THE FIRST-CLASS BATTLESHIP "MAINE."

On the accompanying page we present our readers with the first accurate engraving that has yet been made of the new battleship "Maine." The illustrations of this ship that have already appeared in several illustrated journals are based upon the original designs for an eighteen-knot vessel of inferior armament. The accompanying engraving is made from the latest amended designs, and includes the two additional 6-inch rapid-firers in the main deck battery, the substitution of two boat cranes for four, and other changes of a minor character.

In the three battleships of this type, the "Maine," "Ohio," and "Missouri," we shall have fighting ships at once the equals of anything abroad and reflecting credit upon our naval advancement. To the persistent stand of Engineer in-Chief Melville on the vital question of speed is the betterment of these ships over their predecessors, the "Illinois" and type, in the main due, and the increase of armament followed as a natural consequence upon the expansion of the original displacement of 11.525 tons.

The principal dimensions and general features are:

Length on load water line	388 ft 00 in.
Beam, extreme	72 " 2·5 "
Draught, at normal displacement	23 " 6 "
Displacement, normal	12,500 tons.
Indicated horse power	16,000
Speed, maximum	18 knots.
Coal bunker capacity	2,000 tons.
Complement, officers, seamen, and marines, about	600

The hulls of the ships are substantially similar to the "Illinois" type refined by the added length of twenty feet amidships. The inner bottom extends fore and aft throughout the major length of the vessels and reaches from the keel up to the lower edge of the armor belt, four feet below the normal load water line of 23 feet 6 inches. This double bottom space is divided into the usual watertight subdivisions and is under the reasonable control of powerful pumps. The interior of the vessels is also well cut up by the usual watertight subdivisioning, which is likewise under thorough pumpage and drainage control.

The ships have a freeboard forward of nineteen feet and a freeboard aft of eleven. The upper deck reaches from the stem aft to the after turret, and at the bow is flared out to a considerable extent. The main purpose is to make the ships drier in a head sea, but incidentally it affords ampler deck room for various purposes and more space on the deck beneath.

The details of the armor have not yet been finally determined, even though it has been decided that the armor shall be treated by the Krupp process, but there is every reason to believe it will remain practically as follows: The side waterline belt will be of armor having a maximum thickness of 12 inches for a depth of 4 feet, thence tapering to 8 inches at the armor shelf 3½ feet below. This maximum thickness will reach from a line nearly abreast the forward end of the after turret to a point just abreast the after end of the forward turret, and thence will taper to 4 inches at the stem. The protective deck will rest flatly on the inner ledge of this waterline belt throughout the engine, boiler and magazine spaces, and will be 2¾ inches thick, in two courses. Forward and aft of this region it will slope to the bow and to the stern. At the sides, aft, the deck will be 3 inches thick, amidships 1¾ inches thick, and forward the side slopes will be 2 inches thick, the armor of the waterline belt without making a greater thickness needless. The diagonal athwartship bulkheads at the extremities of the thickest part of the side armor will be 10 inches thick. The side armor above the armor belt and about the amidship battery of 6-inch guns will be of 5½ inches backed by two courses of half-inch hull plating. The casemate armor on the upper deck and the protection about the two 6-inch guns on the main deck way forward will also be of 5½-inch armor.

The turrets and barbettes will have a maximum thickness of 14 inches. The original design submitted contemplated a distribution and thickness of armor similar to that on the "Illinois" type, and the present reduction is due to the superior defensive qualities of the plating treated by the Krupp process. A very considerable reduction in weight is thus secured, and it is not yet certain that more widespread protection will not be given to the hull just above the waterline belt. A coffer dam about 36 inches wide extends forward and aft to the bow and to the stern from the athwartship armor bulkheads in the space between the protective and the berth decks. It will be filled with briquettes of corn-pith cellulose. On the berth deck there will be another coffer dam so filled and of like thickness. The efficacy of this cellulose belt has already been well established in actual conflict.

The ships will be propelled by two sets of triple expansion engines actuating twin screws. These engines will be put in separate watertight compartments. They will be of the three cylinder, vertical, inverted cylinder, direct-acting type, and the cylinders will be of 38½, 59, and 92 inches in diameter, with a common stroke of 42 inches. The high pressure cylinders will be forward and the low pressure cylinders aft. The collective indicated horse power of the propelling, air-pump and circulating pump engines will be 16,000 when the main engines are making in the neighborhood of 126 revolutions a minute.

