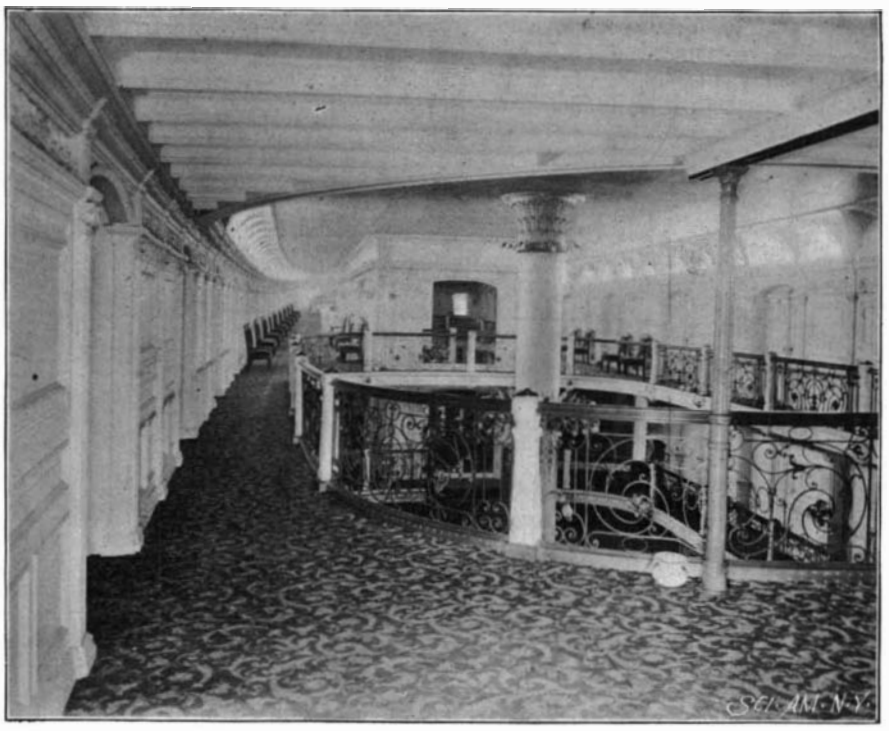
THE HUDSON RIVER STEAMER ADIRONDACK, OF THE PEOPLE'S LINE.

We present in this impression a series of views of the Adirondack, the latest addition to the famous fleet of Hudson River steamers that plies between this city and Albany. It was as far back as the year 1834 that the People's Line, which owns this handsome vessel, made a modest start in river transportation by launching the Westchester; and during the intervening sixty-two years the company has carried a very large share of the travelers that go during the summer months to Saratoga, Lake George, the Adirondacks, and the St. Lawrence regions. The rapidly increasing travel by this line during the last few years called for a further addition to the fleet, and it was resolved to build a boat which, in size, speed, and accommodation, should rival anything afloat on the river.

The keel of the Adirondack was laid at Greenpoint, New York, on June 8, 1895, and within five months the vessel was launched, the fitting out being completed in time for the summer season of 1896. The hull is built almost entirely of wood, and the beam engine, which is of the vertical pattern so common in river service, is of the simple surface condensing type. At first sight it may appear surprising that in this age of steel shipbuilding and quadruple expansion engines, so fine a vessel as this should be built of wood and provided with a single expansion low pressure engine. The Adirondack, however, was built to meet the special requirements of the Hudson River navigation, and her design is based upon the experience of steamboat men who have grown gray in this particular service. Wood was chosen for the hull because it gives a more flexible and stronger boat, stronger, that is to say, for the strains to which it is subject in pushing its way over the shoals of the upper river when the water is at a low stage. A wooden hull that is stiffened by a truss such as is seen in the general view of the boat will spring and give if it should touch in passing the river bars, whereas the plates of a steel hull would be broken or bent permanently out of shape.

It may be mentioned here that the engine was built as a simple, in preference to a compound or triple expansion engine, because the company estimated that it would prove in the long run, for the particular class of work this boat has to do, a more economical design. While they were aware that, for continuous sea service, a multiple expansion engine is more economical, and will more than recover the extra first cost of its numerous and complicated parts, it was felt that the conditions of service for this boat were so entirely different that the same saving could not be realized. The Adirondack is only in service for a part of the year, and makes but one trip a day, of about ten hours' duration. It was estimated that the total value of the fuel saved during the comparatively brief hours of service would not equal the interest on the extra cost of building and running a compound or triple expansion engine.

