

NAVIES OF THE WORLD.

VII. JAPAN.

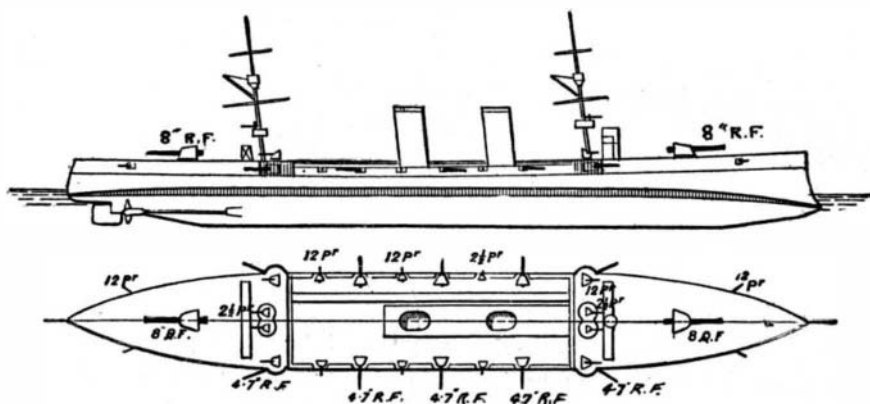
At such a time as the present, when Japan is taking the momentous steps which will constitute her one of the great family of nations, it would be unpardonable, in a series of articles on the navies of the world, to omit from the list the Japanese navy—the youngest and, in proportion to its numbers, perhaps, one of the most formidable of them all. Starting under the impulse of the famous victory of the Yalu, and carefully observing its tactical and technical lessons, this young giant of the Pacific has built up in less than half a decade a navy which is to be reckoned as of the first class in every point but that of numbers. As will be seen from the table herewith, the navy contains five first-class battleships with an average displacement of close to 14,000 tons and an average speed of over 18½ knots. Every one of these vessels has been launched since 1896, carries the latest high power guns, and is protected with either Harveyized or Krupp steel. To these must be added the "Chin-Yen," a second-class battleship, a little larger than our "Texas," which has been thoroughly overhauled by the Japanese since she was captured in the Chinese war. Next in importance are the five powerful armored cruisers which are completed and building in British and French yards. They are larger than our "Brooklyn," more powerfully armed, and of about the same speed. Next in the order of importance are eight protected cruisers of about 4,400 tons displacement and an average speed of 21 knots. Four of these have been built in American and British yards and have shown speeds of from 23 to 24 knots, being, indeed, the fastest ships of their

ships and won a practical victory. On the other hand, although the Chinese battleships "Ting Yuen" and "Chen Yuen" were terribly cut to pieces in their unarmored portions and the crews decimated, the belt and the barbette armor around the main gun positions was practically intact. Moreover, shells from the 12-inch guns of these ships had wrought terrible havoc on the Japanese unarmored vessels, Admiral Ito's flagship being put out of action, with the loss of 90 officers and men killed and wounded, by a single 12-inch shell that came aboard between decks.

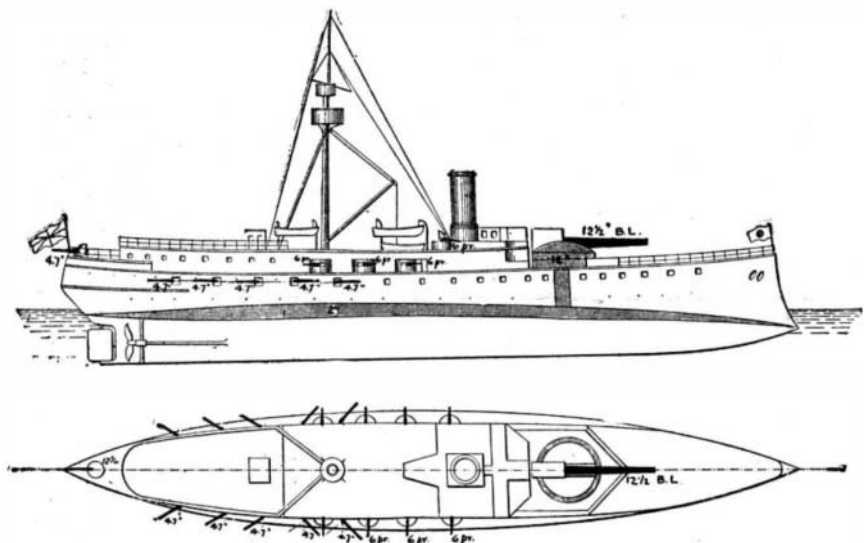
Among the first orders placed after the war was one for two first-class battleships, the "Yashima" and "Fuji." The former was built at Elswick, the latter on the Thames, and both have been turned over to the government. In size these two ships are about 2,000 tons smaller than the "Royal Sovereign" class of the British navy; but they are a knot and a half faster

"Shikishima," now building at the Thames Iron Works, and her mate (not yet named), which is under construction at Elswick (Armstrongs). They are improved "Fujis," the weaker points in the earlier vessels being strengthened in accordance with general drift of battleship construction. Thus the belt is made continuous from bow to stern; the deck is increased in thickness from 2½ to from 3 to 5 inches; the armament is increased by raising the strength of the rapid-fire battery from ten to fourteen 6-inch rapid-fire guns, and substituting twenty 12-pounders for the twenty 3-pounders on the "Fuji." The six 6-inch guns on the main deck are also placed in 6-inch casemates. The normal coal supply is to be 700 tons, the complement 741, and the displacement 14,850 tons.

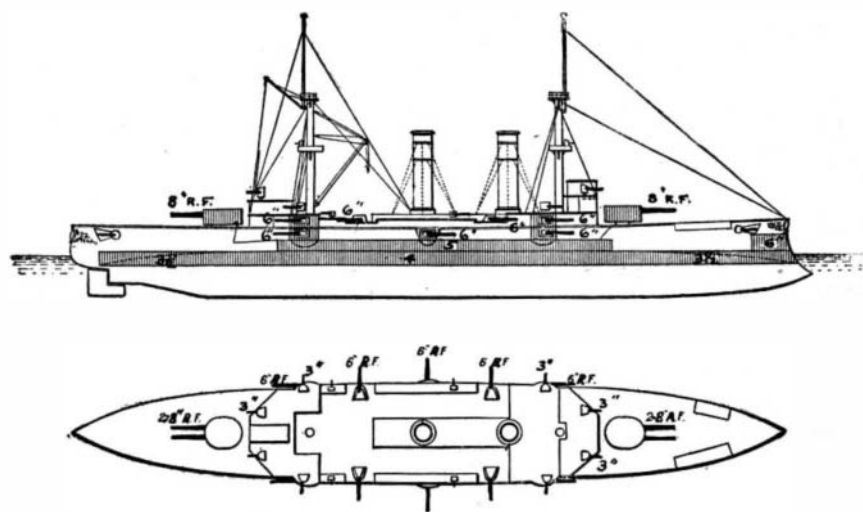
The latest battleship to be laid down is an improvement over the "Shikishima," and is very similar to the "Formidable" class now building for the British navy. With a displacement of 15,200 tons the "Asahi" is the largest warship in the world. Her armor is more complete than that of the "Shikishima," the 9-inch main belt extending from end to end at the waterline and up to the berth deck amidships. Two of the fourteen 6-inch guns that are on the main deck on the "Shikishima" are placed on the gun deck in the "Asahi," which thus has a battery of ten 6-inch long-caliber rifles protected by 6 inches of Harvey steel. The four 6-inch guns on the main deck are placed in 6-inch casemates. The speed with 15,000 horse power will be about 19 knots. The battleship "Chin Yen" is the former Chinese "Chen Yuen," which acquitted itself so creditably in the battle of the Yalu. She was built at Stettin, Germany, in 1882. The following are her chief



