

SCIENTIFIC AMERICAN

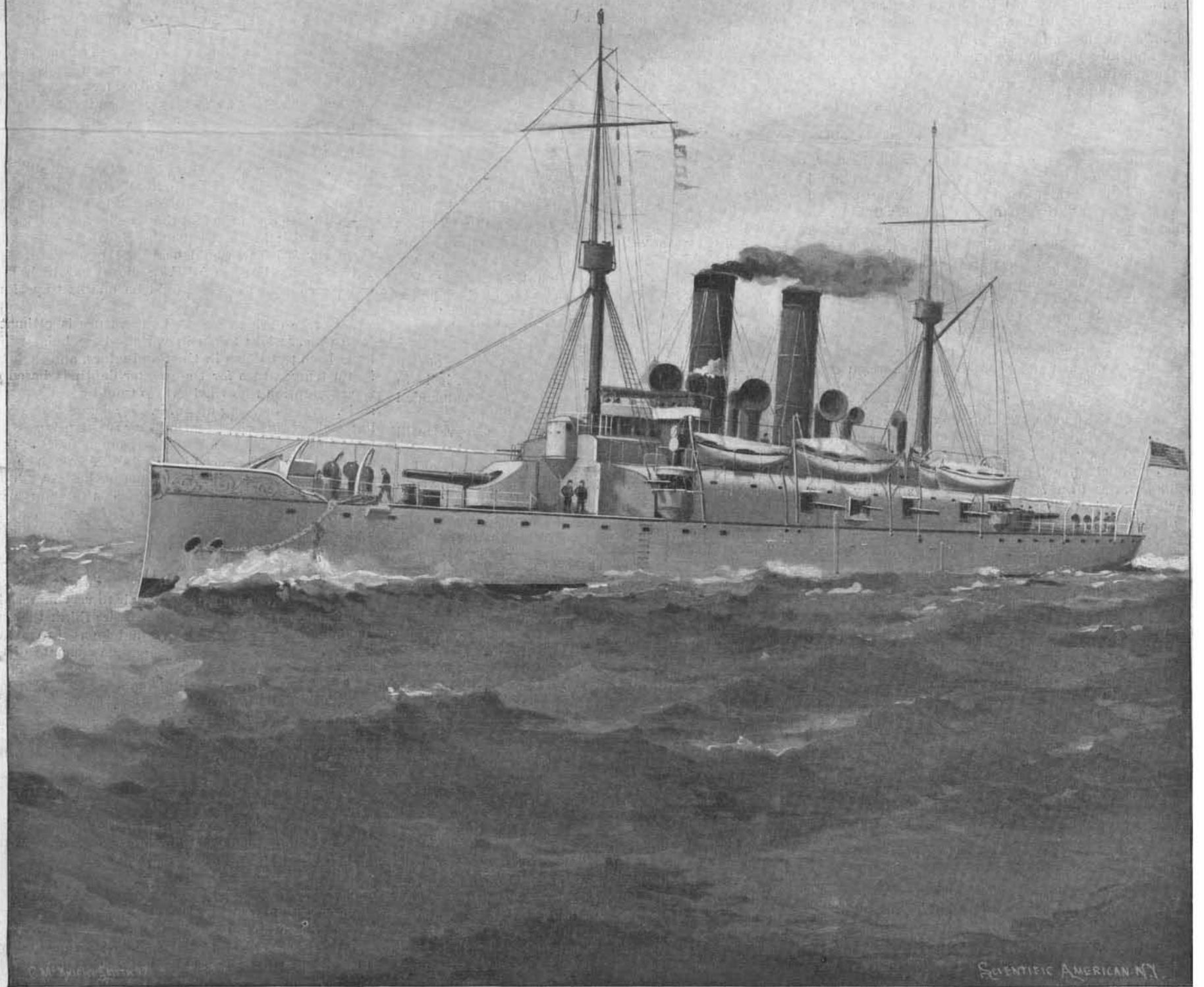
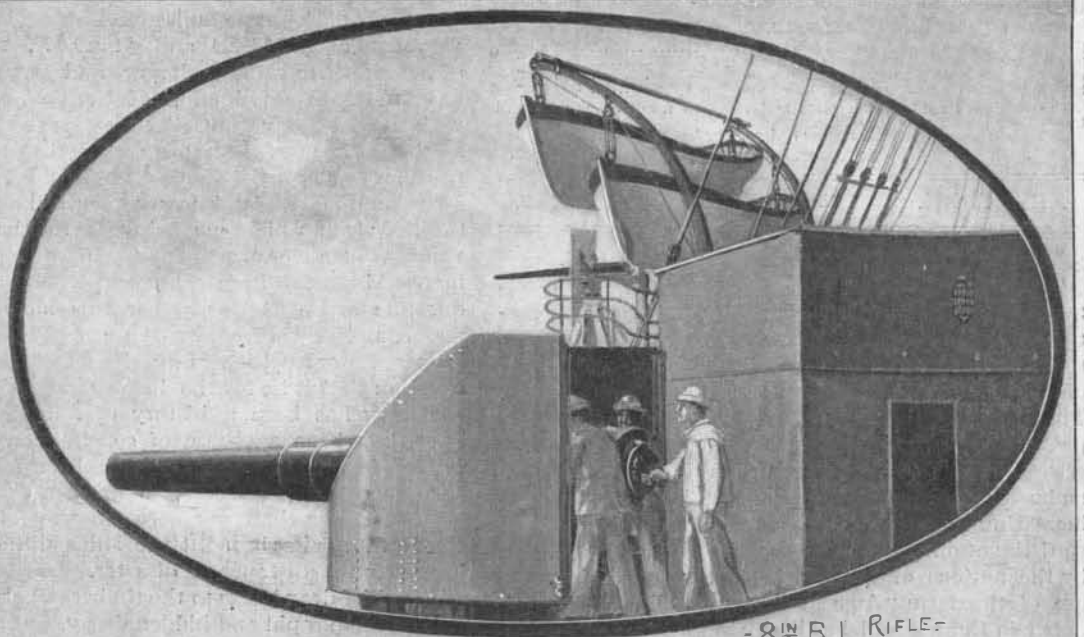
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Displacement, 3,000 tons. **Speed** (estimated), 17.5 to 18 knots. **Maximum Coal Capacity,** 570 tons. **Complement,** 296. **Armor,** 1 1/2-inch protective deck amidships for one-third of length. **Armament,** two 8-inch B. L. rifles, six 6-inch rapid-fire guns, one 3-inch field gun, six 6-pounder rapid-fire guns, four 1-pounder automatic guns, two Colt machine guns. **Date:** Launched, 1884; reconstructed, 1890.

