

## LAUNCH OF THE BATTLESHIP "OHIO."

The launch of the battleship "Ohio" at the Union Iron Works, San Francisco, which occurred on May 22, was a notable event. It took place in the presence of the President of the United States and several members of his Cabinet, including the Secretary of the Navy, besides the Governor of Ohio and a large number of other distinguished guests. The crowd of lookers-on numbered fully 100,000.

The battleship "Ohio" is a sister ship to the "Maine," now building at Philadelphia by William Cramp & Sons, and the "Missouri," now being built at Newport News. Its dimensions are: Total length, 388 feet on the load water line, 72 feet 2½ inches extreme breadth, and a mean draught of 23 feet 6 inches, at which she has a displacement of 12,300 tons. The full load displacement will be 13,500 tons. The contract speed is 18 knots, the greatest, in this respect, of any battleship yet built for the United States navy; though it will be surpassed by ships of the "Georgia" class, of which 19 knots are expected. An increased speed for heavy battleships is one of the most marked tendencies of the naval construction of today; in fact, the Italians have gone so far in this respect that their latest battleships, or cruiser-battleships, as they should be called, are to have a speed of over 22 knots an hour.

The "Ohio" combines practically every improvement known in naval construction at the present time. She is surrounded by a coffer dam filled with cellulose extending along the water line from stem to stern. The hull is protected abreast of the engines and boilers by a side armor belt extending 3 feet 6 inches above the water line and 4 feet below. This belt is 11 inches in thickness for a depth of 4 feet 6 inches, whence it tapers to a thickness of 7½ inches at the bottom. Casemate armor, 6 inches thick, extends from the side belt to the upper deck. At the ends of the casemate armor, diagonal armor 9 inches thick extends from the side of the vessel to the barrette.

The "Ohio" and her sister ships are the first of the United States warships to be fitted with submerged torpedo tubes. They project from each side of the hull about 50 feet from the bow and 10 feet 6 inches below the water line.

The "Ohio" is provided with two military masts with signal yards. The foremast is located over the forward conning tower, which is protected by armor 10 inches in thickness. The conning tower aft has a protection of 6-inch armor. The speaking tubes and electric signals of the forward conning tower are inclosed in a tube 12 inches in diameter surrounded by steel 7 inches thick. This tube extends below the protective deck. The machinery and boilers are protected above by a protective deck, worked flat within the casemates and sloping forward and aft to bow and stern. The center of the protective deck is 2¾ inches thick, forward it is 4 inches and aft 3 inches in thickness.

The armament of the "Ohio" consists of four 12-inch breech-loading rifles, sixteen 6-inch rapid-fire guns, six 3-inch rapid-fire, eight 6-pounder rapid-fire, six 1-pounder rapid-fire, two 3-inch field guns, and two Colts. The main battery consists of four 12-inch 40-caliber breech-loaders, placed in the two turrets, and the sixteen 6-inch rapid-fire, of which ten are placed in the casemates, two are on the berth forward protected by 6-inch armored sponsons and four are on the upper deck. The turrets are operated by electricity, a complete rotation being accomplished in one minute. The magazines of the "Ohio" can store 240 rounds of ammunition for the 12-inch guns, 3,200 for the 6 inch, 9,000 rounds for the 6 pounders and 4,000 rounds 1-pounder.

Electricity for lighting the battleship, operating the turrets and conning towers, hoists, etc., is supplied by eight 32-kilowatt generating sets, having a pressure of 80 volts at the terminals. There are four dynamo rooms and as many powerful searchlights.

The engines of the new battleship are in duplicate, rights and lefts, and each in a separate water-tight compartment. They are of the vertical, triple expansion type, with cylinders 38½, 59 and 92 inches respectively in diameter and 42 inches stroke, with a main condenser of 9,600 square feet cooling surface, and an auxiliary condenser of 800 square feet surface. With 126 revolutions the engines are expected to develop 16,000 horse power.