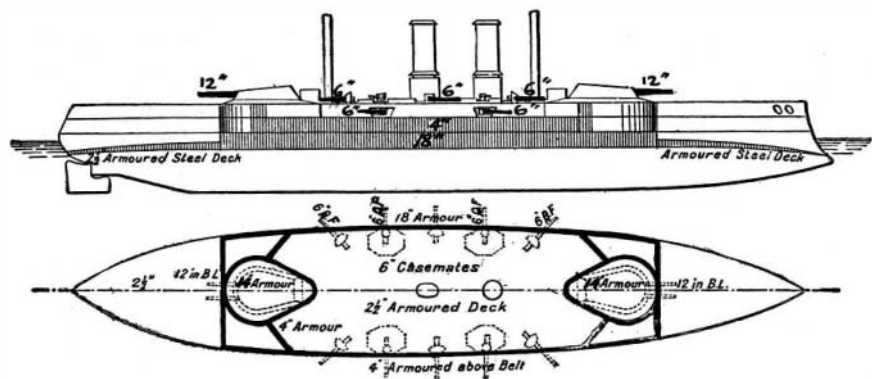
Protected Cruiser "Takasago." Class of Four Ships. The "Takasago" and mate: Displacement, 4,300 tons. Speed, 24 knots. The "Chitose" and "Kasagi": Displacement, 4,760 tons. Speed, 23.7 and 22.5 knots.



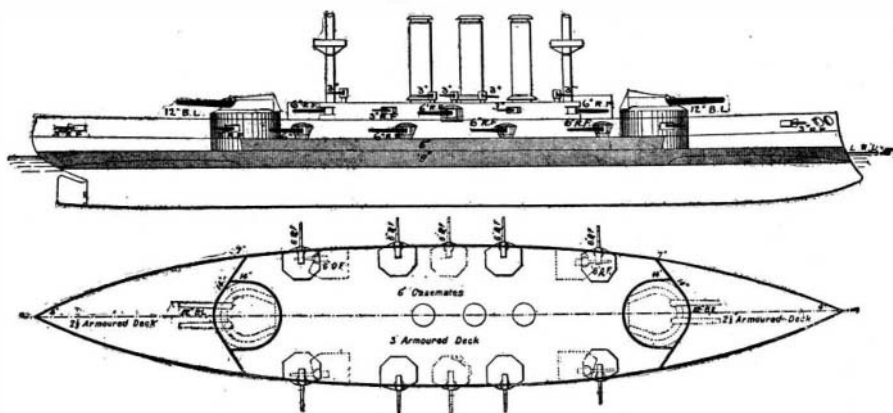
Protected Cruisers "Itsukushima" and "Hashidate." Also with modifications, "Matsushima." Displacement, 4,277 tons. Speed, 17.5 knots.



Armored Cruiser "Asama." Class of Three Ships. Displacement, 9,750 tons. Speed, 22 knots. Also two ships of about same displacement and less speed and lighter armament.



First-class Battleships "Fuji" and "Yashima." Displacement, 13,320 tons. Speed, 18.2 and 19.2 knots.



First-class Battleships "Shikishima" and mate. Also, with modifications, the "Asahi." Displacement, 14,850 tons. Speed, 18.5 tons. Armor: Main belt, 9 inches; upper belt, 6 inches; deck, 3 to 5 inches; gun positions, 14 and 6 inches. Armament, four 12-inch, fourteen 6-inch rapid-fire, twenty 3-inch, eight 3-pounders, four 2½-pounders. Torpedo Tubes, 5. Date, 1899.

NAVIES OF THE WORLD—VII. JAPAN.

class in the world. The balance of the navy, with the exception of some modern gunboats and smaller cruisers, antedates the China-Japan war of 1894-95, but is of fairly modern construction.

The two most important lessons learned by the Japanese in the war with China were the immense value of the rapid-fire gun and the great powers of resistance of the modern battleship. The Japanese fleet at the Yalu did not include a single battleship, all of the vessels being of the cruiser type; but the armament of the fleet was chiefly made up of modern rapid-fire weapons, and while the unprotected nature of the vessels rendered it unwise to risk an action at close quarters with the two battleships which constituted the chief fighting element of the Chinese fleet, the rapid-fire guns at a range of several thousand yards cut through the unarmored portions of the enemy's

and carry a larger coal supply. The Harveyized armor moreover is superior to the compound armor of the "Royal Sovereign," and the Armstrong guns, though lighter, are of a later pattern and of greater power. The waterline belt is 18 inches in thickness and the upper belt 4 inches. The barbettes of 14-inch armor carry each two 12-inch B. L. rifles, and the rapid-fire battery amidships consists of ten 6-inch rapid-fire guns disposed four in casemates of 6-inch steel on the gun deck and six behind 6-inch shields on the main deck. Twenty-four 3-pounders and 2½-pounders are distributed on the gun deck, main deck, and in the tops. These ships are to-day among the fastest battleships afloat, the "Fuji" having made 18.5 knots and the "Yashima" 19.2 knots on her trial, rivaling the fast battleships of the Italian navy.

The "Fuji" and "Yashima" were followed by the

particulars: Displacement, 7,400 tons; speed, 14 knots; belt armor, 14 inches; gun positions, 12 inches; deck, 3 inches; armament, four 12-inch old pattern Krupp guns and ten 5.9-inch rifles.

