

THE JAPANESE NAVY.

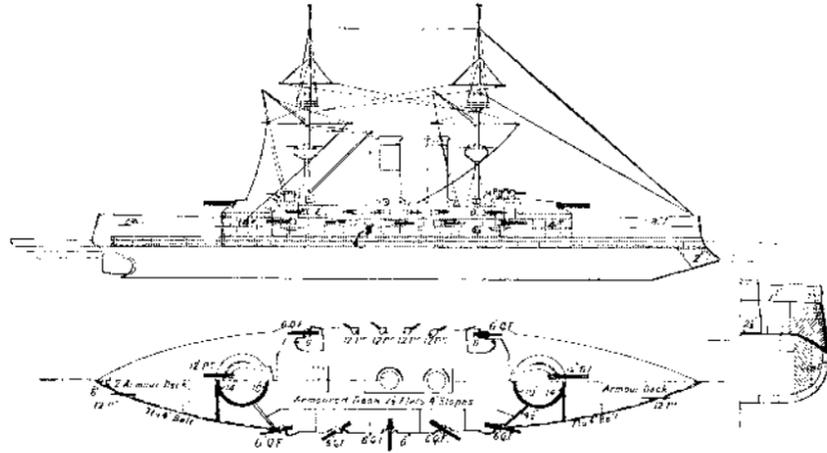
No stronger evidence of the important part played by sea power could be given than is offered by the spectacle of a little nation like Japan standing fully prepared and eager to enter into a life-and-death struggle with the greatest military power upon earth. The confidence of Japan is based upon her possession of a thoroughly modern and highly efficient navy, and upon the fact that the proximity of the seat of war to her harbors and dockyards will probably give her a strong strategic position against a nation whose battle must be fought with half the circumference of the world intervening between a disabled ship and the dockyard for its repair. Command of the high seas would place a Japanese army of invasion within easy touch, at all times, of its base of supplies; while the Russian army would be dependent upon several thousand miles of single-track railroad, whose capacity would at all times be utterly inadequate to the task of bringing to the seat of war the necessary supplies.

The Japanese navy has the distinction of being the most absolutely modern of all the leading navies of the world. This is due to the fact that the work of construction was seriously undertaken

only after the close of the Chinese war, while the ships which she owned at the time of the war were well up-to-date, and are indeed to-day serviceable vessels.

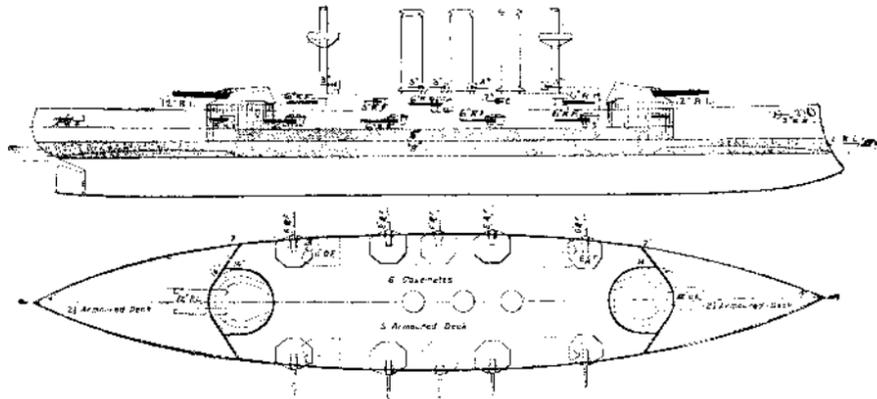
The main strength of the navy lies in the homogeneous fleet of six first-class battleships, all built within

the last eight years in English yards, of which the latest, the "Mikasa," built by Vickers in 1900, shares with her sister, the "Asahi," the distinction of being to-day the largest and most powerful battleship in commission. With a length over all of 436 feet, a beam of 76 feet, and a draft of 27 1/4 feet, this vessel displaces 15,200 tons and carries a complement of 730 men. She conforms in general design to the British battleships of the "Prince of Wales" class; but she is somewhat larger, carries a more numerous intermediate and secondary battery, while the intermediate guns are carried in broadside behind a continuous wall of 6-inch armor, instead of being mounted in casemates. There is a continuous belt of Krupp armor at the waterline, which varies in thickness from 9 inches amidships to 4 inches at the ends. The protective deck is 4 inches in thickness on the slopes. The side armor amidships, from the main belt up to the level of the main deck, is 9 and 6 inches thick. The armament of this as well as that of all the other warships, is of the Armstrong type. It consists of four 12-inch, 40-caliber guns in barbette turrets, protected by 14-inch Krupp steel on the barbetstes, 10 inches on the front of the turrets, and 8 inches on the sides. The intermediate battery is made up of fourteen 6-inch, 40-caliber guns, ten of these being carried on the gun deck behind a continuous wall of 6-inch Krupp armor, and four in separate casemates on the main deck, two forward, two aft. The secondary battery of twenty 3-inch guns is widely



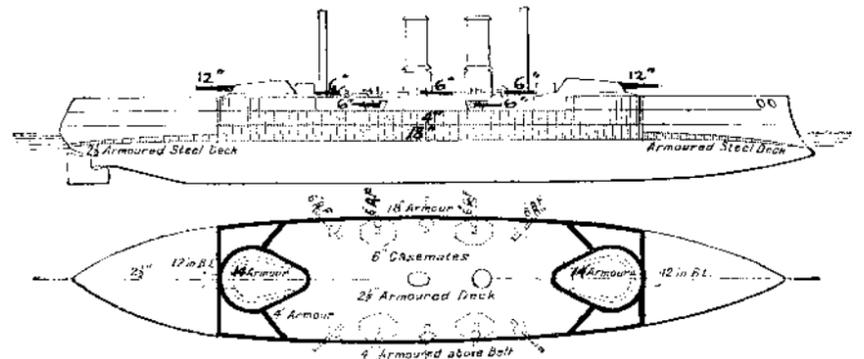
Battleship "Mikasa." (The Largest Battleship in Commission in the World.) Completed in 1902.

