

Gathmann shell, it was considered that the results on the plate itself were very inadequate. In the test of the service armor-piercing projectiles three rounds were fired, the first two being with armor-piercing shot filled respectively with 20 pounds of maxinite and 20 pounds of dunnite, the last being an armor-piercing shell filled with 60 pounds of maxinite. The projectiles burst as they were passing through the plate, which was completely broken up, and the flying fragments of plate and shells tore the steel backing literally to shreds, cut to pieces the heavy oak struts at the rear, and blew away several hundred tons of the sand backing.

As far as we know, large-caliber, high-explosive shells have never before been carried through heavy armor. Had this been done, it could scarcely have been kept a secret, and would surely have become known to the world at large. It is, therefore, evident on comparing the upper with the lower pair of photographs that, while our heaviest armor is impervious to attack at ordinary ranges by 12-inch shells, we are in the possession of a high-explosive shell which can penetrate and burst behind the best armor employed in foreign navies.

### Armored Cruisers.

#### ARMORED CRUISERS OF THE "MARYLAND" CLASS—"CALIFORNIA."

The development of the cruiser during the past few years has been in two widely divergent directions. On the one hand we have the large armored cruiser of from 12,000 to 14,000 tons displacement, with a complete waterline belt; and well-protected positions for a main battery of two or four heavy 8, 9 or 10-inch guns, and full broadside or casemate armor for a numerous battery of broadside rapid-fire guns. On the other hand, we see the protected cruiser tending to lower speed, less protection and lighter battery. The line of division between the battleship and the armored cruiser, furthermore, is becoming less distinct; and the six magnificent ships of the "Maryland" class will be so well armored and protected that they would not hesitate to take their place in line of battle against second-class battleships, while their large coal capacity and high speed will enable them to fulfill all the requirements of the first-class cruiser.

The six fine vessels of the "California" class will be 502 feet long, or longer by 90 feet than the next largest ships in our navy; and they will be but little shorter on the waterline than ocean liners like the "St. Paul" and "New York."

The fighting positions and the "vitals" will all of them be sheltered behind walls of Kruppized steel, and the arrangement of armor protection will be as follows: First, a waterline belt 7 feet 6 inches wide extending from bow to stern, which carries its maximum thickness 4½ feet from the top down, whence it tapers to the armor ledge. For a distance of 244 feet amidships, the belt will have a maximum thickness of 6

inches and a minimum of 5; thence to the bow and to the stern the belt will have a uniform thickness, top and bottom, of 3½ inches. For a distance of 232 feet amidships, above the waterline belt and up to the main deck, the sides will be reinforced by 5-inch armor; transverse bulkheads, turning inboard at the ends of this side armor, will complete the central casemate, housing the ten 6-inch guns. These transverse bulkheads will be 4 inches thick. The protective deck will be continuous from bow to stern; on the flat it will be 1½ inch thick and on the slopes 4 inches thick. Above this protective deck, a cellulose belt 3 feet thick will be worked along the sides, from one end of the ship to the other. It is required that the water-line armor belt be so placed that at least a foot of it will be out of water at deepest load draft.

The armament will consist of: A main battery of

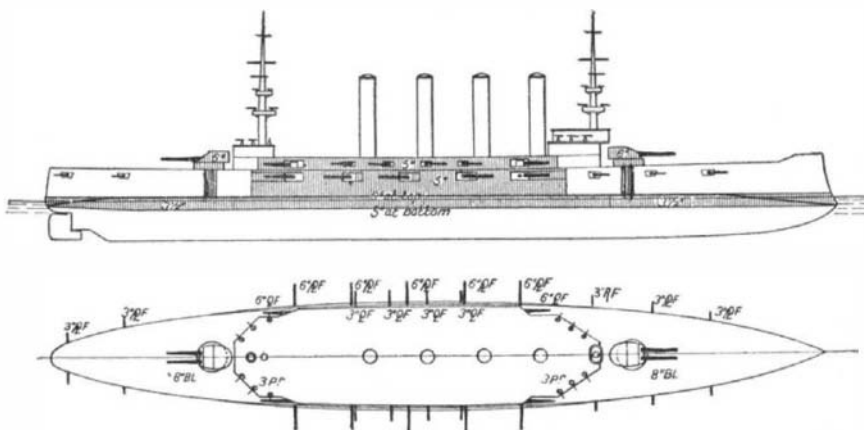
ahead, while all the other guns on each side will have arcs of fire of 110 degrees, and will be arranged to house within the side line. These guns will be separated by 2¼-inch splinter bulkheads. The ammunition hoists will be run by electricity, and are to supply each 6-inch gun with three complete rounds every minute. The 14-pounders will be mounted on the gun deck and up in the superstructure, three forward and two aft of the 6-inch battery on each side, and four on each broadside between the 6-inch guns up in the superstructure. The 3-pounders are to be mounted on the superstructure deck and on the bridges, while most of the 1-pounders are to fill the military tops. Each 14-pounder is to be supplied six rounds a minute, while the 3-pounders are to have ten.

