

COMPARATIVE STRENGTH OF THE NAVIES OF THE WORLD.

There are few tasks that have proved more puzzling to the statistician than that of arranging the navies of the world according to their comparative strength. For the term strength, as applied to naval and military *materiel*, is an elastic term, and the value of any tabular comparison will depend upon the basis upon which it is made. If the total number of units in a fleet be taken as the basis we shall get one order of rating; if the total displacement, we shall get another. If it be considered that the number and displacement of battleships is a true test of comparative strength, the standing of the navies will receive still another readjustment; while if what we ourselves consider to be the true test, that of all armored vessels, whether battleships or armored cruisers, be adopted, there will be yet another change of position.

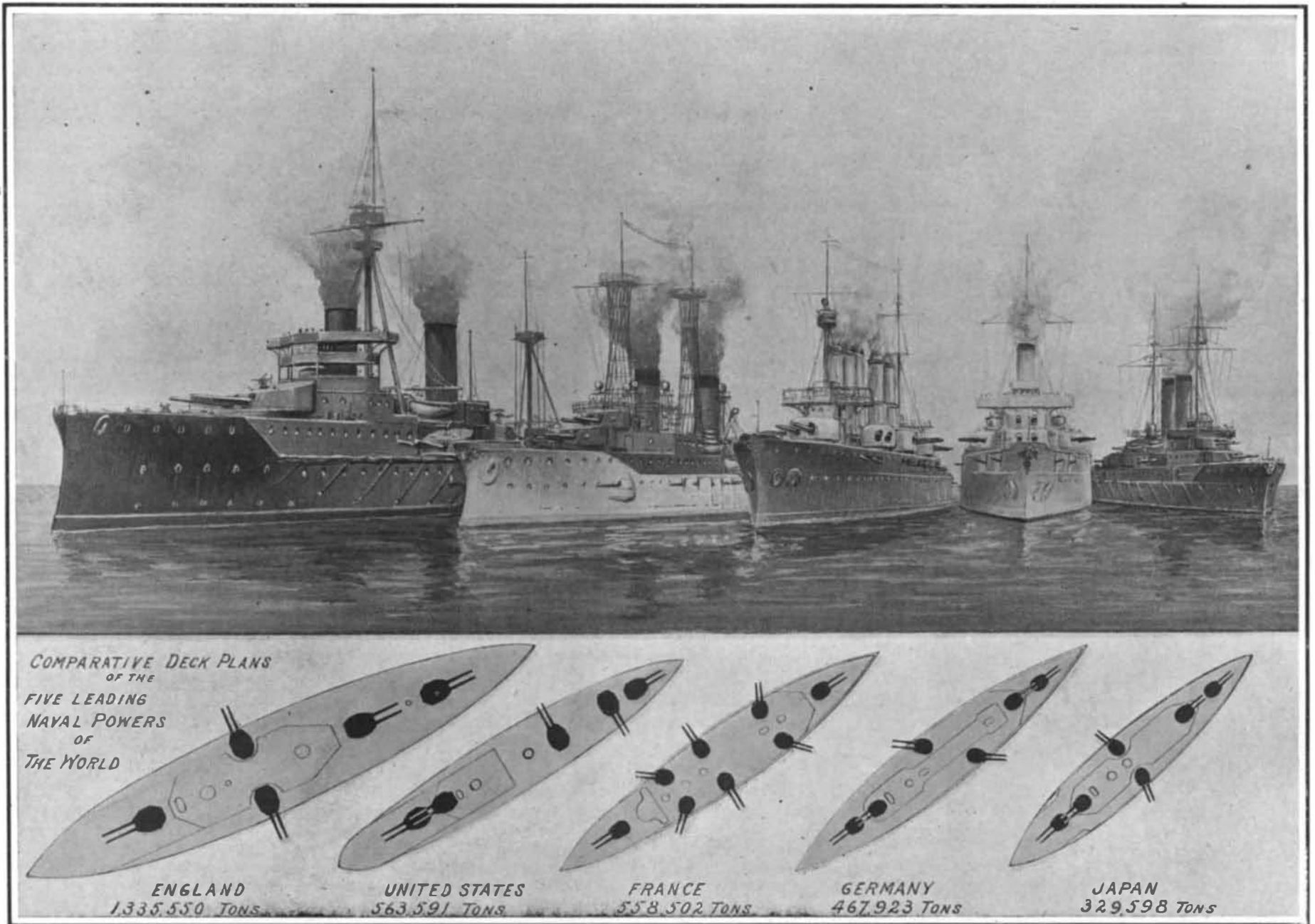
Among the many comparisons that are made annually of the relative strength of the world's navies, one of the best is that compiled at the end of each year by the United States Navy Department. The data on which it is based are compiled from government documents, and probably afford the most correct informa-

