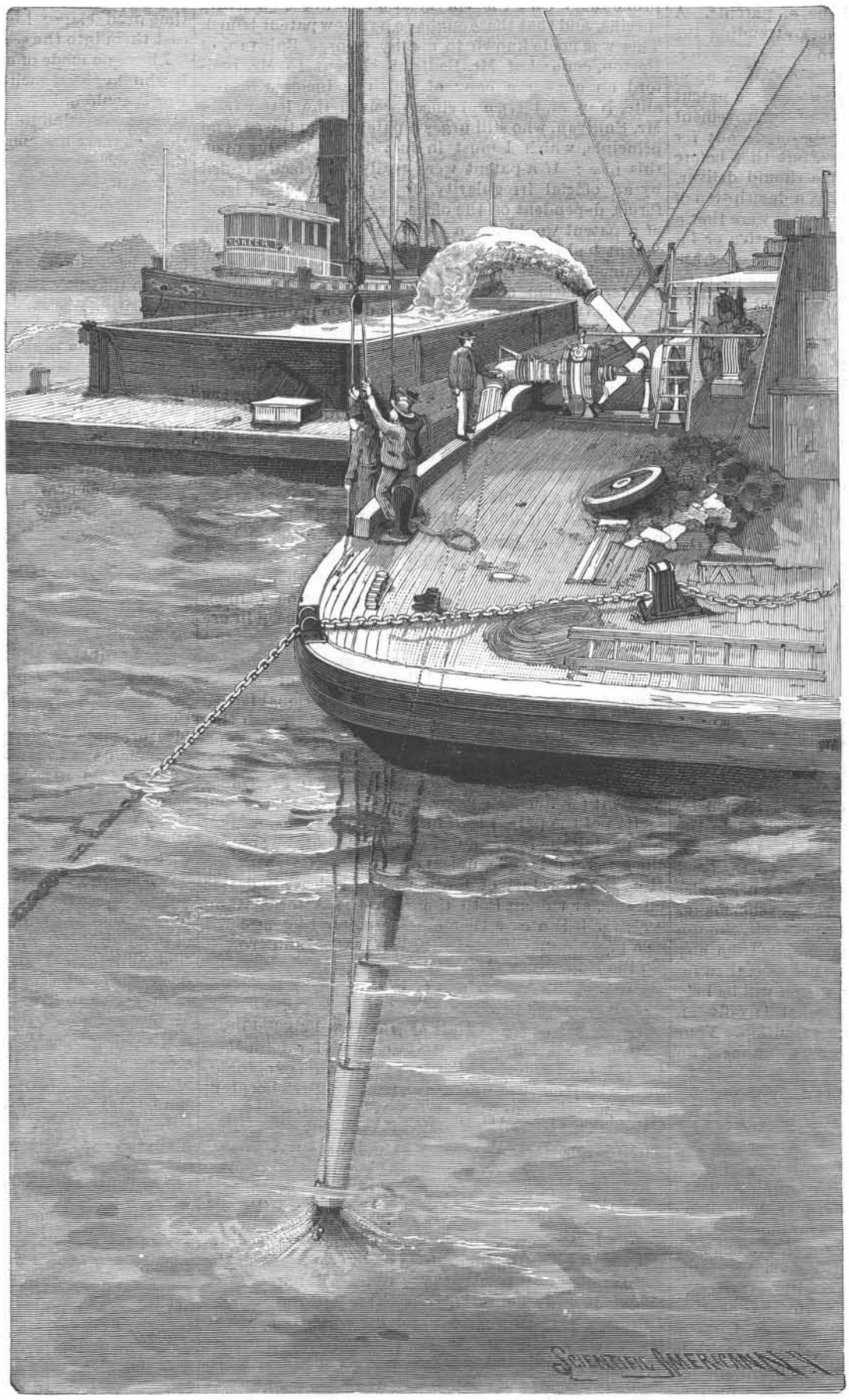
THE UNITED STATES DRILLING SCOW GENERAL NEWTON AND THE REMOVAL OF DIAMOND REEF, NEW YORK HARBOR.