The firing stations for the torpedoes will be sheltered from the reach of 6-pounders and lighter pieces, and are to be located above the torpedo tubes. The conning-tower, located at the fore end of the superstructure, will be of steel 9 inches thick, and the signal tower, located at the after end of the superstructure, will be of steel 5 inches thick. The pilot house will be of bronze. All magazines are to be carefully insulated, and certain of them are to be chilled by the refrigerating plant. All are also to be easily susceptible of instant flooding.

The ships will be driven by twin triple-expansion engines of 23,000 horse power, which are calculated to give them a speed of 22 knots an hour. As the displacement is 13,680 tons, these vessels in respect of their motive power afford an interesting comparison with the British armored cruisers of the "King Alfred" class, which on a displacement of 14,100 tons are to make 23 knots an hour with 30,000 horse power. The boiler rooms of the "California" will contain 30 water-tube boilers placed in 8 water-tight compartments.

The ships will carry ammunition enough to put up a good long fight; 500 rounds being allowed the 8-inch guns, 2,800 rounds for the 6-inch guns, 4,500 rounds for the 14-pounders, 6,000 rounds for the 3-pounders, and a pretty liberal supply for the rest. Provision is to be made for closing many of the water-tight doors automatically, i. e., from a single controlling station, and every care has been taken to localize the effects of damage by shell-fire or torpedo.

