

BATTLESHIPS AND MONITORS NOW BUILDING FOR THE NAVY.

There are now completed and in commission in the United States navy five battleships, four of which are of the first and one of the second class. These are the "Oregon," "Indiana," and "Massachusetts," of 10,288 tons, and the "Iowa," of 11,410 tons, first-class battleships, and the second-class "Texas," of 6,315 tons.

There are now building in our yards eight first-class battleships of over 11,000 tons, whose aggregate displacement is 94,125 tons. As the aggregate displacement of the battleships now in commission is about 60,000 tons, it will be seen that we have over 50 per cent more tonnage of battleships in course of construction than took part in the operations of the late war.

These eight vessels represent three successive naval appropriations. The "Kentucky" and "Kearsarge" were authorized in 1895 and are about ready to undergo their steam trials; the "Alabama," "Wisconsin," and "Illinois" were authorized in 1896 and are about 60 per cent completed; while the "Maine," "Ohio," and "Missouri" were authorized last year and are in the early stages of their construction.

Judging from the rate of progress achieved in the past, we may expect to see the first-named ships in commission by the close of the present year; the three "Alabamas" by the close of 1900, and the "Maine" with her mates in the winter of 1902-03.

In addition to these fine vessels, we unfortunately have under way four ships of an obsolete and discredited type, which will be known as the "Arkansas," "Connecticut," "Florida," and "Wyoming." They are monitors, pure and simple, and represent a class of ship which was built in the early, experimental stages of warship construction, when designers were feeling their way toward the ideal fighting ship as represented by the eight battleships above mentioned. These four monitors were ordered by Congress in the face of the opinion and advice of the men who design and the men who fight the vessels of our navy. The fact that we are committed to the construction of four of these archaic curiosities serves to show to what absurdities Congress can be committed when it sets up its own judgment against that professional opinion which should guide it in such purely technical questions as those of warship design.

Including the monitors, we now have under construction the twelve armored vessels which our artist has shown grouped together in the accompanying illustration. As each of the ships is drawn with careful attention to detail, particularly in the matter of armament, the group conveys an impressive idea of the exceptional offensive qualities of the forthcoming addition to our navy.

The particulars of the ships are given in the accompanying tables, from which it will be seen that, while there has been a reduction in the weight of the main battery, there has been a remarkable increase in the weight of the intermediate battery, the latter being so great as to render the total energy of gun-fire enormously greater in the latest ships of the "Maine" class.

that the retention of the four 8-inch guns necessitates the use of the lighter guns in the broadside rapid-fire battery.

The most novel feature in these ships is the double-deck turrets for the main battery. They were adopted after much discussion, in which it was argued that the 8-inch guns would not be capable of training independently of the 13-inch guns below them, and that one lucky shot might put half the main battery out of

crease of nearly 100 per cent over the old weapons firing brown powder.

The new guns will be provided with improved breech mechanism of the Welting pattern, the rights of which were recently purchased from Maxim-Vickers for \$200,000. The rates of fire will be greatly increased thereby, so that here again will be a large addition to the fighting capacity.

In the accompanying estimate of the total energy of

	Displacement.	Main and Intermediate Batteries, Broadside.	Weight of Shell in Pounds.	Foot-Tons, Energy per Shot.	Speed of Fire.	Total Energy of Broadside for Five Minutes in Foot-Tons.
Kearsarge ...	11,525 tons.	{ 4 13-inch. 4 8-inch. 7 5-inch rapid fire.	1,100 250 50	33,627 8,011 1,834	1 per two minutes. 1 " " minute. 8 " " "	Brown powder..... } 336,270 " " " " " " " " } 160,220 " " " " " " " " } 513,520 Total brown powder..... } 1,010,010 " " " " " " " " } 1,450,000
Alabama	11,525 tons.	{ 4 13-inch. 7 6-inch.	1,100 100	33,627 3,200	1 per two minutes. 6 " " minute.	Brown powder..... } 336,270 " " " " " " " " } 672,000 Total brown powder..... } 1,008,270 " " " " " " " " } 1,569,000
Maine	12,500 tons.	{ 4 12-inch. 8 6-inch.	250 100	48,000 6,000	1 per minute. 8 " " "	Smokeless powder } 960,000 " " " " " " " " } 1,920,000 Total smokeless powder. } 2,880,000

action by disabling both guns. To which it was replied that the great economy in weight and the unequaled protection afforded the 8-inch ammunition hoists, more than compensate for the risks incurred. The performance of these turrets will be watched with great interest, and we shall not be surprised if they are repeated in some modified form in future ships.