Displacement, 15,200 tons. Speed, 18.6 knots. Bunker Capacity, 1,500 tons. Armor (Krupp): Belt, 9 inches to 4 inches; sides, 9 inches; deck, 4 inches; barbets, 14 inches; shields, 10 inches; casemates and central battery, 6 inches. **Armament:** four 12-inch; fourteen 6-inch; twenty 3-inch; 12 small guns. **Torpedo Tubes, 4 submerged.**



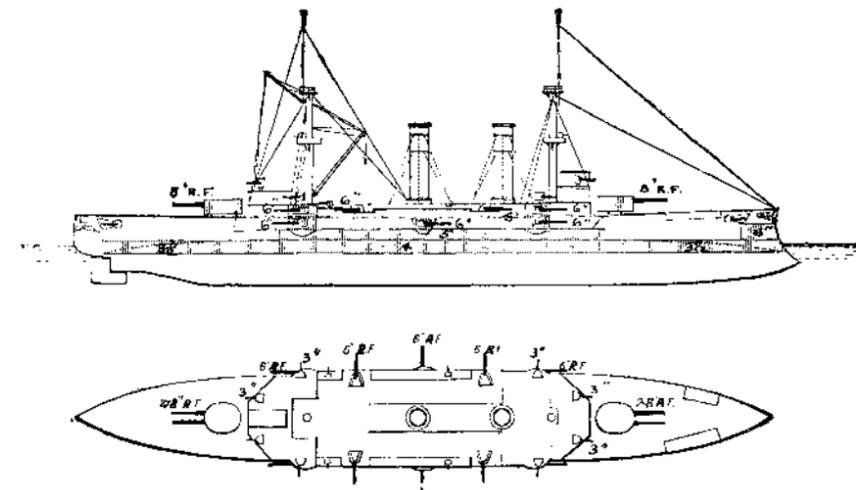
First-class Battleships "Shikishima." Also, with modifications, the "Asahi," of 15,200 tons, and "Hatsuse," of 15,000 tons.

Displacement, 14,850 tons. Speed, 18.5 knots. Armor: Main belt, 9 inches; upper belt, 6 inches; deck, 4 inches; gun positions, 14 and 6 inches. **Armament:** four 12-inch, fourteen 6-inch rapid-fire, twenty 3-inch, eight 3-pounders, six 2 1/4-pounders. **Torpedo Tubes, 5. Date, 1899.**



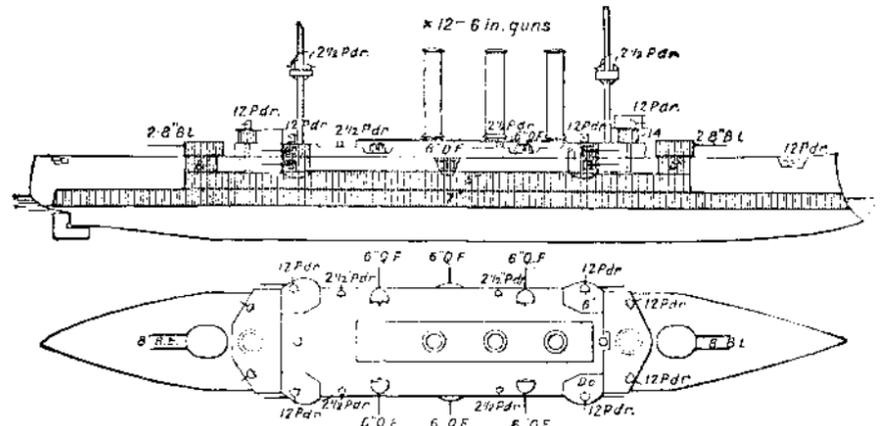
First-class Battleships "Fuji" and "Yashima."

Displacement, 12,500 tons. Speed, 18.2 and 19.2 knots.



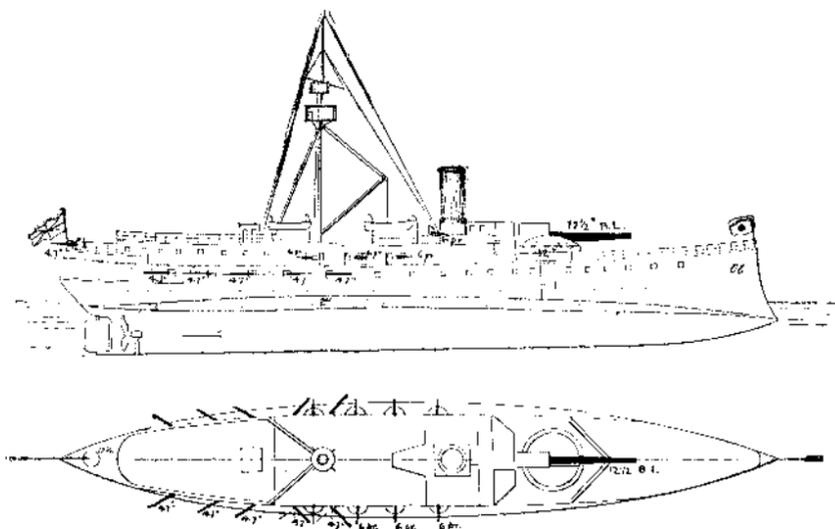
Armored Cruisers "Asama" and "Tokiwa."

Displacement, 9,750 tons. Speed, 22 knots.



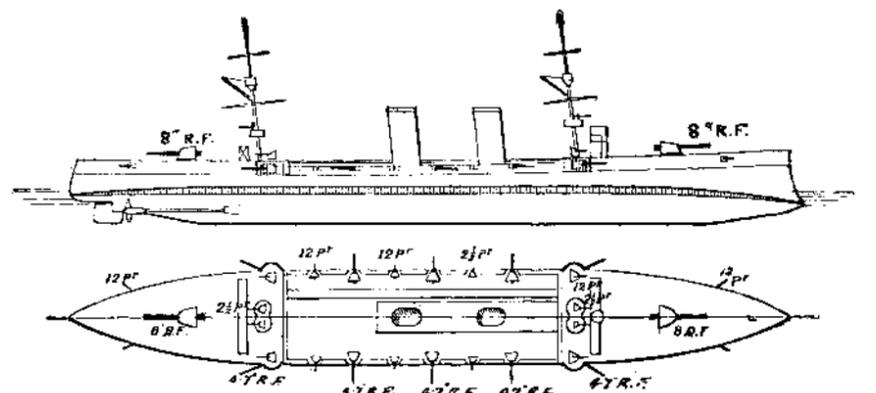
Armored Cruisers "Idzumo" and "Iwate."

Displacement, 9,800 tons. Speed, 22.04 and 21.8 knots.



Protected Cruisers "Itsukushima" and "Hashidate." Also, with modifications, "Matsushima."

Displacement, 4,277 tons. Speed, 17.5 knots.



Protected Cruiser "Takasago." Class of Four Ships.

