zontal plane; the ropes are roved around various pulleys, and finally as they pass through a "top" at the upper part of the machine they are twisted together to form the cable, and then after being roved around grooved sheaves to obtain the necessary pull are reeled up by a power-reel. When a sufficient length of cable is obtained, it is ready for shipment. In this plant there is a large horizontal rope and drilling-cable laying machine, but the principle does not differ materially from the vertical machine.

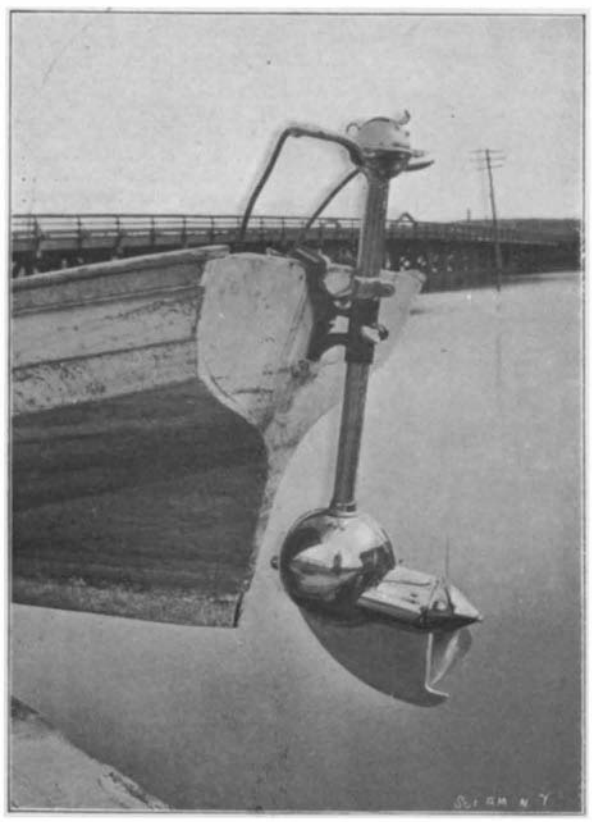
Ropes of considerable size, towing lines and ships' cables of the largest dimensions are made on the ropewalk, which is 1,100 feet long and which passes under one cross street. The yarn is rewound on larger bobbins, and the number used depends on the size of the rope. These bobbins are put on a framework of wood, located near one end of the ropewalk, and the ends of the yarn are passed through holes in an iron gage-plate shown in our first engraving of the ropewalk, and which is known as the face plate. It then passes through cast-iron tubes, and the yarn is fastened on hooks of the forming machine, which consists of a truck which travels on a track the entire length of the walk. There are as many hooks as there are strands. As the former moves away from the face plate it draws the yarn with it, and at the same time each hook revolves by means of gears, twisting the yarn left-handed into a strand. The machine is actuated by a cable which lies along the floor of the ropewalk. The cable passes over a large wheel at the left and serves to operate the mechanism which turns the hooks, and at the same time winds up a cable attached to the end of a ropewalk, thus making its motion positive. When the forming machine has reached the upper end of the ropewalk, as shown in our second engraving of the walk, the strands, each 1,100 feet in length, are completed. They are now taken and laid over on the other side of the walk, and the strands are then ready to be "laid" or made into rope. Two laying machines are required, one at each end of the walk, and are known as the "upper" and "lower" machines. They also give the rope what is known as a fore turn and an aft turn. As many of these strands as are required for the rope are stretched to full length and are attached to hooks on the laying machine. The upper machine has several hooks, but only one is used. All the strands are fastened to this hook and they turn left-handed in laying, and the lower machine has as many hooks as there are likely to be strands and operates in the opposite direction. The strands are meantime placed in the grooves of a conical wooden block called a "top," through which is passed an iron bar which is fastened to an upright post of a car called a "top sled." Pieces of rope called "tails" are fastened on the bar and wound round the rope to be laid. They help regulate the lay and assist in giving the rope a finish-gloss. The top having been mitered between the strands as closely as possible to the top, the sled is gradually forced along as the twisting proceeds in a right-handed direction. The lower machine keeps all the strands from untwisting. The top sled finally arrives at the lower end of the walk, with the full length of completed rope behind it. It is then compactly coiled by a reeling machine, covered with burlap and shipped to its destination.