The weakest feature of the "Kearsarge" is that it sits very little higher in the water than the "Oregon"—a feature which would greatly hinder it in chasing an enemy to windward. In the "Alabama" class, ships of the same tonnage, this is rectified by the addition of a spar deck, which extends aft for three-quarters of the ship's length. This raises the freeboard to about 20 feet forward as against 13 feet aft, and enables the forward 13-inch guns to be carried at an elevation of 26 feet above the water line. A further improvement over the "Kearsarge" is shown in the wider separation of the intermediate battery, which is rather crowded in the earlier ship and might be entirely wrecked by a single 12-inch shell. Eight of the 6-inch guns are carried on the main deck within the 5½-inch armored citadel, four are placed behind 5½-inch armor on the spar deck above the citadel, and two are carried in 5½-inch sponsons forward on the main deck. This is a far better arrangement. The guns would take longer to silence and the danger of panic is reduced. While the total muzzle energy of the metal thrown from one broadside in five minutes works out as practically the same as that of the "Kentucky," the greater carrying power of the 6-inch over the 5-inch would render the fire of the "Alabama" more destructive at ordinary fighting ranges of 2,000 to 3,000 yards.

In the "Maine" class we see a greater advance than in any other ships of the new navy. These remarkably

broadside fire in one minute the rates of fire are calculated from actual results obtained. They are, in the case of each ship, the best that could be obtained by trained crews. As a matter of fact, such a fire will never be sustained for five minutes, but the table serves the end of showing the vast increase of power and rate of fire in the case of the "Maine" due to smokeless powder and improved breech mechanism. Unless the 13, 8, 6 and 5-inch guns originally designed for the "Kearsarge" and "Alabama" classes are modified to suit the new smokeless powder, the "Maine" will be theoretically nearly three hundred per cent more powerful than the earlier ships.

Experimental work, however, is being done with the 13-inch gun, and in recent tests with smokeless powder an energy of about 44,000 foot-tons has been secured. The powder chamber has to be of less diameter and longer for the new powder, but there is no structural difficulty to prevent the change from being made.

The four monitors will have all the vices of their type. Their worst feature is that they roll so quickly as to make accurate shooting an impossibility. Admiral Sampson condemned them in his report of the San Juan engagement, and there is not a naval officer of the new school in our navy that favors the type. The "Arkansas" and sister ships have only 18 or 20 inches freeboard, and in any kind of a sea their 12-inch guns, of which they carry two in a forward turret, would be half the time out of sight in the trough of the waves. The present designs are a modification of those first made, the ships having been lengthened 27 feet amidships to accommodate an increased supply of coal. The particulars of these ships will be found in the accompanying table.

A New Copyright Law.

A new copyright amendment of far-reaching importance is now before Congress and is to be found in a section of the Legislative, Executive and Judicial Appropriation Bill relating to the Library of Congress. The exact text is as follows: "Provided that on and after the first day of July, 1899, no person shall be entitled to a copyright unless the copies deposited with the Librarian of Congress of such copyright, book or other article, or the photograph deposited of a work of the fine arts, shall be of such substantial and permanent paper or substance, and ink and impression, as shall be according to such standard as shall be from time to time established and approved by said Librarian." It will be seen that no provision is made in the law for the publication of standards, and as the law requires that two copies must be deposited with the Librarian on or before the date of publication, it will be seen that an error in not complying with the standards would necessarily result in a loss of the copyright. It is very probable that this point has not been considered by a committee of the House, and when it is, this seeming oversight will be corrected. The American Copyright League has directed its counsel to file a protest against alterations of the copyright statutes which seemed to clothe the Librarian with arbitrary power, not only of establishing a standard, but of altering it at will. The recent investigations which have been carried on in England regarding paper and the life of books would certainly show the necessity for some law of this kind, but the bill should be worded so as not to cause hardship to anyone.

