

THE LAUNCH OF THE FIRST CLASS BATTLESHIP "ILLINOIS."

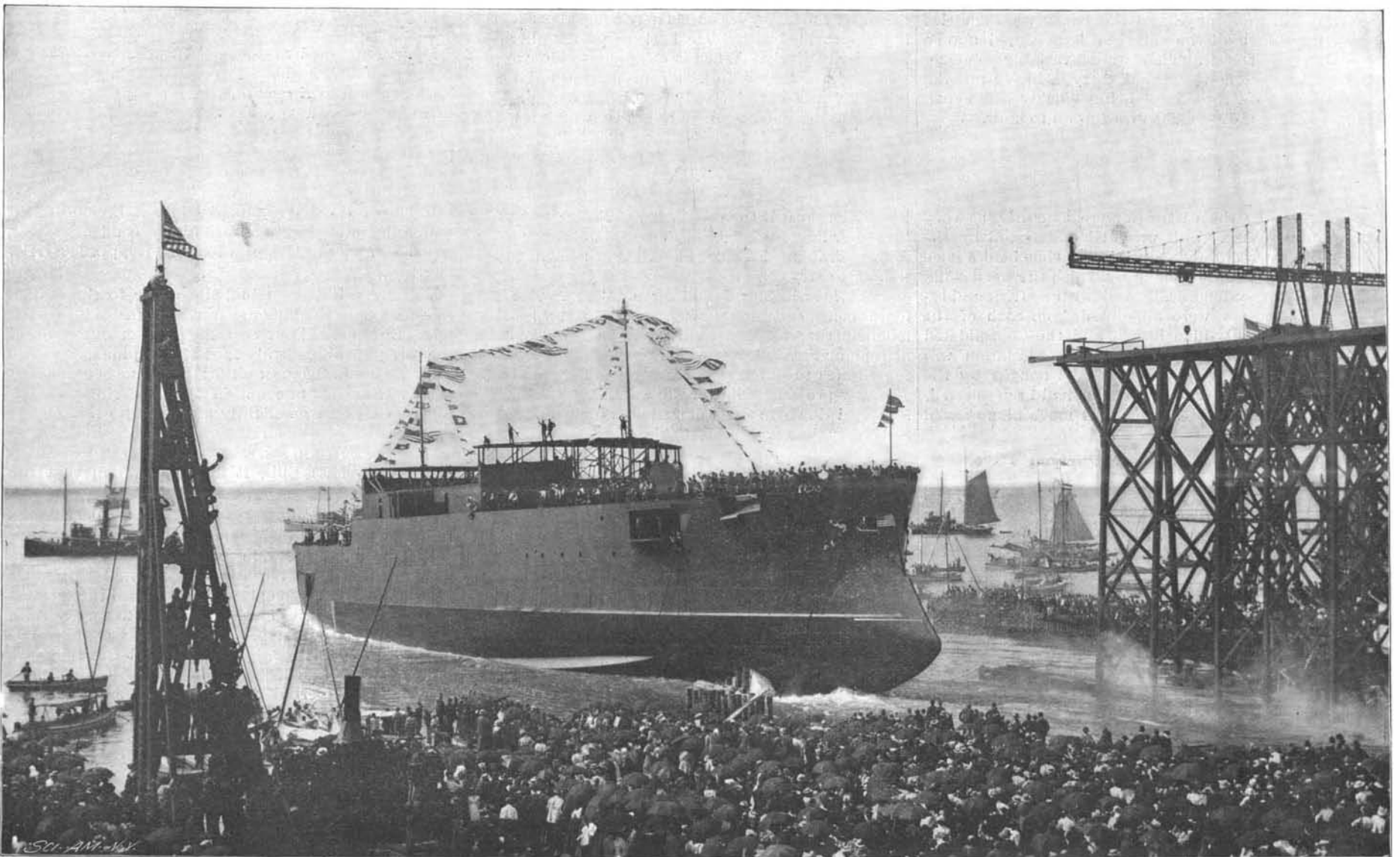
In our last issue we gave some notice of the "Illinois," comparing her with the "Oregon," at present the most notable battleship in commission in our navy. In the current issue we are enabled to present our readers with a view of the launch of the "Illinois," which is reproduced from a photograph taken just as the ship left the ways. The photograph will assist the reader in forming a clear idea of the disposition of the armor upon and within the vessel.

