

TWO OF THE LATEST TYPES OF BATTLESHIPS.

It is evident, even to the casual student of naval matters, that the once clear line of demarkation between the battleship and the cruiser is likely, in these latter days, to disappear altogether, the two types becoming merged in a vessel which is distinguished by possessing, in the highest degrees, the qualities of size, speed, armor and armament.

We illustrate on the front page of this issue two of the latest designs for battleships, one representing the "Duncan" class of the British navy, and the other the "Peresviet" class of the Russian navy, both of which illustrate the tendency above referred to.

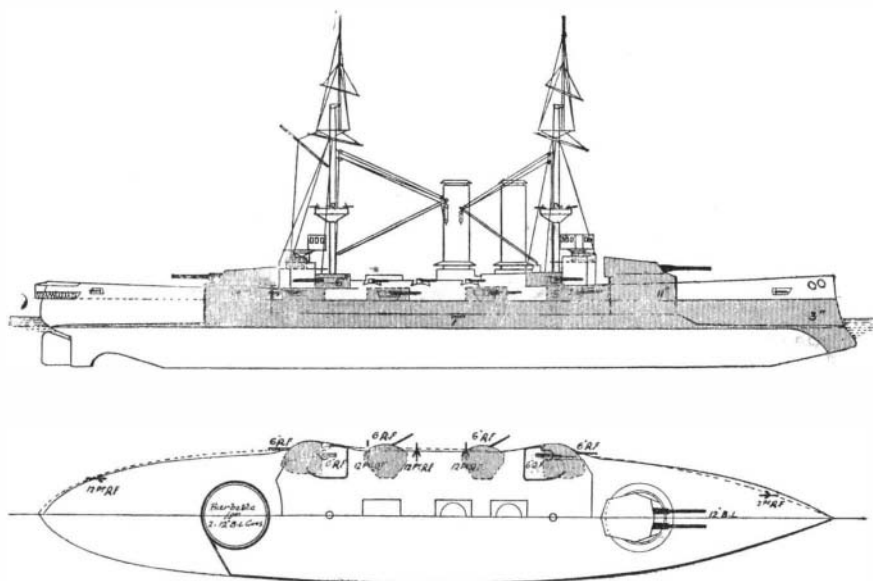
THE BRITISH BATTLESHIP "DUNCAN."—The "Duncan" represents the commonly accepted ideas as to what features should be embodied in a first-class battleship, and in her speed and the disposition of her armament she is not unlike our own vessels of the "Pennsylvania" class, although the latter are considerably more powerful. In the "Duncan" we see the direct descendant of the original "Royal Sovereign" type of 1892, with such modifications introduced as have been suggested by the progress of naval design during the past decade. The "Royal Sovereign" was of 14,150 tons displacement, 17½ knots speed, with 18 inches armor on the side and 17 inches on the gun positions; an armament of four 13½-inch, ten 6-inch guns and sixteen 6-pounders; and a bunker capacity of 1,800 tons of coal. Following her came the "Majestic," launched in 1895, of 14,900 tons displacement, 17½ knots speed, and the same bunker capacity, carrying 9 inches of Harveyized armor on the sides and 14 inches on the gun positions, and armed with four 12-inch wire guns, twelve 6-inch rapid-firers, and eighteen 3-inch rapid-firers. Then came the "Canopus" type, launched in 1898, of 12,950 tons displacement, 18.25 knots speed, and the same armament as the "Majestic," but with armor reduced to 6 inches of Harveyized steel on the belt and 12 inches on the gun positions. The "Duncan," which is now under construction, is, therefore, a direct improvement upon the "Canopus," having 1,000 tons more displacement and the same battery, but 19 knots speed, as against 18.25, while her bunker capacity has been raised to 2,000 tons. The defensive qualities are vastly greater, 7 inches of Krupp steel taking the place of 6 inches of Harveyized steel on the belt, and the gun positions being protected with 11 inches to 6 inches of Krupp steel, as against 12 to 5 inches of Harveyized steel in the case of the "Canopus." The 7-inch side armor of the "Duncan" extends over 290 feet out of her total length of 405 feet, and it is continued, with a gradual decrease in its thickness forward, to a minimum thickness of 3 inches at the bow. Protection is further assured by two steel decks, the lower turtle-backed deck being 2 inches in thickness, and the deck above it 1 inch in thickness. The main armament consists of four 12-inch wire guns, carried in two barbets plated with 11 inch Krupp steel, and twelve 6-inch rapid-fire guns carried in casemates, eight of them on the gun deck and four on the main deck. Of these 6-inch guns, four will be able to fire dead ahead and four dead astern. Although the "Duncan" is an admirable design, altogether we think that the efficiency of the 6-inch battery would be greatly increased if the 6-inch plating in the wake of the 6-inch guns on the gun deck were continuous, instead of extending only in the wake of each gun position.

