COMPOSITION OF THE FLEET WHICH SAILED AROUND THE WORLD.

Whether by design or accident, the fleet of battleships which was selected for the 42,000-mile cruise around the world, contained two or more representatives of every class of battleship which has been built for our navy from the close of the Spanish war to the present time. Moreover, it does not include a single ship that was in commission during that war, or took any part in its active operations. So that to any student of naval affairs (and there must have been many a score of such at the various ports of call) the visit of the fleet presented an unrivaled opportunity to trace the development of the United States navy, at least as far as its capital ships are concerned, during this, the most active decade of construction in the history of our navy.

During the progress of the war, when we had but four first-class and one second-class battleships in commission, frantic efforts were being made to rush to completion two sister ships, which, about the time of the outbreak of hostilities, had been launched from adjoining slips in the Newport News yard. These were the two battleships "Kentucky" and "Kearsarge," vessels of 11,520 tons displacement and a little less than 17 knots speed. They are characterized by a low freeboard of 13 feet, and by the fact that they mount their main battery of four 13-inch and four 8-inch guns in superposed, or two-deck, turrets, a device which has the distinction of having been installed against the bitter opposition of the naval constructors, and of being to-day cordially disliked by the line officers to whom its design and installation was originally due. Designed with the object of securing a maximum all-round fire for a maximum number of guns, it is open to the objections that too many guns are carried upon a single turntable, preventing independence of training; that there is an undesirable concentration of heavy weights; that the matter of ammunition supply is complicated; and that a single high-explosive, heavy armor-piercing shell might at one blow put half of the main armament out of commission. However, the superposed turret makes a brave show, and it cannot be denied that excellent target results have been achieved by guns mounted in this way.

The next two ships in point of importance in the fleet are the "Illinois" and "Wisconsin," of the "Alabama" class, vessels of about the same displacement and speed as the foregoing, and carrying four 13-inch guns in two 2-gun turrets, fore and aft, and a broadside of fourteen 6-inch rapid-fire guns disposed behind the armor of a central box battery. Ships of this class are easily recognized by their two elliptical smokestacks, placed abreast of each other, in the English fashion of the period when the "Alabama" class was designed. Their seagoing qualities, as compared with the "Kentucky" and "Kearsarge," are improved by the addition of a forecastle deck, giving a freeboard forward of between 19 and 20 feet on normal displacement.

Next in importance are the "Ohio" and "Missouri" of the "Maine" class. Originally, the three ships of this class were designed to be of the same size as the preceding "Alabama" class; but they were subsequently lengthened 20 feet, the displacement being raised to 12,500 tons, and the speed from 17 to 18 knots. The 13-inch gun gives place to a 40-caliber, 12-inch piece, of higher velocity and greater power. Four of these guns are carried in two turrets, and there is a powerful secondary battery of sixteen 50-caliber 6-inch guns. In the five ships of the "Virginia" class, a great advance was made both in size and power over the "Maine" class. The superposed turret was reintroduced, as was also the 8-inch gun. The ships are of slightly under 15,000 tons displacement, and all of them, on trial, made over 19 knots an hour. The armament is unusually powerful. It consists of four 40-caliber 12-inch guns, eight 40-caliber 8-inch, twelve 50-caliber 6-inch, and twelve 50-caliber 3-inch guns. The four 12-inch and four of the 8-inch are carried in two superposed turrets forward and aft, and the other four 8-inch are mounted in two turrets, one on each beam. The twelve 6-inch pieces are mounted behind casemates on the main deck. These five ships were the first battleships in our navy to have a continuous, unbroken upper deck from stem to stern, with a freeboard of 19 feet or over. Because of the superposed turret mounting, the "Virginias" possess a heavier broadside, even, than the "Connecticut" class which followed them, the total amount of metal that can be thrown from one broadside in five minutes being 98,800 pounds, as against 89,200 pounds for the "Connecticut" class.

In the "Connecticut" class our designers have turned out one of the most successful battleships designed for any navy. They are about 1,000 tons larger, though about one knot slower than the "Virginia" class. The main battery consists of four 45-caliber 12-inch guns mounted in two turrets; four 45-caliber 8-inch in four turrets; twelve 50-caliber 7-inch guns mounted in casemates on the main deck; and twenty 50-caliber 3-inch guns. The "Connecticut" represents the highest development of what might be called the mixed-caliber battleship, as distinct from the all-big-gun type, which was introduced by the "Dreadnought." As such, she is comparable with the "King Edward" of the British navy, which carries four 9.2-inch guns in her intermediate battery, as against the eight 8-inch guns of the "Connecticut."

