

**THE OFFICIAL REPORT ON THE WRECKED SPANISH WARSHIPS.**

We have before us the full text of the official report of the naval board appointed by Admiral Sampson to investigate the condition of the wrecks of the Spanish fleet now lying on the Cuban coast. Accompanying the report are a series of photographs and a set of drawings showing the location of the shot holes on each vessel. In our issue of July 30 we gave several illustrations, reproduced from photographs taken the day after the fight, when the ships were still burning, which gave a vivid impression of the destruction wrought by our shell-fire and by the conflagrations which it started. It is not necessary to reproduce any of the photographs which accompany this report; but we present the four official diagrams showing the number, location, and size of the hits on each cruiser. They are of extreme interest, and those of our readers who are following closely the naval events of the war will find these diagrams of special value for future reference.

In order to expedite the examination and render it as complete as possible, the board was divided into committees to consider the subjects indicated below:

Condition of hull and practicality of saving the vessels.

Condition of ordnance equipment, magazines, etc.

Condition of machinery and boilers.

Effect of gun-fire upon the enemy's vessels.

"INFANTA MARIA TERESA."

The vessel lies nearly upright, and is down by the stern about five feet. She rests easily, bearing throughout the greater part of her length upon a firm coral sand bottom.

The examination of the structure extended to the protective deck. The frames above water are practically intact, and are doubtless so below water.

new breech-blocks. The secondary battery of 6-pounders, however, is badly burned. The engines are covered with water to within six inches of the tops of the cylinders, but they do not appear to have been struck by exploding shells, and there is reason to believe that, if the vessel is raised soon, both the engines and boilers can easily be put in serviceable condition. As our readers are aware, the wrecking operations are being pushed in the endeavor to save this vessel.

**Effect of Gun-Fire.**—The "Maria Teresa" was struck twenty-nine times, as was also the "Vizcaya." More than half of the hits were by 6-pounder shells, though it was the larger shells that wrought the greatest destruction. An 8-inch shell struck the shield of the second 5½-inch gun, passed through it, ranging aft, and exploded. "The effect of the explosion," the report says, "upon almost everything about the decks in that vicinity must have been terrific." Another interesting hit, showing the effect of bursting shell in the coal bunkers, was made by a 5-inch gun, just abaft the after smoke-stack, under the berth deck. It passed through the wing passage and exploded in a coal bunker, rip-

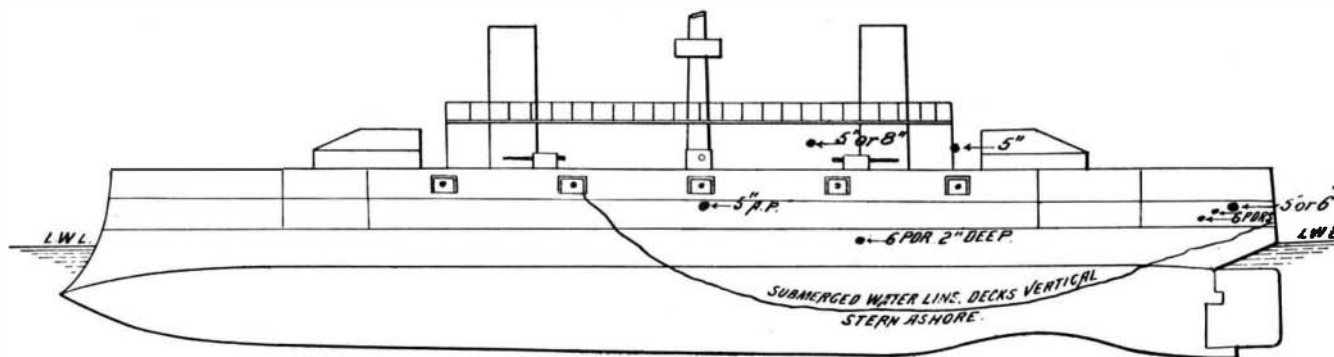
port side away from the frames, completely wrecking everything in that compartment, and made a large ragged hole about four feet square on the starboard side. They both entered at an angle of about 45 degrees with the normal, ranging from aft forward.