Steam will be supplied by twenty-four boilers of the Niclausse water tube type, constructed for a working pressure of 250 pounds to the square inch, reduced to 200 pounds on the steam pipes at the high pressure cylinders. The boilers will be placed in four watertight compartments, and there will be four fire rooms, two double and two single. The boilers will be arranged in groups of eight. There will be three smokestacks, the tops of which will be practically 100 feet above the grate bars. Blowers will be fitted for forced draught.

The coal bunker capacity of 2,000 tons promises a very considerable radius of action in conjunction with the wholesale use of the more economical water tube boiler; and at a cruising speed of 10 knots the ships will have an exceptionally fine reach of action.

The armament will consist of four 12-inch breech-loading rifles, sixteen 6-inch rapid-fire rifles, twenty 6-pounder and four 3-pounder guns, and a couple of smaller pieces. The 12-inch guns, which will be of 40 calibers, will be of the new high powered type designed to use smokeless powder, and with a muzzle velocity of 3,000 feet per second, and firing an 850-pound shell, it will have the enormous energy of 48,000 foot tons, equal to the penetration of 4 feet of solid iron at the muzzle. There will be a considerable saving in weight. These guns will be mounted in two elliptical, balanced barbette turrets, and will have arcs of fire of 280 degrees. The sixteen 6-inch rapid-fire guns will be distributed four on the upper deck and twelve on the main deck. All will have wide arcs of fire, will carry heavy shields, and will be separated, one from the other, by splinter bulkheads 1¾ inches thick. Two of the 6-pounders will be mounted on the main deck just abaft the two bow 6-inch guns, four will be placed way aft on the berth deck, and the remaining ones up on the bridges and in the superstructure. The 3-pounders and the Gatlings will be mounted in the tops.

There will be two torpedo tubes of an under-water type, and they will be located where they will be practically beyond the ordinary reach of shot or shell.

The ammunition supply will be a large one.

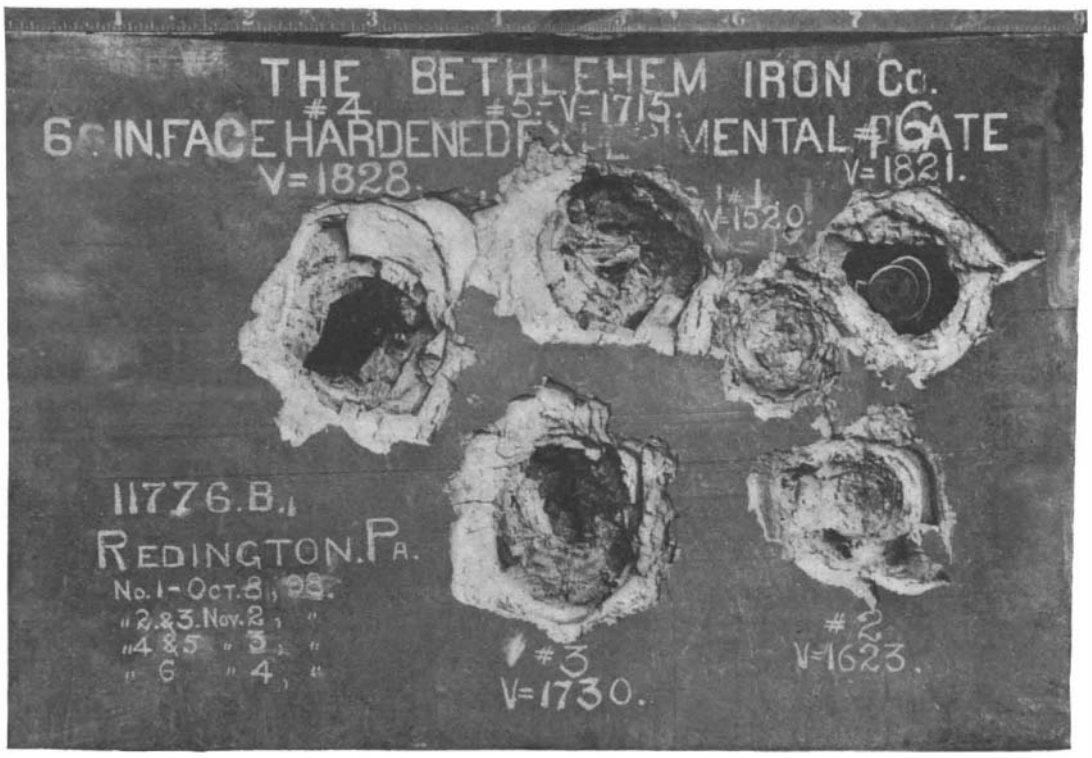
Electricity will constitute the motive energy for many of the auxiliary engines. It will run the ventilating blowers, it will hoist ammunition, turn and control the turrets, besides furnishing light within the craft and light without in the form of four searchlights and a double set of Ardois night signals.

