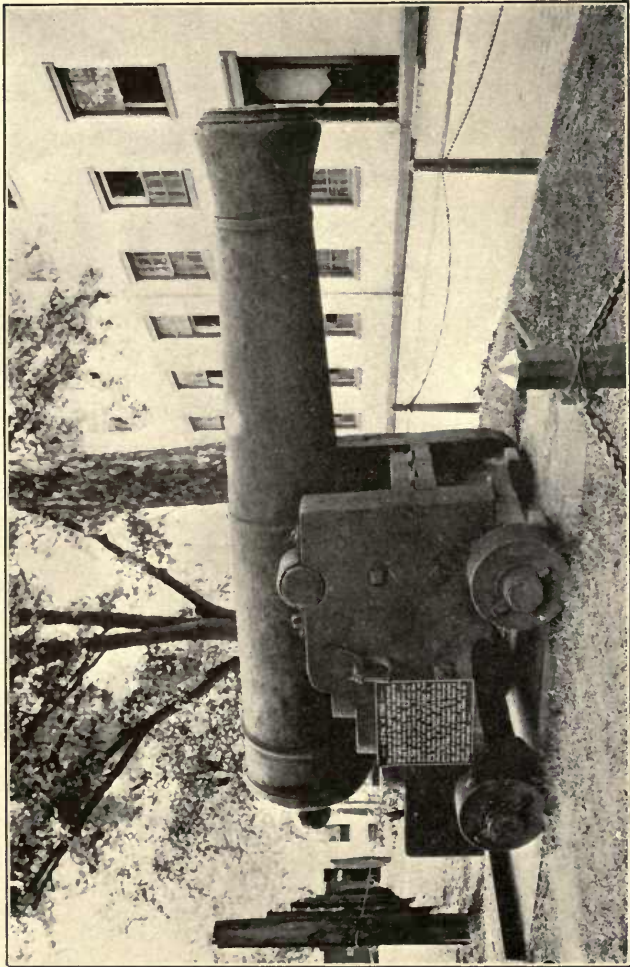
The above sketches of arrangement of battery show the essential differences between the "all-big-gun" battleship and the earlier type with mixed batteries. The English *Dreadnought*, and the United States *Delaware* and *Connecticut* are shown, the former two being "all-big-gun" ships.

are of no avail except against bodies of men. A complete outfit of rifles or muskets is provided for each ship also, for use of the crew when

landed. Nowadays the crews of all naval ships are drilled as infantry, and, when landed, can do the work of soldiers. Formerly the gun crews of men-of-war were armed and equipped for hand-to-hand fights with the enemy, either by boarding or being boarded. Under modern conditions there is small chance of such contingency, and now no arrangements are made to provide arms for hand-to-hand fights on shipboard during naval engagements.

With the increase in the size of torpedo craft and in the range of torpedoes, it has been necessary to increase the size of the guns intended as a protection against them, and on the newest battleships 5-inch guns constitute the torpedo defense battery.

Formerly torpedo tubes were installed above the water line on all ships; it is the custom now on battleships and cruisers to install the tubes below the water. These submerged tubes are fixed in place and cannot be moved or aimed before firing the torpedo. It will be shown, in describing torpedoes, how it is possible to



A smooth-bore 42-pounder cannon of 1780





launch a torpedo broadside on and have it turn in the water in the direction of the target.

Guns are designated as breech-loading rifles to distinguish them from the old style, muzzle-loading, smooth-bore guns, but, as only the former kind now are used, the term is falling into disuse. Most of the guns for the Navy are manufactured at the Naval Gun Factory at



Longitudinal section of a 12-inch gun, showing the number of sections or tubes and hoops of which it is built up.

Washington. They are not in one piece, but are built up of several tubes of wrought steel, the outer tubes being shrunk on the inner ones—that is, the outer tubes are fitted, when hot, over the inner one, and as they cool they contract and grip the inner tubes, compressing them and giving them greater power to resist the enormous forces caused by firing the guns.

Wire-bound guns also have been used in foreign navies, and in the United States coast artil-

lery, but, so far, no use has been made of them in our Navy. All modern guns are rifled—that is, grooves are cut so as to give a rotating movement to the projectiles, which carry copper bands intended to be forced into the grooves of the rifling when the guns are fired. The rotating motion thus imparted to a projectile gives it much greater accuracy in the flight.

The length of a gun is expressed in “calibers,” that is, if a 12-inch gun is 50 calibers in length, it is 50 times 12 inches, or, 50 feet. In the same way a 50-caliber 8-inch gun would be 400 inches, or 33 feet 4 inches.

Certain guns are designated as “rapid-fire,” because of their construction and the arrangement of the ammunition permitting great rapidity of loading and firing. Rapid-fire guns may be described briefly as those using metallic cartridge cases; the largest size gun permitting this is the 5-inch. Guns fitted so that the recoil from one shot aids in loading for the next one, are called “semi-automatic.”

The science of ballistics deals with the action

of the projectiles when fired, and by that science it is possible to calculate the exact range, trajectory, and speed of a projectile.

The turret guns of the battery are protected, as has been noted, by the turret armor. The turrets are supported on structures protected by armor disposed cylindrically about them called barbettes; these serve also to protect the mechanism of the turrets. The barbette armor extends to the protective deck of the ship, by which it is supported.

The protective deck is designed to prevent the penetration of projectiles from above. It is located at about the water line, and its function primarily is to protect the machinery, boilers, powder-magazines, etc., the so-called "vitals of the ship" from mortar fire, and from any fragments of shells that might penetrate, before exploding, the armor of the upper works. The protective deck, which extends the full length and width of the vessel, and is similar to the back of a turtle, slopes at the sides, so as to bring its edge to the bottom of the main belt

side armor; therefore, a shell passing through the side armor would have to pierce also the protective deck before it could reach a ship's vitals. Below the belt armor the side of the ship is unprotected, and thus an additional reason is seen for locating this armor, so that under no circumstances would its lower edge come above the water and expose the part below to gun fire. On future battleships it is expected that there will be a second protective deck, which will be flat and will be placed on the level of the upper edge of the belt armor.

Behind the belt armor and at the water line cofferdams are fitted. These are box-shaped compartments, arranged so that when the outer skin of the ship, adjacent to one of them, is damaged, the water entering will, unless the projectile has passed completely through it, fill only the cofferdam. Frequently cofferdams are packed with obturating material, such as compressed corn pith, which swells when wet and stops the flow of water.

The portion of the ship below the water line,

called the under-water body, is not protected by armor. It is subject to attack only by submarine mines and torpedoes, but it is subdivided into a number of compartments by an outer and inner bottom, and by bulkheads, thereby limiting the space to which, by a single explosion, water can gain access, and preventing serious injury to the floating power.

On certain recent battleships interior armor has been fitted also to aid in limiting the damage due to torpedo explosion.

### ARMOR

The use of steel or iron plates for protection of ships against projectiles was proposed first in 1812. Like many other brilliant ideas, when first proposed, it was not considered necessary nor practical. In 1854 Congress appropriated money for an ironclad, which was never completed. During the Civil War the first armorclads were tested in actual warfare with such success that the future of armor protection of ships was assured.

At the present day Krupp armor is used exclusively in the Navy, it having supplanted entirely the Harveyized armor of ten years ago. The Krupp armor process consists essentially in making steel plates as tough and unyielding as possible, and then "face hardening" them, causing the metal to take up additional carbon, which is called "cementation." This method produces armor plate having the greatest possible resistance to penetration by projectiles. The process of manufacture of armor plates is extremely tedious and difficult.

The armor plates are attached to vessels by bolting them to the side plating of the ship's structure, which is especially reinforced and strengthened behind the armor. A thickness of from three to four inches of teak wood is fitted between the heavier armor plates and the ship plating. This wood is intended to allow for irregularities in the armor plates, and to permit them to be fitted so as to present an even exterior surface.

## ARMOR PROTECTION

Owing to the great weight that is added to a battleship by the armor, it is possible only to use it to protect the vitals, and it must be disposed so as to give the maximum protection with a limited amount of armor. The hull proper of the battleship is protected, and its water-tightness and flotability guaranteed by a belt of armor along the water line. This has its maximum thickness and width amidships, where are the engines and boilers. The main belt armor is of sufficient width to insure protection in the vicinity of the water line, as that rises and falls with the varying conditions of load. It is obvious that the position of the main belt armor must be determined by considering the probable positions of the water line during battle. Persons may fall into error and think that the armor belt is too low because they see a ship floating with it nearly submerged. In such a case it should be remembered that the ship probably is laden very heavily, and that when

the coal, fresh water, stores, etc., going to make up the load are used, the ship will rise, and also that no ship ever will go to battle with any more of a load than is absolutely essential.