All the ships of the fleet are heavily armored, the older vessels carrying from 16½ to 13 inches of Harveyized armor, and the latest ships from 11 to 6 inches of Krupp armor on the waterline and upon the principal gun positions. There has been a steady increase in coal-carrying capacity and, therefore, in the steaming radius, the bunker capacity being as follows: "Kearsarge," 1,500 tons; "Illinois," 1,275 tons; "Missouri," 1,825 tons; "Virginia," 1,900 tons; and "Connecticut," 2,275 tons. The complement has grown from 586 men in the "Kearsarge" to 916 in the "Connecticut."

It is interesting also to compare the steady increase in the amount of metal which can be thrown from a single broadside in the successive ships, the figures for five minutes continuous firing of all guns being as follows: "Kearsarge," 70,720 pounds; the "Illinois," 74,970 pounds; the "Missouri," 85,150 pounds; the "Virginia," 98,800 pounds; and the "Connecticut," 89,200 pounds. The great improvement in rates of fire and energies of projectiles, in the later guns, shows clearly in a comparison of the relative energy, the total energy of discharge for one broadside for the ships of each class in the Atlantic fleet being as follows: "Kearsarge," 2,035,520 foot-tons; "Illinois," 2,354,490 foot-tons; "Missouri," 4,490,670 foot-tons; "Virginia," 5,191,370 foot-tons; and "Connecticut," 4,522,140 foot-tons. It might be supposed that the "Connecticut," with her 45-caliber 8's and 12's and her 50-caliber 7's, would show a more powerful total muzzle energy than the "Virginia," with her 40-caliber 8's and 12's and 50-caliber 6's. But the "Virginia" can concentrate two more 8's upon the broadside, and the greater rapidity of fire of her 6-inch guns more than offsets the greater energy of the slower-firing 7-inch piece; the total energy for five minutes of the 7-inch battery being 1,508,810 foot-tons, and of the 6-inch battery, 2,057,040 foot-tons. In the same way, the eight 6-inch guns of the "Maine" account for 2,742,720 foot-tons of her total energy.

If, however, we take account of the "remaining energies," which determine the punishing power of the guns at the fighting ranges of from 6,000 to 8,000 yards, the "Connecticut" heads the list by a good margin, and the "Maine" drops far behind.

The total muzzle energy of the whole fleet's broadsides during five minutes engagement would be 66,328,910 foot-tons. This would be sufficient to raise the battleship "Kentucky" over one mile into the air.

THE EXTENSION OF THE CHICAGO, MILWAUKEE & ST. PAUL RAILWAY TO THE PACIFIC COAST.

(*Continued from page 152.*)

Coeur d'Alene district. At Beverly, Wash., the line reaches the Columbia River. The last stretch of the new road passes through the virgin timber lands of Snoqualmie Pass in the Cascade Mountains, which are probably the richest timber lands in the State of Washington; and then after following the Cedar River valley to Maple valley, it runs into the populous and thriving cities of Seattle and Tacoma on the Pacific coast. The line to Tacoma runs through Kent and Auburn, passes through Sumner and North Puyallup, crossing the river of that name, and then entering the famous seaport of Tacoma.

Although for a considerable portion of its distance the new line traverses approximately the same country as the Northern Pacific, for the greater part of the distance it will open entirely new sections, in which are included some large areas of fertile agricultural country, and extensive districts that are rich in mineral and forest wealth. The new line will have an advantage over the present lines to North Pacific coast points in lower grades and shorter mileage. The devolpment of the country through which it passes, and the carriage of freight and passengers to and from the large areas which will be tributaries to the line, are not by any means the sole objects for which it has been built. Its promoters are looking beyond the broad Pacific, in the expectation of sharing that large and ever-accumulating trade, which has already assumed considerable proportions, between the Orient and the leading ports of the Northwest. Traffic arrangements have already been made with certain lines of steamers to operate in connection with the new transcontinental route.

According to a consular report, Sir Oliver Lodge has recently demonstrated the efficiency of his fog-clearing apparatus in Liverpool. He succeeded in clearing a thick fog over a radius of 60 feet. The Lodge system consists in discharging electricity at high voltage from a series of disks, with the result that the fog is condensed and falls to the ground. The apparatus will soon be tested in London.

Correspondence.

