

RAISING SUNKEN VESSELS.

The usual method of setting afloat a vessel that has sunk at a place where the water is not very deep is based upon the principle of closing all the apertures in the submerged part of the hull and then pumping out the water. Such an operation, however, is not unattended with difficulty, since, in addition to fothering the leaks, it is necessary to have the hull and deck carefully strengthened by divers, in order to permit them to support, without yielding, the great pressure that is applied to their surface at the time of exhausting the water.

Vessels that have simply sunk without sustaining any serious damage, and the larger part of which remains above water, are usually more easy to raise; but in order to set afloat such as have sunk to a considerable depth in mud or sand, it is necessary to overcome the great friction that the grounded portions exert upon the bottom. With vessels of medium size this is effected only with difficulty, and when it comes to having to do with the great modern ships of war it is necessary to have recourse to special processes, since the traction effected by tugs would, as a general thing, be inadequate to disengage them. As it is impossible directly to overcome the friction opposed by the bottom, the idea has occurred to suppress it by disintegrating the mud or sand either by means of jets of water under pressure or of suction dredges, or even, in certain cases, by means of the two systems combined.

Two interesting examples of such methods have recently been described, one of them applied to the Russian cruiser "Rossia," which sank in shallow water in the river Neva near Saint Petersburg, and the other to the British armorclad "Victorious," which ran aground to the northeast of the jetty of Port Said.

The "Rossia" measures 480 feet in length between perpendiculars, 75 feet in width and 24 feet in depth.

determined by the lines, and, by means of rods placed against the lateral keels, succeeded in taking (and transmitting by telephone) a series of levels, which, combined with the successive frames of the vessel, the draught of water, etc., allowed her position to be



Fig. 1.—OPERATION OF RAISING THE CRUISER "ROSSIA."

obtained with great accuracy. In order to disintegrate the sandy bottom of which we have spoken, there was tied up alongside of the vessel a lighter that carried a force pump of which the pipe was 25 inches in diameter. The divers inserted this pipe into the bottom beneath the keel to such a depth that its lower extremity was about 25 feet beneath the surface

of the ice. In this way they succeeded in softening all the parts in contact. The direct exploration of the bottom (which they proceeded with after the stoppage of the pump), as well as the settling of the cruiser both fore and aft, permitted of ascertaining the results obtained. The operation, which was begun on the 19th of November, was finished with entire success on the 15th of December. It was, of course, much prolonged by the preliminary studies of which we have spoken and by the freezing of the river. On another hand, the vessel was not placed in a dangerous condition, as was the "Victorious," as we shall see, and the duration of the work was not as lengthy as it was in the case of the latter.

This ship (Fig. 3) is one of the most powerful of the British navy. She is 390 feet in length,

and 75 in width, and draws 27½ feet of water. She has a displacement of 15,140 tons and has a speed of 18 knots. On February 14 last, just as she came in front of the prolongation of the jetties of Port Said, she was driven toward the east under the influence of the wind and a very rough sea. After endeavoring, unsuccessfully, to make a resistance with her engines,

she let go in succession two anchors, the chains of both of which snapped. Reduced to a state of helplessness, she ran aground, in 25 feet of water, and about a mile from the extremity of the jetties.

An attempt was made in the first place to displace the vessel by connecting her stern with two tugs that, both together, developed 1,500 horse power. But this merely caused her to turn about; with the advantage, however, that it placed her head in a better direction. On the next day (February 15) the operation was resumed, this time at the bow, but without any appreciable result. However, in hauling upon one of her anchors, the vessel was made to slide upon the bottom for about 300 feet. At the same time, the crew proceeded to unship the coal and some of the projectiles in order to lighten the vessel and permit her to float as soon as she should reach a depth of 26 feet.

As may be seen, the results were but middling. At this point, M. Quellennec, engineer-in-chief of the Suez Canal Company, made a proposition to the commander of the "Victorious" to excavate a canal under the ship by means of a suction dredger operating on the port side and of two tank boats provided with force pumps that should direct upon the starboard side jets of water under pressure against the bottom. Fig. 4 gives a representation of the work.