"ALMIRANTE OQUENDO."  
This vessel suffered more severely than any other vessel. She was hit 57 times, or twice as frequently as the "Teresa" and "Vizcaya," 43 of the hits being made by 6-pounder guns. The wreck lies uneasily, considerably down by the stern, with a slight heel to starboard. The destruction worked by our gun-fire was completed by fire and magazine explosions. The engines and boilers, however, appear to be intact, the protective deck amidships having apparently done its work well in this ship, and indeed in the case of all four cruisers; but the explosion of the magazines and torpedoes have wrecked the "Oquendo" beyond all hope of saving the ship. The hull is practically broken in two at the forward turret. An interesting structural fact is brought out at this point; namely, that there is a decided weakness at the junction of the forward and midship portions of the vessel, arising from the discontinuity of the protective deck.

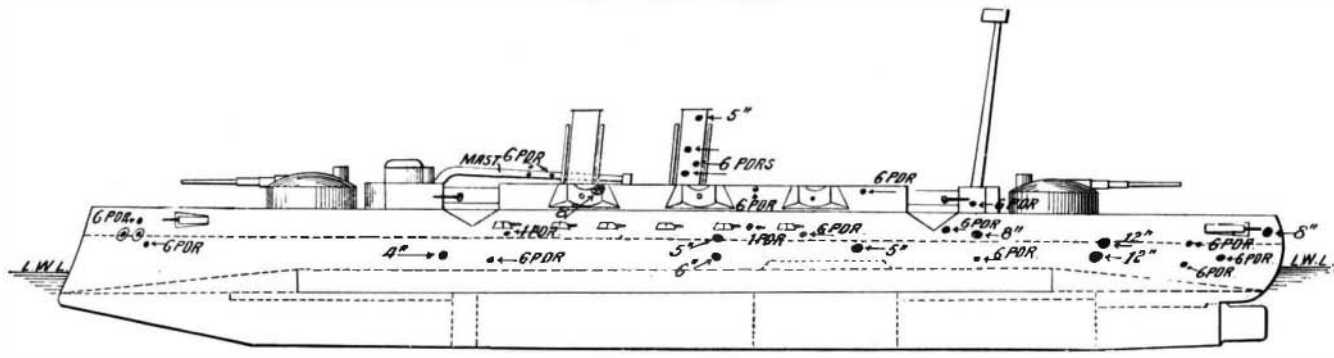
The after 11-inch gun and mount are in excellent condition, and in spite of the fact that its turret was struck, the forward 11-inch gun and mount seem to be uninjured. The 5½-inch battery can be rendered serviceable by the addition of new breech-blocks. One of the after 5½-inch guns was dismantled, and another was penetrated to a depth of 1½ inches by a 6-pounder. The 6-pounder secondary battery is badly burned.

As in the case of the "Teresa," all piping and auxiliaries above the protective deck are destroyed or damaged irreparably.