The boilers are of the Niclausse type and number twenty-four, arranged in three groups. Total area of heating surface, 58,104 square feet; of grate surface, 1,353 square feet. They are designed to withstand a working pressure of 250 pounds to the square inch. The normal coal supply is 1,000 tons, though bunkers holding double this quantity are provided.

The "Ohio" carries fourteen lifeboats, including two steam cutters 40 and 34 feet in length. She is also provided with bilge keels, to reduce rolling. Steering the vessel is accomplished by hydraulic gearing. The valves of the gear are connected by electricity with the conning towers as well as by mechanical connection

with the pilot house. In commission the "Ohio" will carry 35 officers and 511 men. The construction of the "Ohio" was authorized by Congress on May 4, 1898, and her keel was laid April 22, 1899. The contract price was \$2,899,000, exclusive of armor and armament.

The occasion of the launch of this fine battleship presents a fitting opportunity to say something of the celebrated yards in which it was built. From the very commencement of the reconstruction of our navy, the Union Iron Works has been noted for the great success which has attended the vessels that have been built upon its stocks. In proof of this it is sufficient to mention the "Olympia," Dewey's flagship at Manila Bay, and the "Oregon," whose trip around Cape Horn, and subsequent overhauling of the fast cruiser "Christobal Colon" at Santiago, are among the most notable naval feats of the Spanish-American war.

The plant of the Union Iron Works is located in South San Francisco, on the shores of San Francisco Bay. The harbor is entered by the famous Golden Gate; and as the latter is admirably placed for defense, the location of this important yard is everything that could be desired from the strategical standpoint. The history of the works dates back to the year 1849, at which time it was represented by a small foundry, which amounted to little more than a blacksmith shop. In 1885 the business was removed from the city proper to the twenty-three-acre site in South San Francisco, when the concern took the name of the Union Iron Works. The change of site and general reconstruction were stimulated by the desire to share in the work of upbuilding the United States navy, and in preparation for this task the buildings were laid out and constructed on the most modern lines, and a plant particularly suited for the heavy work of warship construction was laid down. Many acres are covered by the foundries, machine shops, boiler shops, etc., which are of brick, while twice as much area is required by the covered works, the shipyards, slips, drydocks, etc. The fitting shops, erecting shops, foundry and boiler shops are all spanned by heavy traveling cranes, and in the equipment are found many special machine tools of exceptionally large size and great convenience of operation, many of which were designed and built especially for this plant. Some of these tools weigh over 100 tons each. The plant is furnished with a high-pressure hydraulic system which is utilized for lifting, forging, riveting, shearing, etc.

One of the most interesting features is the large hydraulic drydock, which was designed by the Union Iron Works for their own use. The lifting-platform is built of a series of five longitudinal and thirty-six transverse girders. It is 6 feet 4 inches deep at the center and 2 feet 10 inches at the sides. The length of the platform at the keel is 436 feet 6 inches and its width 65 feet 7 inches. It is raised and lowered by thirty-six cast-iron rams, each 30.7 inches in diameter, with a lift of 14 feet 6 inches. At the top of each ram is a 6-foot sheave grooved for eight 2-inch diameter steel ropes. The ropes are attached to the platform and are carried up over the sheaves and down to the base castings of the rams. The maximum lift of the platform is 29 feet, the maximum lifting capacity 6,000 tons. In lifting the empty dock a pressure of 275 pounds to the square inch is used, and in lifting the loaded dock a pressure of 1,250 pounds to the square inch. From the year 1887 to the year 1896 an average of a little over ten vessels per month made use of the dock, and the total tonnage accommodated in this period was 1,228,605.

