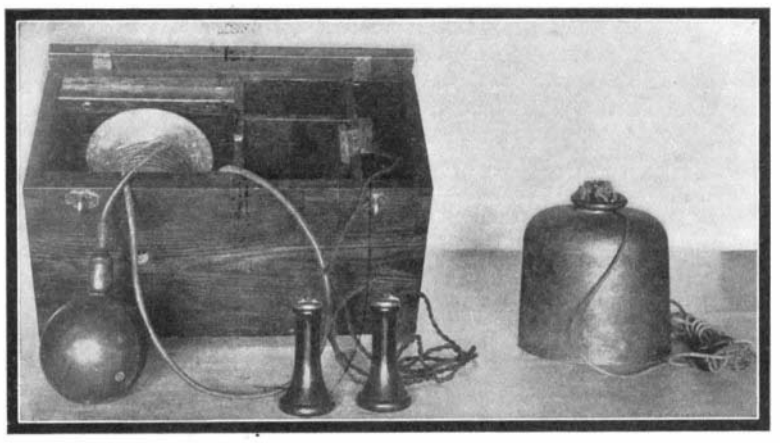
SUBMARINE SOUND TELEGRAPHY.

Next in importance to wireless electric telegraphy through the atmosphere is sound telegraphy through water, in the establishment of communication between steamers and ships at sea.

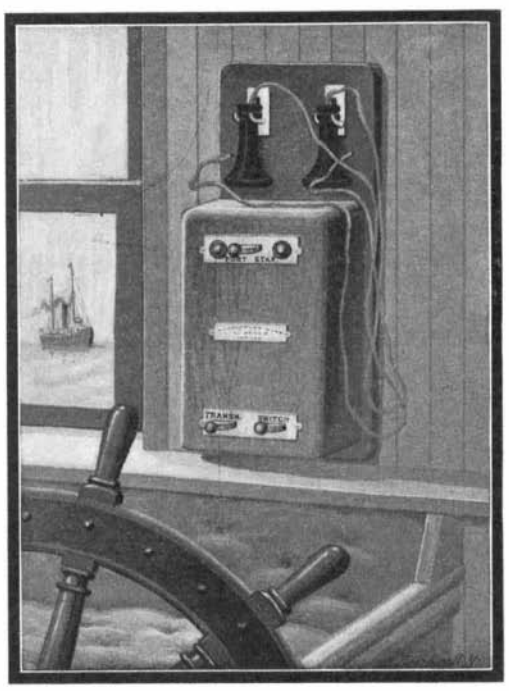
The accompanying illustrations show perfected apparatus for the transmission and reception of bell sound vibrations through the water from one vessel to another. In our issue of February 2, 1901, we described an experimental boat designed by Mr. A. J. Mundy, based on experiments in the conductivity of sound through liquids by Prof. Elisha Gray, which was successfully tested in Boston harbor. Since then several improvements have been made under the direction of Mr. J. B. Millet, of Boston, vice-president and general manager of the Submarine Signal Company, which render the system quite complete and perfect from a practical point of view. Steamships plying between Boston and New York have been equipped with this improved apparatus, and successfully use it in signaling very frequently. Upon invitation, one of the representatives of the SCIENTIFIC AMERICAN, on a very stormy and windy night (January 18th last), took the trip from New York to Boston for the purpose of witnessing the practical working of the system aboard the steamer "Herman Winter," and noted with much interest the distinctness with which signals were exchanged when the ship was seven miles distant from the ringing bell. It is a well-known fact that sound travels faster through water or liquids than air, and this is taken advantage of in a novel and practical way.