The "Takasago": **Displacement, 4,300 tons. Speed, 24 knots.** The "Yoshino": **Displacement, 4,150 tons. Speed, 23.1 knots.** The "Chitose" and "Kasagi": **Displacement, 4,760 tons. Speed, 23.7 and 23.5 knots.**

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distributed throughout the main and gun decks. There are four 18-inch submerged torpedo tubes, mounted in broadside. The vessel has shown 18.6 knots speed on trial, and carries a normal coal supply of 700 tons, with a maximum bunker capacity of 1,500 tons.

The "Asahi," built on the Clyde in 1899, is of about the same dimensions, displacement, and speed as the "Mikasa," and the armament distribution is practically the same, the chief exception being that the intermediate battery of 6-inch rapid-fire guns is carried in casemates, four of the guns on the gun deck, and six on the main deck. The next ship in size is the "Hatsuse," built at Elswick in 1899. She is of the same dimensions as the preceding vessels, differing from the "Asahi" only in the fact that she is of about 200 tons less displacement. Like the "Mikasa" and "Asahi," she is equipped with Belleville boilers; but she exceeded them in speed, having accomplished 19.1 knots an hour. The fourth vessel in importance is the "Shikishima," of 14,850 tons displacement, built at the Thames Iron Works in London in 1898. She has half a foot less beam than the other three; but her armor and armament are identical with those of the "Asahi" and "Hatsuse," and she made on trial a speed of 18.5 knots. Her normal coal supply is 700 tons, and her maximum 1,400 tons. She carries four submerged torpedo tubes, and one above the water in the bow protected by 6-inch armor. It should be mentioned that the armor of the three last-named ships is of the Harvey-nickel type. The other two battleships, the "Fuji," built at London in 1896, and the "Yashima," built at Elswick in the same year, are sister vessels of 12,500 tons, and carry each a complement of 600 men. The length over all is 412 feet, the beam 73½ feet, and draft 28½ feet. They were designed to be an improvement on the British "Royal Sovereign" class. The guns and armor distribution are as follows: There are four 12-inch, 40-caliber Armstrong guns, protected by 14-inch barbets and 6-inch barbet shields; ten 6-inch, 40-caliber rapid-fire guns, four carried in casemates on the gun deck behind 6-inch armor and six carried behind shields on the main deck; while there are sixteen 3-inch guns and four 2½-pounders distributed throughout the ship. At the waterline there is a belt of 18-inch Harvey armor extending for two-thirds of the length amidships, with which is associated a 2½-inch armored deck. Above the belt, the side protection consists of 4-inch armor as high as the level of the gun deck. There are four submerged torpedo tubes and one above water in the bow protected by 6-inch armor. The normal coal supply is 700 tons, and the maximum is 1,300 tons. The motive power consists of cylindrical boiler triple-expansion engines, with which the "Fuji" accomplished 18½ knots on trial, and the "Yashima" 19.2 knots.

Next in importance to the battleships, and fully equal to them in excellence, is a fleet of eight armored cruisers, all of high speed and carrying powerful batteries. First there are the "Idzumo" and "Iwate," built by the Armstrongs in 1899-1900, 408 feet over all, 68½ feet beam, 24½ feet draft, and displacing on this draft 9,800 tons. They have continuous belts of Krupp steel varying from 7 inches to 3½ inches; armored decks 2½ inches thick on the slopes, and a side protection of 5 inches of armor extending from the main belt up to the level of the gun deck. They carry four 8-inch rapid-fire guns in two turrets of 6-inch steel, further protected by 6-inch barbets; fourteen 6-inch rapid-fire guns, of which ten are mounted in casemates and protected by 6-inch armor, four of them being on the main deck and six on the gun deck, and the other four are mounted behind shields between the 6-inch casemates on the main deck. There are also twelve 3-inch rapid-fire guns and twelve smaller guns disposed throughout the vessel. There are four submerged torpedo tubes. The vessels are equipped with Belleville boilers, and on trial the "Idzumo" made 22 knots, and the "Iwate" 21.8 knots.

The "Asama" and "Tokiwa" are armored cruisers, built by the Armstrongs in 1898, that are practically identical with the "Idzumo" and "Iwate." Their dimensions are: Length, 408 feet; beam, 67 feet; draft, 24¼ feet; and displacement, 9,750 tons. The "Asama" made 22 knots on a six hours' forced draft trial, and the "Tokiwa" 22.7 knots. They carry four submerged torpedo tubes and one tube above water in the bow protected by 6 inches of Harvey-nickel armor.

In addition to the four Armstrong armored cruisers, there are two of about the same displacement which were built in Stettin, Germany, in 1899, and St. Nazaire, France, in 1900. The Stettin ship is known as the "Yakumo." She is 407 feet in length over all, 65½ feet beam, 23¾ feet draft, and displaces 9,850 tons. The armor, which is of Harvey-nickel and Krupp steel, consists of a continuous belt 7 inches thick amidships and decreasing to 3½ inches at the ends, and an armored deck 2½ inches thick on the slopes. Above the belt armor is a side protection of 5-inch armor extending to the level of the gun deck. The armament consists of four 8-inch rapid-fire guns mounted in two turrets fore and aft, protected by 6-inch armor, and

STATISTICS OF JAPANESE NAVY.

	Number of ships.	Average speed in knots.	Average displacement in tons.	Total displacement in tons.
Battleships, 10 years or less.....	6	18.75	14,203	85,250
Battleships, 10 to 20 years old.....	..	..	..	..
Battleships, old or refitted.....	..	..	..	..
Totals.....	6	....	....	85,250
COAST Defense Vessels.....	3	12.5	4,336	13,007
Armored Cruisers, 9000 tons or over.....	6	21.75	9,731	58,386
Armored Cruisers, 7000 to 9000 tons.....	2	20.2	7,632	15,264
Armored Cruisers, below 7000 tons.....	..	..	..	..
Totals.....	8	....	....	73,650
Protected Cruisers, 10000 tons up.....	..	..	..	..
Protected Cruisers, 7000 to 10000 tons.....	..	..	..	..
Protected Cruisers, 4000 to 7000 tons.....	7	20.5	4,460	30,801
Protected Cruisers, 2000 to 4000 tons.....	8	18.4	2,965	23,720
Totals.....	15	....	....	54,521
Small Cruisers and Gunboats.....	11	16.5	1,037	11,411
Grand Totals.....	43	....	....	237,899
Torpedo Boat Destroyers.....	20	30.75	332	6,645
Torpedo Bats, 1st Class.....	35	27.5	138	5,203
Torpedo Boats, 2d Class.....	35	23	66	2,315
Totals.....	90	....	....	14,163