THE RECONSTRUCTED CRUISER "ATLANTA."—[See page 424.]

THE RECONSTRUCTED CRUISER "ATLANTA."

Not the least important branch of the work accomplished by the Bureau of Construction and Repair is that of reconstructing, or what we might call rejuvenating, the older cruisers of the navy. For obvious reasons this work is not so attractive or so much in the public eye as the construction of new battleships and cruisers, although it is in its way quite as important. The reconstruction of our earlier ships, which is being steadily and very ably carried out, chiefly by Naval Constructor Bowles at the New York navy yard, saves many a good ship from being relegated to the reserve list, if not to that of the obsolete or condemned. The latest cruiser to be thus overhauled and refitted is the "Atlanta," of which we present illustrations on the first page of this issue.

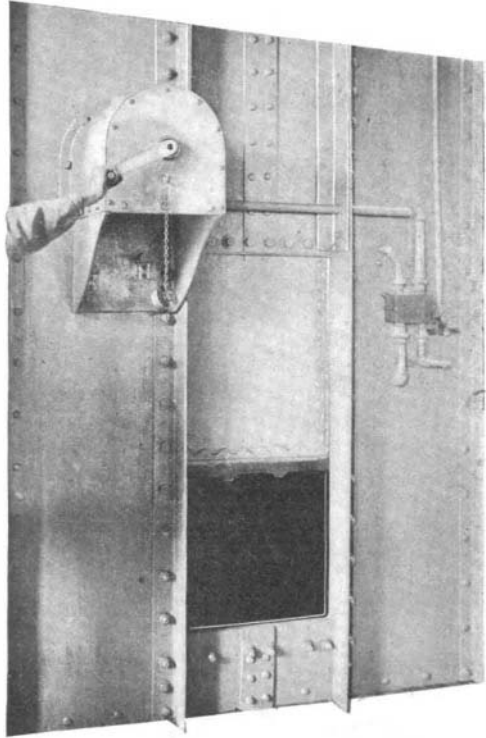
The "Atlanta" was one of the three first vessels to be built for the new navy. As launched, she was a semi-protected cruiser of 3,000 tons displacement and 15.6 knots trial speed. Her protective deck of 1½-inch steel was only partial, and covered merely the engines and boiler spaces, the ends of the vessel being unprotected. This is a method of construction whose faults are so obvious that it has been abandoned for a number of years, although we regret to see that it has been adopted once more in our six new cruisers of the "Denver" class. The original armament of the "Atlanta" consisted of two 8-inch guns carried on the main deck behind shields and six 6-inch guns mounted in broadside on the main deck within the superstructure. There was also a battery of small rapid-fire guns.

