

THE NAVIES OF THE WORLD.

I. GREAT BRITAIN.

The present article on the British navy is the first of a series on the navies of the world which will appear during the next few months in the columns of the SCIENTIFIC AMERICAN. The great popularity enjoyed by the SPECIAL NAVY EDITION and the large number of requests that have reached this office for a series of illustrated papers on the leading navies of Europe make it evident that the newly awakened interest in naval matters will render such a series particularly acceptable at this interesting and critical period of the world's history.

The British navy is selected for first consideration, as holding the same predominant position in the Eastern as our own navy does in the Western Hemisphere. Of the two chapters devoted to this navy, the first will deal with the battleships and armored cruisers, the second with the protected cruisers, gunboats, and torpedo craft.

Including all the new vessels that will be laid down in the private and government yards by the close of the year, the official lists show that the fighting ships of the British navy of all classes, from battleships to torpedo boats, make a grand total of 625 vessels. This total is made up as follows: Armored vessels, comprising battleships, coast defense vessels, and armored cruisers, 103; unarmored vessels, including protected cruisers, unprotected cruisers, and gunboats, 226; destroyers, 106; torpedo boats, 190.

The above estimate, it must be remembered, includes all vessels that appear on the official lists of the navy. Some of them are necessarily old ships whose slow speed and out-of-date armament would greatly restrict the sphere of their usefulness. While they are by no means obsolete and could render good service on the innermost lines of defense, or at the remote and less important stations of the empire, they cannot justly be included in an estimate of the modern British navy. By way of eliminating these older vessels, we will apply a scale of speeds, omitting all ships in the respective classes which fall below the speed limit. This test is a more representative one than might at first sight be supposed; for with the gradual introduction of superior armor, guns, and construction, there has always been a proportionate increase in the speed of war vessels.

Omitting, then, all battleships that fall below about 14 knots speed, coast defense vessels below 10 knots, armored cruisers below 17 knots, protected cruisers below 15 knots, and gunboats below 12 knots, we get the following results: Armored vessels, 96; including 54 battleships, 25 coast defense vessels, and 17 armored cruisers. Unarmored vessels, 194; including 97 protected cruisers of from 14,000 to 2,000 tons and 97 small cruisers and gunboats of 2,000 tons and less. Adding these totals to those of the destroyers and torpedo boats gives a grand total of 586 efficient and up-to-date vessels.

While there is, of course, great strength in numbers, the real fighting power of the British navy lies in its fleet of 54 seagoing battleships. These constitute the main line of defense, and if this line should ever be penetrated and its ships dispersed or sunk, all the other 500 vessels could not save the vast British empire from dismemberment or the "tight little isle" itself from invasion. It is a sound axiom in naval warfare, the naval warfare of steel armor and high-powered guns, that no vessel can fight outside of her class with any reasonable hope of success—not, at least, where the opposing ships are handled by crews of equal efficiency. Battleship must be opposed by battleship, cruiser by cruiser, torpedo boat by torpedo boat, destroyer by destroyer. A fleet of unarmored cruisers could no more lie in the line of battle against a fleet of armored battleships with any hope of success than a pygmy could fight a

giant. The cruisers' guns would burst a storm of harmless shells against the battleship's belts and turrets, while the 12-inch shells of the latter would pierce the cruisers from side to side. Their light gun shields and casemates, moreover, would prove to be little better than shell traps, serving, as did the thin turret shields of the "Oquendo," at Santiago, merely to burst the heavy shells as they passed through and insure the death of the whole gun detachment which was sheltered (?) behind it.

Although the brunt of the battle will fall upon the line-of-battle ships, the cruisers and torpedo boats that accompany the opposing fleets would probably assist in dealing the decisive strokes when the ships of one or other side had been badly crippled. After a battleship's unarmored ends had been blown away, her engines or

these 34 ships, we would mention their size, seaworthiness, and speed, and in these respects they are peculiarly suited to the needs of a nation whose possessions are found in every quarter of the globe. The average size is over 14,000 tons, they all, with two exceptions, have a clear freeboard of from 20 to 25 feet, with a main deck extending unbroken from stem to stern, and the average speed is 18 knots.