twelve 6-inch rapid-fire guns mounted as follows: Two on the gun deck in broadside protected by 6-inch casemates, and eight on the main deck, two forward and two aft, in casemates of 6-inch armor, and four mounted in broadside in the open behind shields. There are twelve 3-inch guns and twelve smaller guns. Four submerged torpedo tubes are carried, and one in the bow above water. The "Yakumo" is about one to two knots slower than the Armstrong boats, having made 20.7 knots on trial. The French-built cruiser "Azuma" is a longer and leaner craft, measuring 446 feet in length over all by 59 feet beam, 24¼ feet draft, and her displacement is 9,436 tons. Her armor protection and armament are the same as those of the "Yakumo." On her trial she made 21 knots speed. The other two armored cruisers of the fleet of eight are the "Kasaga" and "Niasin," of which illustrations and some description were given in our issue of January 23. These vessels are of 7,632 tons displacement, and are armed, the "Kasaga" with four 8-inch and the "Niasin" with two 8-inch and one 10-inch guns, and both vessels with fourteen 6-inch, ten 3-inch, and four smaller guns. They carry four above-water torpedo tubes behind 6-inch armor, and the protection consists of a 6-inch belt, and 6-inch side armor in the wake of the batteries carried up to the level of the main deck. The speed of the vessels is a little over 20 knots an hour.

The fourteen armored ships above described form the first line of defense for Japan. Following them we come to a class of vessels, the protected cruisers, of much smaller displacement, but of high speed and powerful batteries. The most important of these are four vessels, the "Chitose," "Kasagi," "Yoshino," and "Takasago." The "Chitose," built at San Francisco in 1898, and the "Kasagi," built at Cramps in 1897, are both of 4,760 tons displacement. The "Chitose" showed a speed on trial of 23.76 knots an hour, and the "Kasagi" 22.76 knots. They are protected by a 4½-inch deck supplemented by cofferdams and bunkers amidships. The battery is mounted behind shields, and consists of two 8-inch rapid-fire guns, one forward and one aft, and ten 4.7-inch guns mounted behind shields on the gun deck. The guns are all of the Armstrong rapid-fire type. Both of these vessels carry four above-water torpedo tubes. The "Yoshino," of 4,150 tons displacement, was built by the Armstrongs in 1892. She mounts four 6-inch, eight 4.7-inch, and twenty-two smaller guns, and carries five torpedo tubes. The steel deck is 4½ inches in thickness. On trial the vessel made 23.1 knots. She carries a maximum coal supply of 1,000 tons. The fourth cruiser is the "Takasago," built at Elswick in 1897. She is of 4,300 tons displacement, and she maintained 24 knots speed on trial. She has a 4½-inch protected deck, and her armament consists of two 8-inch rapid-fire guns behind 4½-inch shields, ten 4.7-inch guns behind 2½-inch shields, and eighteen smaller guns and five torpedo tubes.

We now come to a class of three curious vessels, the "Matsushima," "Itsukushima," and "Hashidate," built at La Seine, France, in 1889, 1890, 1891. They are of 4,277 tons displacement and 16.7 knots speed. They are protected cruisers pure and simple, inasmuch as they simply have an armored deck 1½ inches in thickness with a cellulose belt for protection, and 5 inches of

armor protection above the engine-room hatches. The peculiarity of these little ships is in their armament, the main element of which consists of a big 12½-inch Canet gun, which in its time was the most powerful weapon in existence. The gun weighs 66 tons, and fires a 990-pound shell with a velocity over 2,300 feet per second, and a muzzle energy of 35,200 tons. This gun is mounted, in the case of the "Matsushima" (which, by the way, was the flagship of the Japanese admiral at the battle of Yalu) amidships abaft the superstructure, in a barbet protected by 12-inch steel armor, covered with a 4-inch hood, and communicating with the magazines by hoists protected with 12 inches of steel. In addition to this gun an intermediate battery of twelve 4.7-inch rapid-fire guns is carried in broadside. There are also four above-water torpedo tubes. The other two vessels carry the 12.5-inch gun on the forward deck, and the intermediate battery consists of eleven 4.7-inch guns. There are no vessels in the world that compare with these rather non-descript cruisers, and it is difficult to assign them their true fighting value.

The Japanese navy also includes eight smaller protected cruisers of from 2,000 to 4,000 tons displacement, whose average speed is 18.4 knots an hour and average displacement a trifle under 3,000 tons. The "Akitsushima," launched in Japan in 1892, is of 3,150 tons displacement and 19 knots speed, and carries four 6-inch, six 4.7-inch, and ten smaller guns, and four above-water torpedo tubes. The "Suma," launched in Japan in 1895, of 2,700 tons, and 20 knots speed, has a 2-inch deck, and 4½-inch shields to her 6-inch guns. She is armed with two 6-inch, six 4.7-inch, and sixteen smaller guns, and she has two above-water torpedo tubes. The "Akashi" is a sister vessel to the "Suma." The "Chiyoda," 2,450 tons, 19 knots, launched on the Clyde in 1889, is really an armored cruiser, but on account of her age and the partial belt which she carries, she is included among the protected boats. She has a 4½-inch belt, a 1-inch deck, and carries ten 4.7-inch guns, seventeen smaller guns, and three torpedo tubes. The "Naniwa" and "Takachiho," launched by the Armstrongs in 1885, are vessels of 3,700 tons displacement and 18 knots speed, which were refitted in 1900. They have a 3-inch deck, 3-inch engine hatches, and carry two 10.2-inch Krupp guns, six 6-inch rapid-firers of the Elswick pattern, sixteen smaller guns, and four above-water torpedo tubes. The protected cruiser "Idzumi," 18 knots, formerly the Chilean "Esmeralda," built at Elswick in 1884, and overhauled and refitted in 1901, was the first protected cruiser ever built, and was a famous vessel in her time. She has a 1-inch steel deck, and carries two 6-inch, six 4.7-inch, and seven smaller guns. A protected cruiser of small value is the "Sai Yen," of 2,300 tons and 12 knots speed, built at Stettin in 1886, and captured from the Chinese. She carries two 8-inch guns forward in a 10-inch compound armor turret, and one 6-inch gun aft, besides eight smaller guns and four above-water torpedo tubes.

The Japanese navy includes eleven small cruisers and gunboats, some old and some quite modern, which range in displacement from about 600 to 1,600 tons, and from 12 to 21 knots speed. They call for no particular description.