The dimensions of the Adirondack are: Length over all, 412 feet; beam, 50 feet; width over guards, 90 feet; depth of hull, 13 feet; and draught, 8 feet. She is of 4,500 tons gross measurement and has a freight capacity of 1,000 tons. The oak keel is 12 inches wide by 16 inches deep. The frames, which are of oak, chestnut and red cedar, are 12 inches thick and are spaced 24 inches center to center. They vary in depth from 20 inches on the floor to 10 inches at the sides. There are 11 keelsons of yellow pine, measuring 12 inches by 20 inches, and they are bolted to the frames at each intersection by four bolts. The entire hull is strengthened by diagonal straps of ½ inch by 4 inch iron, which are riveted to the frames at each intersection. The hull is also stiffened by two deep suspension trusses or "hog frames," the top chord of which is 14 inches wide by 30 inches deep. There are three watertight bulkheads, which reach to the main deck.



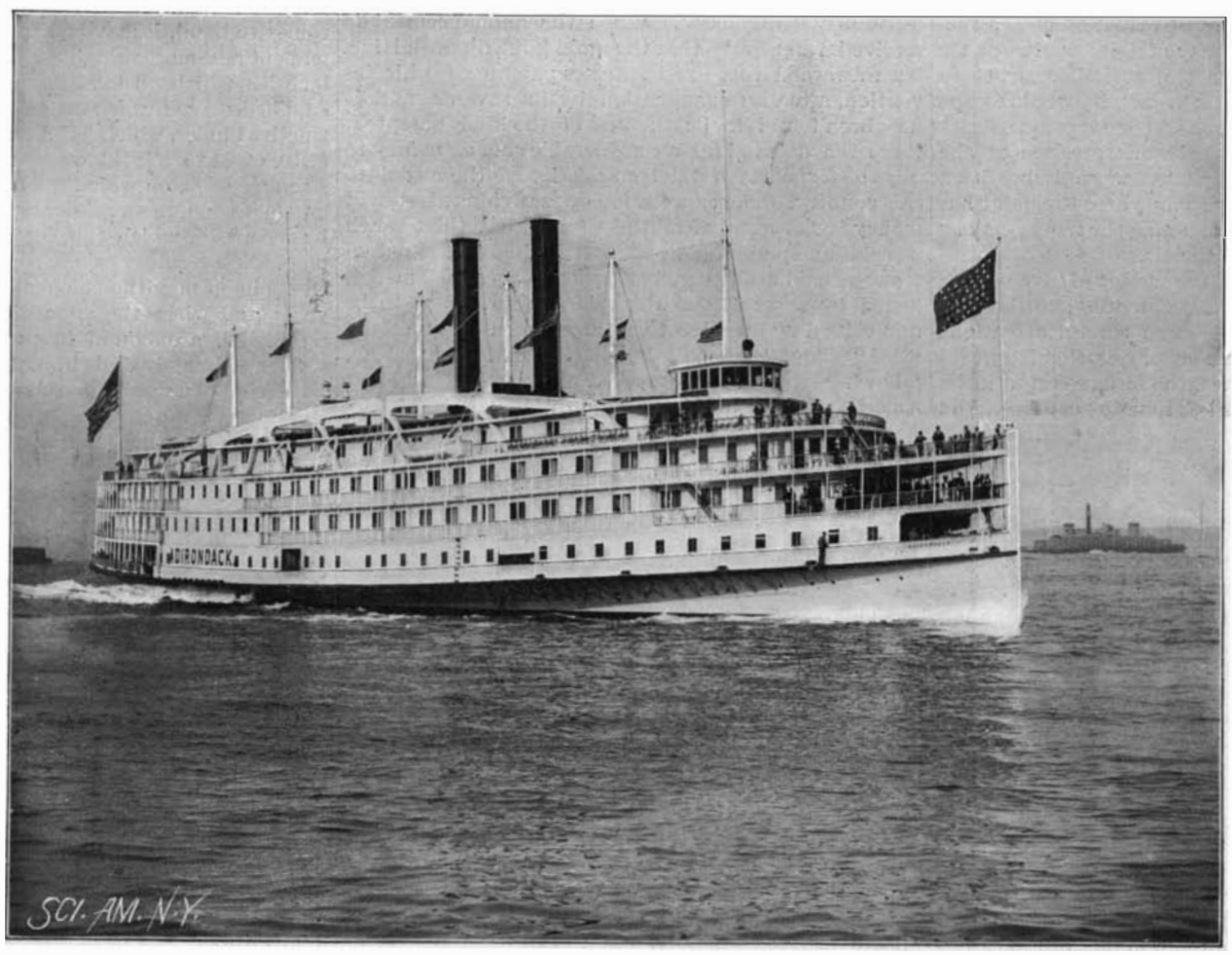
THE GALLERY OF THE ADIRONDACK

In order to give our readers a clear conception of a typical river steamboat beam engine, we have prepared the detailed and very handsome engraving shown on our front page. The reader is supposed to be looking at the boat from a position a little off from the port bow, the side of the hull and superstructure and the housing of the paddle wheel being broken away so as to show the full height of the engine, which extends through four decks. The engine foundation consists of deep steel keelsons, which are securely bolted to the wood keelsons above mentioned. The A-shaped gallows frames are built up of steel plates, the legs, which are of box section, being strongly braced together with struts, which are also of plate steel and open box section. The walking beam consists of a strongly ribbed cast iron web, belted with a heavy wrought iron strap; the whole being firmly strapped and keyed together. The cylinder is 81 inches in diameter by 12 feet stroke. The two large vertical pipes seen in front of the cylinder are known as the side pipes; the one on the starboard side being the steam pipe and the other the exhaust. Each of these pipes carries a separate rocking shaft which is operated by its own eccentric. The motion of each rocking shaft is communicated to the two vertical lifting rods which operate the valves by means of two cams called "wipers." The eccentric rods are formed with hooks at their outer ends, which engage a pin in the arms of the rocking shafts. They are thrown out of gear by means of the slotted vertical rods through which the eccentric rods work, one of which will be seen in the engraving. These vertical rods are known as strippers, and they are operated by the levers which will be noticed attached to the rocking shaft on the steam pipe. When it is desired to start or reverse the engine, the eccentrics are thrown out of gear, and the valves are worked by a steam starting and reversing engine, which is controlled by the vertical lever seen near the steam pipe. If it is desired, the valves can be operated by the starting bar shown in the engraving.