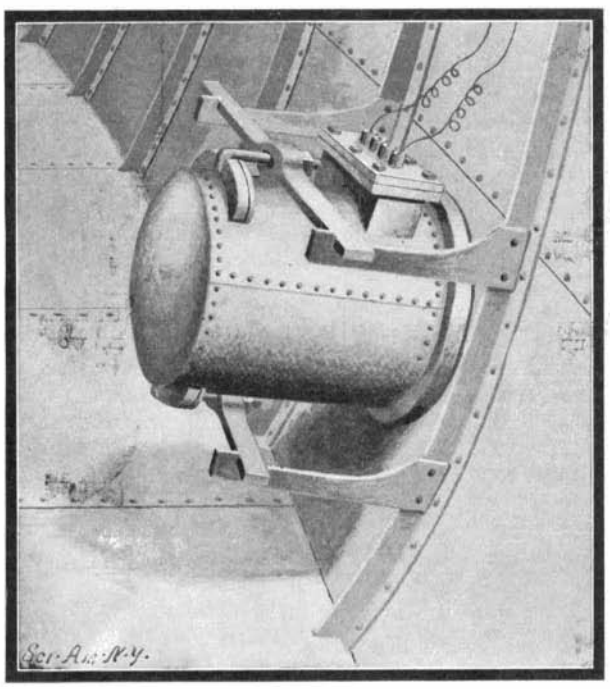
Portable Submarine Sound Signaling Apparatus.

Referring to the large illustration, the circular dotted lines shown in the larger vessel represent the position in the ship of the two sound receivers, one upon each side in the hold, located approximately twenty feet below the surface of the water. The lightship "Pollock Rip" has the sounding bell hung through a well in the center of the ship, about twenty-five feet below the bottom. It also has a receiving apparatus. Beyond, at the left, is observed a lighthouse and a buoy. Depending from the buoy is a bell, with a pipe leading to the shore to the compressed-air reservoir in the lighthouse. In the small illustration the manner of suspending the bell is shown. It is held by a main chain, while a second operating chain is attached at its lower end to the bell crank of the hammer, and the upper end to a pneumatic piston, which is operated by compressed air either from the anchored lightship or the lighthouse, as the case may be, or it may be operated by a direct upward pull by manual power if desired.

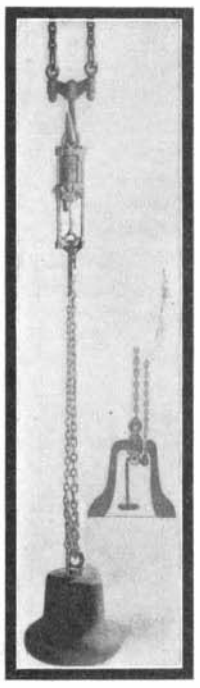
It has been ascertained that the receiver for collecting the sound vibrations need not be located on the outside of the vessel, but operates as well when clamped on the inside against the inner surface of the outer hull, especially in iron ships. The sound vibration from the bell passing through the water is communicated to the side of the ship's hull, and that in turn to the liquid or water in the receiver. This, as will be noticed in the illustration, consists of a cup-shaped metal cylinder having the open end edged with rubber, and clamped against the side of the hull. Four hook-supporting arms project inward from the hull, and upon these rest two crossbars in which are hook eyebolts, the hook portion being clamped over projections on the surface of the receiver. By this arrangement the open end of the receiver is clamped securely against the side of the ship's hull, making a water-tight joint.



The Telephone Sound Receivers.



The Sound Hold-Receiver.



