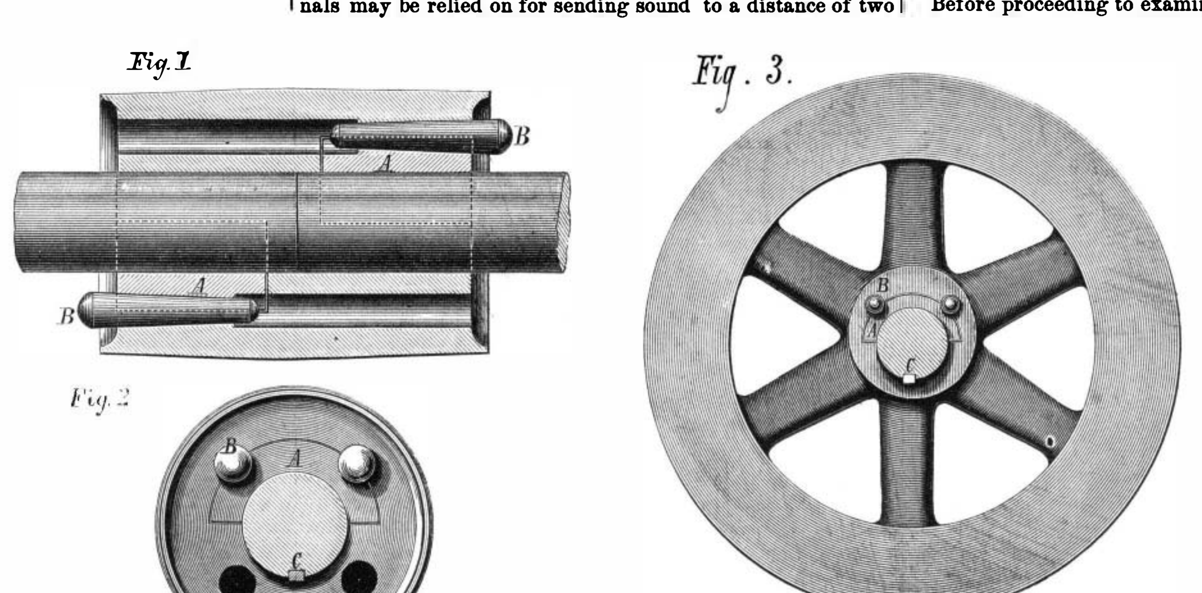
IMPROVED SHAFT COUPLING.

The annexed engravings represent a new shaft coupling, in which two shaft ends and the sleeve are connected by longitudinal wedge keys alone, these being driven in on opposite sides of the ends and between the bushings and the sleeve. Through the center of the hub passes the shaft aperture, which is enlarged at each end, as shown. At A, Fig. 1, are bushes fitted in and keyed down to the shaft by the keys, B, which firmly press the shaft against the opposite side of the hole, where it is secured against revolving in the coupling by the key, C, Fig. 2. The bushes are preferably located on opposite sides of the hub, though they may be, if desired, on the same side.

If the device is to be placed in a position where much jarring occurs, the wedge keys, B, may be prolonged through the coupling, and be set up on the nuts on the ends. The coupling as thus arranged is especially intended to obviate the use of bolts, screws, and flat tapered keys or wedges, so as to be readily removed by driving out the keys by means of a drift. For coupling fly and other wheels to shafts (see Fig. 3) a tight fit is obtained by boring the hole about one hundredth of an inch smaller than the shaft, the segment or bushing being bored in its place in the wheel. The inventor claims that this attachment of wheel and shaft is easily effected, and the wheel may be removed without requiring sledging, forcing with power screws, etc. Similarly, steam engine cranks can be attached to shafts as firmly as by a shrinking fit, while the injurious strain on the metal produced by the latter is avoided.



GUSS' SHAFT COUPLING.

Patented through the Scientific American Patent Agency April 4, 1876. For further particulars relative to rights to manufacture, etc., address the inventor, Mr. S. M. Guss, Reading, Pa.