A SUGGESTION FOR INVENTORS.

To the Editor of the Scientific American:

Regarding all of the information that has been published about the collision in the sinking of the steamship "Republic," there is one comment from a passenger of the "Florida" which is, I believe, of particular interest. It is as follows:

"As I got to the deck," said Roberto, "I saw the big hull of the 'Republic' a faint blur in the darkness, and immediately there came over the water the boom of a rocket, and the darkness was for a second illuminated. The bow of the 'Florida' was in bad condition, and there was a running and scurrying of men down there, investigating the nature of the damage and repairing it as best they could."

The question arises that if as soon as the distress rockets were sent off they illumined the ocean sufficiently to make out the whereabouts of the "Republic," why would it not have been a good plan to send off rockets before the collision? This, of course, brings up the entire question of what kind of lights, if any, will penetrate or illuminate in a fog.

Palmer H. Langdon.

New York, February 6, 1909.

A YACHT DESIGNER'S OPINION OF THE NAVY SITUATION

To the Editor of the Scientific American:

To your editorial in the Scientific American of December 19, 1908, commenting on President Roosevelt's recommendations in regard to the reorganization of the navy's bureaus, kindly accept, from one who has helped a little to make his country's navy the "best ever," a modest but sincere and hearty "encore."

Only by frequently repeating such clear and effective statements of the problems involved, can those who are entirely unfamiliar with them be shown the technical difficulties to overcome in the building of our naval vessels.

Your excellent illustration of the troubles that would result from an application of the general principle in the President's proposal to the question of a design for the defender of the "America's" cup, appeals strongly to one who has wrestled with the problems many years as a yacht designer.

As one who was moreover intimately connected with the design work on the ships under Lewis Nixon and the late J. J. Woodward, and more recently in constructing them under the eminent ex-Chief Constructor F. T. Bowles, allow me to second the expression of your hopes that our ships may continue to be designed by the technically expert.

Marblehead, Mass., December 21, 1908. J. R. P.

ALCOLINE.

To the Editor of the Scientific American:

Surely he who finds a short cut between an idea and its expression in this day, when railroads are spending millions in shortening and leveling their lines, is worthy of as much honor as Swift thought due the man who made two ears of corn grow where only one grew before. Now, it is patent to all that the appellation "denatured alcohol" cannot pass into current use. It is too long, clumsy, and contradictory for our monosyllabic age, and in its place I suggest the caption of this letter, *Alcoline*, and submit the following points in its favor:

First, it puts it into articulation with the other well-known fluid fuels: gasoline, kerosene, benzine, etc. The popular mind will very readily grasp the analogy, even if it should be etymologically incongruous.

Second, it would obviate or at least minimize the danger of such mistakes as have strewn the path of "wood alcohol" with twisted corpses. Possibly the world may not lose much by the departure of any chance boneheads who cannot understand that some kinds of alcohol kill more quickly than others, but some otherwise good and useful men might be tempted to try the new brand, "denatured alcohol," just as otherwise sensible people will dab at a freshly-painted surface, just to see if it is drying, so this point has some weight.

Third, it gives this substance, which is plainly destined to occupy an increasingly important place in our industries, a single, unconfusable name. "Denatured alcohol" is too long, confusing, and misleading. If it is "denatured," it no longer has a right to the name alcohol. To follow the analogy, the Scientific American is printed upon "denatured spruce" by type made of "denatured ore." The presses are operated by "denatured" lightning, which is generated by "denatured water" power, denatured by "denatured" forests of the Carboniferous era! Let us have a name as well as a place for everything, without qualifying words to trip us up!

Ward Morse.

Genoa, Nance County, Neb., January 6, 1909.

The Current Supplement.

The current Supplement, No. 1729, contains a large number of interesting contributions. Among these may be selected William H. Booth's paper on "Coal, Its Composition and Combustion," Friedrich Hartmann's instructive article on "Amalgams," a succinct statement of steam engine efficiency in the light of modern thermo-dynamic conceptions, an illustrated article on the government's efforts to stop the appalling loss of life in mines, a picturesque description of the wonderful cavern of Proumeyssac in France, an enumeration of recent earthquakes that preceded the great Italian cataclysm, a summary of the scientific attempts to stop bodily decay and prevent death, a review of some recent processes of making artificial unwoven cloth, an account of the surgical instruments of antiquity, a popular statement of the sewage problem, and a continuation of the treatise on aeronautic motors begun in the last number of the Supplement.