The three armored cruisers building at the Armstrongs are sister ships. The "Asama," of which we present an illustration, is completed and the "Tokihwa" and an unnamed vessel are under construction. The "Asama" is an extremely powerful ship, either for offense or defense. Her armor protection weighs altogether over 2,000 tons. It comprises a continuous belt 7 inches thick amidships, sloping to 3½ inches at the ends. An upper belt 5 inches thick reaches to the gun deck and on this deck are six 6-inch rapid-fire guns in 6-inch casemates. On the main deck are eight more 6-inch rapid-fire guns, four in 6-inch casemates, and four behind shields. Forward on the same deck is an

SCIENTIFIC AMERICAN

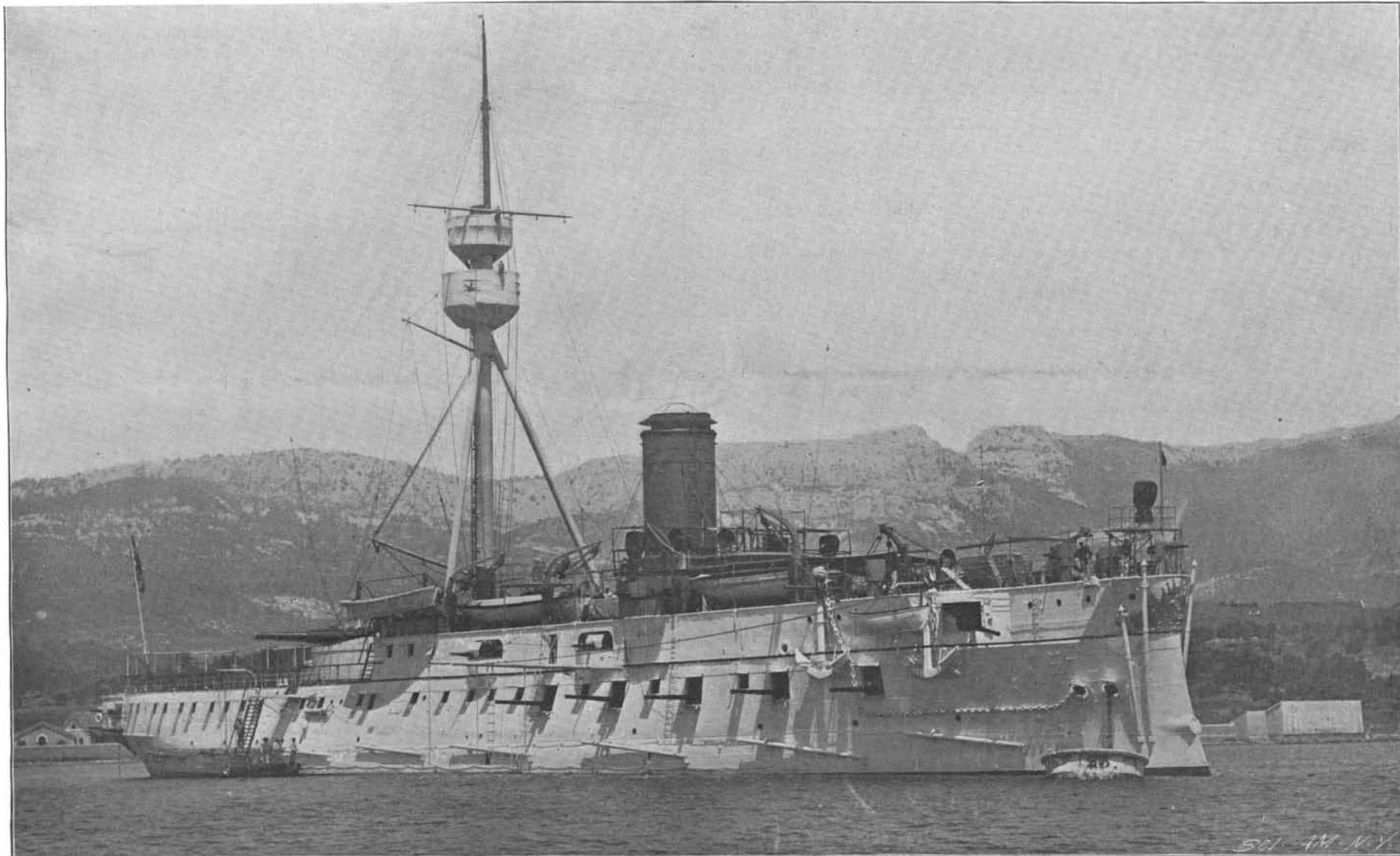
[Entered at the Post Office of New York, N. Y., as Second Class Matter. Copyright, 1899, by Munn & Co.]

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

Vol. LXXXI.—No. 5. |
ESTABLISHED 1845.

NEW YORK, JULY 29, 1899.

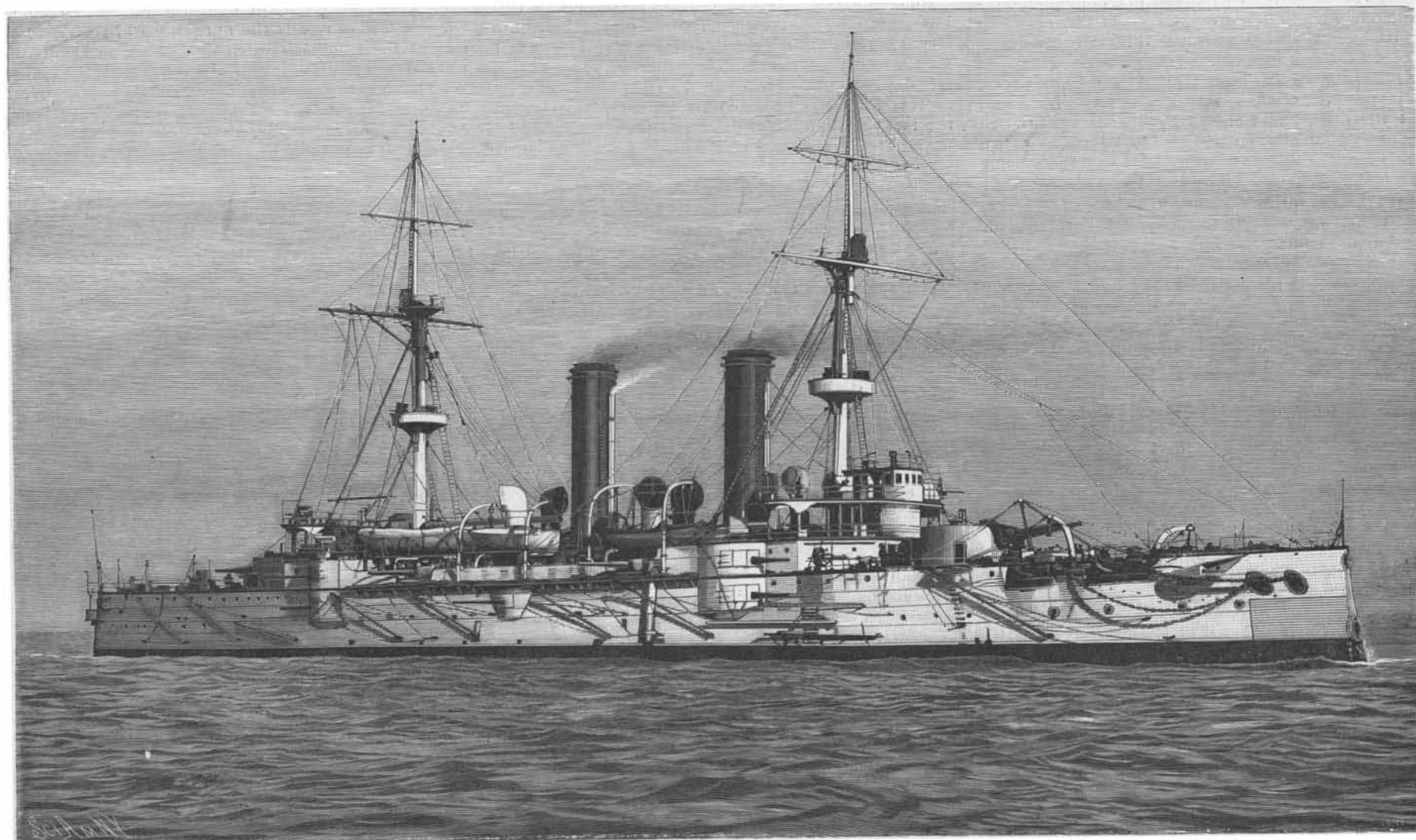
[\$3.00 A YEAR.
WEEKLY.]