Judged from an American standpoint, the armament is rather light for a vessel of 14,000 tons displacement, although it must be remembered that there are compensating features in the high speed and the large coal supply. Our own vessels of the "Georgia" class, illustrated in the SCIENTIFIC AMERICAN of November 17, 1900, although of only 1,000 tons greater displacement, are of equal speed and much more heavily armored; and also in addition to carrying the same number of 12-inch and 6-inch guns, they will have an intermediate battery of eight 8-inch rapid-fire guns.

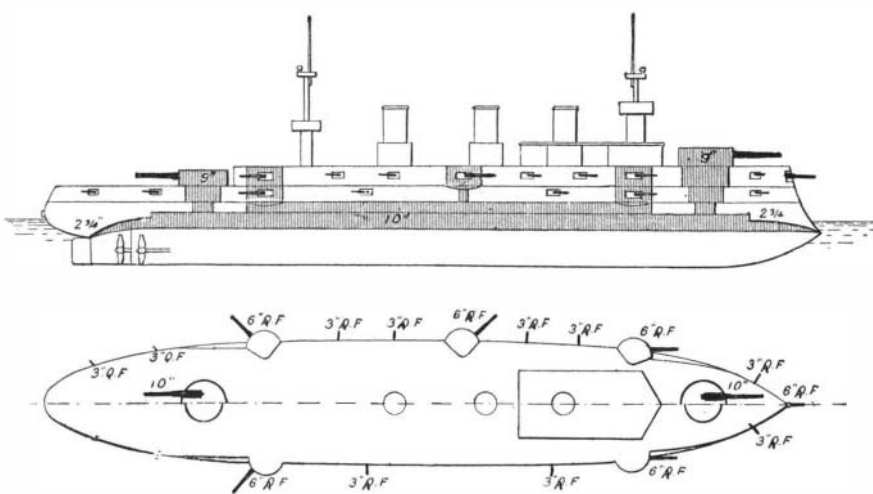
THE RUSSIAN BATTLESHIP "PERESVET."—The Russian navy, like that of France, is remarkable for the wide diversity of types which exists among its battleships; indeed, it may be said that Russia has shown more originality, and is answerable for the introduction of more novelties of design, than any other naval power. The "Peresviet," with her sister ships "Oslabya" and "Pobieda," combine the qualities of the battleship and cruiser. They are unlike any other ships of recent construction, although the speed of

18 knots is rather low in these days for a cruiser-battleship, a type which in the Italian designs as represented by the "Regina Elena" class, is to have a maximum speed of 23 knots an hour. The "Peresviet" is distinguished from all preceding vessels of the Russian navy by being driven by triple-screw engines, and it is also the first of the Russian ships to carry the 6-inch rapid-fire guns of the secondary battery in separate armored casemates. A noticeable feature in these ships is the extremely high freeboard; the two forward 10-inch guns must have a command of over 33 feet above the water. A thoroughly characteristic feature is the large number of 3-inch guns which are carried, there being no less than twenty of these very formidable little weapons; indeed, the Russians in their later ships show quite as strong a preference for extremely heavy batteries as we do in the United States.

The "Peresviet" and class are 434 feet 6 inches long, 71 feet 6 inches beam and draw 26 feet of water. They are expected to develop their contract speed with an indicated horse-power of 14,500. Their coal supply is very liberal, for on a displacement of 12,674 tons they will carry a normal coal supply of 1,063 tons, and a maximum bunker capacity of 2,056 tons. The protection is very clearly shown in the accompanying diagram. It consists of a belt of 10 inch Harveyized



BRITISH FIRST-CLASS BATTLESHIP "DUNCAN." CLASS OF SIX SHIPS.