Above the belt armor the lighter so-called "casemate armor" is fitted, which is intended to protect the topsides, the guns of the secondary battery, and the ship's interior arrangements and mechanisms.

### ENGINES

For many years, since the abandoning of sails on men-of-war, exclusive use was made for their propulsion of reciprocating steam engines; these are of the familiar type in which the steam acts by forcing pistons back and forth, which, by means of cranks, cause the propeller shaft to revolve. These shafts have at their ends, which project into the water, screw propellers, and by the action of these against the water the ship is propelled. Reciprocating steam engines for propelling naval ships are



operated on a principle of triple expansion—that is, the steam operates in three stages, first on one piston, called the high-pressure, then on a second, called the intermediate-pressure piston, and then on two others, called low-pressure pistons. After the steam has acted on the low-pressure pistons it is conducted to the condenser, which is kept cool by the circulation of water from the sea. The steam is condensed and forms a vacuum in the condenser, which aids in moving the low-pressure pistons by pulling on the side on which the steam is not acting.

Recent developments have introduced the turbine steam engine. This functions on an entirely different principle from that of the reciprocating engine. Essentially in principle the turbine is not dissimilar to a windmill; instead of the wings of a windmill acted on by the wind, in the case of a turbine the steam impinges through jets, suitably disposed, on buckets, or vanes, fitted to the circumferences of large wheels or rotors, thus causing them to turn.

There are numbers of rotors, all fixed directly to the propeller shafts, and thus there is no intermediary of piston rods, cranks, etc. In a turbine, as in a reciprocating engine, steam operates in successive stages and passes finally to the condenser. The turbine engine has many advantages, and some decided disadvantages over the old-style engines. The turbine renders possible higher speed of propulsion of ships and, by the absence of reciprocating parts, does away with vibration to so large an extent that a turbine ship vibrates barely perceptibly. On the other hand, the turbine does not lend itself so readily to lower speeds of propulsion, and has the decided disadvantage of not reversing, so that, to run the propellers backwards, for backing the ship, additional turbines in an opposite direction are installed. It is probable, however, that for vessels where high speed is desired, turbine engines will supplant reciprocating engines. They are especially suited for torpedo craft, and are being fitted on all recent torpedo destroyers.

## TWIN SCREWS

Until the advent of turbine engines for ship propulsion, twin screws were the rule for warships. While more expensive than the single screw arrangement, they present a great advantage in offering more facility of manœuvering. Through having the propellers one on each side, and by operating them at different speeds or in different directions, the vessel can be turned more readily than is possible by using the rudder alone with a single propeller on the center line. With the use of certain forms of turbine engines, the speed of revolution is so great as to render it necessary to have four propellers. This is done in order that the requisite power may be obtained without unduly increasing the diameter of the propeller blades, and consequently the speed of their tips. Another type of turbine engine, through having a slower speed of revolution, permits of the use of twin screws.

Formerly triple-screw arrangements were

tried on certain high-speed ships. These, however, were found to present no advantages over the twin-screw arrangement, when reciprocating engines were used. Some recent torpedo destroyers fitted with turbines have triple screws.

### HORSEPOWER

The power of engines is given in horsepower; this expresses the power to do work. One horsepower is defined as being the amount of work necessary to raise a weight of 550 pounds one foot in a second—thus, a vessel's 12,000 horsepower engines would be able to raise  $550 \times 12,000$ , or 6,600,000 pounds, one foot every second. This does not mean that the engines actually do this, but it means that the work which the engines do in turning the propeller would, if applied to lifting weight, do this amount.

### BOILERS

The familiar type of boiler, a large cylindrical vessel with a furnace beneath and tubes passing through, to permit the heat from the

flames and heated gases to come into contact with the water, formerly was used on naval vessels. This type is known as the "fire-tube" or "Scotch boiler." In recent years the "water-tube boiler" has supplanted the fire-tube boiler for naval use. The water-tube boiler differs essentially from the fire-tube type in having a series of tubes to contain the water. These tubes are disposed around and in the furnace so as to obtain maximum effect from the fire in transforming the water into steam—the purpose of the boiler. The steam is received in a cylindrical vessel or drum disposed at the top of the boiler, and joined to the water tubes, and thence is conducted to the engines.

The advantage of the water-tube boiler over the fire-tube boiler consists in its greater efficiency and lightness, and in its more rapid action, which permits greater forcing.

There are many different types of water-tube boilers, some of which differ radically in principle and method of operation. One type, the Babcock and Wilcox, has been used almost ex-

clusively on vessels of the U. S. Navy, until recently.

### FORCED DRAFT

At times, in order to drive the vessel at its maximum speed, it becomes necessary to obtain the greatest amount of steam possible from the boilers; to do this, forced draft is used. A forced draft, by supplying more air to the fires, causes them to burn with more heat and results in greater and more rapid evaporation of steam. The air is forced into the fire rooms, or stoke holds, by means of centrifugal fans. By their use a higher air pressure than outside is produced in the fire rooms. All other openings being kept closed, the air can escape only through the furnaces and chimneys, causing the desired additional or forced draft. The extra speed gained by a battleship from using the forced draft is sometimes as much as 2 to 3 knots.

### FUEL

For many years coal was the only fuel used successfully on ships, but for a number of years merchant ships burning oil or petroleum have

operated with success and economy, and recent battleships and torpedo destroyers have been designed to burn oil fuel. Some of the battleships use it in connection with coal, but other more recent battleships and the destroyers are dependent entirely on oil fuel. A decided advantage arising from the use of oil fuel is the absence of smoke caused by coal. This is a very great advantage in time of war, as vessels often are located by their smoke long before they can be seen.

Coal is carried in bunkers which must be so disposed as to permit the coal being readily accessible to the fire rooms. On men-of-war it is disposed also with a view to the protection it affords from projectiles and torpedoes, and, for that reason, the coal bunkers usually extend the full length, on each side of the boiler and engine compartments. Besides the arrangements that must be made to permit the coal to be transported readily from the bunkers to the fire rooms, provision must be made for readily taking on coal from a collier or a coal barge, along-

side, to the bunkers of the ship. "Coaling ship," as the operation of taking on coal is called, is an important event on a man-of-war. It must be performed expeditiously, so as not unduly to delay the vessel. Special coaling booms and hoisting whips are arranged to hoist the coal on deck, whence it is dumped through chutes to the bunkers below, coal-passers being stationed in the bunkers to "trim" the coal, that is, to shovel it away from the bottom of the chute so that the bunker will fill evenly. Great rivalry exists between the crews of different ships as to speed in coaling, the largest amount taken on by a United States battleship so far being over 500 tons in one hour.

The problem of taking on oil fuel is much simpler, as it can be pumped through pipes, appropriately arranged, directly into the oil tanks. If this were the only consideration there can be no question as to the choice of fuel for the Navy. Oil fuel, however, is difficult to store, as it is very penetrating, and leaks through joints that would not allow water to pass; also, its cost



and the comparative difficulty of obtaining it, operate against its general adoption. It offers the additional disadvantage of being more difficult to operate with success. It is sprayed into the furnaces by means of steam pressure and, strangely enough, the steam mixes with the oil and provides oxygen for its consumption. It can be used auxiliary to coal, or by itself.

#### ELECTRIC PLANT

On modern battleships practically all of the mechanical operations, excepting only the propulsion and steering of the ship itself, and hoisting of anchors, are carried out by electrically driven machinery. Electric motors operate the boat cranes and deck winches, which hoist the boats, coal, and stores; the ventilating blowers; fresh-water pumps; the ammunition hoists; some of the pumps; the automatically controlled doors in water-tight bulkheads; the dish-washing machine, ice cream freezer, meat grinder, and the laundry machinery, and potato peeler. The turrets are turned and their guns elevated by

electric motors. The ship is lighted throughout by electric lamps. Cooking is carried out on electric ranges, and heating the ship by electricity is under discussion. Without its electric plant a battleship would be nearly helpless; for that reason its installation is most important, and accordingly carefully designed and arranged. The most recent ships laid down will be fitted with electrically operated steering and anchor-hoisting arrangements.

#### RAM

Formerly men-of-war were fitted with a ram on their bows, with the idea that an enemy's ship might be attacked by ramming. This actually occurred during the Civil War, and vessels were sunk, due to damage inflicted by ramming. It has been concluded, in recent years, that hostile ships would not approach one another near enough for that purpose, owing to the power of the modern guns and the danger from torpedoes. Rams, or perhaps it would be more accurate to say ram bows, are fitted on recent

ships because it was determined by means of experiments in the model basin at Washington, that the form of a vessel having such a bow offers less resistance to propulsion than one without it.