From Photograph by Symonds & Company, Portsmouth, England.

1.—Protected Cruiser "Matsushima"—Admiral Ito's Flagship in the Battle of the Yalu.

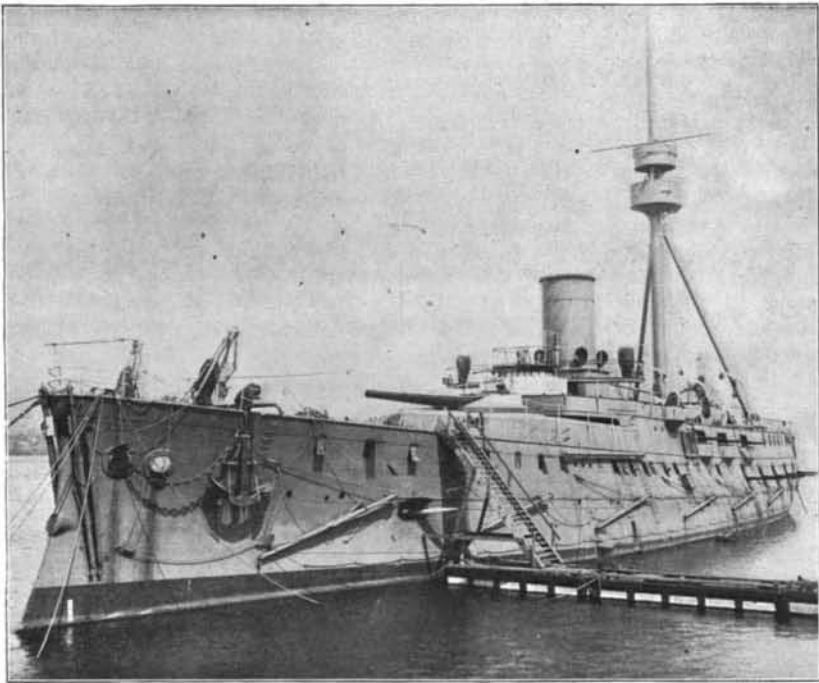
Displacement, 4,277 tons. Speed, 17.5 knots. Normal Coal Supply, 400 tons. Armor: Protective deck, 2 inches; main gun position, 12 inches; rapid fire battery, light shields. **Armament, one 12.5-inch B. L. rifle, twelve 4.7-inch rapid-firers, five 6-pounders, eleven 3-pounders, six machine guns. Torpedo Tubes, 4. Complement 350. Date, 1890.**



2.—Armored Cruiser "Asama." Class of Three Ships.

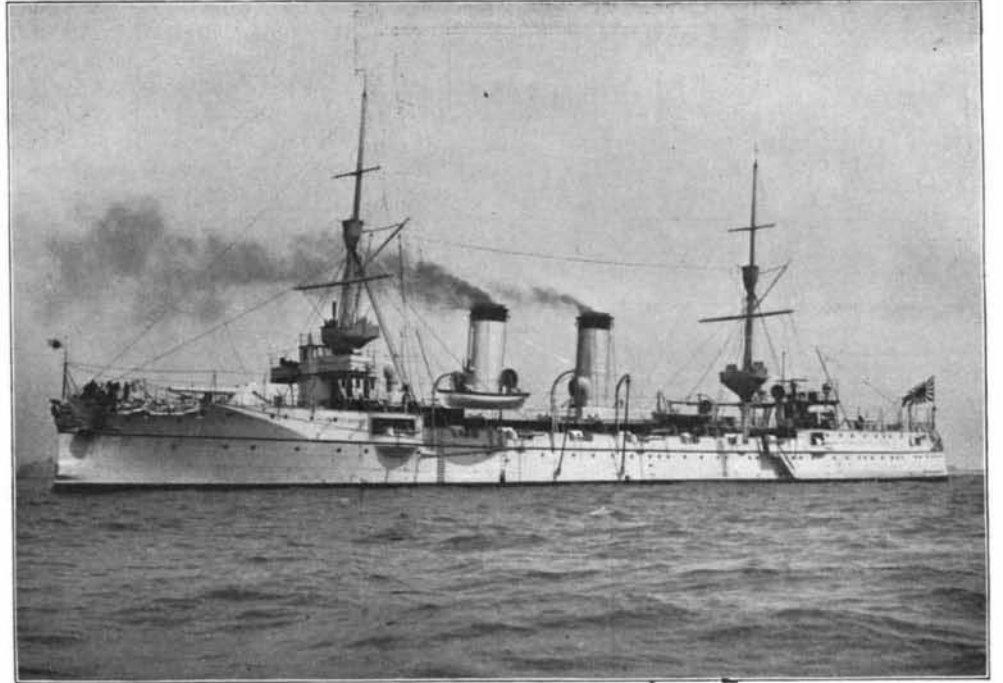
Displacement, 9,150 tons. Speed, 22.7 knots. Maximum Coal Supply, 1,450 tons. Armor: Main belt, continuous, 7 inches amidships, 3½ inches at ends; upper belt, 5 inches; turrets, 8 inches; casemates, 6 inches; deck, 2 inches. **Armament, four 8-inch rapid-firers, fourteen 6-inch rapid-firers, twelve 12-pounders, eight 3-pounders. Torpedo Tubes, one in bow behind 6-inch armor, four submerged. Complement, 500. Date, 1898.**

NAVIES OF THE WORLD—VII. JAPAN.—[See page 72.]