The first vessel of the new navy undertaken by the Union Works was the "San Francisco," a cruiser of 4,098 tons and 19.5 knots speed, which was launched October 16, 1893, which had the distinction of being the "Monterey," of 4,000 tons and 13.6 knots speed, launched April 28, 1891. Then followed the celebrated "Olympia," 5,870 tons and 21.6 knots. She was launched November 5, 1892, and in respect of her high speed, effective battery and handsome appearance can today compare favorably with many vessels that have the advantage of nearly a decade of subsequent improvement in the art of warship construction. The next vessel was the battleship "Oregon," launched October 16, 1893, which had the distinction of being the fastest battleship at that date in the United States navy. Then followed the two 1,000-ton gunboats "Marietta" and "Wheeling," which were launched March 18, 1897. Next the "Wisconsin," a battleship of 11,565 tons and 16 knots speed, was launched November 26, 1898. Following her was the torpedo boat destroyer "Farragut," which achieved a trial speed of 30.3 knots. On September 8, 1900, the monitor "Wyoming," 3,235 tons and 11.5 knots speed, was launched. At this yard there are also many vessels still upon the stocks or in various stages of completion, such as the semi-protected cruiser "Tacoma," 3,500 tons and 16.5 knots, the three torpedo boat destroyers, "Paul Jones," "Perry" and "Preble," and the submarine boat "Grampus." To these must be added some of the finest vessels of the naval programmes of the past two years.

## Science Notes.

The government of Prussia is about to establish public libraries. For cities, permanent libraries and public reading rooms will be maintained, while for the rural districts movable libraries will be supplied.

The trustees of the British Museum have recently transmitted a beautifully illuminated address to the Emperor Menelik expressing their thanks for the assistance and facilities which his Majesty has accorded of late to British travelers who have undertaken journeys to Abyssinia for the purpose of scientific exploration.

The Prussian government has advised the various communities in Prussia that they should erect, at their own risks, cheap dwellings for employes, the laboring population, and persons of relatively small income. It also urges electric lines for quicker suburban communication, and mentions a number of legal steps which will prevent excessive real estate speculation.

The British people consume nearly six pounds of tea per head of the population, or an increase of one pound per capita in sixteen years. There is no other country which, in any way, approaches this. Holland is the only country in Europe where the consumption of tea exceeds one pound per head. In Russia and in the United States also, which are the other two large tea consumers, the consumption amounts to under one pound per head.

The method of sweating Connecticut Valley wrapper tobacco by artificial heat is to keep it at a temperature of from 90 degrees to 100 degrees, so as to obtain something akin to tropical conditions. The temperature of the rooms, when the experiments were first tried, was from 140 degrees to 160 degrees, and it was then the practice to keep the leaf moist. Now the leaf is kept drier until the end of the operation, when more moisture is used in cooling off.

The most important event of the year 1899-1900 in Greece was the finding in Crete of the vast Mycenaean palace at Cnossus, with its corridors, store-chambers, throne room, east and west courts, frescoes and library of clay tablets in Mycenaean characters. In Asia Minor the work at Priene has been finished. That begun at Miletus promises well and has already yielded inscriptions. At Ephesus a Greek monumental gateway was found which combines lintel and arch construction.

The frontier defense of the Roman Empire between the Danube and the Rhine has been under examination by a royal commission for eight years, and the work is nearly completed. At Carnuntum, in Austria Hungary, an ancient bakery has been discovered. The room contained two baking ovens and a row of charred, completely preserved bread loaves, measuring 29 x 32 centimeters, says The American Journal of Archaeology. Ancient bread has been known hitherto only from Pompeii.

Thomas Jefferson produced many inventions. He devised a folding chair which he used to carry to church when the services were held in the house at Charlottesville, where the seating arrangements were insufficient. This chair was composed of the now familiar three sticks, which, being unfolded and covered with a piece of cloth, made a tolerable seat or camp stool. He is also credited with the revolving chair, which is now such a familiar and necessary article of office furniture. At the time it was stated that Jefferson had devised this chair so that "he could look two ways at once." He also invented the copying press, and he sent one of his own devising to Lafayette as a present. He invented a hemp break, a pedometer and a plow. The latter received a gold medal in France in 1790. He sent the original design to the Royal Agricultural Society of the Seine, and they awarded a medal for it. Eighteen years afterward the society sent him a superb plow containing his improvement.