The "Illinois" has a belt of Harveyized armor of a maximum thickness of $16\frac{1}{2}$ inches, which extends in the wake of the machinery spaces and is carried forward continuously up to the stem. It is $7\frac{1}{2}$ feet in depth, $3\frac{1}{2}$ feet of it at the normal draught of the vessel being above the water line and 4 feet below it. At the time of the launch this armor was not in place, and the "shelf" upon which it rests can be clearly seen in the engraving. The point aft at which the belt terminates is indicated by the offset (seen in shadow in the engraving) near the stern, and its top edge at the bow is shown by the offset in the curve of the stem, which is also discernible in the engraving. The forward turret for the 13-inch guns will be located above the spar deck, on which the workmen and guests at the launch-

(the maximum roll being 45°) that her captain put back in alarm to Plymouth. The trouble was remedied by the insertion of bilge, or rolling, keels, as they were then called, and the angle of roll was reduced to from 12° to 15° . We had a similar experience with our own "Indiana," which rolled in a heavy sea to such an extent as to break loose her 13-inch turrets. Bilge keels were added to this ship and the vessels of her class with the same excellent results in stability.

One excellent feature of the "Illinois" is the extraordinary amount of armored area which she presents against the shells of the enemy. Not only is there a heavy belt of armor for nearly three-quarters of her length at the water line, but the hull is further protected above this main belt by a supplementary belt of lighter armor $5\frac{1}{2}$ inches in thickness which extends from the top of the armored belt amidships throughout the height of two decks. This armor extends from barrette to barrette and it ends in diagonal bulkheads which rest upon the 12-inch bulkhead that extends across the ship and joins the armor belt with the barbets. Immediately inside the $5\frac{1}{2}$ -inch armor, and carried well forward and aft, are coffer dams 3 feet wide and 3 feet in height, the top of which is 6 feet above the mean load water line. These coffer dams are closely packed with cork pith cellulose. It can thus be seen that the

against 10,000 of the "Alabama," giving her a speed of $18\frac{3}{4}$ knots as against 16 knots, and her complement of officers and men is 700, as against 489 for the "Alabama." On the other hand, the "Alabama" possesses marked advantages in protection and the weight of her armament. Her belt varies from $9\frac{1}{2}$ to $16\frac{1}{2}$ inches, whereas the belt of the "Canopus" is only 6 inches in thickness with a 3-inch sloping deck behind it. The armor on the gun positions varies from $5\frac{1}{4}$ to 17 inches in the "Alabama," while in the "Canopus" it ranges from 5 to 12 inches. The maximum thickness of the deck plating in the "Alabama" is 4 inches and in the "Canopus" 3 inches. The "Alabama" carries four 13-inch 60-ton guns and fourteen 6-inch 6-ton guns, against four 12-inch 46-ton guns and twelve 6-inch 7-ton guns for the "Canopus." It is evident that the weights allotted to guns are considerably heavier in the "Alabama." Unfortunately, the "Alabama" will not get the benefit of the improved weapons which are to be mounted on our latest battleships. Her guns are of the older type, and the 13-inch 60-ton weapon has less energy than will be possessed by our new pattern 12-inch gun. The respective speeds of the two ships are as we have said 16 knots for the "Alabama" and $18\frac{3}{4}$ knots for the "Canopus." It is here, in respect of her comparatively low speed, that any fault



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LAUNCH OF THE "ILLINOIS," OCTOBER 4, 1898, AT THE YARDS OF THE NEWPORT NEWS SHIPBUILDING COMPANY.