Diamond Reef in the harbor of New York for many years was known as a dangerous shoal. It was situated at the mouth of the East River between the lower end of New York City and Brooklyn. Its limits were supposed to be known until about two years ago a vessel came in contact at a depth of nineteen feet with a rock hitherto unknown to any one. This lay a short distance to the east of the original shoal. It is by no means the first instance of such accidental discovery of rocks in the much traversed waters of this vicinity. Within the last few years two other rocks but a few miles from Diamond Reef have been discovered by vessels striking them.

Upon the discovery of the new Diamond Reef obstruction, it was surveyed and found to all appearances to consist of a rock of small area surrounded by a gravel shoal. It was supposed that a couple of months' blasting would be required to remove it. On attacking it, the conditions were found to be different than supposed. The apparent bed of gravel was only a thin deposit overlying a massive rock formation. It is only to-day, after twelve months' blasting, that the work is on the verge of completion.

The drilling scow used for executing the work, and which is illustrated in the present issue, was built during Gen. John Newton's administration for work upon the reefs of the harbor. For over twenty years it has been at work, and has proved the most successful machine for its own class of operations yet constructed. It is the property of the United States government.

As it is designed to work in exposed situations where there may be risk of collision with passing vessels, the leading idea in its construction of hull was to make it so strong that no ordinary impact would hurt it. It has a hull, rectangular in plan, 128 ft. long and 56 ft. broad. It is designed to perform two principal offices, to drill blast holes and to hoist the debris from blasting. The first function is accomplished by a dome which is lowered upon the bottom of the channel. Through the center of the hull of the scow an octagonal well hole thirty-two feet in diameter is constructed. Around this are arranged several catheads, short beams carrying grooved sheaves at their end, over which chain tackles work. These catheads are arranged in radial planes, pointing toward the center of the well hole. The dome is a portion of a hemisphere. It is made of boiler plate. The top is cut off, the truncated shell having a large central aperture. This dome is suspended from the catheads by the chain tackles mentioned above.



SAND PUMPS IN OPERATION REMOVING SAND AND GRAVEL.

By windlass power it is raised and lowered as desired. Around its lower rim are a number of pointed leveling bars. These are 4½ inches square and have a drop of four feet. They are arranged with self-acting cams, so that they can be held in any desired position, and trip lines for the cams are worked from the surface by lines or chains, if desired. Around the dome, arranged upon a circle of 23 ft. 6 in. diameter, are a number of 6 in. tubes. These reach nearly to the bottom plane of the dome. At the top they carry funnel-shaped openings of 21 in. diameter. An inner set of similar tubes is arranged upon a circle 11 ft. 6 in. in diameter. Besides this, provision is made for tubes to be set at any point of the large central opening in the top of the dome.

In operation the dome is brought over the place to be attacked. It is lowered by the tackles in a horizontal position As it nears the bottom the pointed leveling legs strike the rock and are pushed up one by one until all attain a bearing. When all is satisfactory the legs are clamped fast. Drill bars are now lowered from the scow and introduced into the tubes best placed for the work to be done. All this detail is determined by divers. The drill bars are connected to jars at their tops and are worked by ropes from drilling engines on the upper deck of the scow. They accomplish their work by their own impact, exactly as in drilling an artesian well, the tubes acting as guides.

In this way holes of any desired size are rapidly bored. Cartridges charged with dynamite or other explosive are placed in the holes and exploded by electrical detonators after the scow has been withdrawn a sufficient distance. The charges are placed in the holes by a diver.