The suction dredger, lying abreast of the ship, was held on the side of the offing by two anchors through which it was hauled from stem to stern and reciprocally. The debris sucked up was thrown back into the sea. At the same time, the jets of water of the tank boats kept disintegrating the muddy sand on the starboard side, and the tugs kept pulling away. All at once, on the morning of February 17, the vessel started forward a hundred and fifty or two hundred yards, and then foundered anew. This spurt caused the cables that connected the vessel with the dredger to snap, but fortunately no injury was done. The operations were

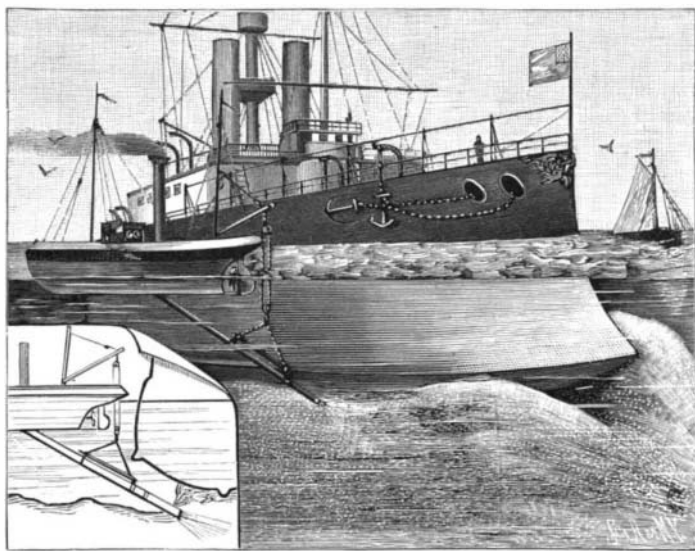


Fig. 2.—DISINTEGRATING THE MUD AND SAND UNDER THE "ROSSIA."

With a full load, she displaces 12,200 tons. At the time of the accident her displacement was 10,800 tons. She settled to a depth of about 30 inches into a bed of fine and muddy sand, mixed with a large proportion of pebbles, and, as a consequence of the lowering of the level of the water, exerted upon the bottom a pressure of 2,500 tons. Unfortunately, it was in the month of November, and the river having frozen over, the ice formed so thick a layer around the hull that the effort to break it had to be abandoned. It having been reported by divers that the stern was free and that the lateral keel on the left side was free also for nearly its entire length, an endeavor was made, but without success, to float the ship by pulling her sideways. The school of divers of Cronstadt was then put in charge of the operations. The divers donned their suits under a tent set up on the ice (Fig. 1), and descended two at a time, accompanied with electric lamps and telephone apparatus, and were able to stay under water for half an hour.

The idea occurred to make a diagram of the bottom upon which the ship lay, and to this effect the hull was divided into ten parts, each marked with a white line. The divers were lowered successively in each of the vertical planes