#### WATER-TIGHT SUBDIVISION

The most important safeguard that a ship has against foundering is its water-tight subdivisions. This is the division of the ship into compartments by means of bulkheads, or partitions, which are water-tight, and, in case the hull is pierced and water floods one of the compartments, it is prevented from spreading by these bulkheads. This feature is particularly important in men-of-war, which are liable to injury by projectiles, or by torpedo and submarine mine explosions, in addition to the damages from collision, grounding, etc.

A modern battleship is subdivided into more than 500 water-tight compartments, any one of which could be flooded without the water penetrating beyond it, provided its doors were closed.

In order to insure, in case of accident, the closing of the doors in the most important bulkheads, they are fitted on some ships with electric motors by means of which they may be closed by the officer of the deck at the first warning. On some recent battleships there are more than forty such power-operated, water-tight doors. Other openings in water-tight bulkheads are fitted with hand-operated water-tight doors, which are designed to resist as strong water pressure as the bulkheads to which they are fitted.

#### WIRELESS TELEGRAPHY

The greatest aid to navigation of modern years is the wireless telegraph. By its means vessels out of sight of each other, up to 300 miles apart, and often at greater distances, can communicate more readily than formerly they could when lying in harbor within sight of one another. All ships of the United States Navy are fitted with wireless telegraph, and, in addition, the Navy maintains a number of stations

along the coast to receive and transmit communications to ships. The only external evidence of a ship's being fitted with wireless telegraph is the aerial wires which are suspended in the form of antennæ from the top of the highest mast, the operating room generally being placed behind the armored sides of the ship where the instruments would be safe in battle. In order to insure against the wireless being placed out of commission through loss of the mast in battle, on those ships which have fire-control towers, the aerial wires are supported from these towers, which, as will be seen, are designed especially to stand even when pierced by gun fire. It has been found to be possible, also, to fit aerial wires on the side of the ship away from the enemy, low down near the water, so as to be protected by the ship itself. This will give a means of communicating shorter distances if, in battle, the regular aerial wires are shot away.

A special naval wireless telegraph station is now under construction near Washington. This

will be able, it is expected, to communicate with ships 3,000 miles distant.

The distance at which it is possible to communicate by wireless telegraph varies considerably, due to different conditions, all of which are not understood. Nighttime is the best for communicating, it being possible often to double the distances attained in daytime. The distance at which communication may be had is increased by the height of the tower supporting the aerial wires, and by the power of the instruments.

#### MILITARY MASTS AND FIRE-CONTROL TOWERS

The fighting top and military masts in the older warships have been supplanted in the most recent ones by a structure called the fire-control tower. The earliest war vessels, even, were provided with raised structures in which armed men might be stationed to harass the enemy by musketry fire or with hand grenades. This method of fighting was most effective in deciding the outcome of battles in the days when

two war vessels lay alongside one another and fought "yard-arm-to-yard-arm." Lord Nelson, while on the decks of the *Victory*, was killed during the battle of Trafalgar by a musket shot fired by a marine in the mizzen top of the French vessel *Redoubtable*, which was lying alongside of the *Victory*.

In former armored ships the so-called military masts were fitted with rapid-fire cannon of small caliber for the similar purpose of annoying and harassing the enemy when at sufficiently close quarters to bring these guns into range. There is no chance, however, under modern conditions of two hostile battleships approaching one another close enough to make effective guns of the small caliber that it is possible to put in the fighting-tops. The small cannon, therefore, were doomed along with the military masts.

Under present conditions, as they are understood, the need for an elevated structure on a battleship consists in the requirement for signal yards, for a support for the aerial wires for

the wireless telegraph, and for stations for the fire-control observers. It is to this latter function that the fire-control tower owes its name. The requirements for fire-control towers are, that observers should be sufficiently elevated above the water to permit them to see the fall of the projectiles, to determine whether the gunpointers are aiming too high or too low, and whether the projectiles are falling over or short. Information is transmitted from the towers to the sight-setters to enable them to correct any error in the range to bring the guns to bear on the target.

The type of fire-control tower or cage mast, as it is called, recently adopted and installed on all United States armored vessels was designed to meet the above-stated requirements for an elevated structure about 120 feet above the water, which would combine lightness with ability to withstand, without falling, partial destruction by projectiles. These fire-control towers are constructed of steel tubing latticed together, having at the tops platforms on which



the observers and range-finders may be mounted. Many of the units of such a mast can be shot away without causing it to fall.

*Searchlights* are provided on warships for the purpose, incidentally, of aiding in navigating the ship in harbors, etc., at night, but primarily for use in discovering hostile torpedo craft, which might attack under cover of the darkness. For this reason the searchlights are mounted in elevated positions above the upper deck, and are so disposed as to throw their beams in every direction. The searchlights consist of electric arc lamps, their rays being projected by large reflectors. The lights can be turned in any direction by the operator to bring into view objects miles distant in their range.

#### AMMUNITION

The explosive most commonly used for all guns is smokeless powder. Formerly brown powder, which has the familiar ingredients of saltpeter, charcoal, and sulphur, was used. Brown powder, owing to the dense smoke it gen-

erated, which interfered with sighting successive shots, and its inferiority to smokeless powder, in other respects, has been abandoned definitely. Smokeless powder not only causes practically no smoke nor fumes, but has the advantage over brown powder of fouling less the bores of guns, and also of giving greater velocity to projectiles with less weight of powder. Smokeless powder is made from ordinary cotton by treating it with acids, and by purifying; it is translucent and varies in color from light lemon to a deep brown. It is ordinarily in the form of small cylindrical pieces pierced through their length by numbers of small holes.

Over half of the smokeless powder for the Navy is manufactured at the U. S. Naval Proving Grounds at Indian Head, Md., the remainder being purchased from private firms manufacturing it. Many precautions have to be taken in the handling and storage of smokeless powder, as it is liable to deteriorate under unfavorable conditions, and explode. The explosion that blew up the French battleship *Jena*, several

years ago, is attributed to spontaneous explosion, in her magazines, of deteriorated smokeless powder.

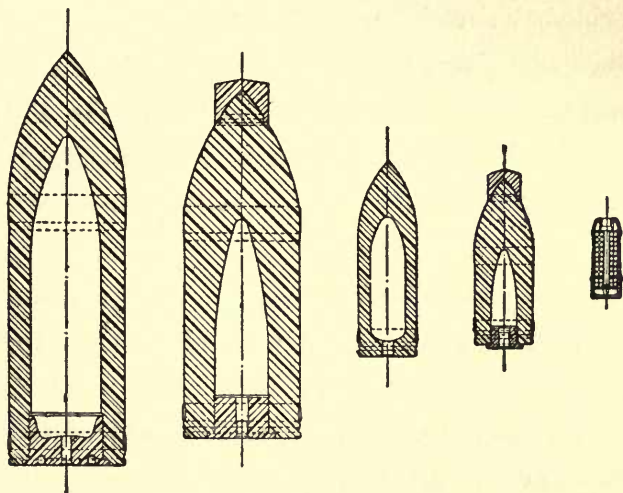
### PROJECTILES

All projectiles, or shells, as they are called sometimes, are cylindrical in shape, with a pointed ogival-shaped end. Their form and dimensions have been worked out carefully in order that they will travel true and without "tumbling." Each projectile is fitted with a band of soft copper, or similar metal, which presses into the rifling of the gun and transmits to the projectile the rotating motion which causes it to travel true and straight on its trajectory, thereby representing the advantage of rifled guns over smooth-bore guns. There are three general classes of projectiles, viz.: Armor-piercing, common, and shrapnel. Armor-piercing projectiles, or shells, as they are called ordinarily, are intended to be used against the armored sides of ships, and have hardened points for piercing armor. In addition they are fitted

with a cap of soft steel, which has the effect of increasing, about 20 per cent., the ability of the projectile to penetrate armor. The action of the soft steel is not understood with certainty, the explanation commonly accepted being that the first shock of impact bends in the hard plate, while the projectile pierces its cap; the hard point of the projectile then strikes the hard surface of the armor when it is bent in nearly to its breaking point, and enters more easily. Armor-piercing shells have a bursting charge of black powder, or high explosive, and are fitted with a fuse designed to explode the charge in the projectile after it has pierced the armor.

Common shell are intended for use against unarmored vessels, fortifications, etc. They are made, usually, of cast steel, one of the requirements that they must fulfil being that when exploded they shall break into a great number of fragments. They also have a bursting charge which is somewhat larger than that of the armor-piercer. They are not used generally in guns larger than 6 inches.