ACCORDING to Science, Prof. Cleveland Abbe, editor of The Monthly Weather Review and Professor of Meteorology at the Weather Bureau, has given his valuable collection of books, papers, and pamphlets relating to meteorology to the Johns Hopkins University.

Name.	Type.	Displacement in Tons.	Speed in Knots.	Armor.		Armament.	
				Belt.	Turrets.	Main.	Intermediate.
Kentucky.....	First-class battleship.	11,525	16	13¾ in.	17 in.	Four 13-in.	Fourteen 5-in. rapid-fire.
Kearsarge.....	" " "	" "	" "	" "	" "	" "	" "
Alabama.....	" " "	" "	" "	" "	" "	" "	6-in. "
Wisconsin.....	" " "	" "	" "	" "	" "	" "	" "
Illinois.....	" " "	" "	" "	" "	" "	" "	" "
Maine.....	" " "	12,500	18	12 "	14 in.	12-in.	Sixteen "
Ohio.....	" " "	" "	" "	" "	" "	" "	" "
Missouri.....	" " "	" "	" "	" "	" "	" "	" "
Arkansas.....	Monitor.	3,100	12	11 "	11 in.	Two 12-in.	Four 4-in.
Connecticut.....	" " "	" "	" "	" "	" "	" "	" "
Florida.....	" " "	" "	" "	" "	" "	" "	" "
Wyoming.....	" " "	" "	" "	" "	" "	" "	" "

Taking the vessels in the order of their advancement toward completion, we have first the "Kentucky" and the "Kearsarge," whose dock steam trials have already taken place. Comparing them with the "Oregon" type before them and the "Alabama" type following them, they represent a transition stage. In the "Oregon" we have an unprecedented development of the armor-piercing gun and a weak intermediate battery. In the "Alabama" we see a reduction in the number of armor-piercing and a proportionate increase in the intermediate rapid-fire battery. In the "Oregon" were four 13-inch and eight 8-inch armor-piercers, while the intermediate battery consisted of only four 6-inch, and these were originally slow-firers. In the "Alabama" the 8-inch guns have been thrown out entirely, and the weight has been put into an extremely powerful battery of fourteen 6-inch rapid-firers. Now this change, which is in agreement with the course followed by other navies, was gradual, and in the "Kentucky" and "Kearsarge" we see the intermediate step, for in these ships four of the 8-inch guns are retained, and the demand they make upon the displacement of the ship is shown by the fact that the intermediate battery consists of 5-inch instead of 6-inch guns. As the total weight of guns, mounts, ammunition, etc., for a 6-inch is about double that required for a 5-inch gun, it is evident

fine vessels embody the experience gained during our late war, and in them, moreover, we have not hesitated to adopt some of the best features of foreign practice. The most important advance has been in speed and armament. The grave defect of the five ships already described is their low speed of 16 knots, which is from 3 to 4 knots less than that of some foreign battleships now building or in commission. It is due largely to the efforts of Commodore Melville that the "Maine" and her sisters are to steam at 18 knots instead of the 16 knots originally proposed. The result is to be obtained by giving them an increased length of 20 feet to accommodate the more powerful machinery. Another important modification that practically doubles the fighting power, as compared with the "Alabama," is the introduction of smokeless powder and improved rapid-firing ordnance. The 12-inch guns will be of great length and will show the high velocity at the muzzle of 3,000 feet per second, the same velocity being called for in the 6-inch rapid-firers. The muzzle energy of the 12-inch gun will be 48,000 foot-tons, as against 25,985 foot-tons for the 12-inch guns of the "Iowa," and 33,627 foot-tons for the 13-inch guns of the "Alabama." The 6-inch guns will have about 6,000 foot-tons energy, as against 3,204 foot-tons for the old slow-fire 6-inch weapon. The new energies therefore represent an in-

ARKANSAS.

KENTUCKY.