Commencing with the oldest of these ships, we have the "Nile" and "Trafalgar," completed in 1890; sister ships of 11,940 tons, 16 3/4 knots, and 1,200 tons coal capacity. They are notable for their heavy armor, the belt being from 16 to 20 inches, the bulkheads from 18 to 14 inches, and the turrets 18 inches in thickness. The 16 to 20-inch armor is carried up to the main deck amidships and around the bases of the turrets, while above

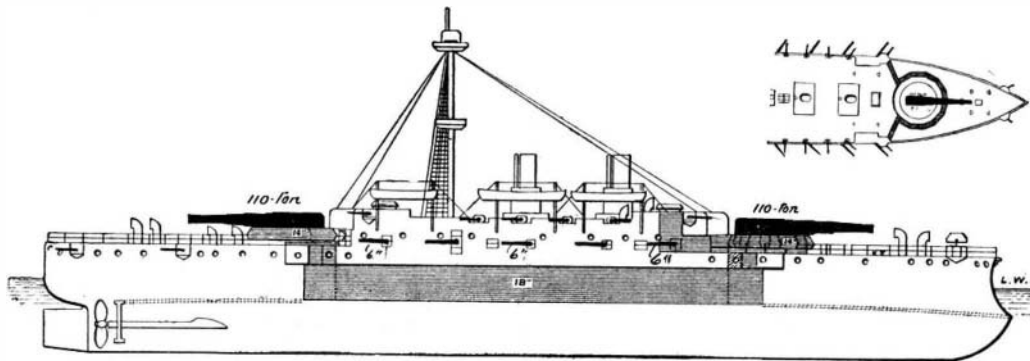
this is an armored redoubt of inch armor. The main battery consists of four 67-ton 13 1/2-inch guns, the secondary battery of eight 4.7-inch rapid-firers. The offensive qualities of these ships are excellent; the defects are the low freeboard (about 13 feet, or the same as our ships of the "Oregon" type) and the very light secondary battery.

The next group of ships to be built was the 8 large vessels of the "Royal Sovereign" class, of which the "Resolution," Plate 3, is one. They were completed between the years 1892 and 1895, and were designed by Sir William White, the chief naval constructor, who has designed all the later ships of the British navy, including those of the Naval Defense Act of 1889. He insisted that a warship must be seaworthy, commodious, comfortable for the crew, carry her guns high above the water, and have good speed and large coal-carrying capacity, in addition to being heavily armed and armored. To embody all these features involved a large ship, and hence the new vessels had a displacement of 14,150 tons. They carry 1,800 tons of coal, are of 17.5 to 18.0 knots speed, and are protected with compound armor as follows: Belt, 18 inches; gun positions, 17 inches; bulkheads, 13 inches; and deck, 3 inches. The armament consists of four 13 1/2-inch breech-loaders, ten 6-inch rapid-firers, and 38 smaller rapid-fire and machine guns. The other ships of this class are the "Empress of India," the "Hood," which differed from the others in having her guns carried in turrets, the freeboard being reduced to 14 feet, the "Ramillies," "Repulse," "Resolution" (see Plate 3), "Revenge," and "Royal Oak."

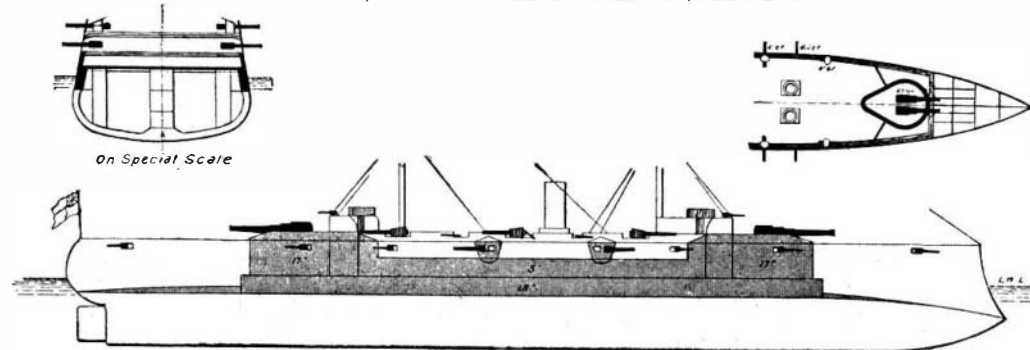
At the same time two smaller but faster battleships were built, the "Barfleur" and "Centurion," whose particulars are as follows: Displacement, 10,500 tons; coal, 1,240 tons; speed, 18 1/2 knots; armor, 12-inch compound belt and bulkheads, 9 inches on gun positions, and 2 1/2-inch deck. The armament is light for ships of this size, consisting of four 10-inch breech-loading guns, ten 4.7-inch rapid-firers, and twenty-nine smaller guns.