ing are gathered. Four of the battery of fourteen 6-inch rapid-fire guns will be located on this deck, the ports for two of these guns being located where the plating of the superstructure on the starboard side of the vessel is shown cut away. The other ten guns will be located on the main deck immediately below the spar deck. Two of these will be placed forward, firing through ports on either bow, one of which is shown in the engraving. Each of these gun positions, as well as those of the four guns on the spar deck, will be protected by six inches of reformed Harveyized steel. On the main deck amidships and between the 13-inch turrets there will be eight 6-inch rapid-fire guns, four on each broadside. It will be noticed the ports for these four guns do not appear in the engraving, and this brings out a fact which will be of interest to those who are not acquainted with the methods of warship construction, namely, that it is customary to carry up the side plating of the hull complete and then cut out the necessary ports afterward.

The long spear-shaped piece of metal which is noticeable at the water line is one of the bilge keels, which are deep plate steel projections that are built out from the bilge of the vessel for the purpose of preventing her rolling. Previous to the introduction of the bilge keel, battleships were proverbially heavy rollers. Those who follow naval matters with interest will remember the case of the "Retribution," one of the first of the 14,000 ton battleships of the British navy, which rolled so heavily in a beam sea in the Bay of Biscay

central portion of the ship is completely shut in by an unbroken wall of armor, which extends from 4 feet below the water line to the level of the spar deck, a vertical height of about 23 feet; moreover, in no part are these walls less than $5\frac{1}{2}$ inches in thickness. When we remember that $5\frac{1}{2}$ inches of Harveyized steel is sufficient to burst all but the largest shells on the outside of the ship it is evident that in the new battleships our gunners will have very excellent protection.

A comparison of the "Alabama" with the "Canopus" type of the British navy shows that in some respects, though they are smaller, our ships are superior, while in others they are not so formidable. Exclusive of the horizontal deck the total weight of armor carried by the "Alabama" class is 2,000 tons, which is considerably in excess of that carried by the "Canopus." This is remarkable when we bear in mind that the displacement of the "Canopus" is about 13,000 tons, while that of the "Alabama" is 11,525 tons. If the ship which is 1,500 tons larger is less heavily armored, the question rises, What are the compensating features? To what use is the extra displacement put? It is chiefly devoted to larger coal-carrying capacity, larger stores and ammunition supply, and more powerful engines and boilers. The larger ship, moreover, provides increased accommodation and enables a bigger crew to be carried. The increased ammunition supply of the "Canopus" over the "Alabama" is not very considerable. Her maximum coal supply is 1,850 tons as against 1,200 tons of the "Alabama." Her engine power is 13,500 as

can be found with the design of the "Illinois;" and it is satisfactory to know that this defect will be remedied in the "Maine" and her sister ships, which are guaranteed to make 18 knots, and will possibly run up to even $18\frac{1}{2}$ or 19 knots on their trials.

Drawing Microscopical Images.

A. H. Smith (Journ. Brit. Dental Asso.) recommends the following method of projecting microscopical images so that they may be traced on paper: The microscope body is placed in a horizontal position and the mirror removed from its substage attachment. The microscope slide having been placed on the stage, the illuminant (lamp light for choice) is condensed on the side by means of a "bull's eye" in the same way as for photomicrography. Care must be taken to center the light. The concave mirror is then attached to the front of the eyepiece of the microscope by a piece of thin wood as a spring, and has its surface at an angle of about 45° with the plane of the anterior glass of the ocular. The image is thus projected on the paper beneath. No distortion will occur if the outer ring of light is perfectly circular. A dark cloth, such as photographers use, is thrown over the draughtsman's head, and also the body of the microscope, and all light excluded save that through the microscope lenses. Any section can thus be easily, rapidly, and comfortably drawn, and, it is said, accurate representations of objects magnified up to 500 or 600 diameters can be obtained.