RUSSIAN FIRST-CLASS BATTLESHIP "PERESVET." CLASS OF THREE SHIPS.

steel, associated with a 2¾-inch protective deck. This belt will be carried up on either side to the main deck for a length of about 250 feet amidships. The main battery of four 10-inch guns is mounted in two turrets, protected with 9 inches of armor. The 6-inch rapid-fire guns of the secondary battery, of which there are eleven, will be disposed as follows: four on the gun deck in armored casemates with arcs of fire from abaft the beam to dead ahead and dead astern; four on the main deck, immediately above the guns just mentioned, the walls of the casemates being vertically flush with those on the deck below and the guns having the same arcs of fire. Two other 6-inch guns will be carried in casemates amidships, as shown in the diagram, and one will be carried on the same deck forward in the bow, its port being cut through the stem. There will be ten 3-inch rapid-fire guns on the gun deck and ten on the main deck. The vessel carries six torpedo tubes; and it should be mentioned that there is a powerful electric installation on board, both for lighting and for such purposes as hoisting shells, turning turrets and similar operations incidental to the working of a battleship. The military masts are short but powerful, and there will be a numerous battery of twenty-seven 3-pounders and 1-pounder guns distributed throughout the superstructure and the military tops. These vessels, as may be judged from our illustration, present an exceedingly

ship-shape and well-balanced appearance, and to our thinking are among the handsomest naval designs which have been turned out in recent years.

A Spider's Genius.

I have considerable respect for the female spider, notwithstanding the fact that she does not treat the male very considerably. I had an opportunity last summer to watch a large one that had a web in the top of a decaying peach tree with so few leaves that it was in plain view. I caught sight of her first when watching some birds with my glass. She seemed to be climbing from the top of the tree on nothing to a telephone wire some fifteen feet away and somewhat higher than her web. When she reached the wire she went around it and then back. In studying the situation, I found the web was so located that it required a cable to hold it up, and the spider had in some way got over the wire so far away. This cable was, of course, a slender silken thread which evidently she had thrown out, and on account of its lightness it had floated to the right place and become attached there by its glutinous properties. It seems remarkable that it should have adhered to the wire firmly enough to allow so large an insect to climb over it, which she did every day as long as I watched her, evidently to mend or strengthen it. The spider must have brains

in which the ability to construct its web and adapt it to conditions is highly developed. In an article in Chambers's Journal the following account of how the spider forms its silken threads is given:

"One of the most interesting features in the economy of spiders is their power of emitting slender threads of a silk-like substance called gossamer, with which most of them construct mesh like nets, and a few long, dangling cables, by which they are buoyed through the air with nearly as much facility as though they had been furnished with wings. The apparatus provided by nature for elaborating and emitting this gossamer is a beautiful piece of mechanism. Within the animal there are several little bags or vesicles of a gummy matter; and these vesicles are connected with a circular orifice situated at the abdomen. Within this orifice are five little teats or spinnerets, through which the gossamer is drawn. It must not be concluded, however, that there is only one film of gossamer produced by each spinneret; the fact is, these teats are studded with thousands of minute tubes too small for the naked eye to perceive, and each of these emits a thread of inconceivable fineness. These minute tubes are known as spinnerules, and the films which proceed from them unite like so many strands of a rope to form the thread of gossamer by which a spider suspends itself. The finest thread which human mechanism can produce is like a ship's cable compared with the delicate films which flow from the spinnerules of the largest spider. The films are all distinctly separate on coming from the spinneret, but unite, not by any twisting process, but merely by their own glutinous or gummy nature. Thus the spinning apparatus of the disdained spider, when viewed by the eye of science, becomes one of the most wonderful pieces of animated mechanism

known to man. The animal has great command over this apparatus, and can apply it at will as long as the receptacles within are replenished with the gummy fluid, but as soon as this gum is exhausted all its efforts to spin are fruitless, and it must wait till nature, by her inscrutable chemistry, has secreted it from the food which is devoured."—Dr. M. L. Holbrook in the Phrenological Journal.

Messrs. Denny Brothers, of Dumbarton, Glasgow, the builders of "Shamrock II.," are constructing a steamer to ply upon the Clyde equipped with the Parsons steam turbine system. This is the first passenger steamer to be propelled by this means. The vessel will be ready for launching shortly, and the experiment will be closely followed by the various steamship companies plying across the English Channel. The French Northern Railroad Company are particularly interested in the scheme, and if the experiments upon the Clyde prove successful, they will introduce the turbine steamer upon their services. Such an innovation will revolutionize the cross channel traveling. The boat will have a speed of 30 knots and will cover the 22 miles between Calais and Dover in a little over half an hour, whereas at present it occupies one hour. By this means the service from London to Paris will be considerably accelerated.