The next building programme included nine more huge vessels that were similar to the "Royal Sovereign" class but were larger

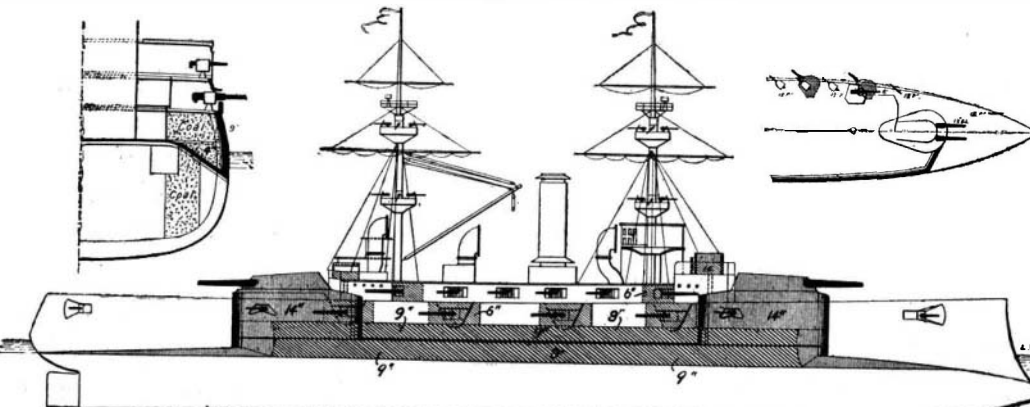
and embodied such modern improvements as wire-wound guns and Harveyized steel. These are known as the "Majestic" class, after the first of them which was completed. The others are the "Jupiter," "Magnificent," "Mars," "Caesar," "Prince George," "Hannibal" (see Plate 2), "Illustrious," and "Victorious." As compared with the "Royal Sovereign" class, the "Majestics" have 750 tons more displacement, carry about the same amount of coal, and have the same speed. The higher quality of the steel used in their armor (Harvey steel) permits the thickness to be reduced, and hence a larger area of the ship can be covered. Thus in the "Royal Sovereign" class the main belt extends vertically only as high as the flat protective deck; while in the "Majestics" the 9-inch belt is carried up to the gun deck (see diagram). Moreover, the



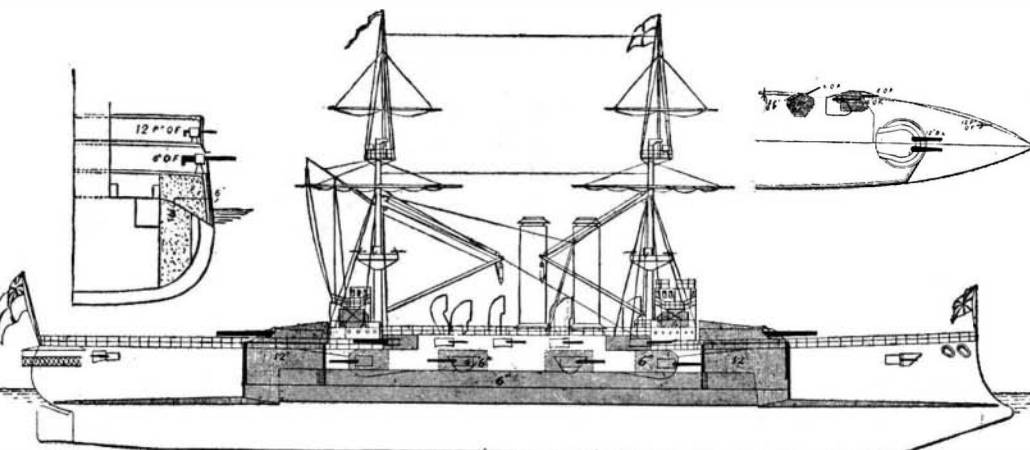
"Benbow," of the "Admiral" Class—10,600 Tons.



"Royal Sovereign" Class—14,150 Tons.



"Magnificent" Class—14,900 Tons. Also "Formidable" Class, with continuous waterline belt and two additional 6-inch guns on main deck.