There will be a dense air refrigerating plant with a daily output equivalent to the cooling qualities of two tons of ice. There will be a distilling plant, consisting of four evaporators and two distillers, with their accessories, having a combined capacity of 8,000 gallons of potable water daily.

Wood will be used but sparingly, and, with the exceptions of the main deck without the superstructure, the upper deck, and the bridges, the decks will be covered with linoleum, rubber tiling, wire mats, or cement. Such wood, other than decking, will be carefully fireproofed, but wherever possible, light metal work will supplant wood altogether, unless in the shape of gratings and such things easily removed and thrown overboard before going into action.

It has been suggested that a comparison of the British "Magnificent" with these new ships might be interesting. The "Magnificent" is of 14,900 tons displacement, and has a battery of four 12-inch, twelve 6-inch, eighteen 12-pounders, twelve 3-pounders, and eight machine guns. The weight of our four additional 6-inch guns is somewhat accounted for in the "Magnificent" in the extremely powerful force of 12 and 3-pounder guns and their ammunition, which is an item of moment. At the same time, the armament of the "Maine" is unquestionably the heavier. The waterline armor of the British ship is only 9 inches thick, but it reaches up the sides to a height of 18 feet, and extends fore and aft for a distance of 220 feet. The "Maine," however, has a decided advantage in the fact that the waterline belt is continuous up to the stem. The casemate armor about the 6-inch guns of the "Magnificent" is 6 inches thick. The protective deck is 2½ to 4 inches thick, the athwartship bulkheads are 14 inches thick, maximum. The conning tower is 14 inches thick, while the barbettes and barbette shields are 14 and 10 inches respectively. The coal supply is lighter by 156 tons, but the crew is composed of 757 persons, and the stores for the additional force are heavier. The ship makes about half a knot less speed than our ships, and, being a bulkier craft, to make that, her engines are heavier. Her boilers, too, of the Scotch type, are correspondingly weightier, and some of the structural accompaniments are of proportionate weight. The comparison shows how the most recent practices and our own system of hull protection yield certain savings of weight, which permit the weight of the defensive and offensive elements of the ship to be augmented to that extent.

The contract price for the "Maine" and her sister ships was $2,885,000, based upon the Cramps' bid.



TEST OF A BETHLEHEM, KRUPP-PROCESS ARMOR PLATE.

From photograph of plate after attack by six 8-inch armor-piercing projectiles. **Thickness of plate,** 6¼ inches. **Striking velocities,** 1,530, 1,623, 1,730, 1,715, 1,828, and 1,821 feet per second.

SUCCESSFUL TEST OF 6¼-INCH KRUPP PROCESS PLATE BY 8-INCH GUN.

BY LIEUT. G. L. CARDEN, ORDNANCE OFFICER, U. S. S. "MANNING."

A 6¼-inch Krupp process plate holds, to date, the armor record in the United States. In ordnance circles the plate is referred to as the "Champion." It was recently fabricated by the Bethlehem Iron Works, of South Bethlehem, Pa., and was tested during November on the Redington proving grounds.

The records show that the new plate has exceeded the requirements demanded of a 10-inch Harvey plate when attacked by an 8-inch gun. Six shots in all were fired at the Krupp plate, 8-inch armor-piercing projectiles being employed. The velocities recorded were 1,530, 1,623, 1,730, 1,715, 1,828, and 1,821 foot-seconds. The projectile fired at 1,828 foot-seconds velocity succeeded in partly getting through, while none of the others reached the backing. The 1,821 foot seconds shell was welded into the plate, but it did not succeed in piercing the target. The other projectiles were broken up on impact.

The Navy Department requirements, at present, for a standard 10-inch Harvey plate, when attacked by an 8-inch gun, call for two shots at 1,491 and 1,786 foot-seconds velocity. The 1,491 foot-seconds shell must neither crack nor perforate the plate, while that at 1,786 foot-seconds must not perforate, but may crack the plate.

The accompanying illustration shows the new plate