SCIENTIFIC AMERICAN

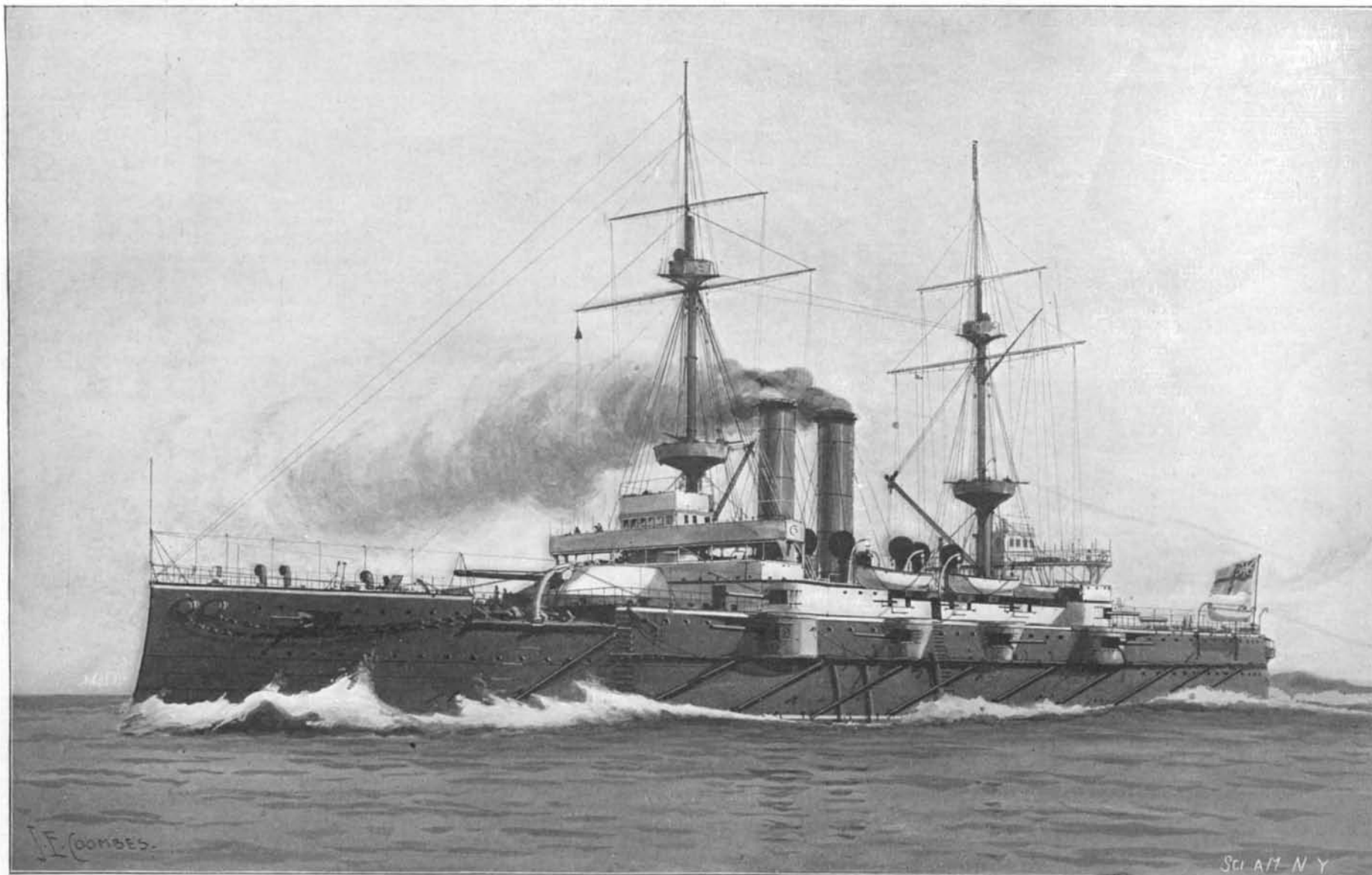
[Entered at the Post Office of New York, N. Y., as Second Class Matter. Copyright, 1901, by Munn & Co.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LXXXV.—No. 3.
ESTABLISHED 1845.