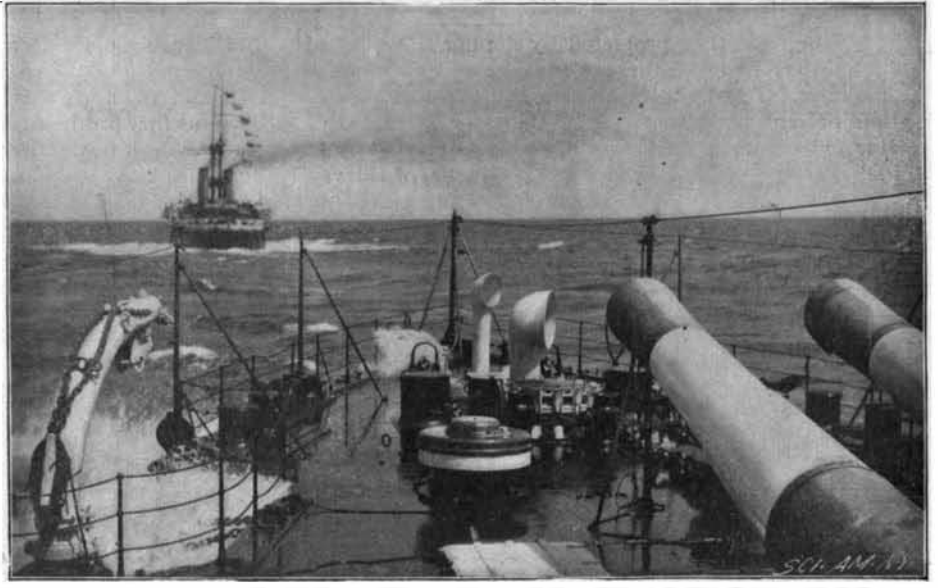
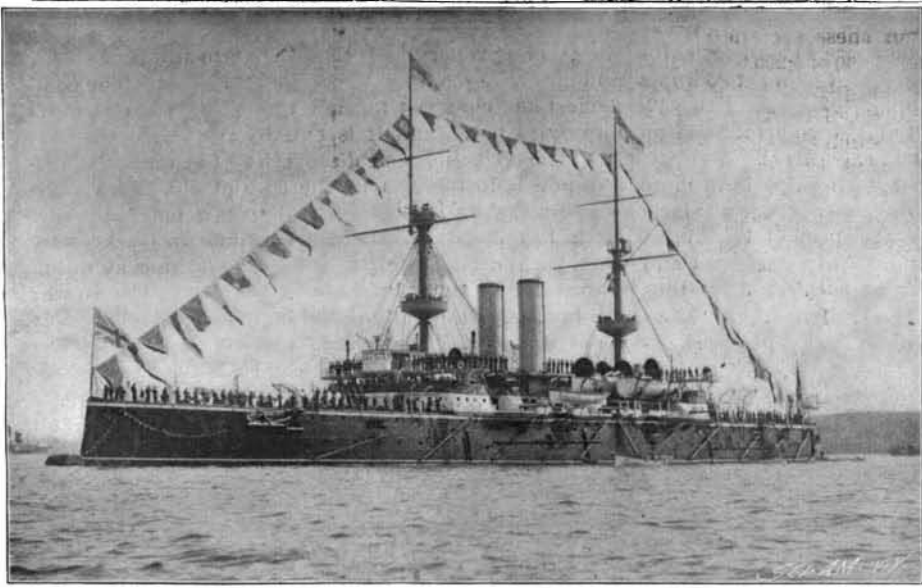
"Canopus" Class—12,950 Tons.

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steering gear crippled, or her heavy guns dismantled, the armored cruisers and the more powerful of the protected cruisers might be trusted to close in and finish her—and this duty they would undoubtedly perform. But this always presupposes that the bulldog has had its teeth drawn, and such work can only be done by the battleship.

The 54 battleships may be subdivided most advantageously according to their age, according as they were built in the present or the preceding decade or at an even earlier date. Under this distribution we get 34 battleships 10 years old or less; 11 battleships over 10 and less than 20 years old; and 9 battleships that are over 20 years old and have been refitted and rearmed or are soon to be so.

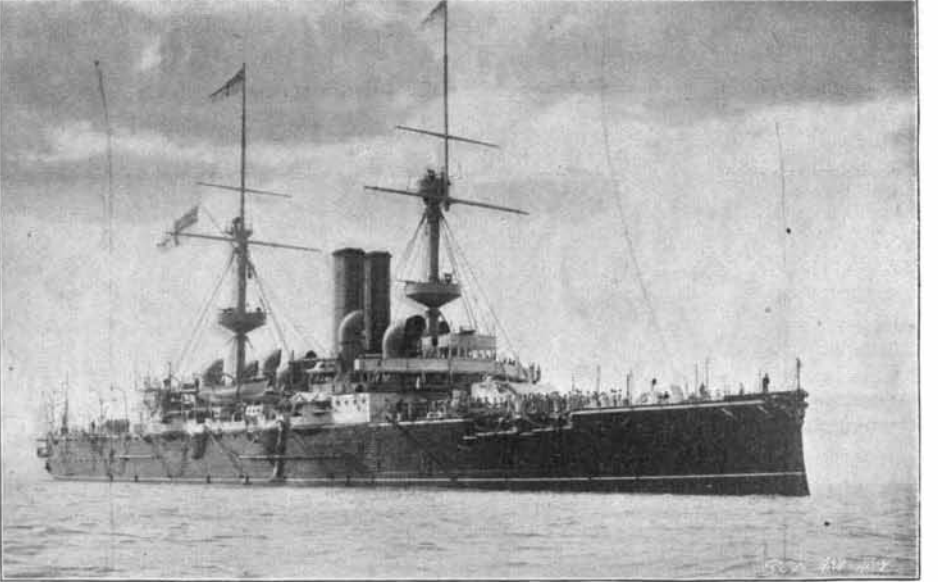
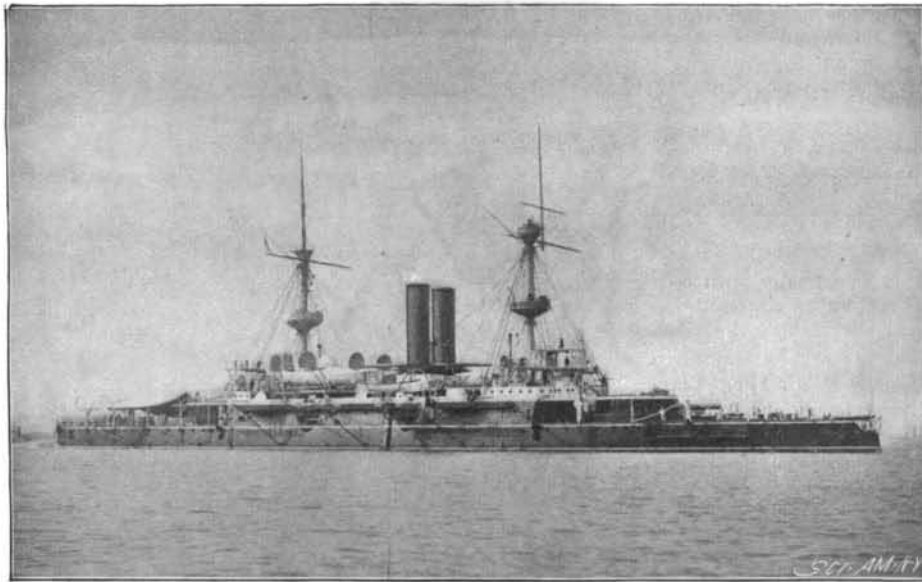
If asked to name the most characteristic features of