Shrapnel are designed for use against bodies of men and have little application to the larger size guns of men-of-war, except to fire against torpedo craft or against bodies of troops on



CROSS-SECTIONS OF PROJECTILES

1. 12-inch common shell.
2. 12-inch armor-piercing shell.
3. 6-inch common shell.
4. 6-inch armor-piercing shell.
5. 3-inch shrapnel.

shore, when blue-jackets or marines are assisting at land operations. Shrapnel have, besides the bursting charge, a number of balls about half an inch in diameter. For so-called rapid-

fire guns “fixed ammunition” is provided—that is, the powder charge is in a brass cartridge case, in the end of which is fixed the projectile, the whole resembling, though many times larger, a rifle-ball cartridge. This arrangement is possible only for guns as large as five inches in caliber. As a six-inch projectile weighs 100 pounds, fixed ammunition would be too heavy. For the guns of six inches in caliber, or larger, the powder charges are put up in silk bags and stored in copper tanks, from which they are removed just before being entered in the gun, after the projectile is in place.

The weights of projectiles for guns of the various calibers are approximately:—

4-inch—	33 pounds
5-inch—	50 “
6-inch—	100 “
8-inch—	250 “
10-inch—	500 “
12-inch—	850 “
13-inch—	1100 “
14-inch—	1400 “

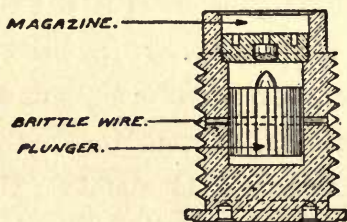
The weight of the powder charge usually is about one-third of that of the projectile.

The cost of firing the big guns is comparatively large. For a 14-inch gun the projectile costs about \$525, the powder charge about \$275. For a 12-inch gun the total cost of projectile and powder is about \$500. In addition each shot fired shortens the life of a big gun by wearing away the rifling. Recent improvements have done much to lessen this damage; the life of a 12-inch gun now generally is considered to be not in excess of 250 rounds, though, by relining a worn-out gun, it may be made as good, practically, as when new. The cost of a 14-inch gun with its carriage is about \$110,000.

### FUSES

All shells having a bursting charge are fitted in their bases with fuses which are intended to explode the charge at the proper time. Fuses are especially constructed devices, which, when exploded by the action of the mechanism, ignite the bursting charge; they may be arranged

either to explode on impact of the projectile, or after a certain fixed time has elapsed. There are many different types, all of them so complicated that a description of their operation would be out of place.



The simplest form of fuse, of which a sketch is shown, consists essentially of a plunger, held by a soft wire, and a percussion cap. When the projectile strikes, the plunger breaks the wire and detonates the cap, which in turn causes the explosion of the charge in the projectile. This type is called a percussion fuse. Other types are arranged so that the detonating cap lights a train of powder, which burns for a short space of time before exploding the charge in the projectile. These are called delayed-action fuses, or time fuses.



## CHAPTER VII

### HIGH EXPLOSIVES; MINES; TORPEDOES; AEROPLANES

#### HIGH EXPLOSIVES

IN addition to smokeless powder, which is the commonest explosive, and is used only for charges for guns, the Navy makes use of various so-called high explosives for charging torpedoes, for submarine mines, high explosive shell, etc. The high explosive most commonly made use of is gun cotton, which is more highly explosive, though it is capable of being burned unconfined, in an ordinary flame, without causing an explosion. Gun cotton is exploded by percussion, or detonation, by means of the explosion of other suitable explosives in contact with it.

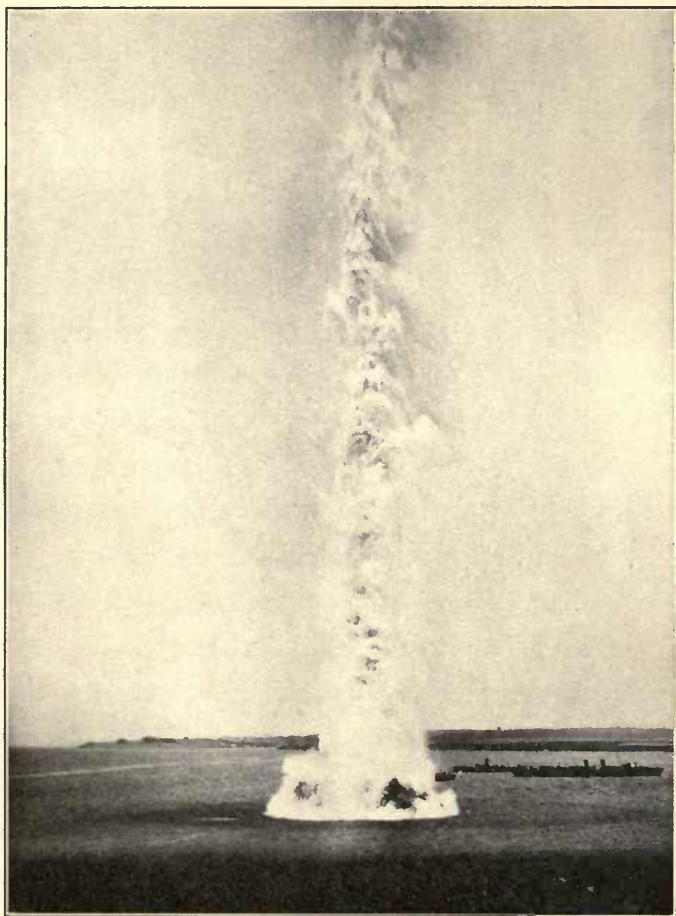
Other high explosives used in naval warfare are nitro-glycerine, from which dynamite is

made, picric acid, the various picrates including emmensite, lyddite, dunnite, etc.

Wet gun cotton explodes much less readily than the dry product. For that reason it is used for charges for torpedoes and mines where danger would arise from carrying and storing large quantities of dry gun cotton. The detonating charge, however, is made of dry gun cotton.

#### MINES

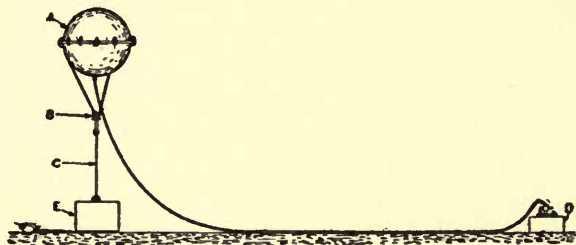
Submarine mines are a large factor in naval warfare. They may be defined briefly as consisting of a charge of explosive confined in a strong case, generally moored in rivers, channels, and outer roadsteads, and arranged to be fired in proximity to a hostile vessel. The several classes of mines may be divided into contact mines, which are exploded by actual physical contact with the vessel, and observation mines, which are exploded by electric impulse from the shore when it has been ascertained by observation that the hostile ship is in range.



The explosion, eight feet under water, of a naval defense mine containing 161 lbs. of wet gun cotton



Floating contact mines were used in the war between Russia and Japan, but, as they are dangerous to friend and foe alike, their use is discouraged and their discontinuance may become a subject of international agreement.



FLOATING ELECTRIC CONTACT MINE

- A. Mine case with explosive charge.
- B. Mooring apparatus.
- C. Mooring line.
- D. Battery box furnishing current to cause explosion when mine case comes in contact with a ship.
- E. Anchor.

United States naval vessels are provided with outfits of so-called naval defense mines, which can be fired either as contact or observation mines. They are fitted with anchors and are arranged so that they will be maintained, in a

fixed locality, at a uniform depth below the surface of the water in spite of the rise and fall of the tide. Naval defense mines are fired electrically; when used as contact mines the circuit is closed by the movement of the mine caused by a passing vessel. When used as observation mines the firing key is located ashore in a convenient spot for the observer.

Each mine has a charge of over one hundred pounds of gun cotton, which is sufficient to damage seriously any vessel with which it is in contact when exploded.

Naval vessels are fitted, also, with outfits for countermining, that is, for exploding and destroying an enemy's mine field, as might prove necessary in case of the capture of a harbor that had been mined by the enemy. These countermines contain very heavy charges of gun cotton, some as much as 500 pounds. They are run in lines across the mine field, and then exploded simultaneously in order to destroy the connections and cause the defending mines to explode by shock. Mine fields for the protection of har-

bors, etc., in the United States are put in place by the Coast Artillery Corps of the Army in connection with their work of coast defense. The space occupied by any system of mines is called the mine field, and its arrangement requires special study of conditions of the bottom, the channel, tides, etc. The mine field should be protected by the fire of small guns, to prevent countermining operations, and by electric searchlights, to guard against night attacks. The mines are arranged in groups so that a ship entering will pass surely within striking distance of one or more of the groups. Sometimes a special channel across a mine field, kept clear of mines, is designated for the use of friendly vessels. The protection afforded by an efficient mine field is regarded as being absolute, and no hostile vessel would consider entering a port known to be so protected.