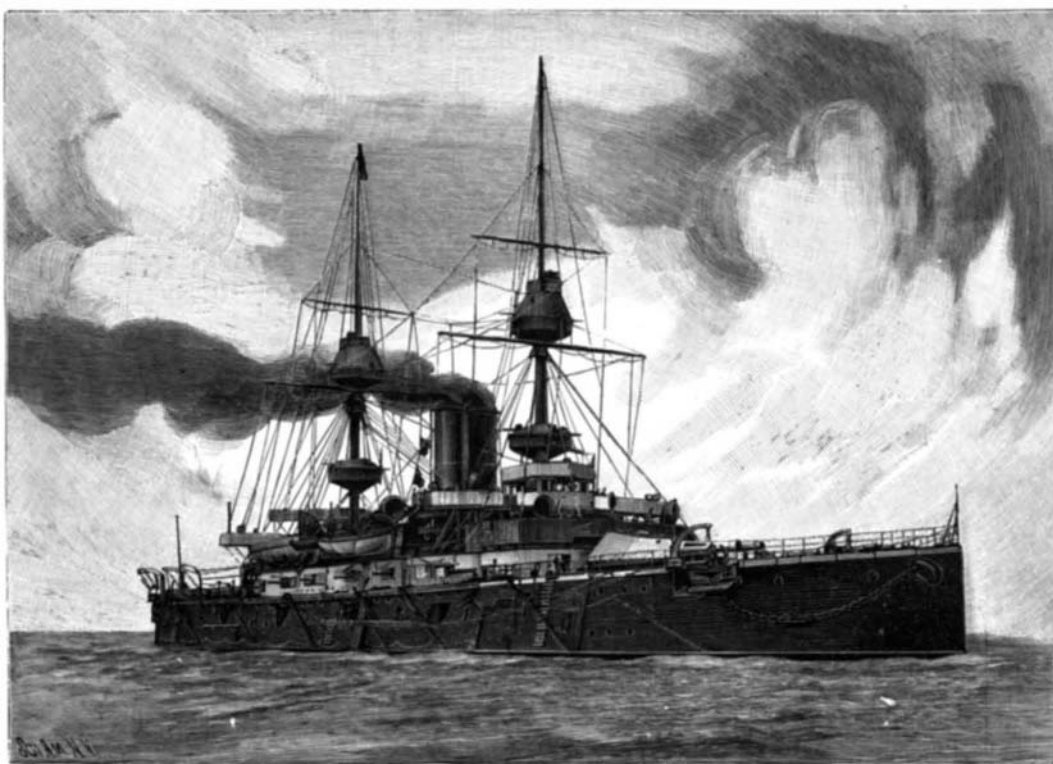


Fig. 3.—GENERAL VIEW OF THE BRITISH ARMORCLAD "VICTORIOUS."

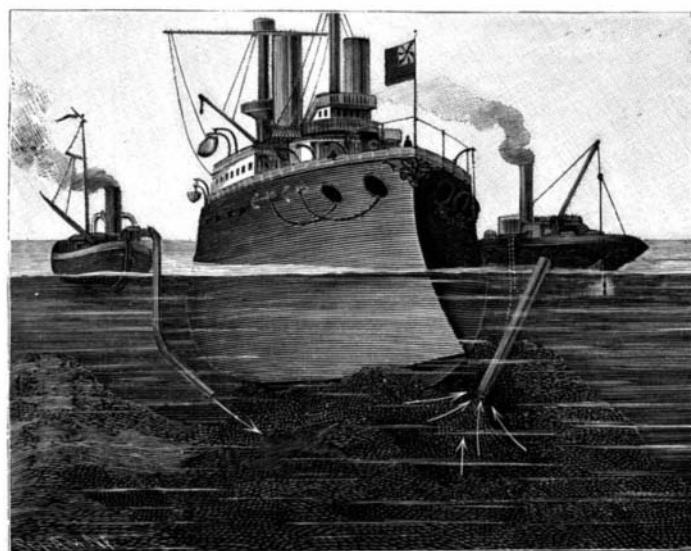


Fig. 4.—OPERATION OF SETTING THE "VICTORIOUS" AFLOAT.

resumed at half past seven o'clock in the evening; but in order that the dredger might move at the same time as the ship, no anchor was thrown out from it. Half an hour later, the "Victorious" began to start forward with slight jerky motions and then commenced to float. This was at eleven o'clock at night. On the next morning, at daybreak, the dredger was anchored

near the shore, and the ship, completely disengaging herself, was in a condition at eight o'clock to be towed to a depth of 35 feet, where she became mistress of her own movements. From the 17th of February, at noon, to seven o'clock on the morning of the 18th she had made a passage of 450 yards in water 25 feet deep, that is to say, 22 inches less than her draught.

The operation was, therefore, entirely successful and the British armorclad was drawn out of a very critical position, since, in a bottom of sticky sand like that in which she ran aground, the adhesion of the keel is such that a foundered vessel may, under the influence of the tides that necessarily hollow the bed, chance to sink progressively up to the mast-head. Such a disaster has happened several times, especially in the roadstead of Bilbao. For the above particulars and the illustrations, we are indebted to La Nature.