The work of reconstruction has been very complete. The old horizontal, compound engines have been changed to triple-expansion by the addition of a high pressure cylinder. At the same time the eight old, single-ended, Scotch boilers have been removed and replaced by two single-ended Scotch boilers and four Wilcox & Babcock water-tube boilers, the Scotch boilers carrying 180 pounds of steam and the Wilcox & Babcock 250 pounds. This change has not only greatly increased the boiler capacity, but it has reduced the bulk of the installation sufficiently to allow the construction of an athwartship coal bunker, which will increase the total coal capacity of the vessel by 80 tons, or about 17 per cent. These changes are expected to result in an increase of the vessel's speed from 15½ to 17½ or possibly 18 knots speed.

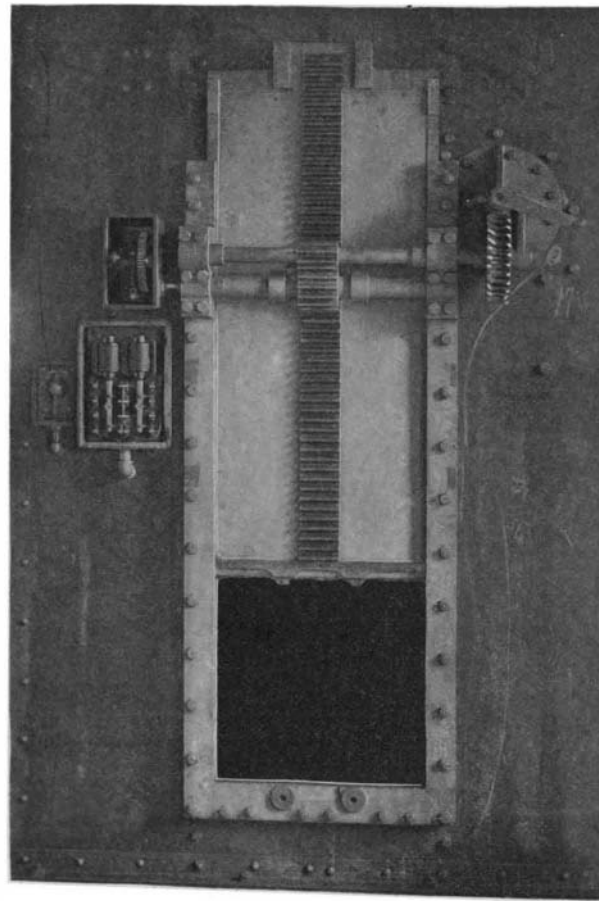
The ship's main battery, which was formerly of the short-caliber, slow-firing type, has been entirely renovated. All of the guns, including the two 8-inch bow and stern weapons, are of the rapid-fire type, the sights being mounted upon a sleeve in which the gun recoils and the breech mechanism being brought fully up to date. Although the new 8-inch guns are not officially known in our navy as rapid-fire, they do actually possess the characteristics which mark the so-called rapid-fire guns of this size in foreign navies.

The lessons of the late war have been turned to good account in the work of reconstruction, for the "Atlanta," on and above the main deck, is absolutely stripped of combustible material; and if she is ever called upon to fight, there will be no fear of her being prematurely put out of action by the burning up of