The handwheel on the small vertical standard in front of the exhaust pipe opens the steam valve for the starting engine, and the wheels which are seen on the other two standards are for operating the injection valve and for turning the surface condenser into a jet condenser, if at any time it should be desired to do so. The surface condenser is located in front of the steam cylinder and below the main deck. Behind the steam cylinder and also below the main deck is the air pump, which is operated by connecting rods from the walking beam. The gear shown attached to the front face of the gallows frame, above the cylinder, is a hand winch, for lifting the cylinder head.

The paddle wheels are of what is known as the vertical or feathering type, in which the buckets are made to enter and leave the water in a nearly perpendicular position. The old type, with fixed radial buckets, is extravagant and uncomfortable; extravagant because it wastes power in forcing water downward when the buckets strike, and lifting it when they leave the water, and uncomfortable because they set up a violent vibration throughout the whole vessel. The feathering paddle wheel is smoother and more efficient in its action. Its construction is as follows: Bolted to heavy timbers just above the guards is a large pin carrying a loose flanged ring, to which are pivotally attached a set of connecting rods. At their outer ends these rods are pivotally connected to rocking arms fastened to the back of the buckets, the buckets themselves being pivotally attached to the rigid spokes of the paddle wheel. The wheel itself is carried, as usual, on an extension of the crankshaft; but there is no outboard bearing on the guards, the whole weight being carried on a massive pillow block, which is securely bolted to the framing of the hull. The above mentioned pin and loose ring are placed eccentrically to the crankshaft, and the ring is rotated in its proper relation to the paddle wheel by attaching one of the connecting rods rigidly to it. The eccentricity of the ring is so adjusted that the buckets shall always enter and leave the water in a perpendicular position, thus securing a true feathering action. The wheels are 30 feet diameter and carry 12 curved steel buckets, each 45 inches wide by 12 feet 8 inches long. The dip is about 5½ feet. The average speed of revolution is about 26 per minute.