The explosion being effected, the derricks seen upon the scow's deck are brought into use. Divers are sent down, who load the rock upon platforms, whence it is hoisted to the surface and dumped into a scow, to be removed. Finally the ground has to be definitely proved free of all dangerous projections. This is done by the use of a peculiar sounding apparatus worked from the scow. Two iron bars are dropped from its rear corners, worked by tackle, so as to be maintained vertically and so as to be kept at any desired depth. A third bar is attached to their lower ends so as to be horizontal. The rods are lowered to the determined minimum depth, in the case of Diamond Reef 26 ft. at low water. By paying out and taking in the four anchor chains the ground is swept with this sounding bar. It is accompanied in its progress by divers. If it strikes any obstacle, the diver signals to the surface. He examines the locality, and places one or more charges of explosive, as seems best, to remove the projections by surface blasting. They are exploded. If satisfactory, the sounding is continued, and the surface blasting is repeated wherever needed.

To remove the softer materials that may form part of the reefs and shoals operated upon, a centrifugal pump with long suction pipe is provided. Through this a stream of water mixed with sand and bowlders is driven, rapidly removing all such matter from the vicinity. Thus the scow really is used in a four-fold capacity, drilling, hoisting, sounding, and sand pumping. The test of its long service of twenty-one years has gone to prove its excellent qualities. Its construction adapts it for use in varying tides. The drill connections of rope are paid out or taken in, as necessary, according to the rise and fall of the tides. The connection of dome and scow is only by chain tackle, so that this is also independent of hourly variation in depth of water. Finally, the hemispherical shape of the dome, acted on by the horizontal sweep of the tides, revolves their thrust-in part into a downward or radial component that anchors the dome more firmly in place.

As work progresses, the position of the dome is constantly determined by triangulation from the shore.

Within the hull of the scow is a small machine shop, a blacksmith's shop, and air compressors for the divers, while a complete electric plant is installed for lighting its interior. Experiments have been conducted also with the light under water in the diver's hands.

The work now in progress in different parts of the harbor of New York is in charge of Lieut.-Col. G. L. Gillespie, to whom our thanks are due for courtesies received in connection with this article.

Action of Oils on Metals.

A series of tests, lasting some twelve months, on the action of various oils on metals in contact with them, recently carried out, gave the following results: In the case of iron, seal oil acted the least on it, and tallow the most. Bronze was not attacked at all by colza oil, and but very slightly by olive oil; it was, on the other hand, vigorously eroded by linseed oil. In the case of lead, the most deleterious lubricant was whale oil; the best, olive oil. Whale, lard, and sperm oils were about equally erosive. Zinc seemed to be but little attacked by mineral lubricant oils; the best oil was lard, and the worst sperm. Copper was not attacked by any of the mineral oils; sperm oil had the least and tallow the most action on it. Generally speaking, mineral oil attacked the metals under test the least; and sperm oil attacked them the most. In conducting the experiments, the metals were first thoroughly cleaned in ether and then dried. They were next carefully weighed and placed in closed vessels filled with oil, which were kept for a year at a uniform temperature in summer of 80° Fah. and in winter of about 50° Fah.

JOHN P. HAINES, president of the Society for the Prevention of Cruelty to Animals, recommends to persons who own horses subject to fits of blind staggers to supply themselves with spirits of ammonia, and when the animal exhibits evidence of an attack coming on to saturate a sponge or cloth with the ammonia and apply it to the horse's nostrils, and it will have as good effect as bleeding in the mouth, which is not always easily accomplished.