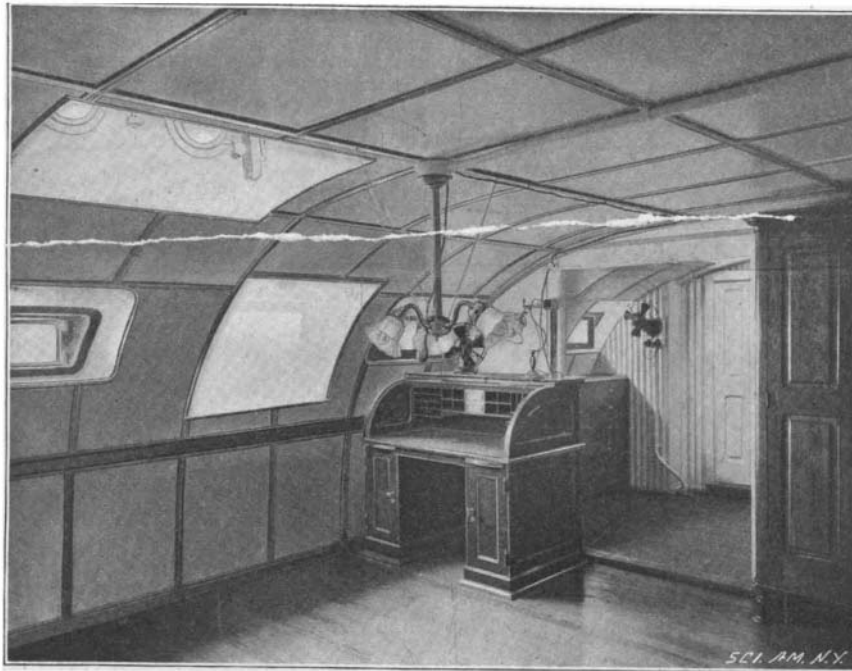
the wooden decks, bulkheads, and furniture. We present two illustrations of the captain's room



REAR VIEW OF DOOR, SHOWING ELECTRIC MOTOR CASE, WITH HAND-OPERATING CRANK SHIPPED



FRONT VIEW OF WATERTIGHT DOOR, SHOWING RAISING AND LOWERING GEAR AND ELECTRIC CONTROLLING DEVICES.



U. S. S. "ATLANTA"—CAPTAIN'S CABIN AFTER FIREPROOFING.



U. S. S. "ATLANTA," SHOWING WOODWORK IN CAPTAIN'S CABIN BEFORE REFITTING.

which strikingly illustrate the changes that have been made. One of these represents the cabin as originally fitted. It shows the wooden bulkheads and elaborate paneling, both outboard and on the ceilings and bulkheads, and the characteristic heavy furniture. All of this woodwork was more or less, and generally more than less, highly inflammable. In the process of refitting, the wooden bulkheads were removed and the panelings stripped from the ceiling and from the outboard turtle-back. Their place was taken by corrugated metal for the bulkheads, a coating of cork paint for the ceiling, and a covering of asbestos on the outboard walls. The wooden furniture is replaced by furniture of metal, one piece of which, a neatly designed roller-top desk, is shown in the engraving. The asbestos sheathing possesses the requirements of a non-conducting, incombustible, splinter-proof covering. The asbestos fire-felt is laid over wire cloth which is attached to a framework of light angle-bar, carried between the ship's frames or bulkhead stiffeners.

The felt is flush with the surface of the frames, or the edges of the angle-bars, and asbestos millboard, three-eighths of an inch thick, is placed over the fire-felt to secure a smooth, hard finish, and it is held in position by galvanized iron moldings. The millboard is coated with sizing to prevent absorption, then painted with white enamel and striped with gold, the result being a pleasing panel effect. The asbestos sheathing has a light, cheerful appearance; it is warm in winter, cool in summer, and is free from the "sweating" which is such an insuperable objection to the use of the plain steel partition. The changes in the captain's cabin are typical of the work which has been done throughout the whole of the officers' quarters. One notable change which is conducive to convenience and cleanliness is the designing and putting in position of a folding metal berth, which in the daytime can be folded against the wall and screened by a curtain. For reasons which are only too well known to those who sleep at sea, the substitution of an open and accessible metal berth for the old, fixed wooden bunk will be greatly appreciated.

Other evidences of the thoroughness with which Naval Constructor Bowles has carried out the work of fireproofing is further seen in the new metal rifle racks for the marines, metal lockers for the gun division, the substitution of wire screens in place of wooden bulkheads for the executive office, metal ladders and numberless other substitutions of metal for wood. On the superstructure deck the old wooden chart house has made way for a new steel structure with circular lights. All of these changes have been made under the immediate supervision of Assistant Naval Constructor Watt, to whom we are indebted for courtesies in the preparation of the present article.