The torpedo boat flotilla consists of twenty destroyers of an average displacement of 332 tons and an average speed of 30.75 knots; thirty-eight first-class torpedo boats, with an average displacement of 137 tons and average speed of 27.5 knots; and thirty-five second-class torpedo boats, with an average displacement of 66 tons and an average speed of 23 knots. The vessels are chiefly of Thornycroft, Yarrow, Schichau, and Normand construction, and the flotilla, which numbers altogether nearly a hundred vessels, is probably as efficient as any in the world.

Exclusive of the torpedo boats, the Japanese fleet is made up of forty-three vessels, of a total displacement of 237,899 tons, of which eighty-five per cent is thoroughly modern, and embodies the latest ideas of the leading naval constructors of the world. The officers are intelligent, resourceful, and brave, and the men well drilled, thoroughly amenable to discipline, and full of patriotism and courage.

Such is the navy of Japan. In the following issue we hope to give an article, similar in scope, on the Russian navy.

An Oxyacetylene Blow-Pipe.

An oxyacetylene blow-pipe is described by M. Fouché in the Bulletin of the French Physical Society. The flame is formed by the combustion of a mixture of one part of acetylene to ½ of oxygen, and in order that the explosion may not travel back into the blow-pipe, a jet velocity is required, due to the pressure of a water column four meters in height. The flame melts most metals readily; it will solder iron and steel. Even silica and lime are melted by it. With a reduction of the proportion of oxygen, the flame becomes luminous, and on falling on lime the free carbon goes to form carbide of lime.

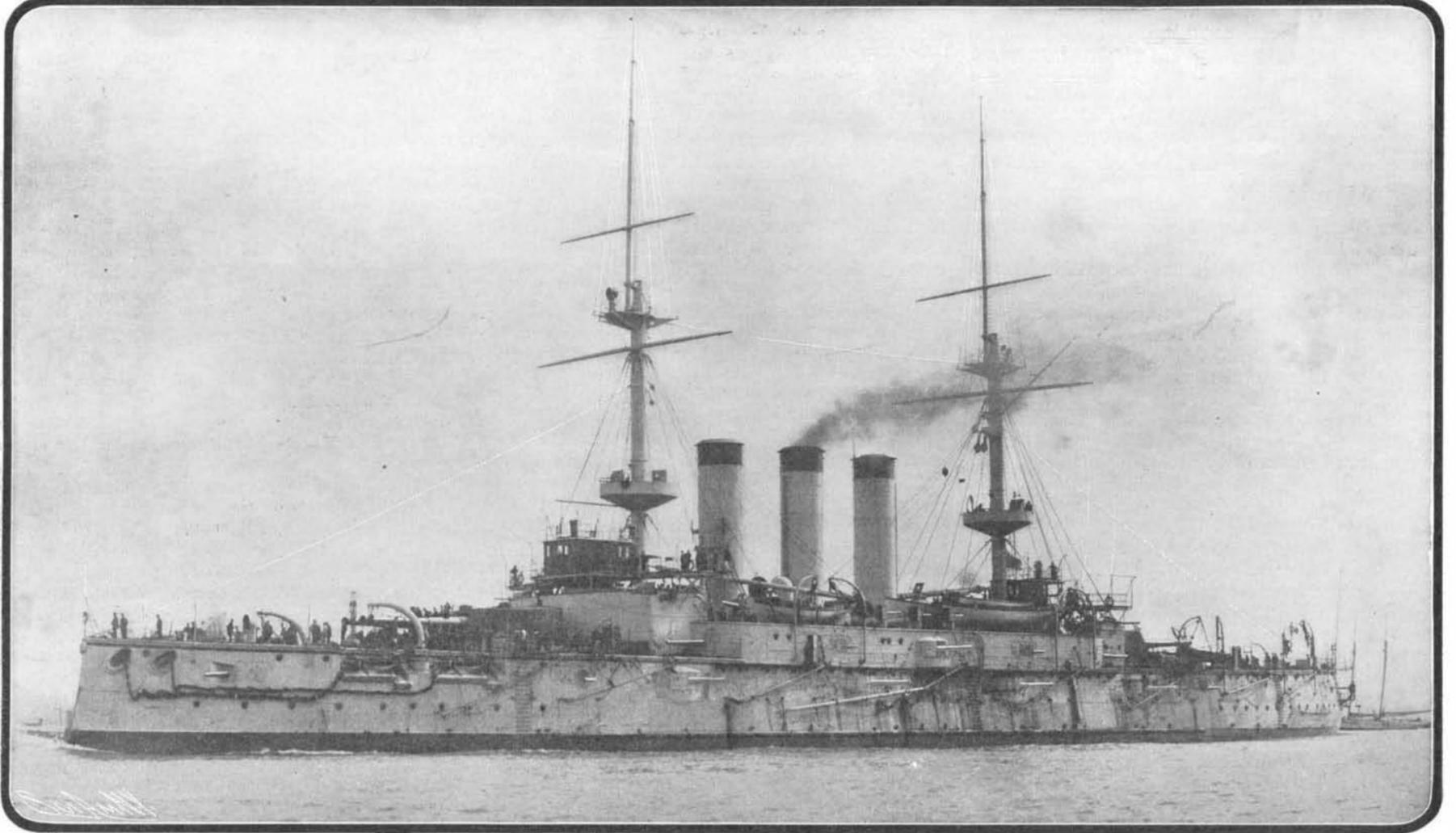
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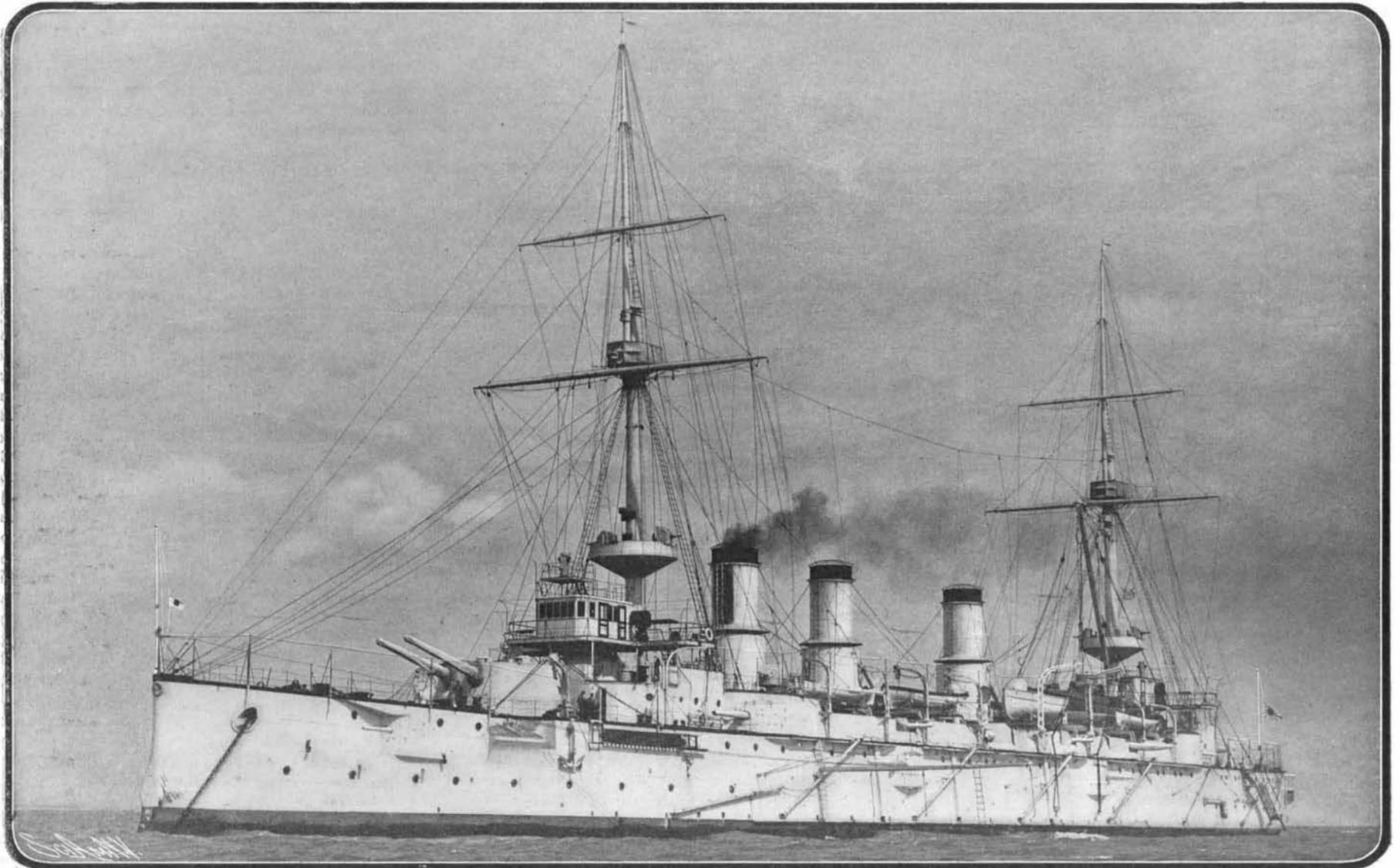
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NEW YORK, FEBRUARY 13, 1904.