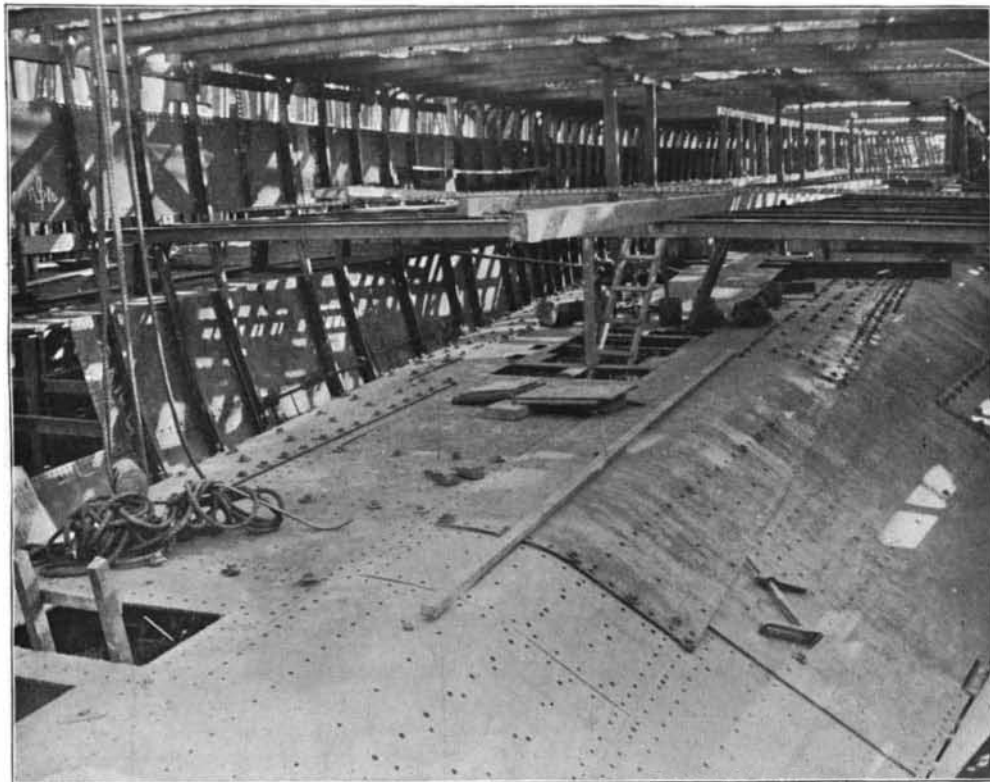
Photograph by Symonds & Co.

3.—Protected Cruiser "Itsukushima." Also "Hashidate,"
Displacement, 4,277 tons. Speed, 17 knots. Normal Coal Supply, 400 tons. Armor: Deck, 2 inches; main gun position, 12 inches. **Armament, one 12.5-inch B. L. rifle, eleven 4.7-inch rapid-fire guns, five 6-pounders, eleven 3-pounders, six machine guns. Torpedo Tubes, 4. Complement, 350. Date, 1867.**

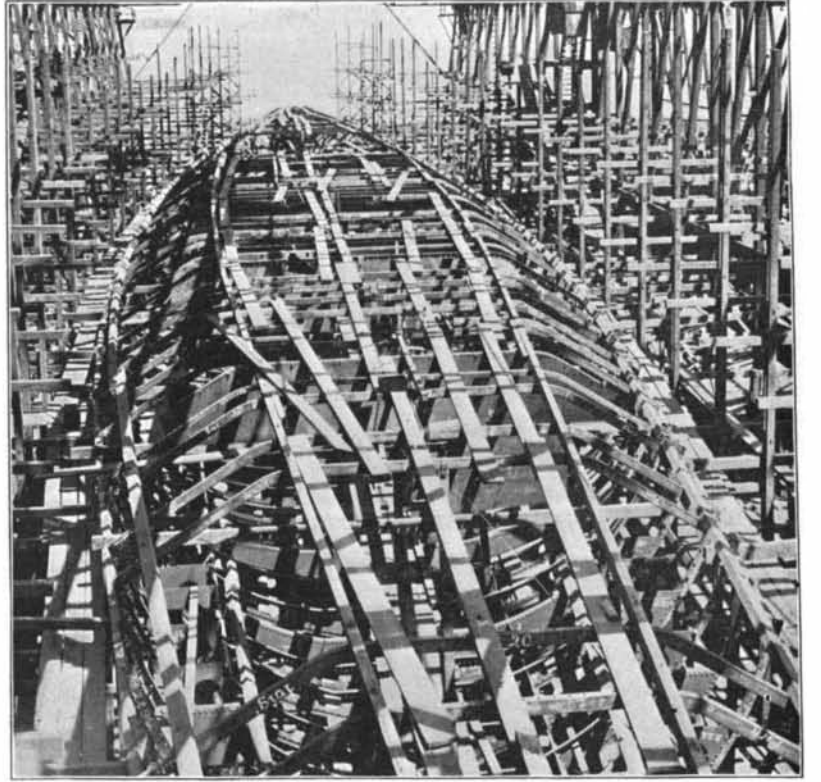


Photograph by Symonds & Co.

4.—Protected Cruiser "Takasajo." Class of Four Ships.
Displacement, 4,300 tons. Speed, 24 knots. Maximum Coal Supply, 1,000 tons. Armor: deck, 4 1/2 inches; shields, 4 1/2 inches. **Armament, two 8-inch rapid-firers, ten 4.7-inch rapid-firers, sixteen 3-pounders. Torpedo Tubes, 5. Complement, 400. Date, 1898.**



5.—Armored Deck Plated in; Side Framing Carried to Main Deck.



6.—Armored Deck in Frame.

CONSTRUCTION OF THE PROTECTED CRUISER "CHITOSE" AT UNION IRON WORKS, SAN FRANCISCO.

NOTE.—The "Chitose" and "Kasagi," the latter built at the Cramps' yard, differ from the "Takasajo" as follows: Displacement, 4,760 tons. Speed, "Chitose," 23.7; "Kasagi," 22.5; and they carry 12-pounders in place of 8-pounders.



From Photograph by Symonds & Company, Portsmouth, England.

7.—First-class Battleship "Fuji." Also "Yashu ma."
Displacement, 13,320 tons. Speed, 18.2 knots. Normal Coal Supply, 1,100 tons. Armor: Main belt, 18 inches; upper belt, 6 inches; main gun positions, 14 inches; secondary battery, 6 inches; deck, 2 1/2 inches. **Armament, four 12-inch B. L. rifles, ten 6-inch rapid-firers, twenty 3-pounders, four 2 1/2-pounders. Torpedo Tubes, 5 (4 submerged). Complement, 600. Date, 1896.**

NAVIES OF THE WORLD—VII. JAPAN.

JAPANESE NAVY.