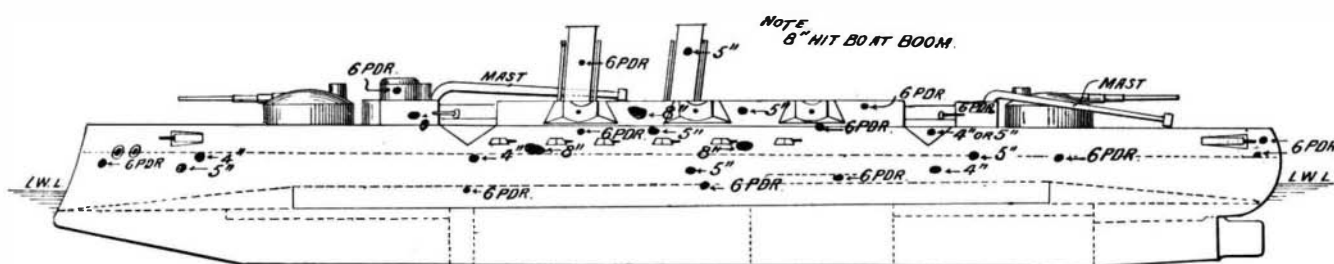
**Effect of Gun-Fire.**—The effects



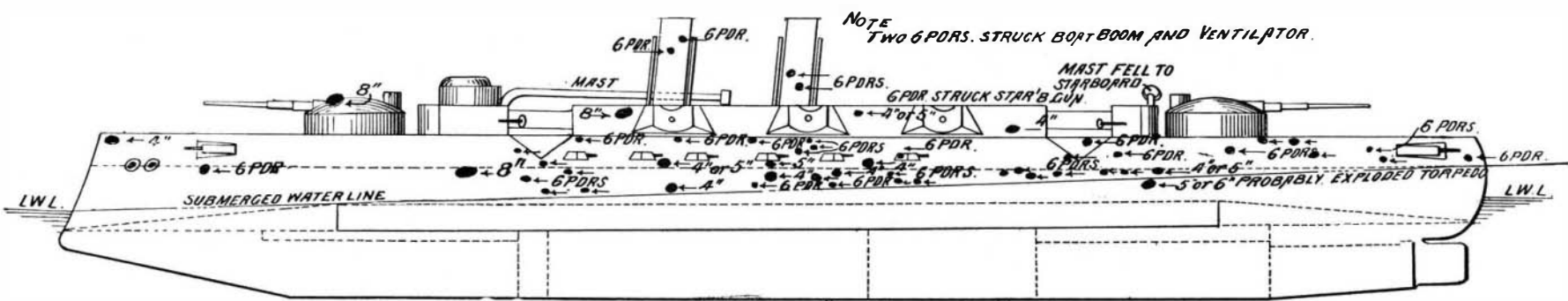
"CHRISTOBAL COLON."



"MARIA TERESA."



"VIZCAYA."



"OQUENDO."

**DIAGRAMS SHOWING LOCATION AND SIZE OF HITS ON SPANISH CRUISERS.**

The deck-beams above water are warped by the heat. The end bulkheads above the protective deck are badly warped by the heat of the fire; but the bulkheading below the protective deck, both longitudinal and transverse, is doubtless intact. The outside plating of the vessel is practically intact; but the heat has warped all the deck-plating above the protective deck. The board considers that, taking full account of the distribution of the weights and the strains involved, and taking full account of the reduction of strength, as pointed out, it is considered that with an intact condition of internal structure below the protective deck, the remaining structural solidity is adequate for the stresses liable to be encountered in wrecking the vessel and those liable to be encountered in any except severe conditions of navigation. There are no indications of external explosions, and all deformations can be accounted for by the heat effect of conflagration.

The 11-inch guns and mounts are in excellent condition, but eight out of the ten 5½-inch guns require

ping up the gun deck in that vicinity. Another 5-inch shell did great damage in the same vicinity. Here is the description of the work of an 8-inch shell, one of the most destructive hits of the battle:

"An 8-inch shell struck the gun deck just under the after barbette; passed through the skin of the ship and exploded, ranging aft. The damage done by this shell was very great. All the men in that locality must have been killed or badly wounded. The beams were torn and ripped, and the longitudinal bulkhead between the two cabins was badly damaged. The fragments of this shell passed across the deck and out through the starboard side at an angle of 45 degrees. This shell also cut the fire main."

The only hits made by the largest shells landed on this vessel. It will be seen from the diagrams that no 12-inch and only two 12-inch shot-holes were found on the wrecks. The two 12-inch shells entered just under the berth deck. They entered through almost the same hole. They exploded in the stern torpedo manipulating room, cutting the beams of the berth deck on the

of the gun-fire upon this ship are described as being "terrific."

"The sides, smokestacks, ventilators, hatch trunks, all seem to have been riddled by shell, by fragments of shell, and by an infinite number of small projectiles. When it is considered that boats which no longer exist were in place and must have been frequently hit, it will be recognized that the effect of this fire was quite sufficient to create dismay among the ship's company besides setting fire to the woodwork. The intense flames to which the three ships were subjected, and the serious explosions of magazines and torpedo heads, caused by the heat of the flames, have so completely consumed all articles and material of inflammable nature that it has been impossible to describe more definitely and in detail the effect of the gun-fires."

The 8-inch shells demonstrated their destructive power on this ship, one of them striking the hood of the forward 11-inch gun, at the edge of the port, bursting, and evidently killing every one in the turret and disabling the gun. This is a case where the danger of

carrying a very light shield is demonstrated. Had there been no shield, the shell would possibly not have burst. The Chinese removed these shields from their 12-inch guns to avoid a similar catastrophe.