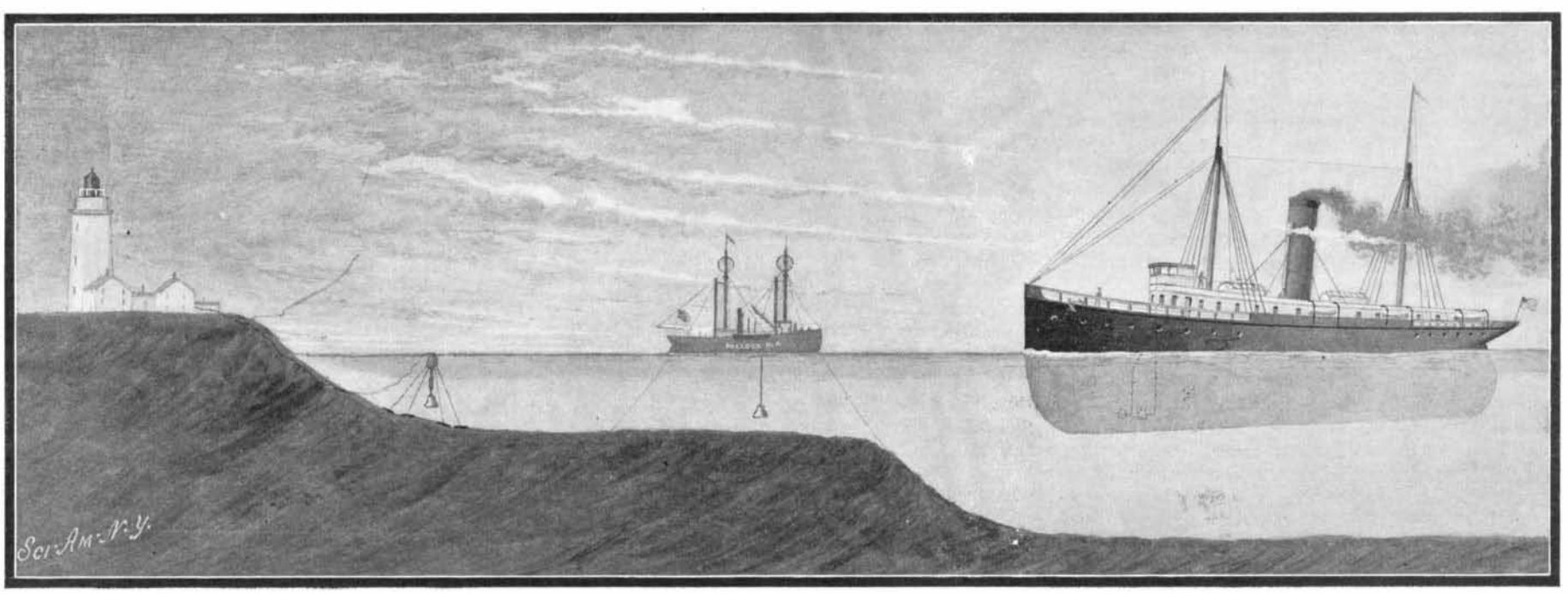
The Signal Bell.

Inserted in the top of the receiver is an electric transmitter, something on the order of a telephone transmitter, from which wires are run to the pilot house of the ship, as will be observed in one of the small illustrations. The wires are connected to a battery and the primary coil of an induction coil in the usual way, and the telephone receivers to the secondary coil.

It is obvious that when a sound impulse is given to the liquid in the receiver in the hold of the ship, it will be transmitted electrically to the telephone receiver in the pilot house. As the sound travels through the water in every direction from its source, it is found that the impulse will be stronger and louder on the side of the ship nearest to the source. By this means the direction of the sounding bell is ascertained, for by listening to the telephone receiver attached to the starboard side water receiver, and then switching over to the port side and listening to that telephone receiver, the ear detects at once which is the louder sound of the two. This was determined experimentally by turning the ship around in a large circle, when the difference in the sound from one side to the other was very noticeable, according to which side was nearer or farther away from the sounding bell. A portable apparatus for small fishing boats is shown in another illustration. The bell is shown on the right of the picture, which is suspended over the side of the boat, the hammer being operated by a separate rope. In the box is a coil of electric cable attached to a hollow water-tight spherical globe containing the electrical transmitter. This is lowered overboard with the bell, and enables two boats so equipped to signal to each other. The sound is conveyed from the spherical transmitter bulb while immersed in the water to the telephone receivers in the same manner as previously described. A depth of twenty-five feet is said to give the best results.

In foggy weather signals of this kind are readily heard, regardless of which way the wind is blowing.

Our representative, while on the "Herman Winter," observed the perfect operation of the apparatus when approaching, passing, and leaving the "Pollock Rip" lightship. It had been prearranged that the signal should be the number 73, the number of the lightship. This locality was reached shortly before daylight, yet when the ship was seven miles from the lightship, tossed by tempestuous seas, the signal, seven strokes then three, was faintly but distinctly heard. Within two miles it was quite loud, and the peculiar A musical note of the bell was plainly noticeable. It is feasible to signal words with a special code, and no doubt such a system of communication will soon be perfected. The usefulness of the system in safeguarding ships against collisions at sea at night or in a fog is evident.



SYSTEM OF SUBMARINE SOUND SIGNALING.