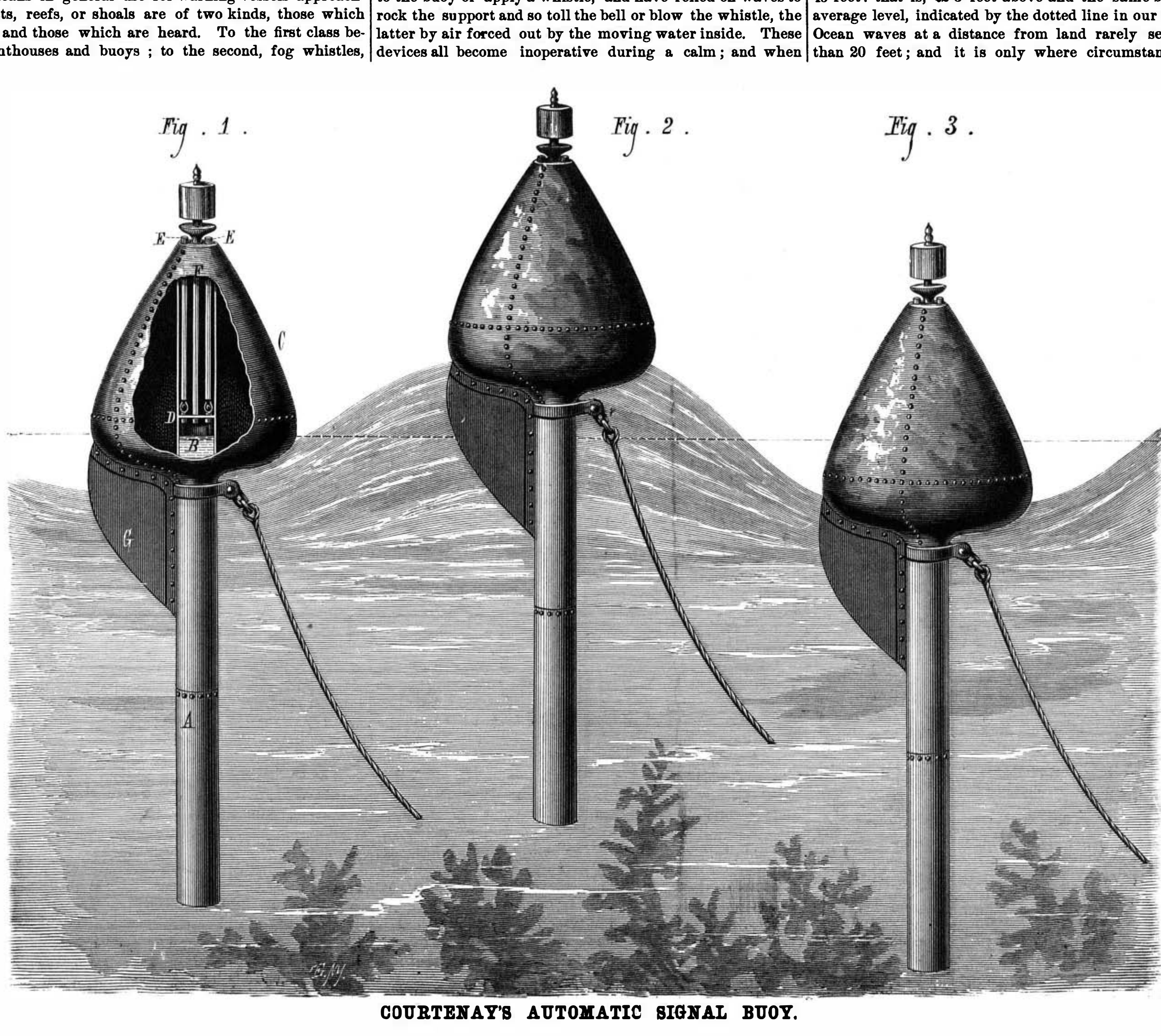
IMPROVED AUTOMATIC SIGNAL BUOY.

The means in general use for warning vessels approaching coasts, reefs, or shoals are of two kinds, those which are seen and those which are heard. To the first class belong lighthouses and buoys ; to the second, fog whistles, bells, horns, sirens, guns, and similar sound producers. Although of late years, mainly through the development of electric illumination, it has been possible to construct lighthouses of extraordinary powers, no beacon ever has been or probably ever will be devised which a heavy fog cannot render practically inefficient. True, it may be similarly asserted that the varying conditions of the atmosphere exercise a potent influence on the transmission of sound, and thus tend to decrease the value of the sound signal; but the fact remains nevertheless that the latter stands superior to the light, for, as Tyndall has proved, "even against a moderate gale and unfavorable conditions for sound transmission, signals may be relied on for sending sound to a distance of two or three miles, and, under ordinary conditions of fog, considerably further." What the lighthouse is to the coast, the buoy is to the hidden reef or shoal; but, unlike the former, it is useless save by day. Moreover, while we have supplemented the lighthouse by the stationary sound signal, we have devised no parallel invention to supplement the buoy. The object has been a sounding apparatus and buoy combined, the former of which will sound under all circumstances; the best we have hitherto done is to fasten a bell to the buoy or apply a whistle, and have relied on waves to rock the support and so toll the bell or blow the whistle, the latter by air forced out by the moving water inside. These devices all become inoperative during a calm; and when a heavy fog is likewise present, the mariner, aided neither by sight nor by hearing, perforce must feel his way, as best he can, by the lead. It is safe to believe that, had we been possessed of some efficient system of sounding buoys, the Atlantic, the Schiller, the Deutschland, and other ill-fated vessels, warned from the reefs and shoals, would not have terminated their voyages in wreck and disaster. There can, therefore, be no question as to the importance and necessity of inventions looking to the perfection of such a system; and for this reason, for the device which we here illustrate, and which belongs to that class, the careful consideration of lighthouse boards and similar bodies is bespoken.

Before proceeding to examine the mechanical construction, a few results of scientific investigation into the phenomena of sea waves may be recalled. Waves are of two classes: those of translation, and those of oscillation. Ordinary sea waves are oscillatory, but become waves of translation as they enter shallow water. They are, in character, cycloidal. The motion of the water is that of alternately flowing to and from a point. Toward the top of the wave the movement of particles is in the direction of the wave; but in the trough, the movement is in the opposite direction. Motion is greatest at the crest and at the lower portion of the trough. At half the hight of the wave there is no motion.

It has further been proved that the depth to which water is agitated by waves is not much greater than the hight of the wave measured from trough to crest. Accurately, a wave 10 feet high and 32 feet long would only agitate the water 6 inches at 10 feet below the surface; at a depth equal to the length of the wave, the motion is diminished to $\frac{1}{534}$ that of the surface. Hence, for practical purposes, we may consider the depth of motion below the surface to be commensurate with the hight of the wave above.

The highest waves ever measured occur off the Cape of Good Hope, and reach a total hight, from trough to crest, of 45 feet: that is, 22·5 feet above and the same beneath the average level, indicated by the dotted line in our engraving. Ocean waves at a distance from land rarely seem higher than 20 feet; and it is only where circumstances, in the



COURTENAY'S AUTOMATIC SIGNAL BUOY.