The action of alcohol upon metals is peculiar. Dr. Malmjac in his experiments used 95 per cent alcohol, which left no residue on evaporation. The metals copper, iron, tin, lead, zinc, and galvanized iron were corked up with alcohol in glass flasks and kept at ordinary temperatures for six months. The copper was entirely unacted upon, but in all the other flasks there was a deposit on the bottom and the metal was covered with a similar deposit. In the case of tin, lead, zinc, and galvanized iron, the deposit was white; that from iron was red, resembling iron rust, says Science. All of the liquids, except that in which the lead had been placed, filtered clear; the latter retained its milky appearance after repeated filterings through double filters. The clear filtrates from iron, lead, zinc, and galvanized iron gave much residue on evaporation, while the residue from tin was hardly appreciable. In the former cases it is clear that not only had the metal been oxidized, but a considerable quantity had entered into the solution. These experiments have an important bearing on the storing and shipping of alcohol, as absolute alcohol is generally purchased in galvanized iron cans, so that it ought to require redistillation.

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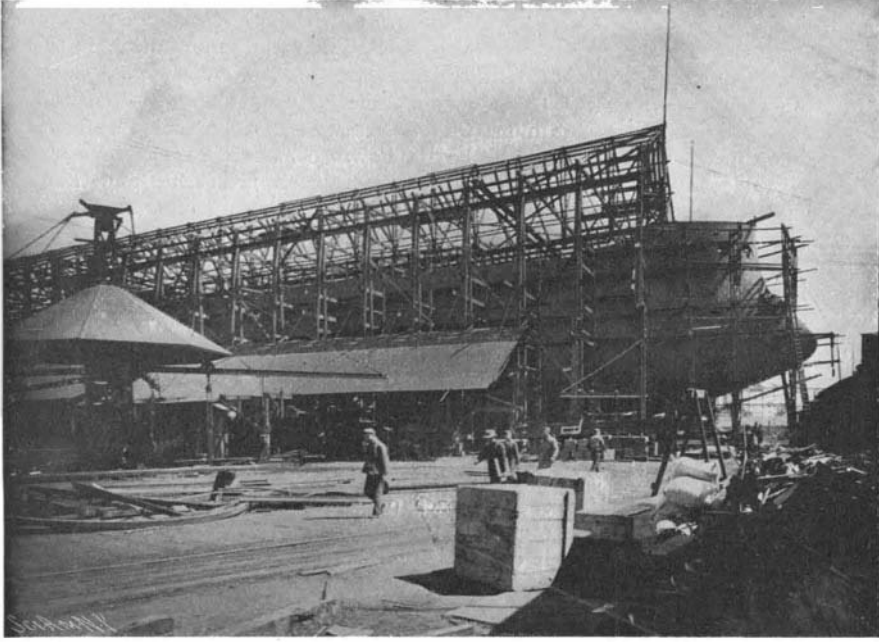
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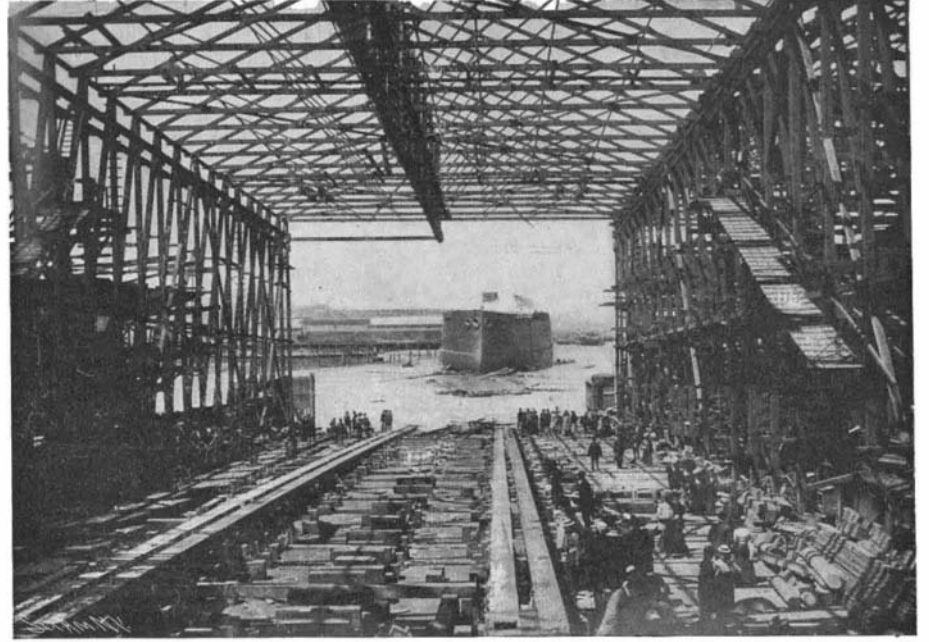
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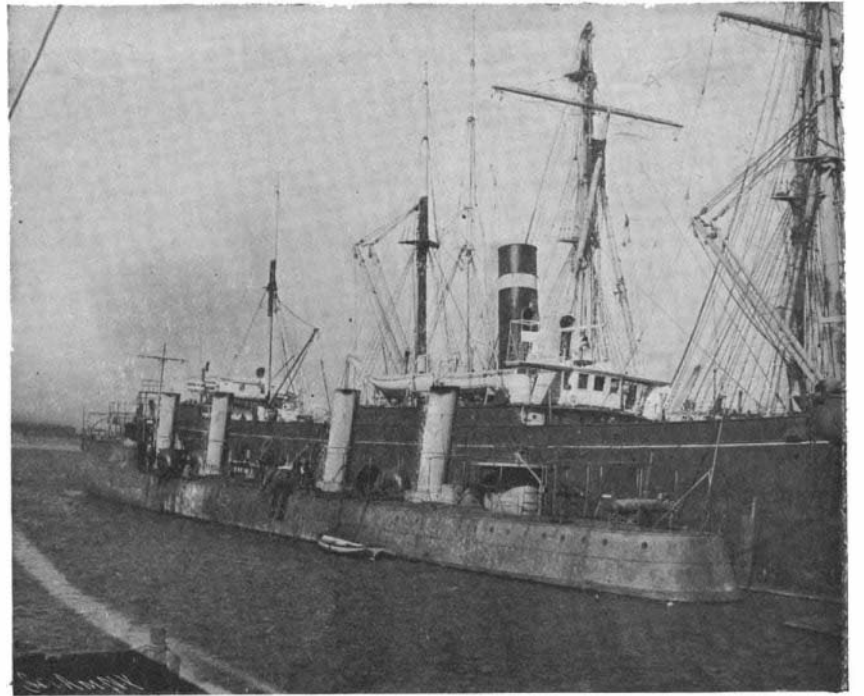
The "Ohio" on the Stocks.