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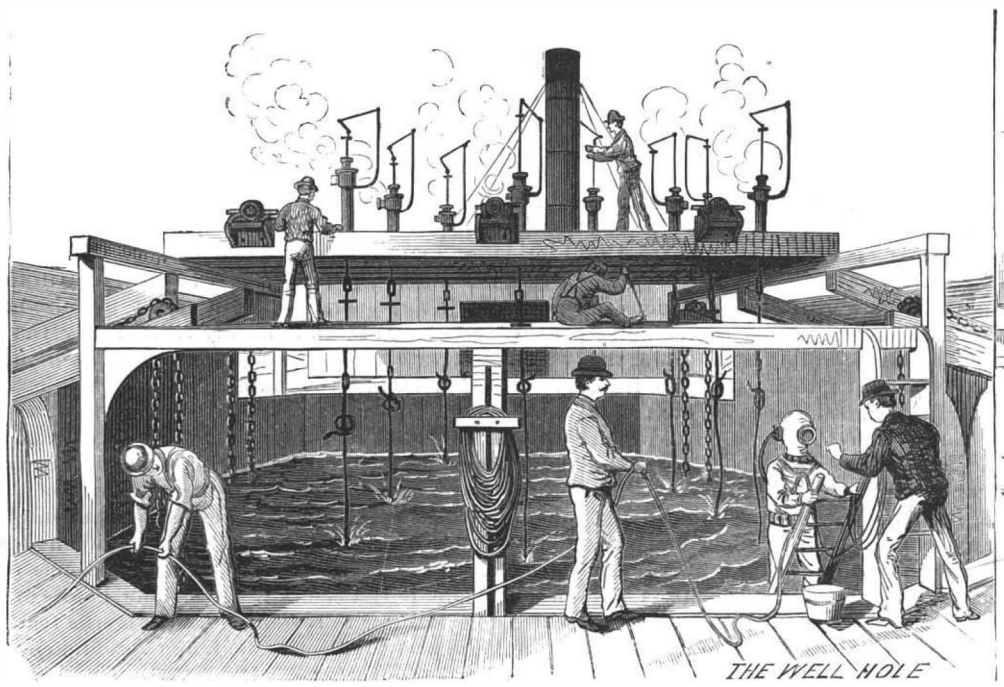
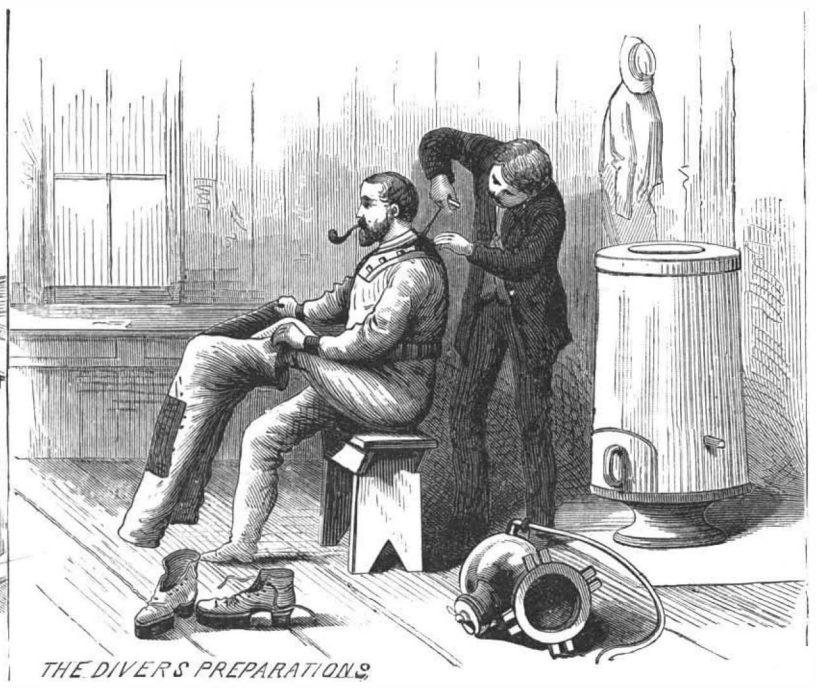
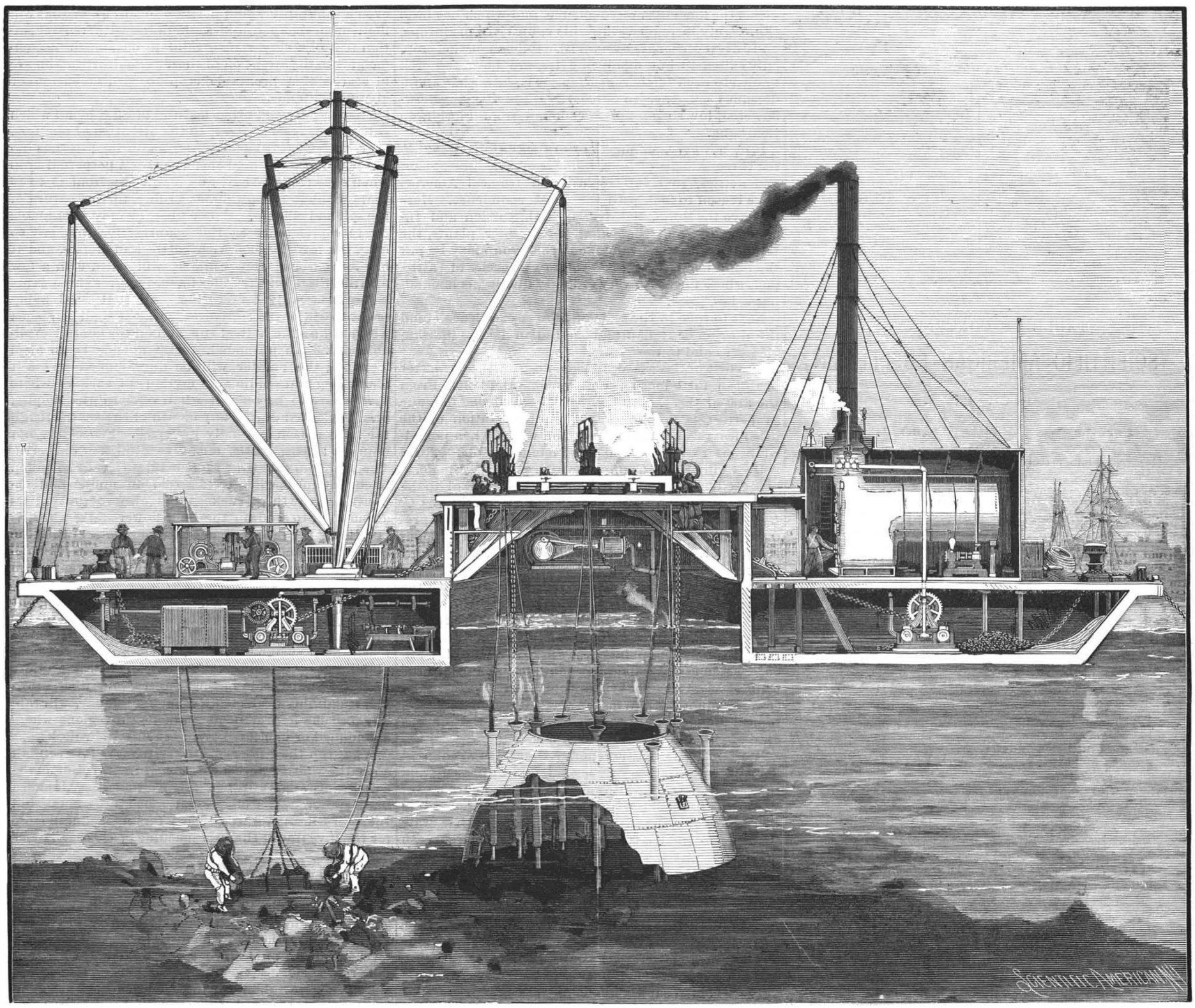


THE WELL HOLE



THE DIVER'S PREPARATIONS



THE UNITED STATES DRILLING SCOW GENERAL NEWTON, AT WORK ON DIAMOND REEF, NEW YORK HARBOR.—[See page 70.]