3.—First-class Battleship "Resolution." "Royal Sovereign" Class of Eight Ships.  
**Displacement**, 14,150 tons. **Speed**, 17.5 to 18 knots. **Bunker Capacity**, 1,800 tons. **Armor**: Belt, 18 inches; barbettes, 17 inches; casemates, 6 inches; deck, flat, 3 inches. **Armament**, four 13 1/2-inch, ten 6-inch rapid-firers, thirty-six smaller guns. **Torpedo Tubes**, 7 (two submerged). **Complement**, 730. **Date**, 1832 to 1835.

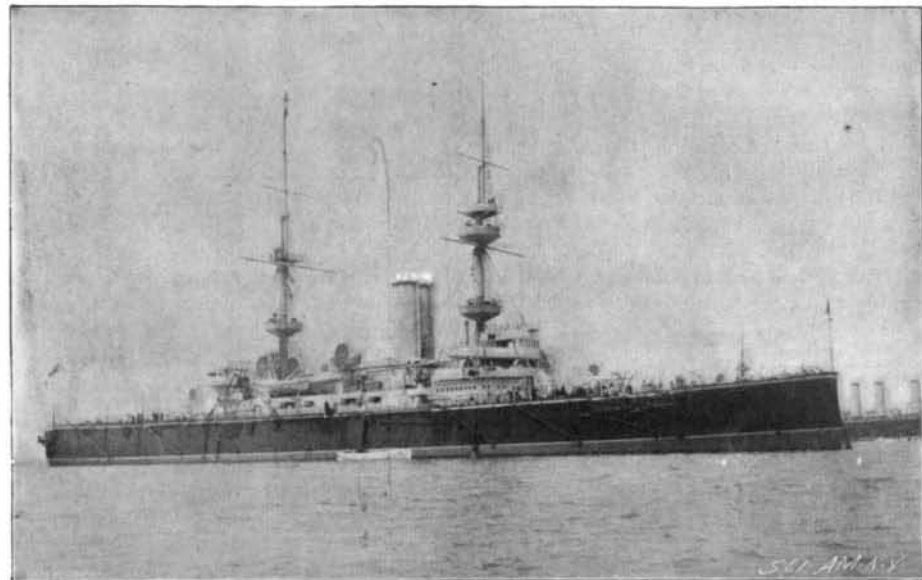
4.—Forward Pair of 13 1/2-inch, 67-ton Guns of the "Resolution," Mounted in Barbette.  
 Height of guns above sea, 27 feet.

Note: In the "Resolution" class the large guns are mounted in the open. In the "Majestic," "Canopus," and "Formidable" classes they are protected at the breech by hoods of 6-inch steel.