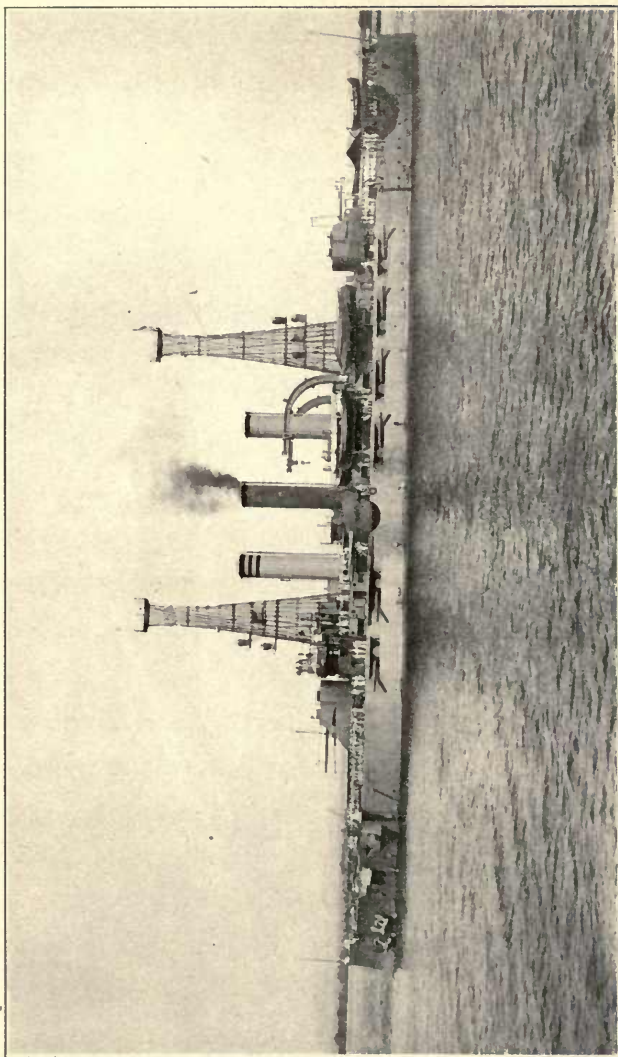
### TORPEDOES

The first type of torpedo used was the spar torpedo, which was fixed on the end of a spar

in the bow of a small boat, and exploded upon impact against the side of the ship, the danger to the crew of the boat being practically as great as to the vessel attacked. This suggested the idea of the floating torpedo, propelled by clock-work, that has developed into the modern automobile torpedoes, the most common types of which are the Bliss-Leavitt (American) and Whitehead (English). These torpedoes are propelled by engines driven by compressed air, have arrangements whereby they are automatically maintained at a fixed depth, and steered at the target toward which they have been aimed. The torpedo is so complicated a machine that a detailed description of all of its operations is impossible in this book's limited space, but a brief description will be given, as this phase of naval warfare, about which comparatively little is known generally, is one that appeals to the public.

The most modern form of torpedo used in the United States Navy is a modification of the Whitehead, known as the Bliss-Leavitt 5-meter,





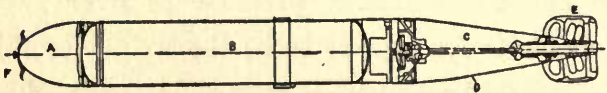
The battleship *Georgia*



21-inch torpedo. It is over 16 feet long, weighs about a ton, carries nearly 200 pounds of gun cotton, and has an average speed of about 26 knots, with an effective range of over 4,000 yards. It is propelled by turbine engines driven by compressed air, carried in the body of the torpedo at a pressure of over 2,000 pounds to the square inch; the weight of this compressed air alone is over 200 pounds. The Bliss-Leavitt consists of three main parts as indicated in the illustration, the head A, the air flask B, to which is attached the immersion chamber C, and the afterbody D. This latter carries the operating mechanism, including the turbine engines and the propellers; the depth regulator, which controls the horizontal rudders that keep the torpedo at a fixed distance from the surface; the gyroscopic gear, which controls the vertical rudders and keeps the torpedo pointed at the target, and a number of other mechanisms that are necessary to the operation of the torpedo.

There are two interchangeable heads supplied

with each torpedo, the war head, which is charged with gun cotton, and the exercise head, which is ballasted with water. The war head is used only when the torpedo is to be fired against an enemy, as, for obvious reasons, its handling for ordinary drills would be danger-



ARRANGEMENT OF TORPEDO

- A. Head.
- B. Air flask
- C. Shaft compartment.
- D. Afterbody.
- E. Tail and propellers.
- F. War nose.

ous. The war head is fitted with a war nose, which is screwed in its end and is intended to explode the gun cotton upon impact upon a ship's side.

Torpedoes are fired from torpedo tubes by means of a small charge of gunpowder or by compressed air. In the case of modern armored vessels, the torpedo tubes are under the water; in torpedo craft the tubes are placed on their decks. Formerly battleships and armored

cruisers carried torpedo tubes above the water, but these were abandoned on account of the danger through premature explosion of a torpedo by an enemy's shot. As soon as the torpedo reaches the water the propelling engines start, the gyroscopic steering gear points it for the target, and when it attains its speed and proper depth below the surface of the water nothing indicates its whereabouts but a small ripple on the surface of the water, and the escaping air bubbles. When torpedoes are fired for exercise they must be recovered, and, for the purpose of indicating their location when spent, the exercise head is fitted with a small can of calcium phosphide, which is ignited by the water, giving smoke and flame.

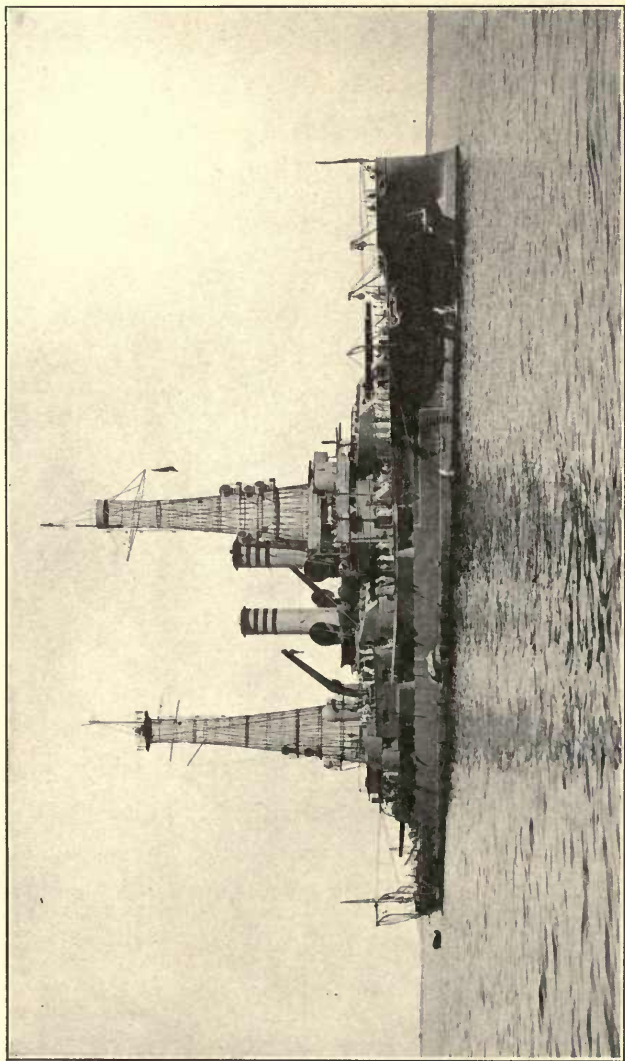
Formerly torpedoes were driven by a compact little engine of the reciprocating "Brotherhood" balanced type. This, though small enough to be placed in a good-sized cheese box, was capable of developing as much as 60 horsepower. The turbine type engine has supplanted the "Brotherhood" for torpedoes, and

has added greatly to the speed and range of the torpedo, by using the air more economically and by reducing friction of moving parts. The gyroscope makes it possible to discharge a torpedo in a direction at an angle up to 120 degrees from its target, and have it turn gradually round through that arc to point for the objective. It is possible in this way for a torpedo boat to discharge all her torpedoes simultaneously when the boat itself is steering head on for the hostile ship, and so to lessen the target offered to its gun fire.

Another device that has increased greatly the efficiency of torpedoes is the arrangement for heating the compressed air by means of an alcohol flame. In this way the speed has been increased by from 8 to 10 knots, with a corresponding increase in range.

### TORPEDO PROTECTION

Foreign ships usually are provided with torpedo nets, which are intended to stop a torpedo before it comes into contact with the ship.