tion in the French navy, being 4,460 tons in the former case, and 1,553 tons for the 516 ships of the French navy.

A most valuable quality in those officials who have charge of the planning and construction of the fighting material of a navy is the capacity to foretell, years ahead of its fulfillment, the trend of future developments; and it is to the possession of this quality by our Bureau of Construction, more than to the appropriations of Congress, that the United States owes its present strong position as the second naval power in the world. Many years ago we ceased building warships of the protected cruiser class, and began to put practically the whole of the displacement authorized by Congress into ships of the armored type, either armored cruisers or battleships. Pushing this policy still farther, after we had built a dozen armored cruisers, we ceased their construction altogether, and outside the building of a few scouts, torpedo boats, and submarines, have invested our displacement entirely in capital ships of the very first size and power.

As a consequence of this policy, in a comparison taking note only of armored vessels, that is, vessels whose sides at the waterline and for some distance

fighting strength of the navies, to base it upon the collective battleship and armored cruiser strength; for, although many of the armored cruisers, particularly in the French navy, carry armaments of comparatively small offensive power, the guns being few and of small caliber, it must be remembered, on the other hand, that many of the vessels included under the head of armored cruisers more strictly belong in the class of battleships, and this is particularly true of the British and German navies. The three armored cruisers of the "Indomitable" class, in the British navy, of 17,250 tons displacement, which are able to carry their batteries of eight 8-inch guns across the high seas at speeds of 25 knots and over, are surely more battleship than cruiser. The latest German armored cruisers, also, are 25-knot ships, carrying a battery of twelve 11-inch rifles. Japan also is entitled to call her latest armored cruisers battleship-cruisers, since they carry the 12-inch gun as their main armament. France, on the other hand, although she possesses twenty-three armored cruisers, whose total displacement is two-thirds of that of her battleships, does not possess a single vessel in the armored cruiser class that is entitled by virtue of its battery and protection



The deck plans show the number and disposition of guns on the latest ships of the "Dreadnought" type in each navy.

THE COMPARATIVE STRENGTH IN BATTLESHIPS AND ARMORED CRUISERS OF THE LEADING NAVIES OF THE WORLD.

tion obtainable. The figures which follow show the number and displacement of warships, built and building, of 1,000 or more tons displacement, and of torpedo craft of more than 50 tons. From these figures are excluded all vessels that are over twenty years old, except in cases where they have been reconstructed and rearmed since the year 1900. The vessels that are authorized, but not yet actually begun, are also excluded; as are also all transports, colliers, repair ships, torpedo-depot ships, converted merchant vessels, and yachts.