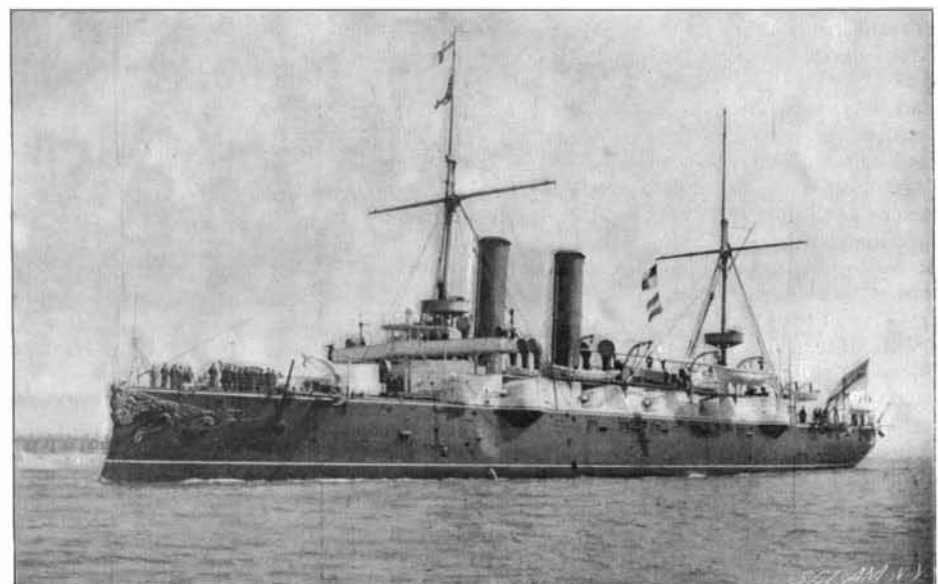
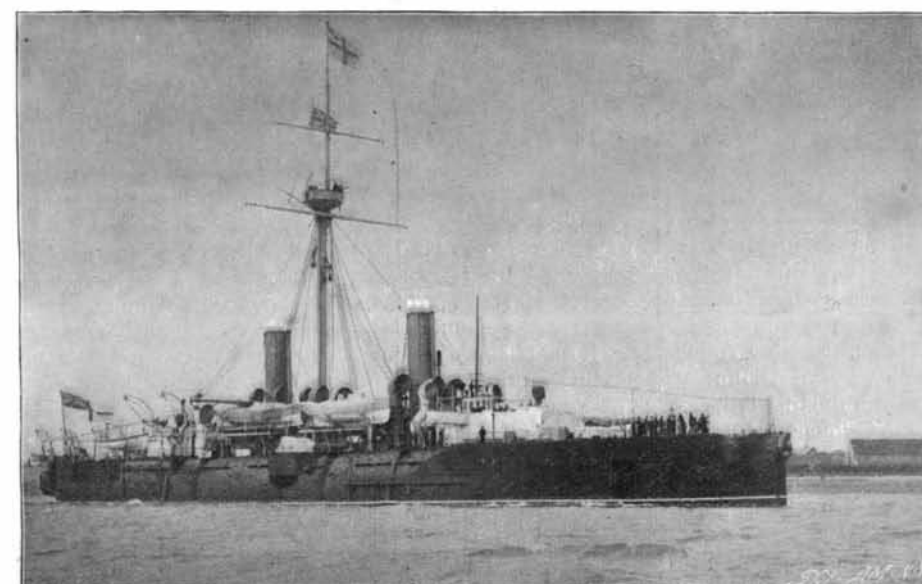
5.—First-class Turret Battleship "Hood." One of this Type.  
**Displacement**, 14,150 tons. **Speed**, 17.5 knots. **Bunker Capacity**, 1,800 tons. **Armor**: Belt, 13 inches; turrets, 17 inches; casemates, 6 inches; deck, flat, 13 inches. **Armament**, four 13 1/2-inch, ten 6-inch rapid-firers, thirty-six smaller guns. **Torpedo Tubes**, 7 (two submerged). **Complement**, 730. **Date**, 1893.

6.—First-class Battleship "Barfleur." Also "Centurion."  
**Displacement**, 10,500 tons. **Speed**, 18.5 knots. **Bunker Capacity**, 1,240 tons. **Armor**: Belt, 12 inches; barbettes, 9 inches; deck, 2 to 2 1/2 inches. **Armament**, four 10-inch, ten 4 7/8-inch rapid-firers, twenty-seven smaller guns. **Torpedo Tubes** 7 (two submerged). **Complement** 606. **Date**, 1894.



7.—First-class Battleship "Renown." Also six of "Canopus" Class, improved "Renowns" of 12,950 tons and 18 3/4 knots.  
**Displacement**, 12,350 tons. **Speed**, 18 knots. **Coal**, 1,800 tons. **Armor**, 8-inch belt, 10-inch barbettes. **Armament**, four 10-inch, ten 6-inch rapid-firers, fourteen 3-inch rapid-firers, twenty-one small guns. **Torpedo Tubes**, 5 (two submerged). **Complement**, 674. **Date**, 1896.

8.—Forward 10-inch Guns of the "Renown."  
 The six ships of the "Canopus" class (18 3/4 knots) carry four 12-inch guns and twelve 6-inch rapid-firers.



9.—Armored Cruiser "Imperieuse." Also "Warspite."  
**Displacement**, 8,400 tons. **Speed**, 16.7 knots. **Bunker Capacity**, 1,130 tons. **Armor**: Belt, 10 inches; barbettes, 4 1/2 inches; deck, 2 inches flat, 4 inches slopes. **Armament**, four 9.2-inch, ten 6-inch rapid-firers, twenty-four smaller guns. **Torpedo Tubes**, 8. **Complement**, 544. **Date**, 1886.