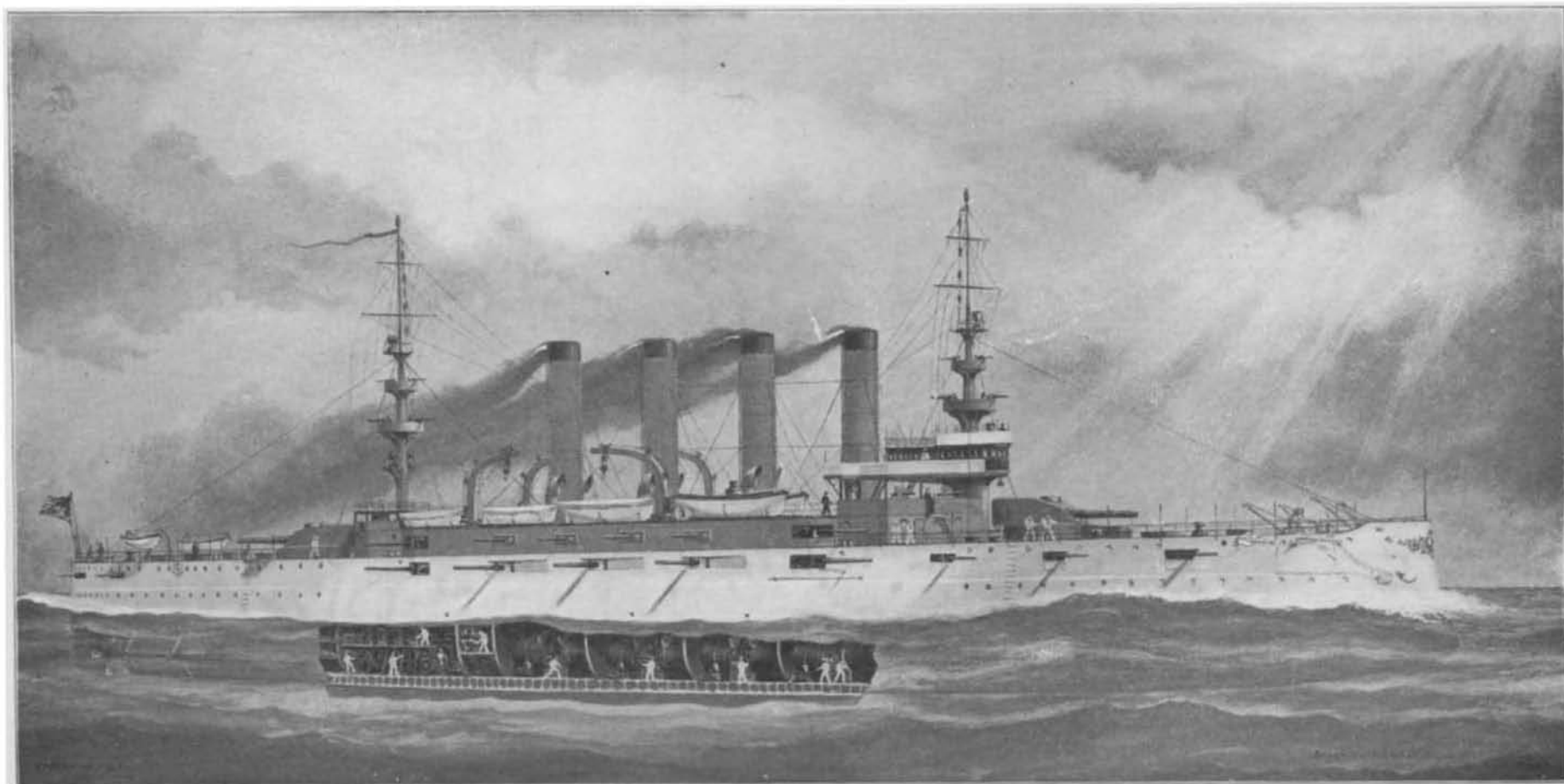
In closing, we would draw attention to the protection afforded to the broadside battery, which, compared with separate casemate protection, as used on the English cruisers of the "Drake" class, is we think superior. The casemate carries 6 inches of armor on the front and 2 inches at the rear. The stretches of the ship's side between casemates are unarmored, and an enemy's shells might pass between casemates, and, bursting on the 2-inch armor of the opposite casemates, wreck them. No such damage could be suffered by the off-side battery of the "Pennsylvania," as all 5-inch and most 6-inch shells would be burst on the unbroken front wall of 5-inch armor.



Gun and Armor Plan; "California" Armored Cruiser Class. "California," "Colorado," "Maryland," "Pennsylvania," "South Dakota," "West Virginia."

four 45-caliber, 8-inch, breech-loading rifles and fourteen 50-caliber, 6-inch, rapid-fire guns; and a secondary battery of eighteen 14-pounders, twelve 3-pounders, eight 1-pounders, two 3-inch field guns, two machine guns, and a half a dozen small-caliber pieces for boat service. There will be two submerged torpedo-tubes, to be placed on the broadsides pretty well forward. The 8-inch guns are to be mounted in two balanced elliptical turrets on the main deck forward and aft of the superstructure. These turrets will be generally 6 inches thick with slanting faces ½ inch thicker. The turrets are to be controlled electrically, and are to fire through arcs of 270 degrees. The rate of ammunition supply is one complete round of powder and projectile to each electric hoist every fifty seconds.

The four 6-inch guns mounted on the main deck are to be placed in sponsons at the four main corners of the superstructure, and are to fire through arcs of 145 degrees—the forward ones from dead ahead aft, and the after ones from dead astern forward. These guns are protected by 5-inch armor. The ten other 6-inch guns, five on each broadside, are to be placed amidships on the gun deck—the forward ones firing dead



**Displacement,** 13,680 tons. **Speed,** 22 knots. **Bunker Capacity,** 2,000 tons. **Armor:** Belt, 6 inches to 3½ inches; turrets, 6¼ inches to 6 inches; barbettes, 6 inches; deck, 1½ inch to 4 inches. **Armament:** Four 8-inch, 45-caliber B. L.; fourteen 6-inch, 50-caliber R. F.; eighteen 3-inch R. F.; twelve 3-pounders; eight 1-pounders; two 3-inch field guns; two machine guns; six automatic guns. **Torpedo Tubes,** 2. **Complement,** 822.

**ARMORED CRUISER "CALIFORNIA."**