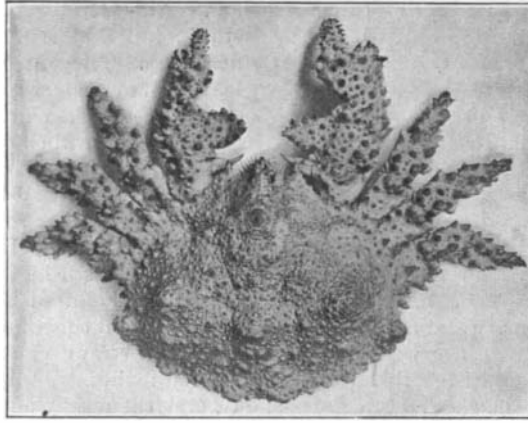
The work above the main deck looking to the safety of the ship from fire finds its match below deck in an entirely new system of watertight, electrically operated doors, which have been designed by Naval Constructor Bowles and receive their first installation in a warship on board the "Atlanta." We

have had the opportunity of inspecting the operation of the door, and it impresses us as being an admirable solution of this difficult and most vital problem. Briefly stated, the absolutely essential elements of a successful watertight door system are first that every door may be closed simultaneously and instantly from the bridge or some central station, and that some telltale announcement shall show that they are closed; secondly, that it shall be possible to raise and lower each door independently, and from either side of the door, without conflicting with the operation from the bridge; thirdly, that it shall be possible to close the door either against a rush of water or through coal which may have accumulated in the doorway. These features, with others of minor importance, are all fulfilled in the present instance. The clear opening of the door can be of any desired size; for coal bunkers as shown in our engravings, it is generally about 4 feet 6 inches by 2 feet. The door is a steel plate riveted to a sliding frame. The guide-frame of bronze is bolted to the bulkhead, the guides being tapered $\frac{1}{10}$ of an inch to the foot. The sliding-frame is made with eleven wedges of the same taper as the guides, there being four on each side, two on top and one on the bottom. The surfaces nearest the bulkhead of both the guide-frame and the sliding-frame are scraped surfaces which form a water-tight joint by the wedge action which occurs during the last half-inch of closing. The guide-frame is open at the lower edge to prevent clogging or jamming.

The door plate carries a bronze rack into which gears a pinion keyed to a horizontal shaft which is carried at the top of the guide-frame. This pinion engages a smaller pinion on a second horizontal shaft, at either end of which is keyed a worm wheel, which in its turn engages a worm. The worm-shaft passes normally through the bulkhead and is driven by a one horse power electric motor, which is carried in a watertight casing on the opposite side of the bulkhead. Crank shafts are provided, which slip over the hexagonal end of the worm-shaft on either side of the bulkhead, and may be used for hand operation of the doors. The motor is compound-wound and of the short shunt type, the short shunt coils being relatively weak and wound outside the series coils. The circuits are so arranged that for raising the door only, the series coils are in circuit, giving a quick and easy starting; while for closing the door, where it may be necessary to cut through coal or other obstructions, the shunt and series coils are both in circuit. The current is controlled by a three-point spring lever switch on each side of the bulkhead. The switch is normally in its central position, in which the door closing circuit may be completed from the bridge or from any central station in the ship. The door-opening circuit can be completed only at the door, and this is done by moving the lever to the right or left, operations which raise or lower the door.

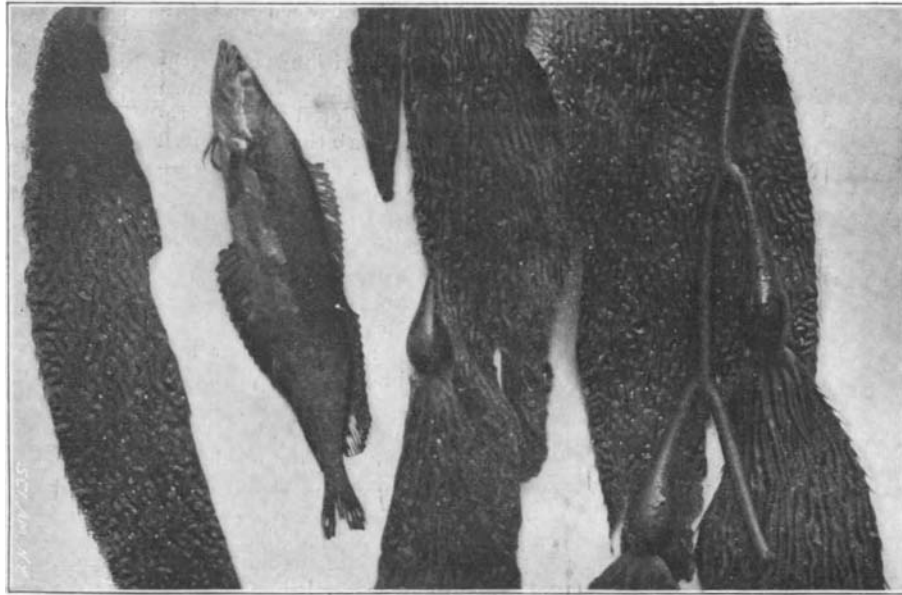
The operation of this system is as follows: In case of an emergency such as a collision, the officer on the bridge can immediately close every water-tight door throughout the vessel, a small signal lamp at the bridge, or other selected station, lighting up during the movement of the door and going out as soon as the door is closed. If any of the crew should be shut in a water-tight compartment, or should it be necessary to pass from one compartment to another after the doors have been closed from the central station, all that is necessary is to turn the spring lever at the particular door, when it will open, the lever returning to the central position and closing the door automatically when the person has passed through. Mechanically considered, the