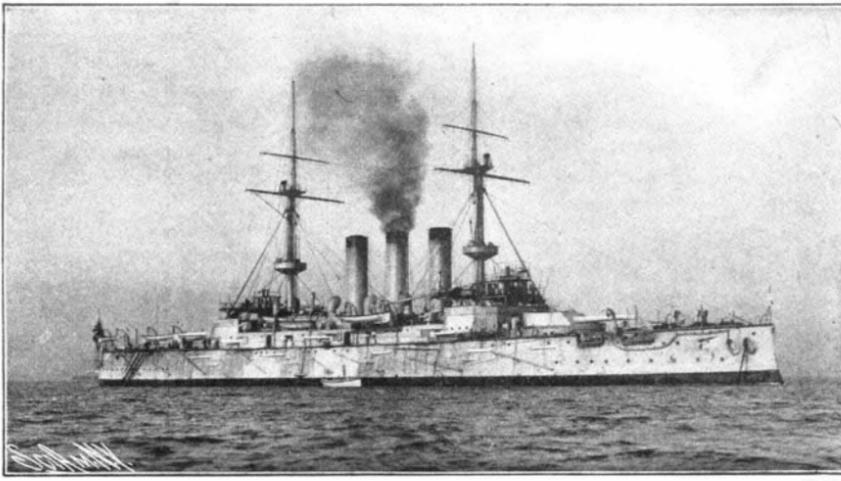
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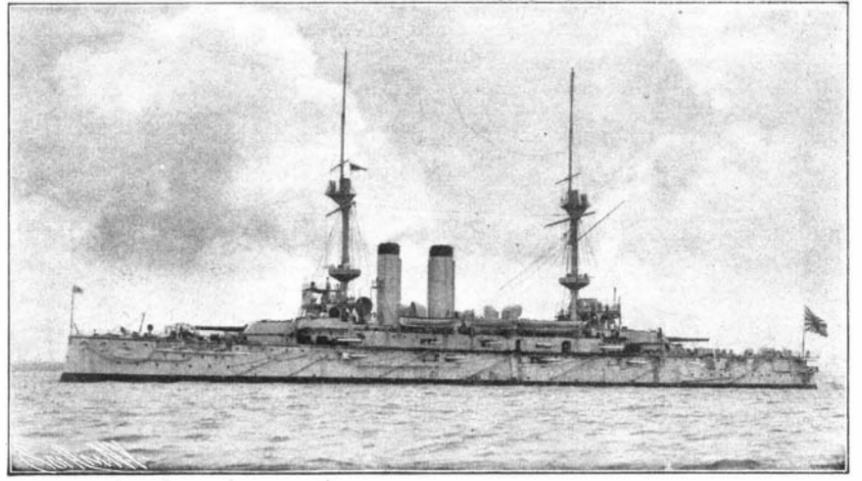
Displacement, 14,850 tons. Speed, 18.5 knots. Bunker capacity, 1,400 tons. Armor: Harvey-nickel. Belt, 9 in. to 4 in.; Side armor, 6 in.; Deck, 4 in.; Bulkheads, 14 in.; Barbets, 14 in.; Shields, 10 in.; Casemates, 6 in. **Armament:** Four 12-in.; Fourteen 6-in.; Twenty 3-in.; Fourteen smaller guns. **Torpedo tubes:** 4 submerged, 1 above water.
JAPANESE BATTLESHIP "SHIKISHIMA." COMPLETED IN 1899.