Taking, then, everything, big and little, subject to the above exceptions, we find that the British navy still maintains its commanding lead, including, as it does, 482 ships of a total displacement of 1,871,176 tons. France comes second with 516 vessels with a total displacement of 801,188 tons. Third place is held by the United States, with 173 vessels and 770,468 tons displacement; followed by Germany with 222 ships of 693,599 tons, and Japan with 179 ships of 444,903 tons. It is interesting to note that, although France leads the United States in total displacement and total number of ships, the average size of the individual unit is just three times as great in the United States as it is

above it and below it are protected by heavy armor, we find that Great Britain ranks first, with 76 armored ships of 1,335,550 tons total displacement. The United States is second with 41 ships of 563,591 tons displacement. France is third with 47 ships of 558,502 tons; followed by Germany with 38 ships and 467,923 tons, and Japan with 26 ships of 329,598 tons.

It may be objected that recent developments, especially since and including the Russo-Japanese war, have depreciated the value of the armored cruiser so greatly that the possession of a fleet of these ships should not be allowed to vitiate the value of a comparison of fighting strength, which can only be accurately made when battleships alone are included. Therefore, we submit herewith figures based on the number and displacement of battleships alone, in which it is found that Great Britain still heads the list with 58 vessels of 867,200 tons; followed by the United States with 29 ships of 406,146 tons; Germany, with 28 ships of 354,031 tons; France, with 24 ships totaling 337,520 tons; and Japan making a poor fifth with 191,498 tons.

It will be noticed, however, that we have preferred in the accompanying illustration of the comparative

to "lie in the line" against battleships and receive the hard knocks of a first-class engagement. Hence, although in total displacement of armored ships she exceeds Germany, strictly speaking she ought to take the fourth position, yielding the third place. Germany, on the other hand, includes among her battleships a large number of vessels which carry nothing heavier than a 9½-inch gun of rather low velocity, and these vessels go far to offset the advantage possessed by Germany in the number and power of the ships of the "Dreadnought" class which she now has under construction.

Attention is directed to the comparative deck plans of the five leading naval powers, as shown in the accompanying engraving. Each represents the type ship now being built by the various nations in the "Dreadnought" class; and, taken with the wash drawings of the ships as they appear afloat, they serve to convey a closely correct impression of these powerful fighting vessels. The British navy is represented by the "St. Vincent," one of a class of four. The length is 530 feet, beam 84 feet, displacement 19,250 tons, and the belt and 12-inch gun protection consist of 11 inches of Krupp armor. The armament consists of ten 12-inch

guns of 50 calibers length—a new piece with a velocity of 3,010 feet per second, and an energy of 54,200 foot tons. By placing two of the turrets amidships, one on each side of the superstructure, the end-on fire is increased at the expense of the broadside fire. Six 12-inch can be fired ahead, eight astern, and eight on each broadside. The forward pair are mounted on a lofty forecastle deck, and the wing guns and four after pairs of guns on the main deck, the forward of the two after pairs of guns being raised sufficiently to fire over the after pair. The "Florida" is the type ship of the American "Dreadnought." She is 518 feet long; 20,000 tons displacement; is protected by 11- to 12-inch armor, and mounts ten 45-caliber guns on the axis of the ship, so disposed that four can be fired ahead, four astern, and ten on each broadside. Her broadside fire is therefore 25 per cent greater than that of the "St. Vincent."

France is represented by the "Danton," 480 feet long; of 18,400 tons displacement; armed with four 12-inch 50-caliber guns, two forward and two aft, and twelve 9.4-inch 50-caliber guns mounted in turrets six on each broadside. The armor is from 10 to 12½ inches in thickness.

Germany is represented by the "Nassau," a 19,000-ton ship, 472 feet in length. If there was any mistake made in arming the earlier German battleships with too light a battery, no such criticism can be directed against this latest design. By mounting two of her turrets *en echelon* amidships, the Germans secure from their twelve heavy armor-piercing guns of 11-inch bore and 50 calibers length the heaviest broadside of any of the "Dreadnoughts"—the heaviest, at least, in the total number of large guns that it includes. At the same time, her end-on fire is also heavier than that of any other ship of the "Dreadnought" type. Two pairs of turrets are mounted forward, the guns of one firing over the other; two turrets are mounted similarly aft, with the result that the "Nassau" can deliver a fire of eight 11-inch guns ahead, eight astern, and twelve on each broadside.