At Postel in the district of Militch a cemetery 3,000 years old has been discovered. Two hundred graves have been unearthed under the supervision of the director of the Berlin Museum. The coffins are of stone, square in shape, and date from the bronze period.

A NEW SUBMERGED ELECTRIC MOTOR AND PROPELLER.

A propelling mechanism which can be transferred from one boat to another in a few minutes' time will be welcomed by many who use boats either for business or pleasure. The device which we illustrate only weighs from 30 to 45 pounds and can be removed at a moment's notice, and if desired can be taken into a boathouse for safety. The batteries weigh from 35 to 55 pounds each, according to their size. The motor and propeller occupy the place of the rudder, and the boat is steered by turning the sternpost. The motor itself is under water and is inclosed in a water-tight globe or shell, the storage batteries being placed in the boat. The motor not only propels the boat, but steers it as well, and the boat answers the propeller as readily as it does a rudder. It can be run at any speed up to four miles an hour using two crates of four cells, and a run of from 20 to 30 miles can be made on each charge. The motor is a series-wound, two-pole machine of slow-speed type. The armature is of the tunnel type with a smooth periphery and is capped with spun-heads so as to present a smooth and uniform surface to the water when revolving. The motor is entirely inclosed in a spun case made in two parts, and is supported from the tube above and held and protected by an aluminium pin below, which also protects the blade. The switch provides for two speeds in either direction and is located at the top of the tube. A bracket is clamped to the stern of the boat by thumb screws and allows the motor to be turned in any direction for steering. The tiller-head, which contains the switch, is connected to the battery by wires. These wires act as tiller cords. Brackets are supplied for either double-ended or flat-sterned boats, as may be desired. The wires to the batteries are provided at their ends with terminals which snap into sockets. There are no binding screws nor adjusting fastenings, so that it is impossible to connect the battery wrongly. The elements are placed in rubber cells which are secured in wooden boxes. The entire machine is nickel-plated. This very ingenious boat-propeller is made by the Submerged Electric Motor Company of Menomonie, Dunn County, Wis.

THE SUBMERGED ELECTRIC PROPELLER AT WORK.



SUBMERGED ELECTRIC BOAT PROPELLER.

A NEW AUTOMATIC TELEGRAPH REPEATER

A device for repeating telegraphic messages both with and without the use of sounders or other receivers at intermediate stations is the subject of an invention for which Mr. Julio E. Cordovez, of Panama, Colombia, has received a United States patent. The contrivance allows the use of the apparatus either for repeating purposes or for those of ordinary communication from station to station. Our description will be confined to the apparatus used with sounders.

In our diagram *A* represents the line-wire from one station, and *B* the line-wire from another station, the wires being connected with the binding-posts, *A'* and *B'*, respectively. The local battery, *C*, is connected by wires, *D* and *E*, with binding-posts, *D'*, *E'*. The poles of the main battery, *C'*, are connected by wires, *F G*, with the binding-posts, *F'*, *G'*. The binding-post, *H'*, is connected by the wire, *H*, with any suitable local apparatus, such as a telephone or a testing instrument. The various binding-posts mentioned are secured upon a board. From the post, *A' B'*, continuation-wires lead to a lightning-arrester, *J*; and the wires connect the lightning-arrester in turn with the switches, *A*4 *B*4, which are shown in engagement with contacts, *K K'*. The switches, however, can also engage another set of contacts, *L L'*, of a central contact, *M*, or rests, *N*, serving to hold the switches out of connection and to prevent them from catching in the various wires. The contact, *M*, is connected with the binding-post, *H'*. The switches can also engage grounding-plates, *O O'*.

The grounding-plate, *O'*, is connected by a wire, *F*2, with the binding-post, *F'*. From the grounding-plate, *O*, a wire, *P*, leads to the coils of a relay-electromagnet, *Q*, connected by a wire, *P'*, with the coils of an opposing electromagnet, *Q'*. A wire, *P*2, connects the coils of the electromagnet, *Q'*, with a contact, *R*, on a telegraphic key. The key has three contacts, *R R' R*2, insulated from one another. The contact, *R*, is normally engaged by a screw on the end of the key-lever. The contact, *R'*, is electrically connected with the key-lever and also with the contact, *L*. The contact, *R*2, is connected by wires, *P*4 *p*4, with the corresponding contact, *r*2, of another telegraph-key. The connec-