As evidence that some of our gunners must have got the range and direction with great accuracy, we direct attention to the concentration of shot-holes below the forward 5½-inch gun sponson, where there are seven holes made by a 6-pounder besides one 8-inch hole. Another concentration of fire is seen on the berth and gun decks below the sponson of the after 5½-inch gun, where there are nine hits by 6-pounders. In calculating the effects of these little shells, it must be remembered that they all passed through the unarmored shell of the ship and burst into flying fragments, one 6-pounder being easily capable of killing or disabling a whole gun crew.

It will be seen from the diagram that a considerable portion of the hull above the flotation line was submerged when the examination was made, so that it is probable that a dozen or more hits lay below the water and could not be observed.

The board consider that it "would be most difficult, if not impossible, to save this vessel."

"VIZCAYA."

Although the "Vizcaya" did not suffer so heavily from our gun-fire, she was so badly wrecked by fire and explosions that the board is of the opinion that it is inadvisable to attempt to save her.

So far as can be determined, the boilers and engines are intact, or, at least, not irreparably damaged.

**Effect of Gun-Fire.**—The "Vizcaya" received a larger proportion of large rapid-fire and 8-inch shells than any other vessel, being struck by no less than 16 of these shells as compared with only 13 hits by the 6-pounders. The effects on the crew were proportionately disastrous, and the report states that "it is evident that the fire of the gun crews of the 'Vizcaya' was very materially lessened and almost silenced by their not being able to serve their guns under the severe fire poured upon them by our ships."

The fact that evidence is lacking of the explosion of many of our shell should attract the attention of the Ordnance Department, though it is true that pieces of exploded shell may have struck parts since destroyed by fire.

The number of shell that struck the ship seemed to show by their direction that about one-half struck as she was leaving the harbor—the shell ranging aft; and the other half as she was attempting to run away.

"CHRISTOBAL COLON."

The board found the "Christobal Colon" lying on her starboard beam ends, the stern being about 150 feet from the shore, and her length lying in a direction nearly perpendicular to the line with the beach.

The depth of water at the stern is between five and six fathoms. The bow lies in a depth of about sixteen fathoms.

The deck is quite vertical. The battery on the port side, with the exception of the two forward 6-inch guns, is clear of the water. The forward and second 6-inch ports are submerged. The rest of the gun ports on the port side are out of water.

The bottom valves are supposed to be open. Many of the watertight doors were closed by the crew of the "Oregon" before the vessel capsized. The bilge keel is exposed, and also the port propeller and the propeller shaft.

There is no deformation visible in the deck or outside plating, except some dents where rocks had touched the bottom, and there is no evidence of the vessel having sustained any structural injury. The extensive side armor will prevent local injury to the sides now bearing on the bottom, and the board believed that with the integrity of the skin plating and of the decks and transverse bulkheads, the vessel can sustain herself in her present position, even in a heavy surf, without injury.

Lieutenant Hobson is now engaged in the effort to

raise this ship, and should he be successful she will form a most valuable addition to our navy. The "Christobal Colon" was by far the best cruiser in the fleet.

The total number of hits that can be counted on the "Christobal Colon" is 8 or 9; but as only a small area of her sides is open to inspection, it is reasonable to suppose that she was hit more frequently than this. The most interesting hit was made by a 5-inch armor-piercing projectile, which struck the steel armor at the junction of No. 3 6-inch sponson at an angle of about 45 degrees, and after penetrating nearly through, rebounded. The hits on this vessel were chiefly received during the long chase by the "Brooklyn" and the "Oregon."

The conclusions drawn by the board from its examination are as follows:

That the use of wood in the construction and equipment of warships should be reduced to the utmost minimum possible.

That loaded torpedoes above the water line are a serious menace to the vessel carrying them and that they should not be so carried by vessels other than torpedo boats.

That the value of rapid-fire batteries cannot be too highly estimated.

That all water and steam piping should be led beneath the protective deck or below the water line and

ANALYSIS OF HITS ON SPANISH CRUISERS.

Size of gun.	Number of hits on each vessel.				Total number of hits by each caliber of gun.	Number of guns of each caliber in action.	Number of hits per gun.
	Teresa.	Oquendo.	Vizcaya.	C. Colon.			
6-pounder.....	17	43	13	4	77	42	1.83
1-pounder.....	2	..	..	..	2	13	0.15
4-inch.....	1	7	4	..	12	3	4.00
5-inch.....	3	3	7	2	15	3	2.50
6-inch.....	1	1	..	1	3	3	0.43
8-inch.....	3	3	5	1	12	18	0.67
12-inch.....	2	..	..	..	2	6	0.33
13-inch.....	..	..	..	..	..	8	0.00
Totals.....	29	57	29	8	123	103	..

is possible that the evidences of some hits have been obliterated—such, for instance, as may have been made by shells fired at considerable elevation from long range and have fallen on the decks or superstructure without penetrating the side plating.