The Japanese are represented by a ship of about 21,000 tons displacement and 481 feet total length, carrying twelve 45-caliber 12-inch guns in six turrets, two forward and two aft, arranged as in our own "Florida," and two amidships, one on each broadside, the concentration of fire being eight ahead and eight astern, and ten on the broadside.

So much for a comparison of the fighting strength of the navies of the world based upon the total displacement of the battleships and armored cruisers. If the mere question of tonnage, or even of the number of guns carried and the thickness of the armor, alone determine fighting strength, the accompanying diagram would pretty closely represent conditions. But there is another element of strength, perhaps the most important of all, which might entirely alter the relative standing. We refer to the human element—the skill of the admirals and officers in strategy and tactics; the accuracy of the men behind the guns; the general *morale* of the whole fleet. Japan has recently

proved her efficiency; and we know that in skill, discipline, and courage her navy apparently leaves little to be desired. The published reports of the target practice in the British navy and in our own would make it certain that the shooting of these two navies is of a very high order. In the United States navy, when the ships have been firing under battle conditions, the average of hits has risen, in the case of one ship, as high as eighty per cent, and the average for the Atlantic fleet is probably about sixty per cent.

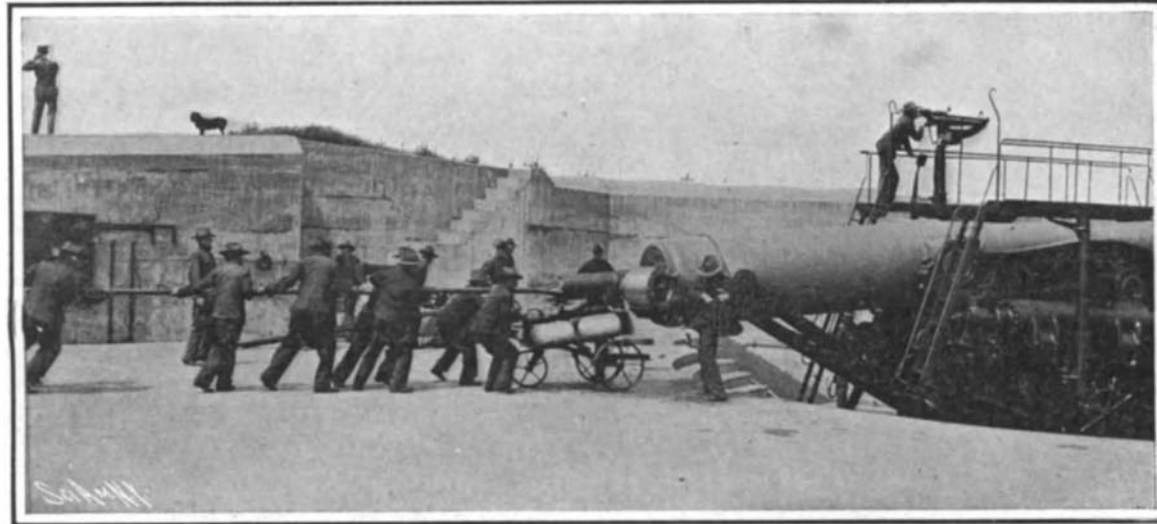
OUR SYSTEM OF SEACOAST FORTIFICATIONS.