DESCRIPTION OF TYPE.	Number of Ships.	Average Displacement.	Total Displacement.	Average Speed.
Battleships, 10 years or less.	5	13,908	69,540	18.7
Battleships, to 20 years.	1	.....	7,400	14.0
Totals.....	6	.....	76,940	.....
Coast Defense Vessels.	2	2,859	5,718	12.1
Armored Cruisers, over 9,000 tons.	5	9,707	48,536	21.1
Armored Cruisers, Below 5,000 tons.	3	2,283	6,850	15.0
Totals.....	8	.....	55,386	.....
Protected Cruisers over 4,000 tons.	8	4,391	35,131	21.0
Protected Cruisers, 2,000 to 4,000 tons.	7	3,021	21,150	18.6
Totals.....	15	.....	56,281	.....
Small Cruisers and Gunboats.	15	1,169	17,53	16.0
Grand totals.....	46	.....	211,857	.....

8-inch steel turret carrying a pair of 8-inch rapid-firers, and another similar turret is mounted aft. A peculiar feature on these vessels is that 6 inches of steel plating protects the bow torpedo discharge, the plating extending 25 feet back from the bow. This plating is shown by a darker shade in the engraving of this vessel. The other four torpedo-discharges are below the water line. The maximum coal supply is 1,450 tons. The trial speed under natural draught was 20.4 knots, and under forced draught 22.07 knots. The concentration of fire is two 8-inch and four 6-inch forward or aft, and four 8-inch and seven 6-inch on either broadside. With their good protection, powerful batteries and high speed these vessels are comparable to anything in this class at present afloat. The two other armored cruisers of this class are the "Azuma," 9,436 tons, building at Rochefort, and the "Yakumo," of 9,850 tons and 20 knots, building at Stettin. The armament in each vessel is smaller by two 6-inch guns, otherwise they are similar to the "Asama." The other armored cruisers are the "Chiyoda," of 2,450 tons and 17.5 knots, carrying ten 4.7-inch rapid-fire guns, built in 1889, and two ships built 20 years ago, the "Hi-yei" and "Kon-go," of 2,200 tons, now used as training ships. Each carries three 6.6-inch and six 5.9-inch Krupp guns.

Among the protected cruisers the most interesting vessels historically are the sister ships "Matsushima," "Hashidate," and "Itsukushima," all of which were prominent at the Yalu. They are similar in all respects but two, the first named carrying her 12.5-inch gun in a barbette aft of the secondary rapid-fire battery and the other two carrying it forward, as shown in the respective engravings of the ships. No vessels possessing the peculiarities of these vessels exist in any other navy, for although they carry no side armor and only a light protective deck, they mount a gun which is even to-day one of the most powerful in the world. It is protected by a barbette of 12-inch armor, and an armored tube leads from the barbette to the magazine below the protective deck. The combination is not a happy one, for the unprotected condition of these vessels would prevent them from engaging the heavily armored ships against which their 12.5-inch guns should properly be directed. As it was, the few 12-inch shells from the Chinese battleships that did land, wrought fearful execution, a single shell that entered the "Matsushima" dismounting two of the guns in the 4.7-inch rapid-fire battery, and killing nearly one hundred officers and men. The rapid-fire battery on the "Matsushima" consists of twelve 4.7-inch rapid fire guns and on the sister ship of eleven of this caliber. The displacement of these vessels is 4,277 tons and the speed 17.0 knots to 17.5 knots.

The four sister ships of the "Chitose" and "Kasagi" protected cruiser class have especial interest for Americans from the fact that these two vessels were built in American yards, the former by the Union Iron Works, of San Francisco, and the latter by the Cramps, of Philadelphia. The two other ships of this class, the "Takasago" and another, as yet unnamed, are completing at the Armstrongs. The "Chitose" and "Kasagi," launched in 1897 and 1898, are of 4,760 tons displacement and 22.5 knots contract speed. This latter was exceeded in the case of the "Chitose," which made 23.7 knots on her trial trip. The protective deck, 1 3/4 inches on flats and 4 1/2 inches on slopes, is the sole armor protection to the hull. Two of our views show the protective deck of the "Chitose" in process of construction. The armament in each ship consists of two 8-inch Armstrong rapid-fire guns, mounted one forward on the forecabin deck and one aft on the poop behind shields; ten 4.7-inch rapid-fire guns in broadside on the main deck, and twelve 12 pounders, with two 6-pounders and two 2 1/2-pounders. There are 5 torpedo tubes.

The Armstrong built ships are somewhat smaller (4,300 tons), and their contract speed is 24 knots, or 1 1/2 knots greater. They carry the same armament except that 3-pounders take the place of the 12-pounders. In speed these ships compare favorably with our "Columbia" and "Minneapolis," while their battery is greatly superior. They would prove dangerous vessels in the work of commerce destroying.

The other seven protected cruisers have an average displacement of 3,021 tons, and an average speed of 18.6 knots. They carry modern rapid-fire batteries, and are serviceable, up-to-date ships; but there is nothing in their design that calls for special mention. The small cruisers and gunboats, of which there are fifteen, have an average displacement of 1,169 tons. With a few exceptions, they are modern vessels and quite up to the standard of vessels of other navies in the same class.

The fate of the Spanish fleets in the late war has taught us that fine ships may be rendered ineffective by neglect, inefficiency, and disregard of the principles of strategy and tactics. Japan has a truly magnificent navy, second to none in fighting and sea-keeping qualities. Has she a naval administration, a trained personnel, and the requisite courage and staying power among her crew to match it? We think she has abundantly proved that she has, and there is every reason to believe that the tactical skill and steady courage and discipline which won the first pitched battle to occur between modern navies will prove to be abiding characteristics of the Japanese navy.

An Important Air Brake Decision.

An opinion, written by Judge Shipman, was handed down by the United States Circuit Court of Appeals July 18, affirming the decision of the Circuit Court, Judge Wallace, in favor of the New York Air Brake Company. For the past two years there has been litigation between the Westinghouse Air Brake Company and the New York Air Brake Company over an alleged infringement of patents by the latter corporation.

The Westinghouse Company contended that the device owned by the New York Air Brake Company infringed claims 1, 3, 4, 5, and 6 of patent 538,001, which was granted in 1895; and also claims 3 and 5 of patent 382,023, granted in May, 1888.

The decision, written by Justice Shipman, is in part as follows:

The Westinghouse patent of 1895 was an improvement upon the quick-action air brakes described in letters patent 360,070 and 376,837, which were issued to Mr. Westinghouse, and which have frequently been the subject of litigation in the Federal courts. The device of 376,837 has gone into universal use and has been the standard quick-action air brake upon long freight trains in this country. Westinghouse, in his attempt to create immediate service upon each car of a long train, enlarged the venting system so that when reduction of train pipe pressure had commenced by the turn of the engineer's valve, the triple valve under each car should also vent the train pipe of that car. Each car contained its own venting mechanism. Westinghouse also saved power by compelling the compressed air thus vented to pass into the brake cylinder instead of into the open air.