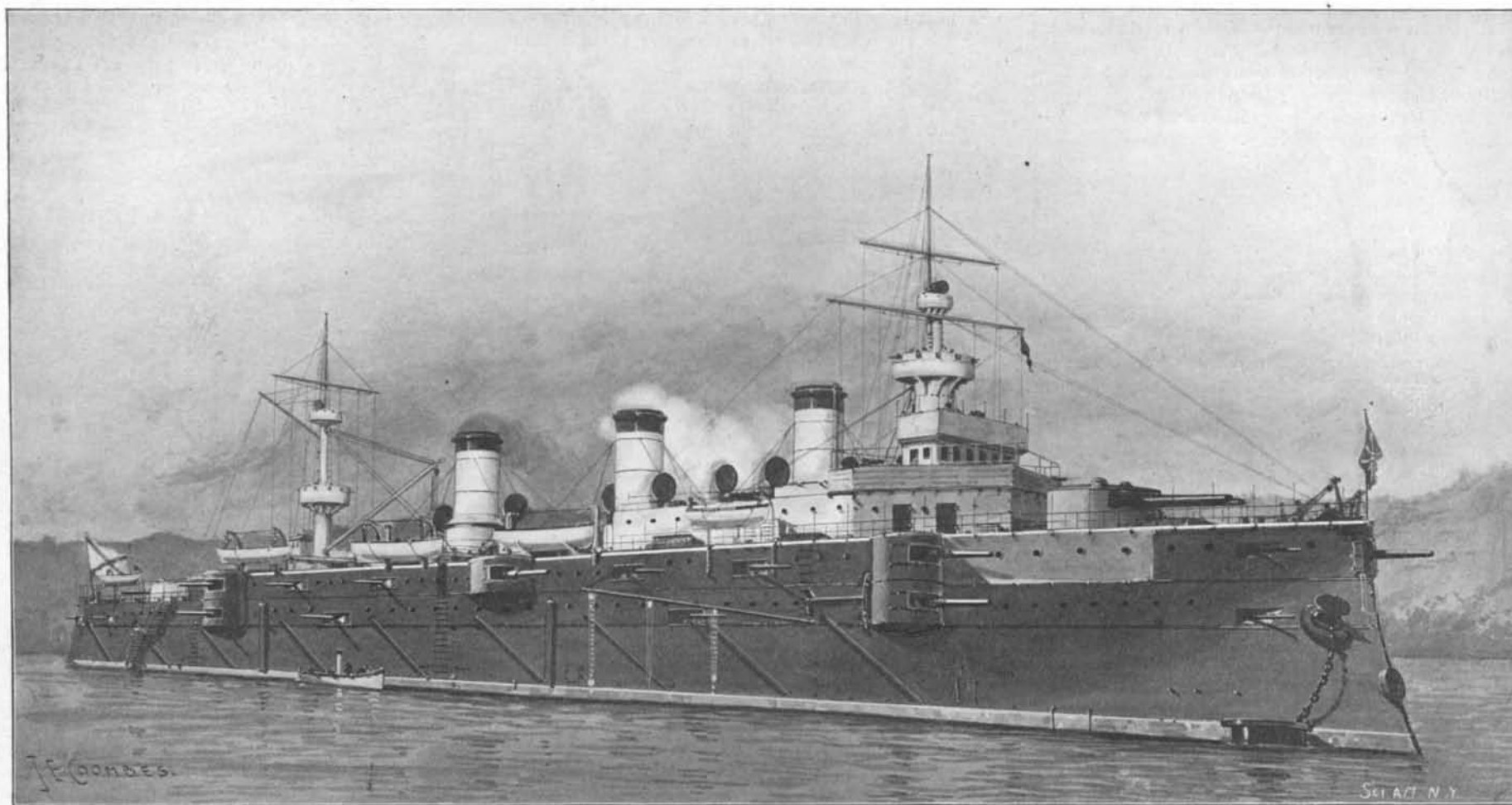
NEW YORK, JULY 20, 1901.

\$3.00 A YEAR.
8 CENTS A COPY.



NEW BATTLESHIP "DUNCAN" OF THE BRITISH NAVY. CLASS OF SIX SHIPS.—[See page 39.]

Displacement, 14,000 tons. **Speed,** 19 knots. **Bunker Capacity,** 2,000 tons. **Armor:** Belt, 7 inches; gun positions, 11 to 6 inches; decks, protective 2 inches, gun deck, 1 inch. **Armament:** Four 12-inch; twelve 6-inch rapid-fire; twelve 8-inch rapid-fire; six 3-pounders. **Torpedo Tubes,** 4. **Complement,** 750.



NEW RUSSIAN BATTLESHIP "PERESVIET." ALSO "OSLABYA" AND "POBIEDA."—[See page 39.]

Displacement, 12,674 tons. **Speed,** 18 knots. **Bunker Capacity,** 2,066 tons. **Armor:** Belt, 2½ inches; gun positions, 9 inches and 5 inches; deck, 2¼ inches. **Armament:** Four long-caliber 10-inch; eleven 6-inch rapid-fire; twenty 8-inch rapid-fire; ten 6-pounders; seventeen 1-pounders; two field guns. **Torpedo Tubes,** 4. **Complement,** 732.