The best system of defense of the seacoast of the United States is an adequate fleet of seagoing battleships, and the nearer this line of defense can be placed to the coastline of the enemy, the more secure from attack will be our own seaboard. If, however, a fleet of the enemy's battleships should arrive off our coast, after either meeting and destroying our own fleet, or skillfully eluding it, the defense of our maritime cities must depend upon fixed seacoast fortifications and

their accessories. The present scheme for seacoast fortifications is outlined in the report of the National Coast Defense Board, under date of February 1st, 1906. The original scheme, as drawn up by a similar board, in 1886, has been practically completed, and our principal harbors and seacoast cities may be considered as well equipped for defense. The fortifications are equipped with batteries of 12-, 10-, 8-, 6-, 5-, 4.7-, and 3-inch guns. The heavy 12-inch and 10-inch guns are mainly relied upon to prevent the approach of the enemy through the channels and entrances defended. They are mounted upon heavy foundations of concrete, and protected in front by parapets of the same material and of great thickness, in front of which are deep sloping embankments of earth. The majority of the guns are mounted, similarly to the 12-inch gun which forms the subject of our illustration, upon what is known as the Buffington-Crozier disappearing gun carriage. In this mount the gun is pivoted at one end of a pair of massive levers, at the other end of which is suspended a weight which is sufficient, after the gun is loaded, to bring it into battery above the parapet. The gun is brought back and down to the loading position by the energy of the recoil. While in the loading position, it is entirely below the parapet, and both the gun and the gun detachment are fully protected from direct fire. The ammunition is kept in massive concrete ammunition rooms, from which it is wheeled on a truck, as required, up to the open breech of the gun, and loaded into the powder chamber. The sighting of the gun is done while it is in the depressed position. At the word of command a catch is released, and the heavy counterweights bring the gun into battery above the parapets. This disappearing mount is used for the 12-, 10-, and 8-inch guns.

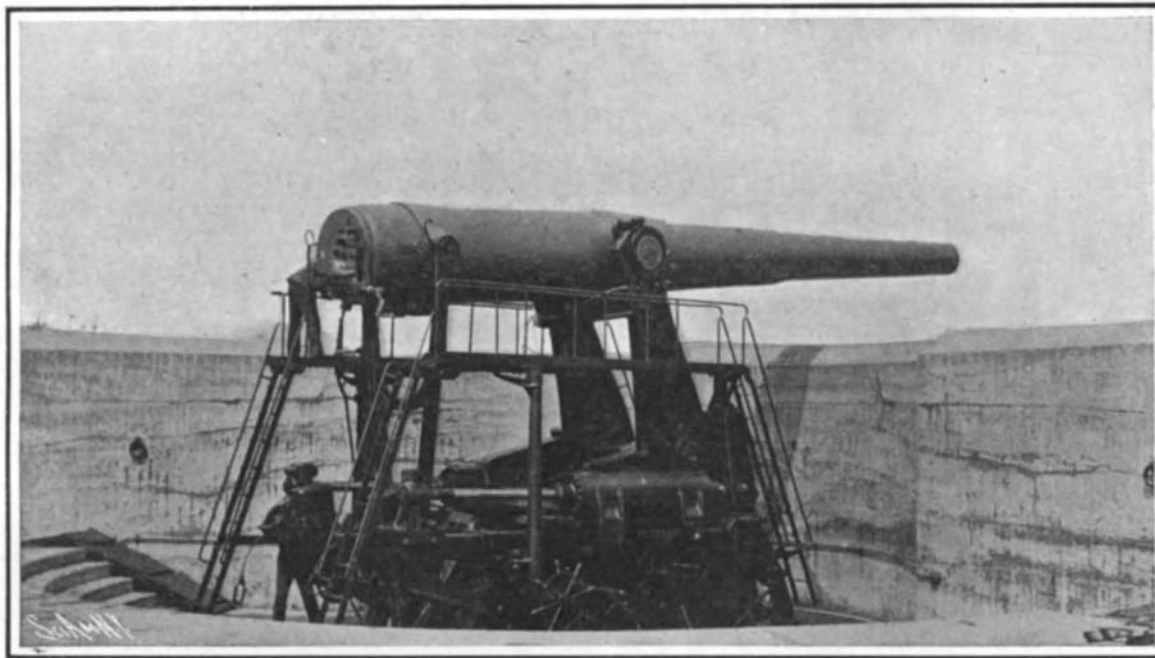
Our latest 12-inch coast defense gun has an initial velocity of 2,550 feet per second, and a muzzle energy of 47,299 foot tons. If it strikes a normal blow (a blow at right angles to the plate) it can penetrate