In 1892 Mr. Westinghouse made a new invention, by means of which he vented the train pipe air into the brake cylinder by the use of a compound piston connected to the brake cylinder piston. A valve in a passageway leading directly from the train pipe to the brake cylinder controlled the discharge of air from the train pipe. The application for a patent on this later invention was filed in March, 1892. Changes were made in the claims and the application lay in the office for about three years, but there was no suggestion that the invention had a broader scope than a new method of venting the air of the brake cylinder until after March 6, 1895, when the defendant's counsel sent to the complainant's counsel for their examination a statement and a description of the new air brake machinery which the defendant proposed to adopt and by which the train pipe was vented into the atmosphere. Thereupon, as it was deemed that the atmospheric pressure venting employed the compound piston method of venting into the brake cylinder which was contained in the pending application of March, 1892, six new claims were caused to be added to the application, which, by the use of general language, enlarged the claims so as to make them apply to the device when used in air brakes. This amendment was allowed, and the patent was issued accordingly. Claims 1 and 6 are the amended and claims 7 and 13 are the restricted claims.

The contention on the part of the complainant is that the invention was actually of a broad and primary character, and was "a train-pipe vent-valve directly operated by a piston, which is the secondary part of a compound piston so organized that the opening of the vent-valve is dependent upon the manner or rate of movement of the primary part of such compound piston." The defendant is of the opinion that the mode by which the train pipe is vented to the brake cylinder constituted the scope of the invention.

It is manifest that the inventor meant to confine himself to the investigations which resulted in the application of 1892 to the system which he had previously perfected. It seems clear that the invention was merely an alteration in a pre-existing perfected system, and was not of a primary character. We are, therefore, of the opinion that the claims inserted by amendment in 1896 must be limited to a piston attached to or moved by the brake cylinder piston for venting the train pipe into the brake cylinder.

The defendant caused its new device, known as valve C, to be invented for the purpose of escaping from the Westinghouse system of venting exclusively into the brake cylinders. It vents into the atmosphere, and uses for that purpose a compound piston, which is a part of the triple valve piston, the action of which is not dependent upon the brake cylinder piston. It follows from the construction which we have given to the patent of 1896 that the defendant's device known as valve C is not an infringement.

Some Curiosities of Our Calendar.

"As we are at the beginning of a year," says La Science pour Tous, "there is still time to recall certain curiosities of the Gregorian calendar. Thus, since the reform of the calendar by Pope Gregory XIII. in 1582, no century can begin with a Wednesday, a Friday, or a Sunday. Also the same calendar can be used every twenty years. January and October of the same year always begin with the same day. So do April and July, also September and December. February, March, and November also begin with the same day. New Year's Day and St. Sylvester's Day also fall on the same day, except of course in leap-years. Each day of the week has served as a day of rest somewhere; Sunday among Christians, Monday with the Greeks, Tuesday with the Persians, Wednesday with the Assyrians, Thursday with the Egyptians, Friday with the Turks, and Saturday with the Jews. Finally, the error of the Gregorian calendar, compared with the actual course of the sun, does not exceed one day in four thousand years. As it is quite probable that neither you nor I shall ever verify this, we shall not risk very much by believing the statement."

Origin and Significance of Spines.

Charles E. Brookes has endeavored to arrive at general conclusions relating to the origin and significance of spinosity from the study of plants and animals. He considers that spines, whether prickles, thorns, or horns, represent a stage of evolution, a degree of differentiation in the organism, a ratio of its adaptability to the environment, a result of selective forces, and a measure of vital power. The spines of plants are referable to two main categories. The first is the restraint of the environment causing the suppression of structures; thus, in desert or arid regions leaves and branches may be suppressed to form spines. The other category is intrinsic suppression of structures and functions; this includes those prickles of brambles and climbing plants that are not produced by suppression of stipules, leaves, etc. Spinosity is a limit to variation, since organs of various kinds are changed into spines, but spines are never changed into other organs.—American Journal of Science, through Botanical Gazette, 27, 147.

Poisoning from Artichokes.

M. Roger has reported to the Société de Biologie a small epidemic of gastro-enteritis which occurred in his practice recently, which he was able to trace directly to the ingestion, by those attacked, of preserved or canned artichokes. Examining the contents of one of the boxes, the vegetable was found to be of a handsome, almost natural green color, which at first gave him the idea that he had to deal with the effects of a copper salt. Chemical analysis, however, revealed not a trace of that metal. He then submitted the material to an examination by bacteriological methods, and was able to isolate a coli-bacillus and a micrococcus. The latter, on pure cultivation, was found to have the property, when cultivated on slices of artichoke, of communicating to the latter an intense green color. The micrococcus is pathogenic to the rabbit.

Japanese Railway Bridges.

The last of the eighteen steel bridges built for the Chinese Railway, by the Phoenixville Bridge Works, have been completed and accepted. These bridges were built within ten weeks after the work was begun, and all but three are on their way to Vladivostok, their destination. A St. Petersburg engineer, who has superintended their construction, states that he does not believe there is a concern in Europe where the work could have been done so quickly.

THE Hamburg-American line is continuing its experiment with carrier pigeons for the purpose of conveying news from the vessels at sea either to New York or Hamburg. The "Augusta Victoria" recently set several pigeons free during a voyage to New York; one of these homed from midocean, 1,500 miles to Hamburg, inside of two days.

The Volta Centenary.

Information regarding the electrical exhibition at Como and the Volta Centenary is of rather mournful interest after the recent fire which destroyed the entire exhibition. The site chosen for the buildings was picturesque in the extreme, being located near the southeastern corner of the beautiful lake, says a correspondent of the English Electrical Review, and was easy of access by rail or water. The exhibition building proper consisted of a crescent-shaped galley with façade, the extremities of the towers being constructed in imitation of the well known Voltaic pile. From the back of this construction opened three extensive galleries, the center one terminating in a circular building. Running parallel with the face of the building, and intersecting the center of the circular gallery, were other galleries devoted to electrical exhibits. A very large part of the exhibit consisted of ingenious electrical domestic appliances. Our English contemporary says, "We were surprised to find that in nearly every instance an inspection proved these appliances to be of American manufacture." This paper is of the opinion that as an electrical exhibition it was of little or no importance. At the southern end of the galleries was the exhibit of relics of Volta and Galvani, which we have already illustrated and which were unfortunately nearly all destroyed by the fire.

A TRANSCONTINENTAL AUTOMOBILE VEHICLE.

Our engraving represents Mr. and Mrs. J. D. Davis starting on what will probably be the longest automobile trip on record, the goal being San Francisco. In this country we have not as yet had any very long runs, Cleveland to New York (708 miles) being, we believe, the longest on record. There is no more delightful way of seeing the country than to view it from the comfortably cushioned seats of an automobile vehicle, which is never tired, and knows neither hunger nor thirst. After the industry becomes better established, we would not be at all surprised if automobile trips from New York to Boston or New York to Lake George were of almost daily occurrence during the season when the roads are in good condition.