The battleship *Idaho*





These nets are of steel, and are carried on booms about 20 feet long, arranged along the ship's side. They could not be used when the ship was under way, and their disadvantages have been regarded as being so great that they never have been adopted in the United States Navy.

The danger to a modern battleship from torpedo attack under ordinary conditions is regarded by many as not being serious, as by the use of searchlights and because of the large number of rapid-fire guns in the torpedo defense battery, the chance is not very great of a torpedo craft being able to approach sufficiently near to fire a torpedo with effect. Even if the torpedo strikes and explodes in contact with the ship, there is a strong probability that the damage would not be sufficient to disable the ship more than temporarily, as protection against torpedoes and mines is afforded by having the water-tight subdivisions of a ship so arranged that the damage from the explosion of a torpedo would be confined to comparatively small compartments.

## AIRSHIPS AND AEROPLANES

Serious consideration is being given by the United States, as well as by other naval powers, to the use, in naval warfare, of airships and aeroplanes. The possibilities are great, and though, up to present time, little has been done to develop them, there is no doubt that each step in improving the reliability of air craft renders their use for naval purposes more promising. Their importance in this connection must not be exaggerated, however, as, like the submarines, they are at the best uncertain, easily destroyed if discovered when nearby, and incapable of great offensive action. Their use for scouting purposes would be great, and there is not much doubt that in the near future scout cruisers will be equipped with aeroplanes to aid them in their scouting duties.

That an airship or an aeroplane could destroy a battleship by dropping on it high explosives is hardly possible. It would be difficult in the first place for an aviator going at

high speed, as he must if he hopes to avoid being struck by rifle fire from the enemy, to hit the deck of the ship with any explosive which he might drop. Even were he to succeed in landing one or more charges of explosives on the deck of a battleship, it is probable that the damage resulting would be only local, and would not affect the vessel seriously.

It has been demonstrated by trial that an aeroplane can rise from an especially constructed platform on the deck of a ship, and, after making a flight, can alight in the same place. Thus, it becomes comparatively a simple matter and one of skill in handling and of reliability of the aeroplanes, to use them for scouting from a ship, wherever it may be.

In order for an aeroplane to be of the greatest possible usefulness, and to render it independent of its ship in case it is forced to descend, it should be able, however, to alight and rise from the surface of the water. This, too, has been shown to be possible, by the use of the so-called hydroplane attachment, which per-

mits the aeroplane to float on the surface of the water, and, when the propeller is started, to arise into the air. Similarly, when its flight is finished, it can alight on the surface of the water and remain there until picked up by its ship, and hoisted aboard in the same manner as a boat. Even if in alighting on the water the aeroplane could not be recovered, the aviator could be brought on board and deliver his information. The ship could carry easily other aeroplanes.

It has been proposed also to utilize aeroplanes for spotting the fall of shots fired at long range. As has been seen, especially designed towers of considerable height are constructed on battle-ships as stations for the spotters, to permit them to see the fall of shots and to correct the range in case the fall of the shots is short or over. An observer in an aeroplane, being at greater height, would be able to make these observations to better advantage and signal them to the ship. It is likely that aeroplanes will be found to be of great usefulness for such work.

Photographs can be taken readily from aeroplanes in flight, and wireless telegraph messages can be sent and received.

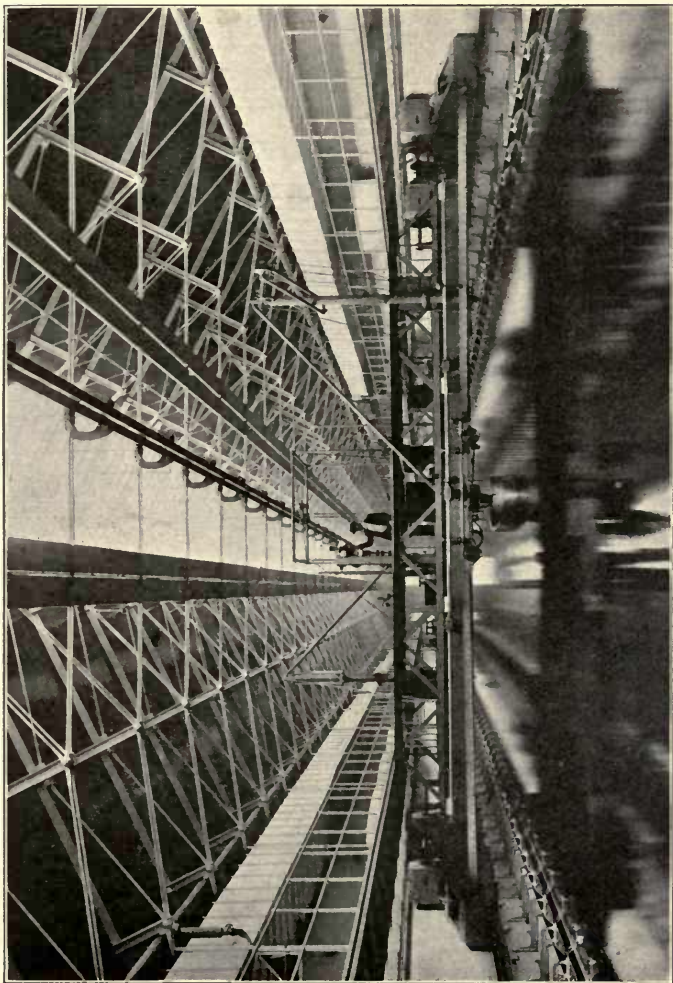
It is probable that rifle and small caliber automatic gun fire will be relied upon chiefly for defense against aeroplanes, although large guns of a type for firing vertically into the air have been developed. A moving aeroplane presents a difficult target, as there is no means of correcting the range, as is done ordinarily by observing on the surface of the water the fall of the shot. For that reason, in order to attack an aeroplane successfully, a large volume of fire will be necessary, and this can be obtained most readily by means of a number of riflemen.

## CHAPTER VIII

### DESIGNING AND BUILDING A WARSHIP; DRY DOCKS

NEARLY all naval vessels of this country are built by private shipbuilding concerns under contract with the Navy Department. In former years, a number of the old wooden ships were built in the various navy yards, and, of recent years, several battleships have been so built. The *San Marcos*, formerly the *Texas*, was built at the Navy Yard, Norfolk. The original *Maine*, which was blown up in Havana Harbor, and the *Connecticut*, were built at the Navy Yard, New York, which yard is now engaged on the battleship *Florida*, which is nearly completed, and the *New York*, which has been commenced only a short time.

When Congress passes a law authorizing new ships for the Navy, it becomes the duty of the Secretary of the Navy to take the necessary



The Naval Experimental Model Basin at Washington



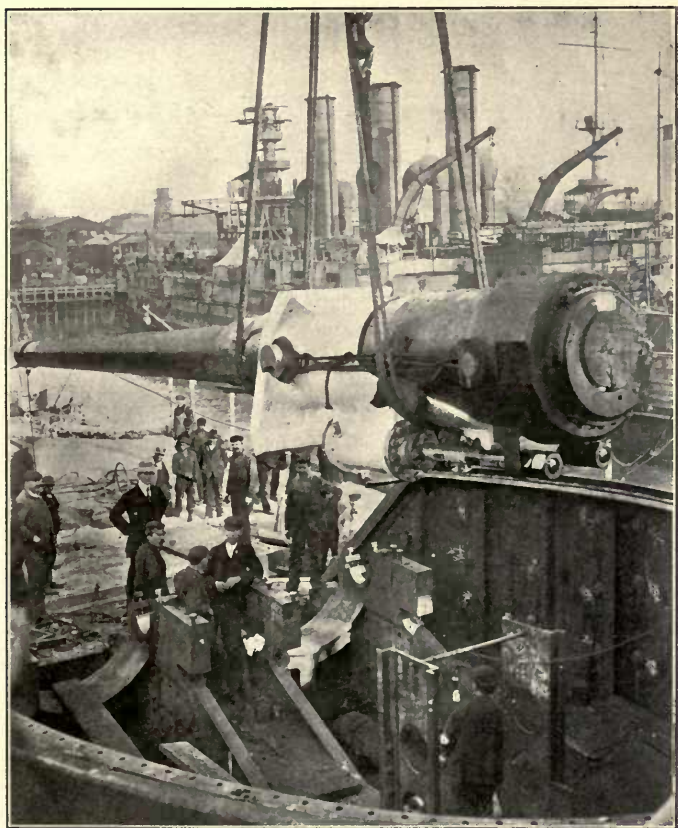


steps looking to the construction of these ships. The characteristics of the ships are fixed in a general way by the act authorizing them; it remains for the Navy Department to determine in full the details, such as the exact displacement, speed, armament, type of engines, arrangement, etc. The design is prepared in the Bureau of Construction and Repair under the general instructions, as to military characteristics, of the General Board, which is charged by the Navy Regulations with this duty.