Of the 123 hits recorded, 77, or more than one-half, were made by 6-pounders. Then come the 5-inch rapid-firers of the "Brooklyn," which evidently did splendid work against all the vessels, but especially against the

"Vizcaya," where seven 5-inch shells got home. The next largest number of hits is to be credited to the 8-inch and the 4-inch rapid-fire, the latter guns on the "Iowa" landing 12 shots. The 6-inch scored three hits, the 12-inch two hits, and the great 13-inch guns probably never landed at all. If they had, the mark of their 1,100-pound shells would be plainly visible on the vessels.

In studying the accompanying table of percentage of hits per type of gun, it is remarkable how closely the results agree with the forecasts as to what would happen in a naval engagement. On the theory that there will be a large number of misses for one hit, it is readily understood how the 13-inch guns failed to score a single hit—they did not fire often enough. Moreover, of the larger-calibered guns above 4-inch, by far the highest percentage of hits per gun was made by the guns of the rapid-fire type, namely, the 5-inch rapid-firers of the "Brooklyn" and the 4-inch rapid-firers of the "Iowa." Another curious fact is that if the percentage figure (0.43) for the 6-inch slow-firers be multiplied by the respective

rates of fire of the 4-inch and 5-inch guns, the result gives very closely the percentage of hits recorded for these guns, namely, 4 and 2.50.

We should naturally expect, arguing along the same lines, that the 6-pounder, on account of its very great rapidity of fire, would have shown the highest percentage of hits per gun engaged; that it does not is due, probably, to the fact that some of the fighting was done at ranges which were rather long for guns of such small caliber.

THE GUNDALOW.

To one who has had a passionate fondness for boats, who has sailed in all kinds of craft, from row-boat with homemade sail to yacht and coasting schooner, certain occasions stand out as real epochs in life. One may be the first sails in the easy-steering dug-out canoes and buckeyes of the Chesapeake and Hampton Roads, which glide along so quietly yet rapidly, one of the most interesting relics of the aboriginal life of the Southern coast. Another may be the first sight of a full-rigged ship under full sail on the Atlantic, a picture of incomparable beauty. Then may come the running through a fleet of red-sailed English fishing snacks in a dead calm in the British Channel, the tiny craft in color and contour delighting the eye. The Thames lighters, lying in the upper reaches of the Thames, with picturesque sloping gaff and brailed-up sail, or with their red sails spread driving up the river off Rochester and Greenwich, or beating like a fleet of yachts up the Medway, hold a warm place in the memory. Standing on the bridge at Rochester, near neighbor to or successor of the one on



THE GUNDALOW WITH LATEEN SAIL—A RELIC OF EARLY DAYS.

fitted with risers at such points as may be considered necessary.

ANALYSIS OF GUN-FIRE.

It is estimated that about 6,000 shells of all sizes were fired during the Santiago engagement, of which all but such as were aimed at the two destroyers, during the brief time that they remained afloat, were fired at the four armored cruisers. The diagrams of the shot holes show a total of only 123 hits as having been made on the metallic structure of the vessels. At first sight this would appear to be a very low percentage for such good marksmen as our American gunners are universally considered to be. There are modifying circumstances, however, which must be considered in connection with the accompanying table analyzing the gun-fire.

1. The first half of the battle, or that in which the "Teresa," "Oquendo," and "Vizcaya" were destroyed, took place under the confusion of a dense pall of smoke, none of these three or of the American vessels using smokeless powder. Moreover, what gentle breeze there was, blew off shore from the Spanish to the American fleet, bearing back both their own and the Spanish smoke upon the American gunners.

2. The smoke rendered it difficult to get the range of the Spanish vessels.

3. The diagrams show only the shot holes that were visible above water after the cruisers had settled more or less in the water.

4. There were a few hits on the starboard side that do not appear in the diagrams.

5. The woodwork having been all burned away, it