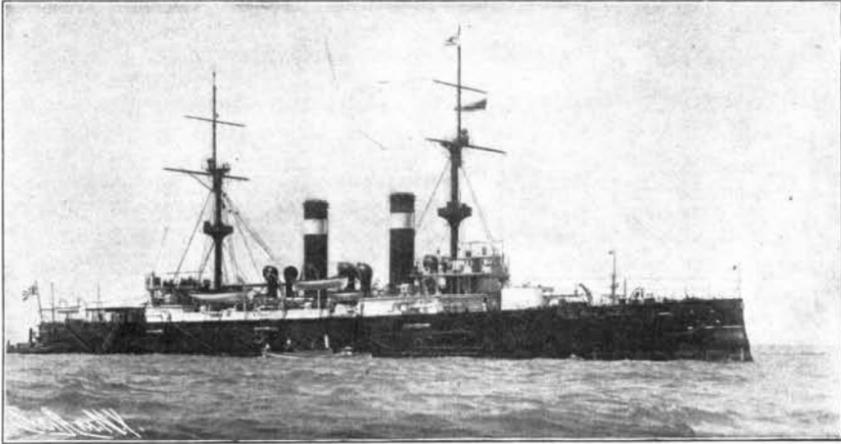
Displacement, 9,436 tons. Speed, 21 knots. Bunker capacity, 1,300 tons. Armor: Krupp steel. B. It, 7 in. to 3½ in.; Side armor, 5 in.; Deck, 2½ in.; Gun turrets and bases, 6 in.; Casemates, 6 in. **Armament:** Four 8-in. R. F.; Twelve 6 in. R. F.; Twelve 3-in. R. F.; Twelve small guns. **Torpedo tubes:** 4 submerged, 1 above water.
JAPANESE ARMORED CRUISER "ADZUMA." COMPLETED IN 1901.—[See page 134.]



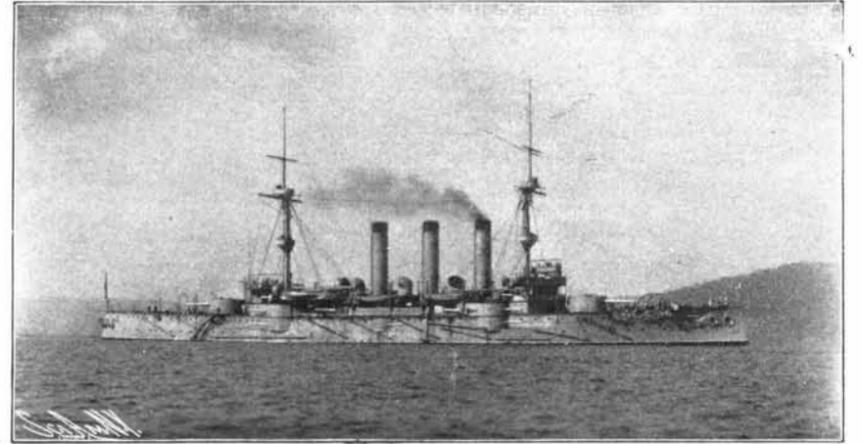
Displacement, 15,000 tons. Speed, 19.1 knots. Bunker Capacity, 1,500 tons. Armor (Harvey-nickel): belt, 9 inches to 4 inches; side, 6 inches; deck, 4 inches; barbettes, 14 inches; shields, 10 inches; casemates, 6 inches. **Armament:** four 12-inch; fourteen 6-inch; twenty 3-inch; 14 small guns. **Torpedo Tubes, 4** submerged.
Battleship "Hatsuse." Completed in 1900.



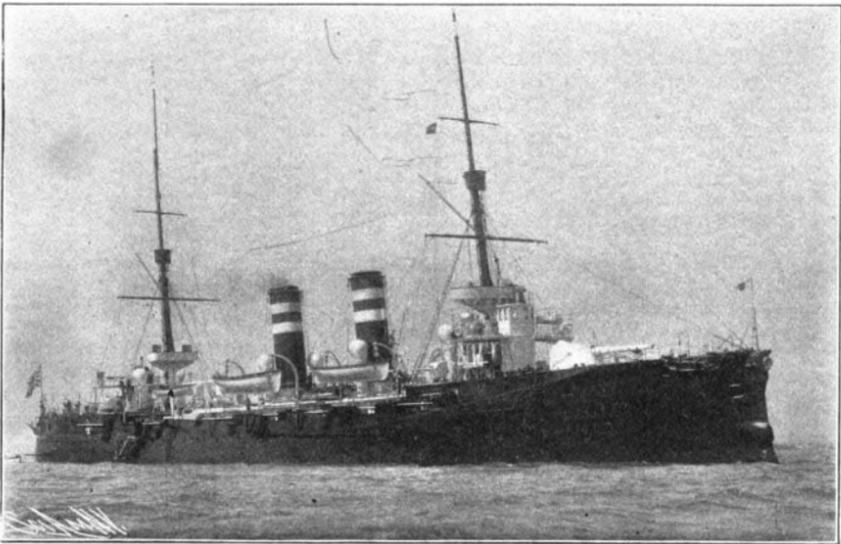
Displacement, 15,200 tons. Speed, 18.3 knots. Bunker Capacity, 1,400 tons. Armor (Harvey-nickel): belt, 9 inches to 4 inches; side, 6 inches; deck, 4 inches; barbettes, 14 inches; shields, 10 inches; casemates, 6 inches. **Armament:** four 12-inch; fourteen 6-inch; twenty 3-inch; 14 small guns. **Torpedo Tubes, 4** submerged.
Battleship "Asahi." Completed in 1900.



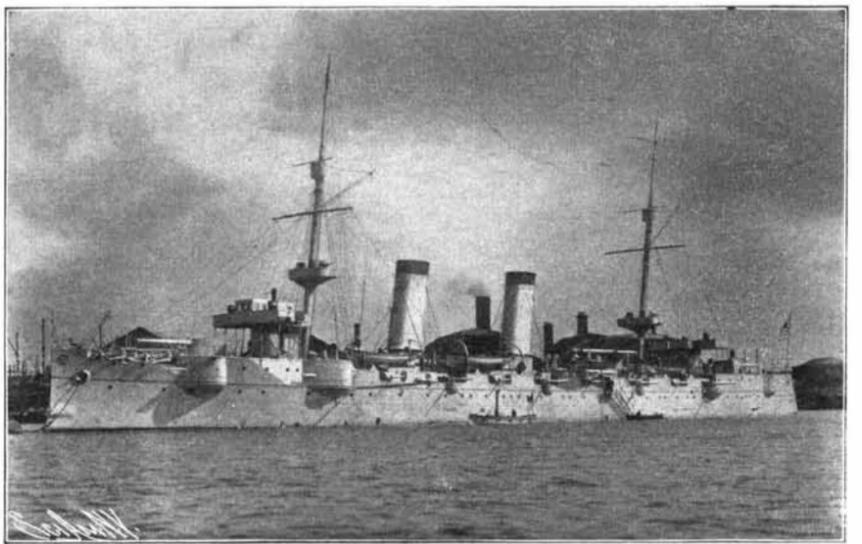
Displacement, 9,700 tons. Speed, 23 knots. Bunker Capacity, 1,300 tons. Armor (Harvey-nickel): belt, 7 inches to 3½ inches; deck, 2½ inches; side, 5 inches; 8-inch gun turrets, 6 inches; casemates, 6 inches. **Armament:** four 8-inch; fourteen 6-inch; twelve 3-inch; seven smaller guns. **Torpedo Tubes, 4** submerged, 1 above water with 6-inch armor.
Armored Cruiser "Asama." Completed in 1899.