With a strongly constructed touring car made especially for the purpose there would be no difficulty in making sixty to seventy miles a day over ordinary roads and probably few travelers would care about doing more than forty miles a day. At present carriages using some of the products of petroleum as fuel are the best adapted for touring purposes, but undoubtedly, in time, along all important roads there will be charging stations, so that the electric vehicles will be on the same plane as those driven with the aid of gasoline or benzine.

We understand from press accounts that Mr. and Mrs. Davis are making satisfactory progress in their trip, notwithstanding a few mishaps which are apt to occur in running a vehicle of this kind. The start was made at about eleven o'clock on Thursday morning, July 13, from the front of the New York Herald building, Thirty-fifth Street and Broadway, New York. Crowds witnessed the start and cheered the venturesome tourists as they began their long journey. Owners and manufacturers of motor carriages united in giving Mr. and Mrs. Davis an escort up Fifth Avenue as far as the Harlem River. The horseshoe which is suspended in front of the carriage seems to indicate that the riders have not enmity toward horses, and it is hoped the omen of good luck will prevent horses from being frightened along the country roads of the 3,700 mile journey. The touring car used by Mr. Davis is of the well-known Duryea type which we have illustrated and described on a number of other occasions.

The route of the Davis party is up the valley of the Hudson River to Albany, then along the banks of the Mohawk, passing through Utica, Syracuse and Rochester to Buffalo, then skirting the shore of Lake Erie to Toledo, and then finally to Chicago. We believe that the route beyond this point has not been definitely decided as yet.

MANY people are apt to consider that corporations are grasping and soulless. Of course, no one will deny that this is sometimes the case, but the Montreal Street Railway Company is certainly generous. It has set apart \$25,000 a year for the benefit of its employees. They will be insured in an accident insurance company of good standing, and the premium will be paid by the Street Railway Company. This insurance will amount to \$1,000 in the event of an accident by any cause, one-half this amount for total disablement, and \$5 per week for time

lost for injuries specified in the policy. Motormen and conductors who have been in the service of the company for two years will receive an increase of pay, and motormen and conductors who have been regularly in the company's service for five years and over will receive their uniforms free of cost.

AN ITALIAN PRINCE BOUND FOR THE NORTH POLE.

Prince Luigi of Savoy, Duke of Abruzzi and nephew of King Humbert, is about to attempt, as others have attempted before him, the pacific conquest of the North Pole.

The prince is the third son of the late Amadeo, ex-King of Spain. He is a captain in the navy, has twice made the tour of the world, and will be remembered



PRINCE LUIGI OF SAVOY.

for his bold ascent of Mount Saint Elias, in Alaska. He is twenty-six years of age and does not, at first sight, appear to be blessed with the strongest of constitutions; but energy and decision are read in his juvenile countenance.

The principal companions of the duke in his expedition will be his aide de camp, Capt. Umberto Cagni, an officer who is as intelligent as he is courageous, and who accompanied him to Alaska; Dr. Cavalli, of the royal navy; and Lieut. Count Quarini, a linguist, belonging to an old Venetian family. Count Quarini, during the Cretan insurrection, distinguished himself by his bravery and coolness, and received the silver medal awarded for military valor.

The Duke personally directed all the preparations for the expedition with scrupulous care.

He took on board of his ship, the "Stella Polare,"

two]tried Italian sailors, four mountain guides, ten Norwegian sailors who have had experience in the Northern seas, and an Esquimo who knows how to drive dogs harnessed to sledges. At Archangel more than a hundred dogs will be embarked. The duke's equipment will include fifteen hundred oak cases containing clothing, food, scientific material, two balloons constructed at Paris, and apparatus for the manufacture of hydrogen.

The "Stella Polare," which was fitted out at Christiania, weighed anchor Monday, June 12. After touching at Franz Josef's Land, the duke intends to proceed by easy stages, marking his route by stations that will show his progress and assure his retreat in case of necessity. The duration of his exploration will be about three years.

For the above particulars and the engraving, we are indebted to L'illustration.

The Coloring Matter of Blue Coral.

Prof. Liversidge has made a series of experiments on the blue pigment of *Heliopora cœrulea* on material obtained by the Funafuti Expedition. His results are interesting, although they do not, unfortunately, throw much light upon the nature or relations of this very curious pigment. He finds that "dead" coral after treatment with hydrochloric acid yields a black pigment which dissolves in formic, acetic, and lactic acids to form a bright blue solution. The pigment is slightly soluble in absolute alcohol, but quite insoluble in ether. The residue after ignition is bulky, and contains much phosphoric acid, iron, lime, and magnesia. Curiously enough Prof. Liversidge found that pieces of "live" coral, or coral which had been gathered while growing, although of a distinct slaty blue color, did not yield blue solutions, but merely pale green ones. The pigment itself was also of a pale chlorophyll green tint. The paper concludes with a list of other blue or green coloring matters in animals. In connection with these we would draw the author's attention to the asserted occurrence of the mineral vivianite in the skeleton of *Belone* and some other forms.—Natural Science.

The Wyoming Exploring Party.

The expedition to the fossil fields of Wyoming left Omaha on July 18. It numbered three hundred scientific gentlemen representing nearly every university and college in the United States. The Union Pacific Railroad Company pays all the expenses of the trip, and it is hoped that the expedition will result in developing the possibilities of this great region which is so rich in fossils of the Dinosaur period. After reaching Laramie the party will go directly into the fossil fields. They will be organized into messes of ten men, each group being provided with two wagons for riding and another wagon for carrying tents, provisions and other supplies. A dark room and complete photographic outfit will be provided. Prof. Wilbur C. Knight, of the University of Wyoming, will have charge of the party. It will take one course to the Grand Cañon of the Platte and will return by another course, giving an opportunity for viewing some of the finest scenery in the West and also giving a chance to collect great quantities of vertebrate fossils.

Antique Safety Pins.

The Metropolitan Museum of Art has some interesting examples of antique safety pins, although they were not called by that name. The antique fibula is really a safety pin, and is constructed on the same principle, consisting of a pin with a coiled spring to keep the point pressed against the sheath to insure a safe fastening and to prevent injury from being stabbed by the point. The manner of using the pin may be seen by reference to many antique statues, notably the Apollo Belvidere. These bronze fibulae vary from two to seven inches in length. Some have a guard to protect the point of the pin; others simply have a catch of bent wire. The backs of the fibulae are of all shapes. In some cases the wire is twisted into odd forms, but usually the back is broadened out so as to admit of ornamentation. Some of the large ones have their backs hollowed, making a mere shell of bronze, on the outer surface of which are cut wavy lines and zigzag decorations. The group of buckles are also very interesting and resemble the ones in use to-day. Several of them were illustrated in a recent number of The New York Sun. In beauty of design the ancient buckles were more than the equal of anything of the kind which is being made at the present time.



THE START FOR THE 3,700-MILE TRIP ACROSS THE CONTINENT.