door is an excellent piece of work both in design and construction. Judging from its operation as now installed on the "Atlanta," it appears to admir-



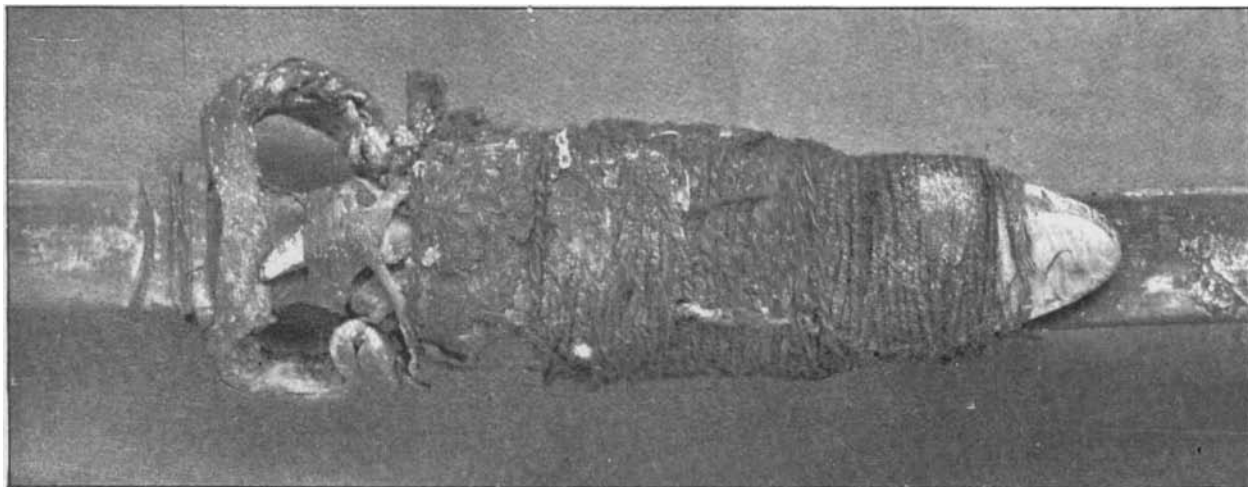
STONE CRABS THAT RESEMBLE ROCKS.

ably fulfill the requirements of a perfect water-tight door installation. We understand that Mr. Bowles' system will probably be exhibited at the Paris Exposition, where, by the way, the valuable Pollok prize is to be