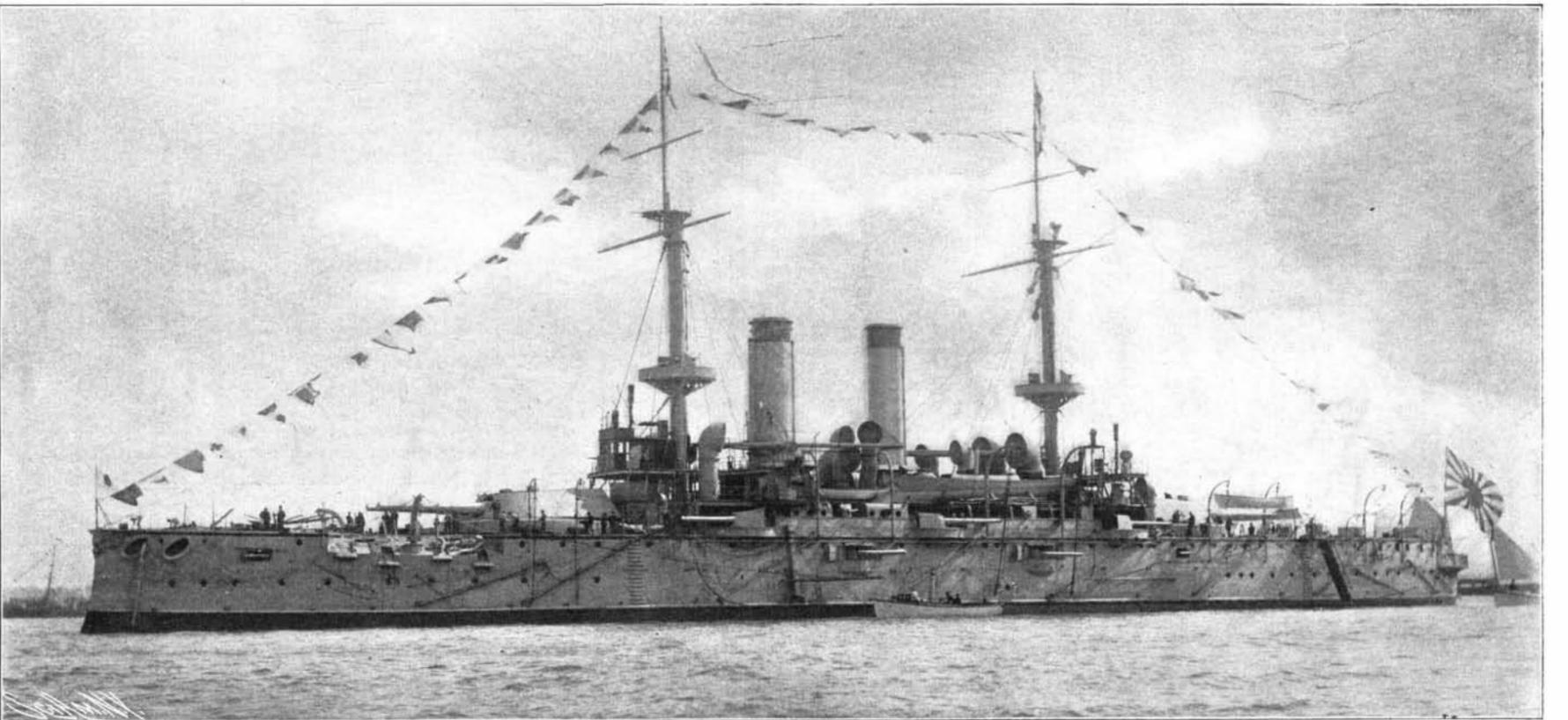
Displacement, 9,800 tons. Speed, 21.8 knots. Bunker Capacity, 1,300 tons. Armor (Krupp): belt, 7 inches to 3½ inches; deck, 2½ inches; side, 5 inches; 8-inch gun turrets, 6 inches; casemates, 6 inches. **Armament:** four 8-inch; fourteen 6-inch; twelve 3-inch; 12 smaller guns. **Torpedo Tubes, 4** submerged.
Armored Cruiser "Iwate." Completed in 1901.



Displacement, 4,300 tons. Speed, 24 knots. Bunker Capacity, 1,000 tons. Armor (Harvey-nickel): deck, 4½ inches; 8-inch gun shields, 4½ inches; 4.7-inch gun shields, 2½ inches. **Armament:** two 8-inch; ten 4.7-inch; 18 smaller guns. **Torpedo Tubes, 5** above water.
Protected Cruiser "Takasago." Completed in 1898.



Displacement, 4,760 tons. Speed, 22.76 knots. Bunker Capacity, 1,000 tons. Armor (Harvey-nickel): deck, 4½ inches; 8-inch gun shields, 4½ inches; 4.7-inch gun shields, 2½ inches. **Armament:** two 8-inch; ten 4.7-inch; 18 small guns. **Torpedo Tubes, 4** above water
Protected Cruiser "Kasagi." Completed in 1898.



Displacement, 12,500 tons. Speed, 19.3 knots. Bunker Capacity, 1,500 tons. Armor (Harvey-nickel): belt, 18 inches; deck, 2½ inches; bulkheads, 14 inches; side, 4 inches; barbettes, 14 inches; shields, 6 inches; casemates, 6 inches. **Torpedo Tubes, 4** submerged, 1 above water.
Battleship "Fuji." Completed in 1897. Also Sister Ship "Yashima."
THE JAPANESE NAVY.—[See page 184.]