There are a donkey boiler and two "Worthington Duplex" fire and wrecking pumps, and a large "Wor-



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thington Admiralty" bilge pump between decks, their combined capacity being 1,000 gallons per minute. The electric light plant, consisting of three Armington & Simms engines, has a capacity of 2,400 lights. Two of these engines are shown below the main deck. They are of the direct connected type. The pilot house carries a search light which will enable objects to be distinguished at a distance of two miles.

Steam is supplied by four steel boilers of the lobster return flue type, each 11 feet wide, 9 feet 3 inch diameter of shell and 33 feet long, with steam chimneys 87 inch diameter and 10 feet 6 inches high. Forced draught is supplied by two large "Dimpfel" blowers, driven by independent engines. The steam pressure is 55 pounds to the square inch, and the total horse power 4,000. The engines, boiler and machinery were constructed by the W. & A. Fletcher Company, of Hoboken, N. J.

The Adirondack was modeled and designed by Mr. John Englis, vice-president of the company, and embodies the results of long years of experience as to the requirements of river navigation. Externally, as the excellent photograph taken specially for the SCIENTIFIC AMERICAN will show, she is an extremely handsome vessel, with all the characteristic marks of a Hudson River boat, and more than the ordinary beauty in her lines. By careful saving of weight in the design, it has been possible to give her an extra deck over the number carried by other ships of her size and horse power on the river. There are five in all: the main, saloon, gallery, upper gallery and dome decks, and all this on a draught of 8 feet of water. There are 350 staterooms, including 24 parlor rooms and 4 suites of parlors. There are also 286 berths in the cabins and 120 berths for the crew. Each stateroom has an iron or brass bedstead, and has a window on the outside of the vessel. The dining room on the after part of the main deck is surrounded by large windows, which give an uninterrupted view of the river on both sides. Two private dining rooms at the extreme after part of the vessel open into the main dining room. All these rooms are finished in white mahogany, with decorated panels in the ceiling,

STAIRWAY FROM SALOON TO GALLERY.

and at each intersection of the panels is an electric light drop covered by a round cut glass globe. There are 200 such lights in the dining room alone.

From the quarter deck, which is finished in white mahogany, a grand staircase leads to the main saloon, which is unusually handsome in its appointments and decoration, the predominating style of the latter being Empire, white, green and gold. A rich effect is secured by the beautiful design and workmanship of the wrought iron and mahogany hand rails around the galleries; and it is noticeable that the dome ceiling is free from any break by lighting appliances, the lights being concealed at the base of the cove.

On the upper tier, in the extreme after part of the upper gallery, is situated the café and smoking room, which is arranged with windows on three sides, so as to provide a clear view of the beauties of the Hudson River.

In addition to the ample water supply in case of fire, the thermostat is used in every stateroom and in all exposed parts of the ship, so that any outbreak of fire would be quickly located.

The Adirondack has never as yet been run at her maximum power; but she has run with a full load of freight and passengers from alongside her dock at New York to Albany, a distance of about 144 miles, in 7 hours and 55 minutes. The fastest speed, 20½ miles an hour, was made between New York and Hudson, the speed being considerably reduced in the upper river by shoal water.

ARMOR FOR FORTIFICATIONS.

Between projectiles and armor there has been a constant struggle for superiority, for while, on the one hand, every effort has been made to bring the projectile to such a state of perfection that it will destroy even the strongest fortification, the resisting power of armor has, on the other hand, been just as steadily increased. It has been extremely difficult to find armor suitable for naval purposes, because, although the thickness of the armor was an important consideration, it had to be limited on account of the danger of overloading the vessel to which the armor was applied. At first, and until 1875, rolled iron was used for armor and then