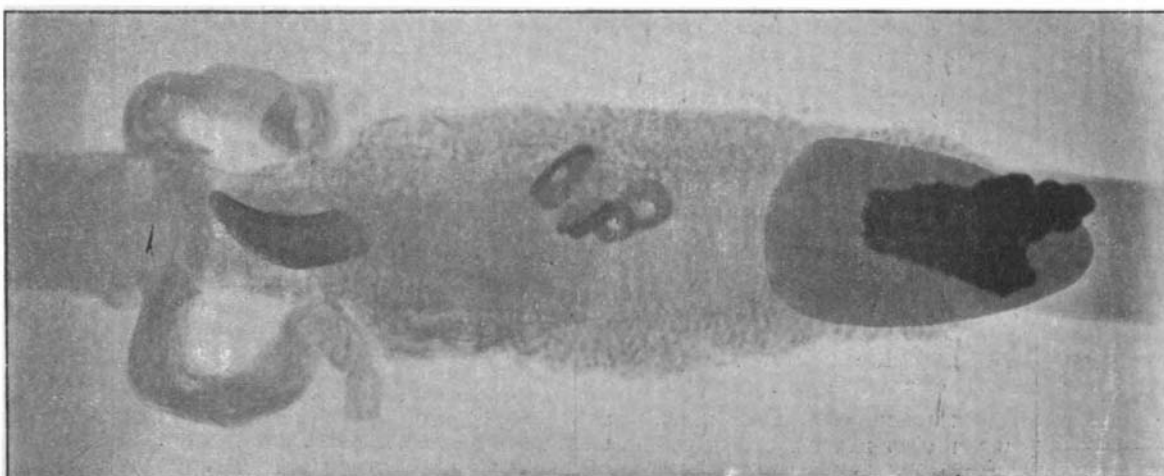


KELP FISH (*Heterostichus rostratus*), SHOWING ITS VERTICAL POSITION IN THE TANK, MIMICKING THE KELP IN SHAPE AND COLOR.

awarded for the best marine life-saving device submitted. Fuller details regarding the system can be gathered from a paper read by Assistant Naval Constructor Watt at the recent meeting of the Society of Naval Architects and Marine Engineers, and published in the Proceedings.



Finger Loops with Wrappings and Fetiches of Throwing Stick, from Cliff Dwelling, Mancos Canyon, Colorado.



Radiograph Shows Inclosed Stone Beads Concealed by Wrapping
AN ARCHÆOLOGICAL USE OF THE ROENTGEN RAYS FOR THE EXAMINATION OF A THROWING STICK.

Such is the "Atlanta" as she will appear when leaving the navy yard for her trial trip. The renovation and reconstruction have been so admirably planned and carried out, that except for the fact that she possesses only a partial armored deck, this vessel will now be well up to the standard of modern cruisers of her class.

ARCHÆOLOGICAL APPLICATION OF THE ROENTGEN RAYS.

Shortly after the announcement of the discovery of the Roentgen rays, Prof. Stewart Culin, of the Free Museum of Science and Art of the University of Pennsylvania, foresaw the possible future of the new rays in examining the internal construction of valuable museum specimens. After suitable apparatus had been installed in the Pepper Clinical Laboratory by Dr. Charles Lester Leonard, an attempt was made to test the practical application of its value in archæological work. Dr. Leonard made a successful radiograph of a Peruvian mummy, and the photograph disclosed the fact that the closely wrapped bundle contained the skeleton of a child having a string of stones or shell beads about its neck. Another radiograph was obtained of a desiccated human foot with a leather sandal. This gave promise of the utility of such pictures in the examination of such objects. Mr. Cushing expressed the opinion to Prof. Culin that a piece of turquoise was concealed beneath the heavy wrapping of brown yarn that binds the finger loops of every fine prehistoric throwing stick from Mancos Cañon, Col., in the University Museum. Mr. Cushing was of the opinion that the turquoise was the heart of a fetish bird. It occurred to Prof. Culin that the verification of this conjecture might be secured, and photographs of the wrappings with corresponding radiographs were made, with the result as shown in our engravings, which we are enabled to present through the courtesy of Prof. Culin.

It will be seen that four stone beads, presumably of turquoise, are revealed as Mr. Cushing had surmised. The extreme fragility of the wrapping was such as to render an examination by other means impossible without serious injury to a most valuable specimen. In the current issue of the SCIENTIFIC AMERICAN SUPPLEMENT appears Prof. Culin's article, accompanied by additional side views of the specimen.

MIMICRY OF THE KELP FISH.

BY CHARLES FREDERIC HOLDER, PASADENA, CAL.

It is said of certain natives of South Africa that when they go into battle they carry bushes in their hands and move so slowly along that it is almost impossible to distinguish them from the mass of verdure about them. When an American warship is about to begin an engagement she is painted lead color, the object being to make her simulate the color of her immediate environment. Even the men behind exposed guns on the cruisers during the late war were ordered to paint their clothes the prevailing hue, so that the sharpshooters of the enemy would not pick them off.

This is called mimicry; the subjects imitating their surroundings as a protective measure; and that man has obtained the suggestion from nature is evident to any one who has made even a superficial study of the subject, as in every branch of animal life some forms are found which protect themselves from enemies in the manner described, namely, by imitating more or less their surroundings.

This singular mimicry is exhibited in a particularly interesting manner among fishes, and the accompanying illustration shows one