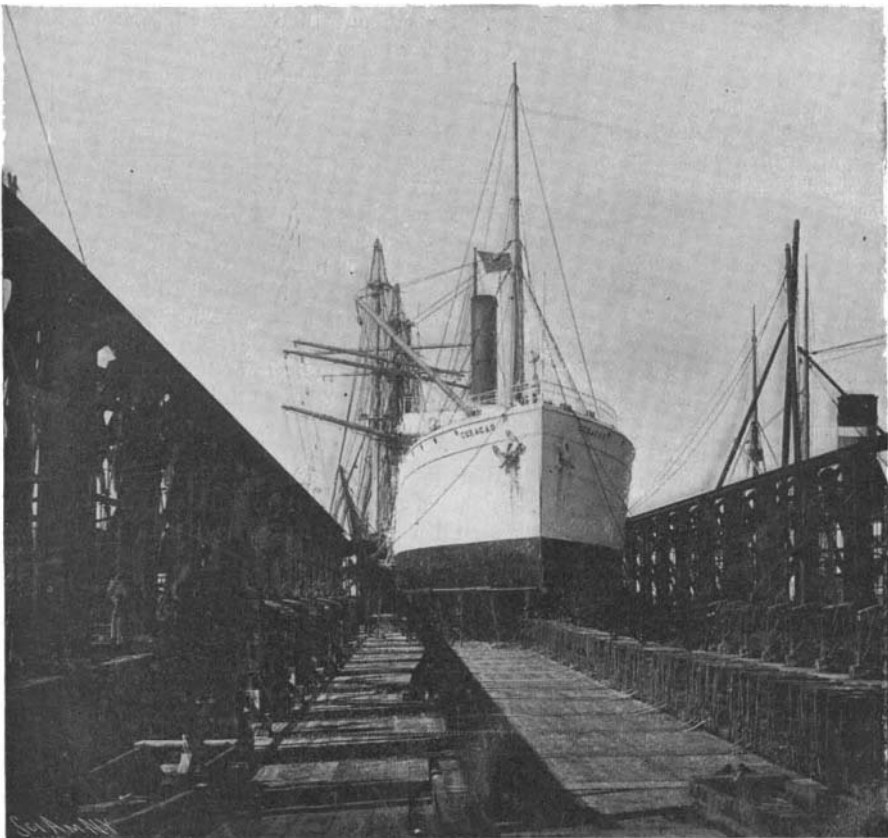
The "Ohio" Afloat—View Looking Down the Ways from the Launch Platform.