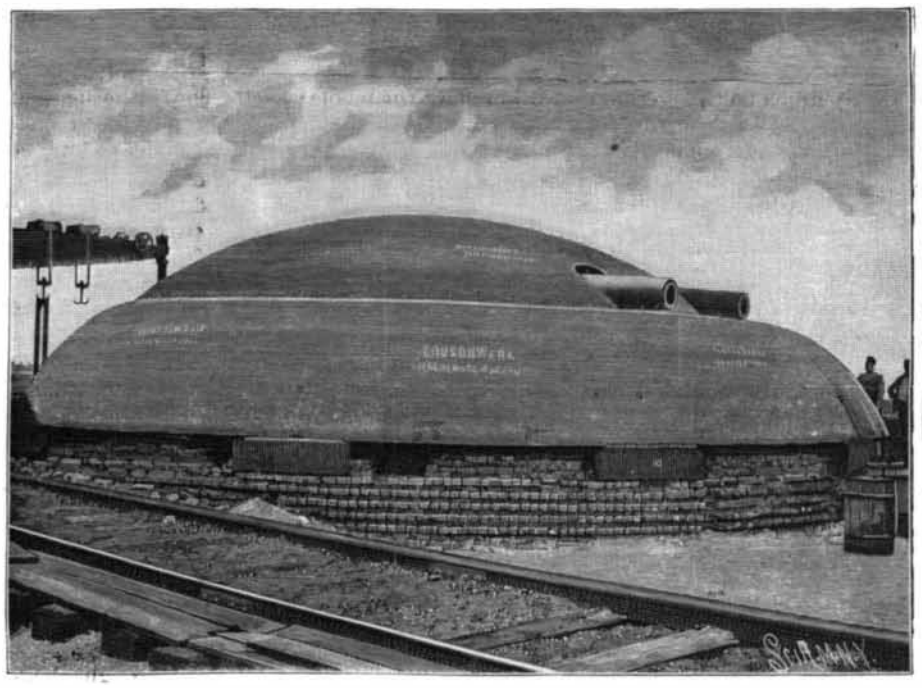

Fig. 1.-CHILLED IRON ARMOR TURRET FOR TWO 24 CM. GUNS-EXTERIOR VIEW.

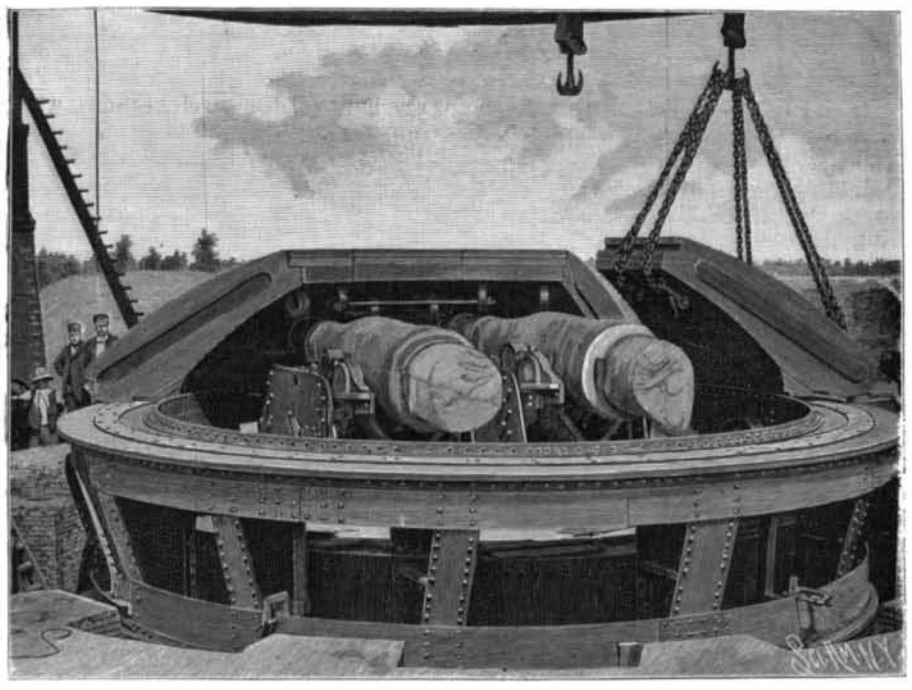

Fig. 2.—CHILLED IRON ARMOR TURRET FOR TWO 24 CM. GUNS IN COURSE OF CONSTRUCTION.