In order to determine the proper form of the under-water body of the ship, so that it may offer the least resistance to propulsion through the water, and, also, to ascertain the power necessary to drive a ship of a given form, recourse is had to the Naval Experimental Model Basin at Washington. A model 20 feet in length is constructed of wood to the exact form which is proposed, and this is ballasted to float at the same relative depth as will the ship. The model is then towed in the basin, which is 470 feet long, by means of an electrically driven

carriage, which travels from one end of the basin to the other. The speed of the carriage and the force that must be exerted to tow the model are registered carefully and, by suitable calculations from them is determined the power of the engines that will be required to drive the ship at the proper speed. Such experiments, of course, have been preceded by a number of trials of models of various shapes, to determine the most efficient form of under-water body. The improvement in speed brought about in the ships that have been designed since the establishment of the Model Basin has been very marked. No design of a new ship to be added to the Navy is adopted until a model representing it has been run at various speeds and drafts in the Model Basin, and it is therefore possible to predict with accuracy the speed that a new ship will attain.

Having determined the under-water body of the new ship, the next step is to dispose the guns, armor, ammunition, coal, machinery, stores, etc., so as to have the completed ship



Hoisting a 12-inch gun on board the *Louisiana*



float at the proper draft and at the same time insure the co-ordination of all the elements that go to make up an efficient battleship. The various parts of the structure must be designed so as to offer proper resistance to the enormous forces that act in a ship afloat and poised on waves. In addition to the calculations that are made in this connection, assurance must be had that the ship will be stable under all conditions, even when water enters through breaches in the hull that may be caused by collision, torpedo explosion, or projectiles.

The preparation of the complete plans and specifications for a large battleship is a difficult task, and requires the work of a number of men for several months. When they have been completed in sufficient detail to inform bidders exactly what is required, and to permit the construction of the ship, bids are invited from various shipbuilders for the contracts to build the ship. The lowest bidder making a satisfactory offer and having the necessary facilities for building a ship is awarded the contract, the

decision being made by the Secretary of the Navy.

In order to insure that ships under contract shall be constructed in accordance with the plans and specifications, naval officers are detailed as inspectors at the various shipyards doing work for the government, as well as at the steel mills, armor mills, gun factories, etc., to inspect the materials used and the manner of carrying out the work. The inspectors at the shipyards also are required to pass on all detail plans prepared by the builders. It must not be supposed that the contract plans represent all the plans necessary to build the ship; there are many thousands of others which show details of the ship even to the locations of bolts and rivets.

Owing to the amount of money involved, and the time required in the construction of a battleship, it would be very difficult for any builder to complete a ship before receiving any payment thereon. For this reason installments are paid from time to time as the work progresses.

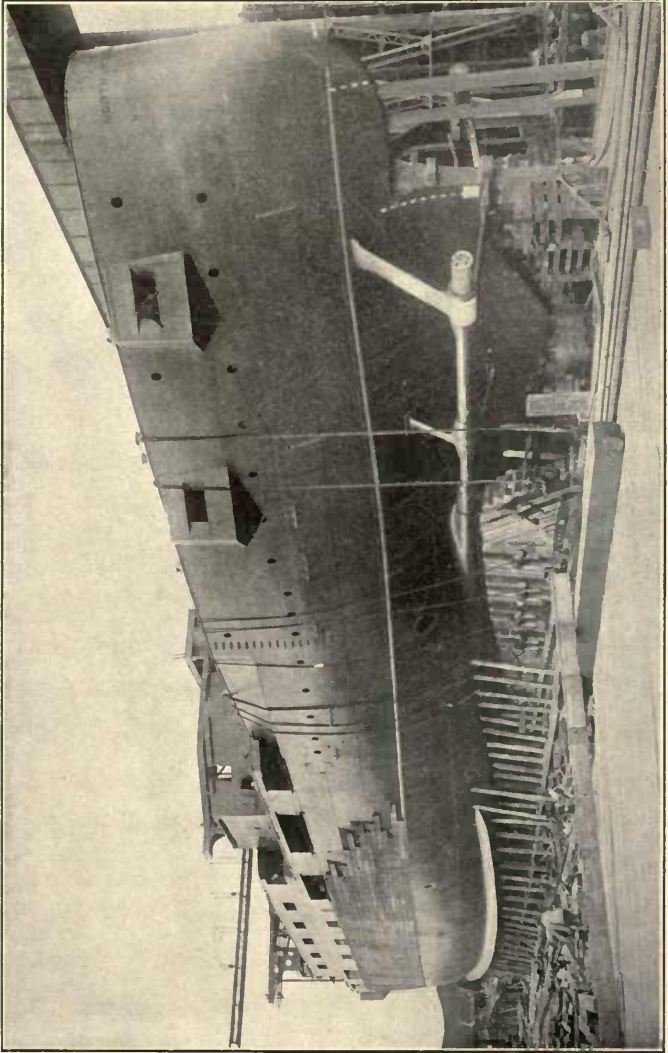
When the builders have prepared the building slip on which the new ship is to be laid down, and a sufficient quantity of material has been assembled to insure rapid progress in the work, the keel is laid. This, which now is a much simpler ceremony than formerly was the case with wooden vessels, consists of laying the flat keel plate on the line of blocks which are placed along the middle of the building-slip for that purpose. The keel of a ship is similar to a human backbone, as to it, on each side, are attached the frames or ribs of the ship. These frames are like girders, and to their outer and inner sides are attached the outer skin and inner bottom of the ship, the space between the two being the so-called double bottom, which is intended to act as a protection in case the outer skin of the ship is pierced in any manner.

Work on all parts of the ship progresses simultaneously and as rapidly as possible. The building slip usually is served by a great overhead traveling derrick, of the cantilever type, which has arms extending on each side to serve

two slips. When the ship has progressed to a certain stage, and the weight has reached about 10,000 tons for the largest ships, it becomes necessary to launch it. It is desirable to delay launching as long as possible, as the facilities for carrying on work and handling materials usually are much better at the slip than when the ship is afloat.

Launching is effected on two slides or launching ways, which are built under the ship, at a distance apart equal to about one-third the beam of the ship, and securely fastened to the ground. Sliding ways are secured to the vessel, the surfaces between them and the launching ways are coated with special lubricating grease, and wedges are arranged to be driven in so as to lift the ship clear of all supports except the ways. Premature launching is prevented by having the upper ends of the sliding and ground ways bolted and lashed together. When all is ready for the launching, the sliding ways are sawed through beyond the point where they are fastened, and the ship slides into the water,





The cruiser *North Carolina* just before launching



after having been christened by having a bottle of champagne broken over its bows by the young lady who has been selected as sponsor. Frequently accidents happen in launching ships, as in the case of an Italian merchant ship, that recently turned over when launched, and became a total loss. Great care is necessary in the launching preparations, and detailed calculations must be made to insure that all will be as planned.

In order to make certain that the contract requirements as regards speed, coal endurance, etc., are complied with, the contractors are required to conduct a speed trial of a vessel before delivery to the Government. A board of officers is appointed to supervise the trials, and to ascertain whether the terms of the contract have been fulfilled, the required speed attained, and other requirements met. To determine the speed of a ship, it is run first over a measured course one mile in length, which must be located in a sheltered harbor, where beacons and range poles on shore will be visible from the ship. It

is also essential that the depth of water be considered, as shallow water retards the vessel. The harbor of Rockland, Me., usually is selected for these preliminary runs on account of the depth of water. Some recent vessels have been run, however, off the Delaware Breakwater.

A vessel on trial is run over the measured mile course in opposite directions, and at successive speeds; meanwhile observations are made of the time necessary to pass over the course, and the number of revolutions of the propellers. From the data so obtained a curve is constructed which shows the speed of the vessel at a given displacement, for any given number of revolutions of the propellers. The ship is run out to sea for the period during which it is required that full speed shall be made, usually eight hours, and, by determining the total number of revolutions of the propellers, the speed of the ship is found. After the full speed run, the endurance runs take place; these are at reduced speed, and last usually twenty-four hours each. The endurance

runs are intended to show that the coal capacity and the arrangements for handling it are adequate, and also the efficiency of the boilers and engines at reduced speeds.

The speed trials are very important to the builders, for heavy money penalties are provided in the contract for failure of the vessel to attain the required speed, or changes and improvements may be called for, which would add to the cost of building the ship.