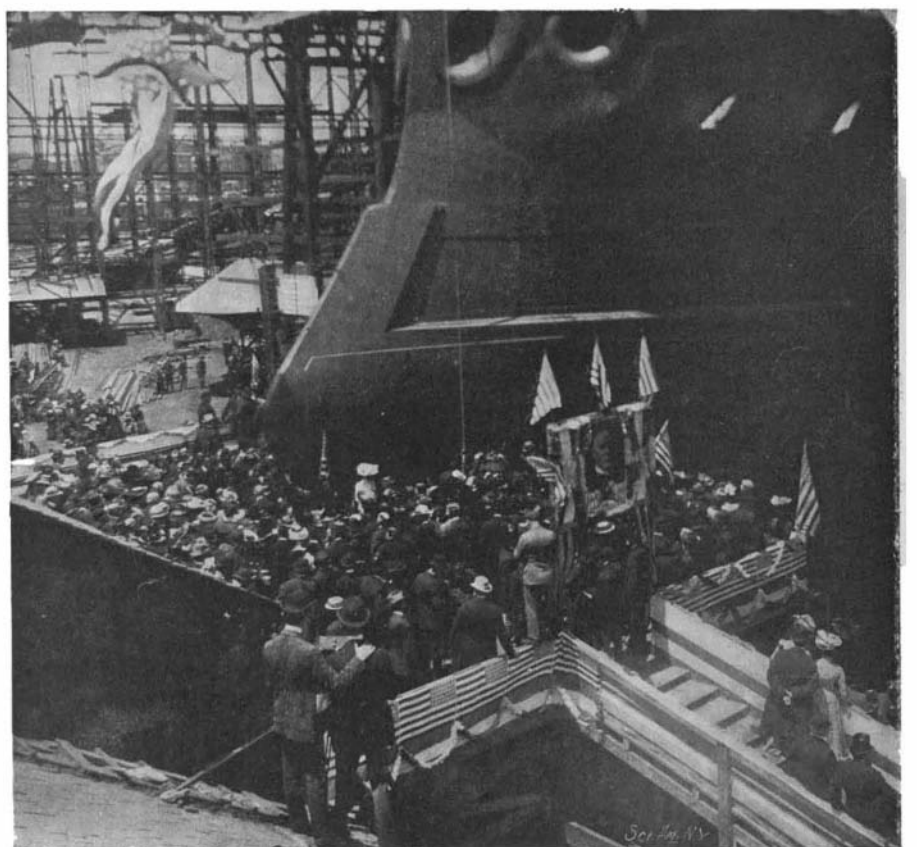
The "Ohio" Immediately After the Launch.



Torpedo-Boat Destroyer "Perry," Constructed at the Union Iron Works.



The Hydraulic Dry-Dock at the Union Iron Works.



The Launching Platform at the Bow of the "Ohio." The President is the Third Figure from the Ram.

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