10.—Armored Cruiser "Australia." Seven of this Class.  
**Displacement**, 5,600 tons. **Speed**, 18 knots. **Bunker Capacity**, 900 tons. **Armor**: Belt, 10 inches; barbettes, 4 1/2 inches; deck, 2 inches on flat, 3 inches on slopes. **Armament**, two 9.2-inch guns, ten 6-inch rapid-firers, twenty-two smaller guns. **Torpedo Tubes**, 4. **Complement**, 484. **Date**, 1888.

From Photographs by Symonds & Co., Portsmouth, England.

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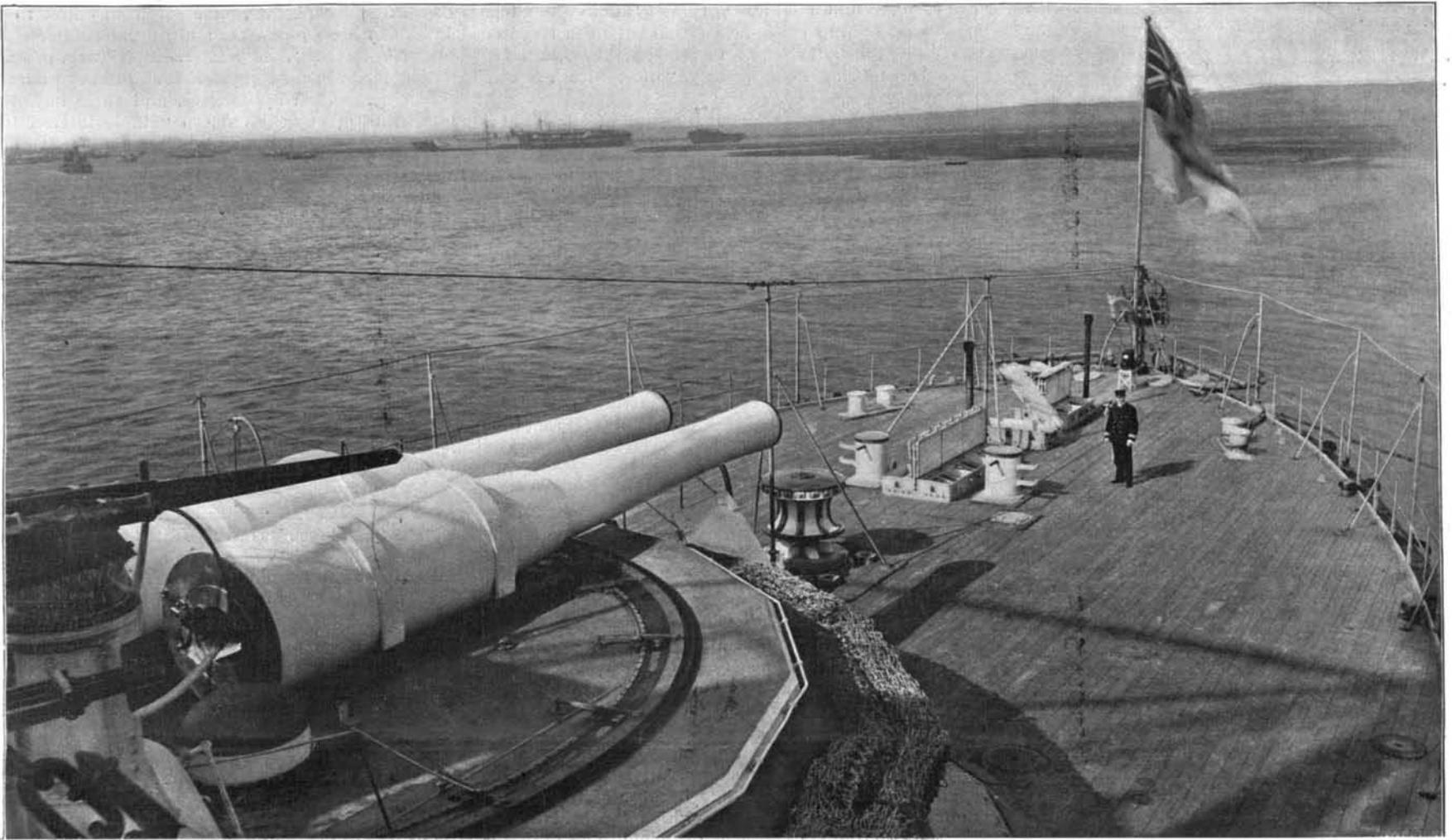
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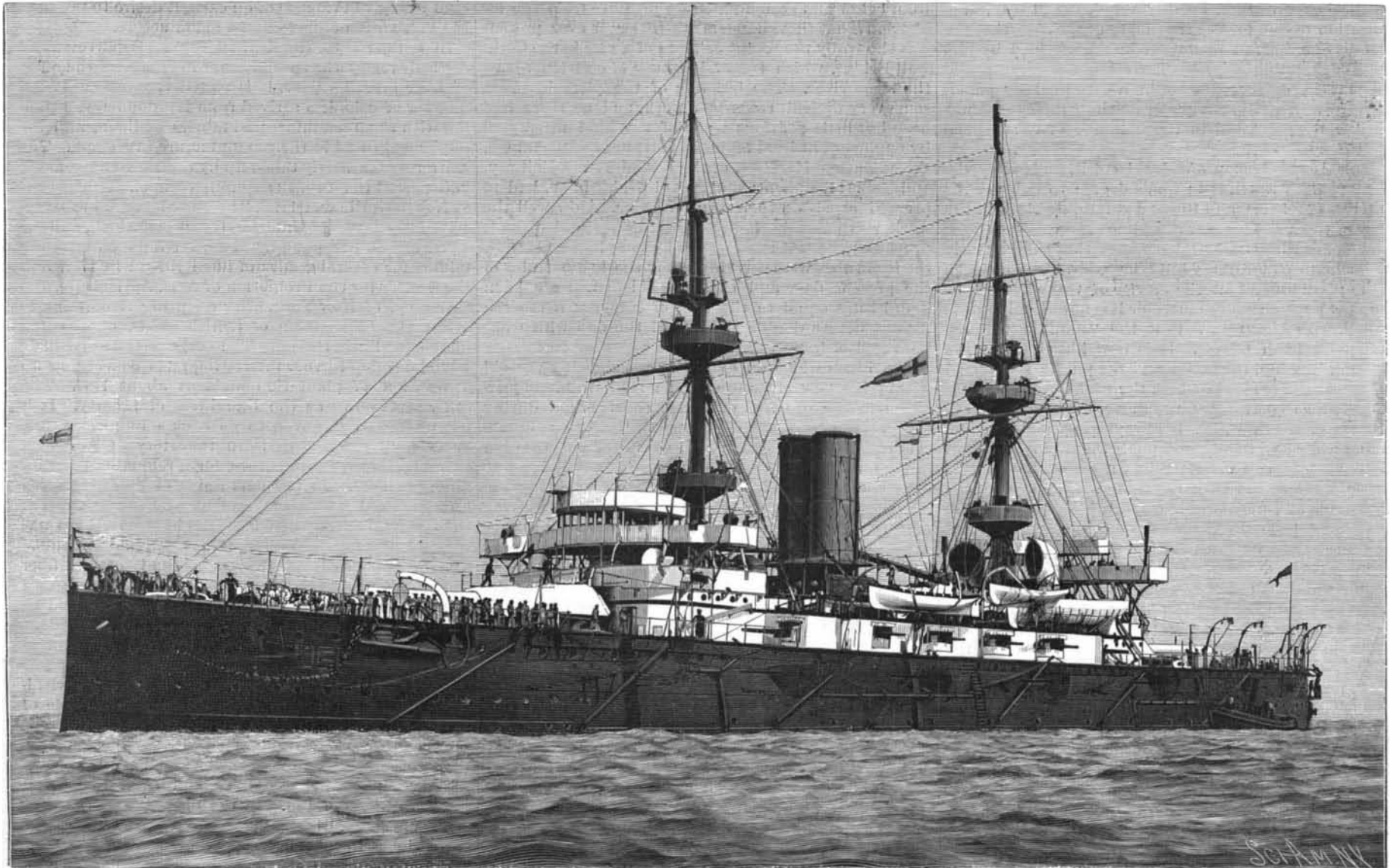
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1.—After pair of 12-inch guns on the Battleship "Collingwood," showing method of mounting in barbette.  
"Admiral" class: Number in class, 8. Four of the "Admirals" carry each four 13¼-inch guns, and one, the "Benbow," two 16¼-inch guns.



From photographs by Symonds & Co.,  
Portsmouth, England.

2.—First-class Battleship "Hannibal." "Majestic" class of nine ships.

(Also six ships of "Formidable" class, improved "Majestics" of 15,000 tons and 18¾ knots.)

**Displacement,** 14,900 tons. **Speed,** 17.5 to 18 knots. **Bunker capacity,** 1,850 tons. **Armor:** Belt, 9 inches by 18 feet deep; barbettes, 14 inches; casemates, 6 inches; deck, 2½ inches flat, 4 inches slopes. **Armament:** Four 12-inch wire guns; twelve 6-inch rapid-fire; sixteen 3-inch rapid-firers; twelve 3-pounders; eight machine guns. **Torpedo Tubes,** five (four submerged). **Complement,** 757. **Date,** 1895 to 1897.

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