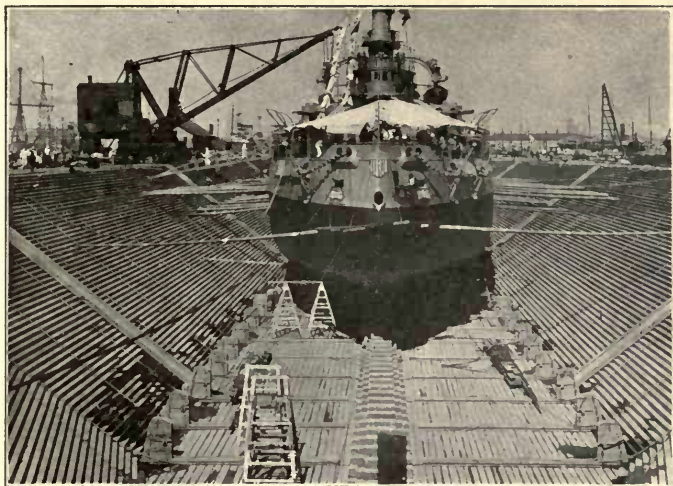
Formerly in the contracts for naval vessels, money bonuses were offered for speed in excess of requirements, but this practice was discontinued a number of years ago, and at the present time, as a spur to the builders, there are only penalties for failure to meet the speed.

Ships return to the builder's yard, after a successful trial trip, with all hands much elated; brooms are hoisted on the mastheads, and the speed is painted on the superstructure. If, on the contrary, the speed trial is a failure, the crowd on board the ship is a very unhappy one.

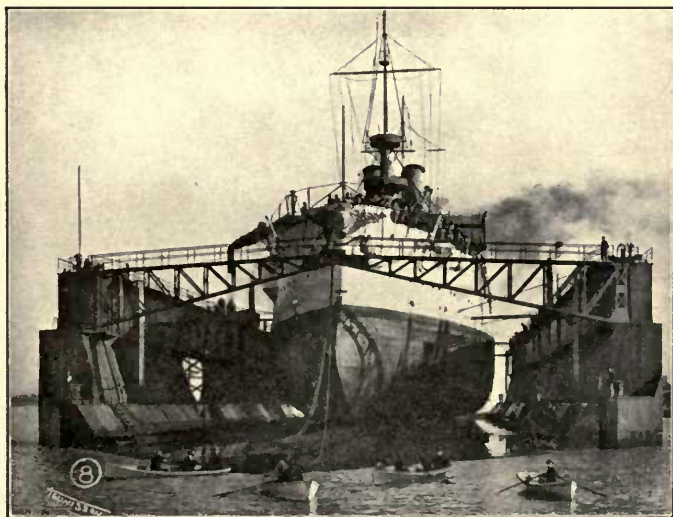
Upon completion of the ship in all details, delivery is effected to the Government, usually at the nearest navy yard. Formerly it was customary to send the crew on board at the builder's yard to accept delivery and commission the ship. The builders are held responsible for any defects, arising during six months after delivery, which may be due to defective material or workmanship. To secure this responsibility final payment is not made until the end of this six months' period, when, if there are no defects, final payments are completed and the contract declared to be satisfied, and closed.

#### DRY DOCKS

All ships require to have their bottoms examined and repaired periodically; wooden ships less often than steel ships, for the reason that their bottoms are sheathed with thin plates of copper, which protect the wood from the attack of the borers or teredo worms, and marine growths, such as barnacles, grass, etc., are prevented by poisonous action of the copper from



The battleship *Oregon* in the Puget Sound graving dry dock



The battleship *Illinois* in the New Orleans floating dry dock





attaching themselves. Before the discovery of copper sheathing, the loss of ships was not infrequent through the destruction of their bottoms by the borers. Sea water acts on the bottoms of steel ships, causing rapid corrosion, and barnacles and marine growths attach themselves readily to the steel, offering considerable resistance to the motion of the ship. For these reasons it is necessary periodically to clean and paint the bottoms of steel ships.

To the bottoms of steel ships paint of a special character is applied. This is designed to prevent corrosion and the attachment of growths, or fouling, as it is called. This latter result is obtained usually by mixing in the paint a poisonous ingredient. It is not possible to use on steel ships the copper sheathing, owing to the galvanic action which takes place between copper and steel in sea water, causing very rapid eating away of the steel.

For the purpose of examining, cleaning, painting, and repairing the under-water bodies of ships, dry docks are provided. Each navy yard

has one or more, some of the larger yards having three or four of different sizes. Most of these dry docks are graving docks, which consist essentially of a basin into which the ship is floated. The entrance then is closed by a caisson or gate, which can be floated in its place and then sunk by admitting water. When the entrance to the dock has been closed effectively by the caisson, the water in the dock is pumped out by means of large electrically driven centrifugal pumps, which empty a dock of ordinary size in from two to three hours. This leaves the ship resting on the bottom of the dock, on blocks which have been especially arranged and placed to fit the irregularities of the ship's bottom, and held upright by shores or spars supported from the side of the docks. After the completion of work on the bottom of the ship, when it is desired to refloat her, water is admitted to the dock through special openings. When the water in the dock is the same level as that outside, the caisson is floated by pumping out the water in it, and it is towed out of the

way. The ship then can be hauled out of the dock by a tug.

Floating dry docks, of which one of the largest in the world is the *Dewey*, at the Olongapo Naval Station, are large floating steel structures so arranged as to be capable of lifting ships bodily from the water. Floating docks are much cheaper than graving docks as regards first cost, but the bottom of a steel dock corrodes in the same way as that of a ship, and its lifetime is limited, while a graving dock is practically indestructible. When it is desired to dock a vessel, the floating dock is sunk by admitting water to it, and the ship is floated over it. When the ship is in the proper place over the dock, the water is pumped out, and it rises, lifting the ship with it. When it is desired to refloat the ship, the dock is sunk again by admitting water, and the ship hauled off. There are side walls to the dock which remain partly above water. In these are located the pumping machinery, and on them the docking gangs work. In order to permit of cleaning and painting the

bottom of a steel dock, which is essential to prevent corrosion, so far as is possible, it must be arranged for self-docking, that is, the various sections, when loosened, can lift each other out of the water. The *Dewey* is in three sections, of which the two small end sections lift the large central section, and are themselves lifted by it.

## CHAPTER IX

### THE NATIONAL DEFENSE

A NATION'S surest guarantee of peace is to be prepared for war. If at all times ready to wage war successfully, its chances of becoming entangled are infinitesimal; in order to secure such a guarantee an efficient fighting Navy is essential. A country which has over-sea possessions is absolutely dependent on its Navy for their retention in time of war. No army, however powerful, can operate far away from its home base without communications, and these its Navy must be depended upon to maintain. Had the Japanese Navy not vanquished the Russian Navy, Japan could not have maintained an army in Manchuria, nor could she have resisted in turn invasion by the Russian armies. The British Empire owes its integrity to the Navy; repeatedly, when its very existence has

been threatened, the English nation has been saved by its naval forces. Had Napoleon been able to obtain control of the sea long enough to realize his dream of invading England, his Empire could not have been destroyed. For this reason the English people as a whole regard their Navy as the nation's bulwark. The United States is in much the same position as England, as regarding its dependencies, which are far distant and largely in the Pacific Ocean. Unless there were a sufficient naval force to prevent a hostile fleet from operating, the Philippines and Hawaii could not be retained. The Army, without the Navy to maintain a line of communication, would not be able to hold them, no matter how strong were the fortifications.

The problem of an invasion of the United States by sea has been worked out in the war offices of every other great armed nation, but, with the addition of each new squadron to the Navy, the solution becomes more difficult, and if the United States continues to build ships according to its means, in the near future its

invasion by sea would be regarded as impossible. The United States, for peace and immunity from war, well can afford to pay so cheap an insurance as is involved by the cost of the Navy. Therefore, every citizen of the United States, whether of the East or the West, of the sea-coast States or of inland States, has an equal interest in the maintenance of a large and efficient Navy, as through it alone the safety of the nation and the integrity of its dependencies can be assured.

The function of the Navy is not directly to protect the coast and the seaports. There are coast defenses and fortifications for that purpose. The Navy must gain control of the sea, and, to do this, must be foot-loose to search out and destroy the enemy's fleet and so indirectly to protect the coasts; to guarantee the country against invasion, and to enable the land forces to carry the war into the enemy's country. For these reasons the Navy must be not only powerful, but it must be a cruising navy, and a fighting navy; the ships must be able to keep the sea in

all weather; they must be capable of cruising long distances, and the gun crews must be well drilled and trained to make the greatest possible number of hits per minute.

While the national defense is of first importance, the duties of the country abroad should not be lost sight of. Without an effective Navy to back it up, the Monroe Doctrine would become a dead letter. Our interest in world affairs and influence in the cause of humanity would not avail anything without the power to make good our contentions.

THE END



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