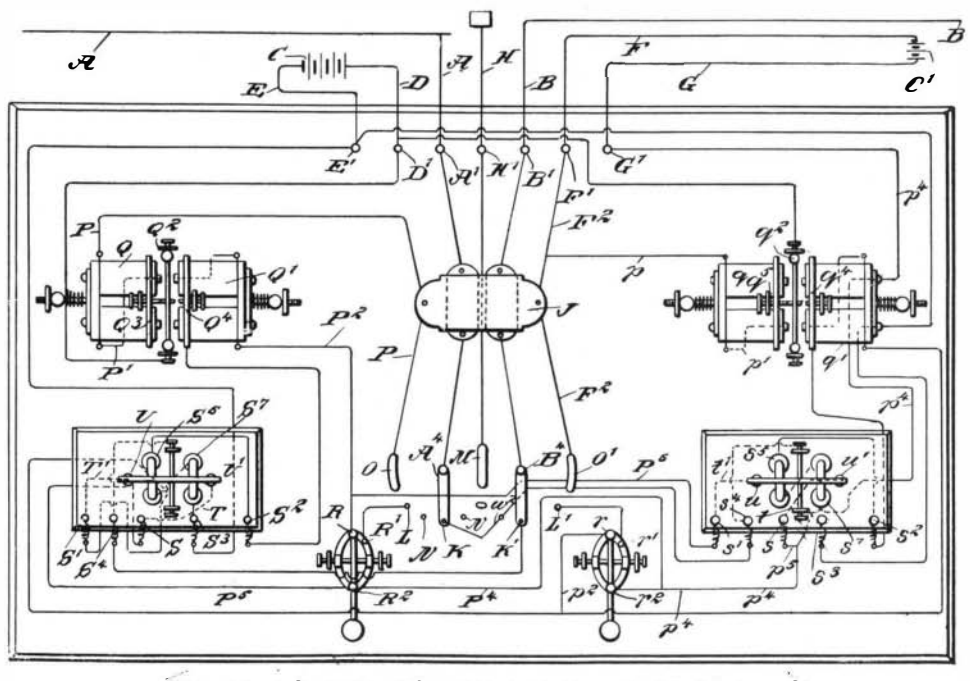
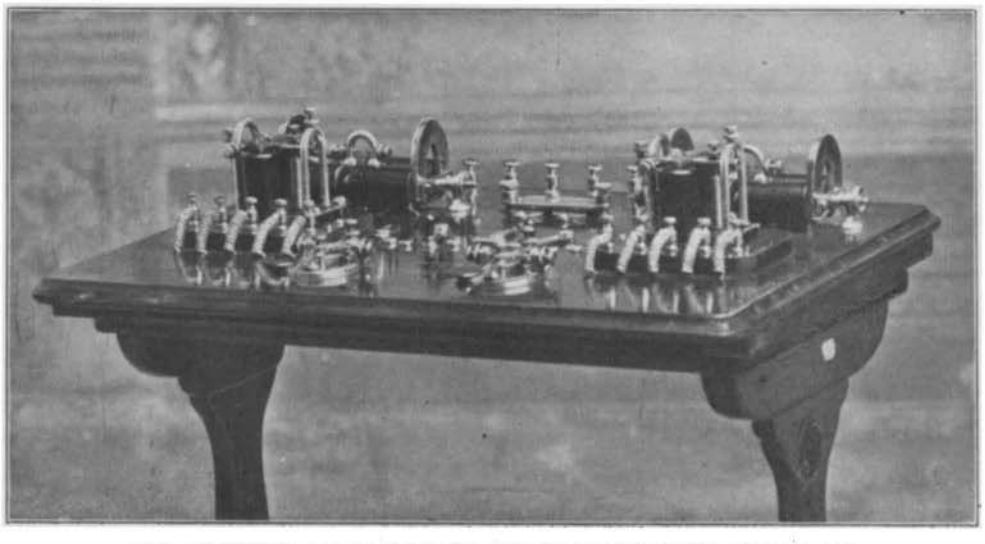


DIAGRAM OF APPARATUS IN WHICH SOUNDERS ARE USED.



THE CORDOVEZ AUTOMATIC TELEGRAPH REPEATING APPARATUS.