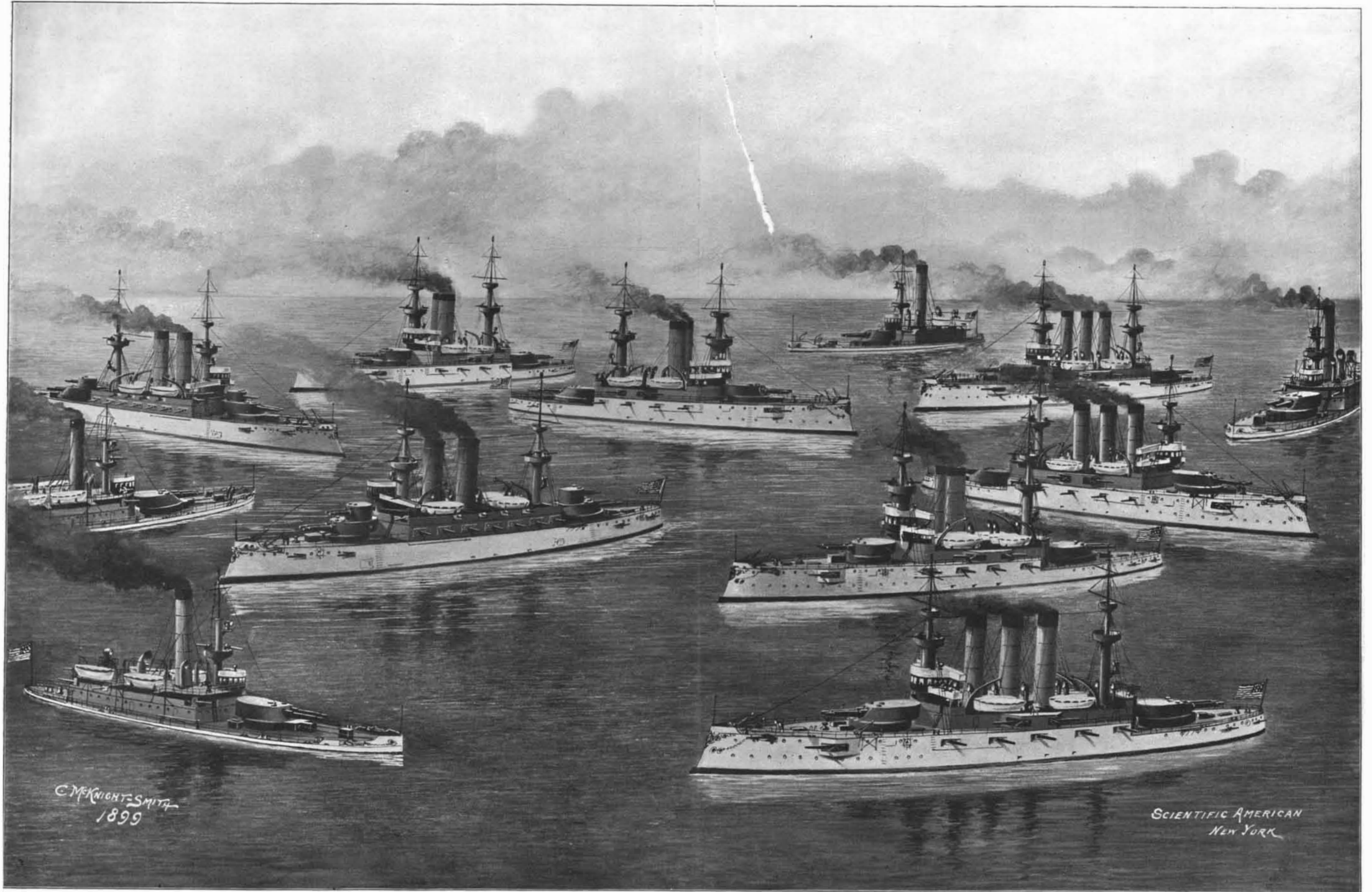
WISCONSIN.

ILLINOIS.

CONNECTICUT.

OHIO.
MISSOURI.

FLORIDA.



WYOMING.

KEARSARGE.

ALABAMA.
MAINE.

FLEET OF BATTLESHIPS AND MONITORS NOW BUILDING FOR THE UNITED STATES NAVY.