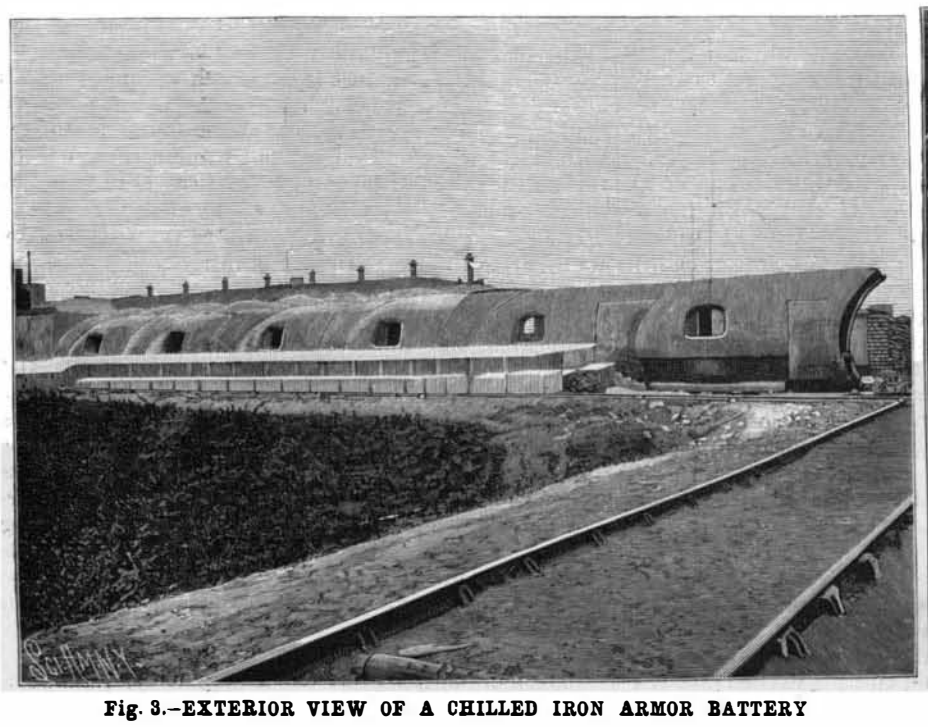

Fig. 3.—EXTERIOR VIEW OF A CHILLED IRON ARMOR BATTERY

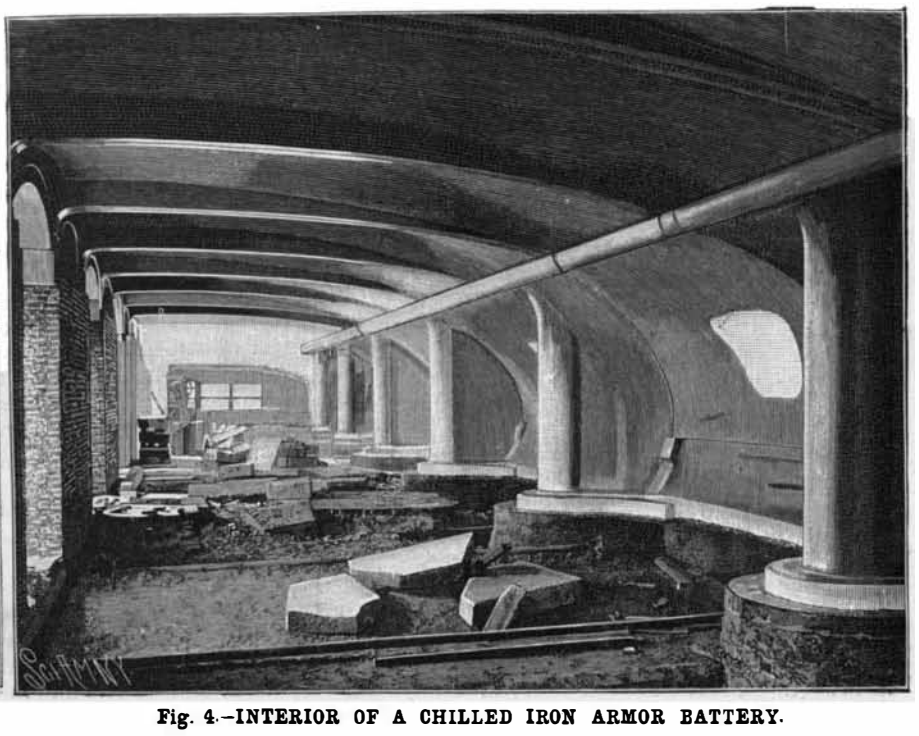

Fig. 4.—INTERIOR OF A CHILLED IRON ARMOR BATTERY.