the 12-inch armor of battleships at 8,700 yards, and the 7-inch armor of armored cruisers at all practicable fighting ranges. To obtain this energy, it is necessary to use such a high pressure in the powder chamber that the corresponding high temperature and high velocity of the gases burns and abrades away the interior of the gun, shortening its life to such an extent that, after sixty rounds, it loses its accuracy. With a view to preventing this rapid deterioration, the Board of Ordnance have decided to build a bigger gun, firing a heavier projectile with a lower powder pressure, thus

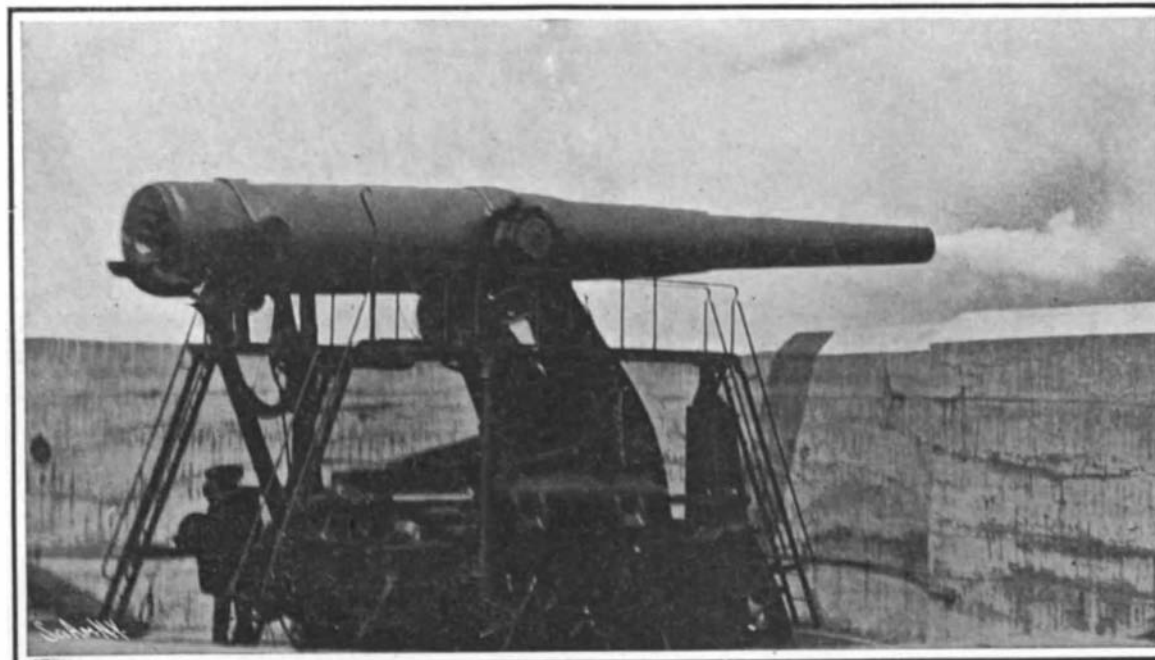


The gun is below the parapet, protected from the enemy's fire.

Loading a 12-inch coast-defense gun.



Loaded and elevated, ready to fire.



The recoil; gun swinging back and down to the loading position.

OUR SYSTEM OF SEACOAST FORTIFICATIONS.

The results obtained on the recently completed voyage around the world would give us reason to believe that both the ships and the personnel have reached a point of excellence which is fully equal, and perhaps superior, to that of any other navy.

Gray Stain for Ivory.—Lay the parts in a solution of 1 part of pyrogallic acid in 20 parts of water, for about 20 minutes, allow them to dry thoroughly, then immerse in a solution of 1 part of green vitriol in 25 parts of water.