

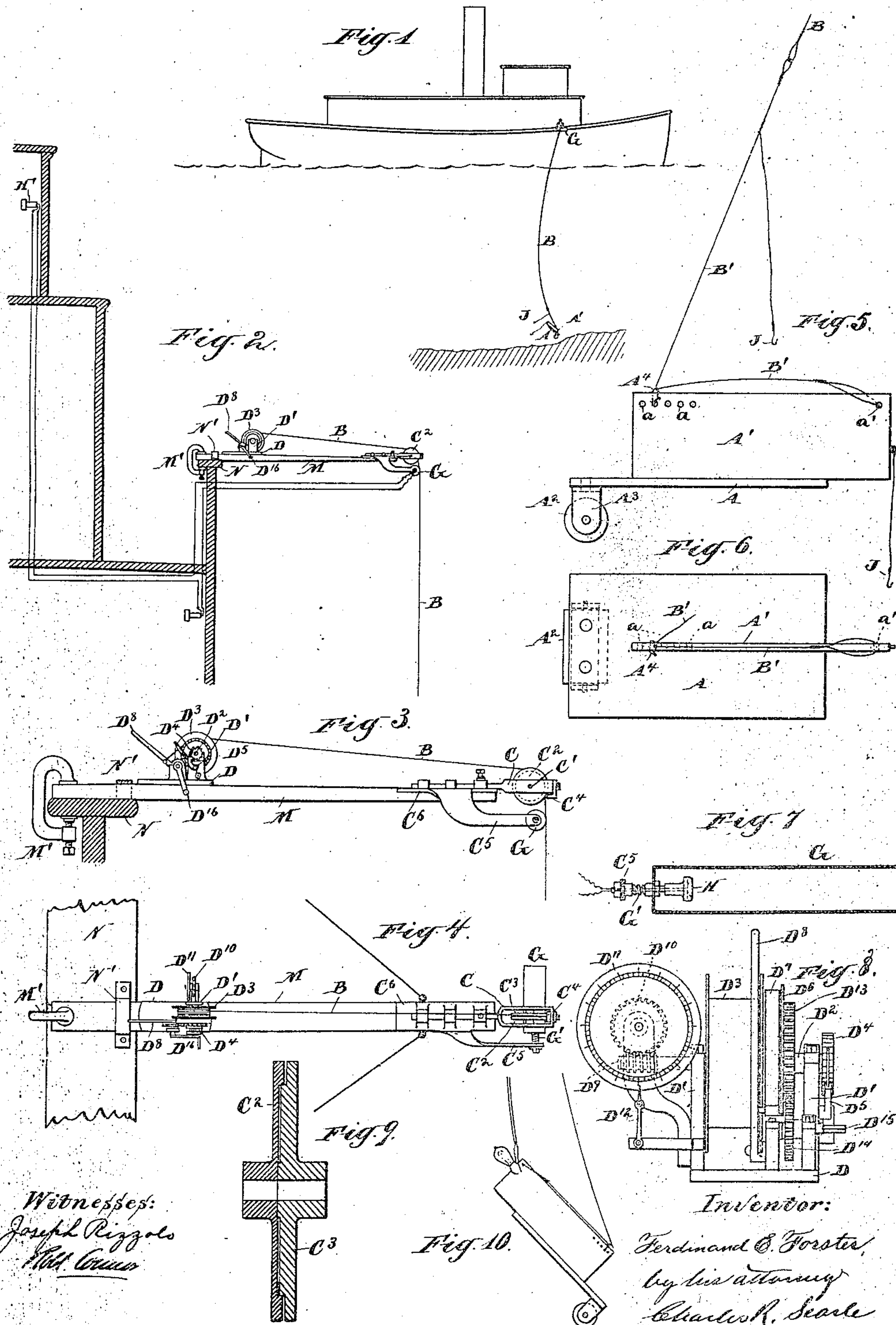
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F. E. FORSTER.
SHOAL WATER INDICATOR.

APPLICATION FILED APR. 16, 1901. RENEWED JULY 2, 1902.

NO MODEL.



UNITED STATES PATENT OFFICE.

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SHOAL-WATER INDICATOR.

SPECIFICATION forming part of Letters Patent No. 720,015, dated February 10, 1903.

Application filed April 16, 1901. Renewed July 2, 1902. Serial No. 114,121. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND E. FORSTER, a citizen of the United States, residing in the city of New York, borough of Manhattan, in the county and State of New York, have invented a certain new and useful Improvement in Shoal-Water Indicators, of which the following is a specification.

The invention relates to sounding-machines of that class in which a submerged plane or sounder attached to and traveling with the vessel is drawn through the water and by the action of the latter analogous to the action of wind on an aeroplane is driven forward and downward. I have shown and described an apparatus of this general character in a patent to me dated September 8, 1885, No. 326,028. The present invention is an improvement thereon.

The invention consists of an improved form of sounder and means for controlling and indicating the depth at which it travels and also improved means whereby the contact of the sounder against the bottom will be plainly indicated to the ear. The sounder is of peculiar form and construction, as will be described farther on, and is held to the vessel by a fine wire paid out from a registering-reel. Between the reel and sounder I place a resonator in yielding contact with the strained wire and adapted to reinforce the vibrations of the latter sufficiently to render them plainly audible to an attendant stationed near the instrument. I also provide the resonator with a telephone or analogous sound-transmitting device adapted to receive and transmit the resonator vibrations to receivers located in the pilot-house and other portions of the vessel.

The invention also consists in certain details of construction and arrangement of parts to be hereinafter described.

The accompanying drawings form a part of this specification and show the invention as I have carried it out.

Figure 1 is a side view of a vessel equipped with my apparatus. Fig. 2 is a transverse section of a portion of the vessel in outline, on a larger scale, and showing part of the apparatus in side view. Fig. 3 is a corresponding view of that portion of the apparatus extending outboard on a still larger scale, and Fig. 4 is a corresponding plan view. Fig. 5

is a side-view of the sounder alone, and Fig. 6 is a corresponding plan view. Fig. 7 is a longitudinal section of the resonator. Fig. 8 is an elevation of the reel and its immediately-connected parts. Fig. 9 is a transverse section of a portion of the apparatus alone. Fig. 10 is a side elevation of the sounder alone, showing a modification in which an electric light is carried thereon.

Similar letters of reference indicate like parts in all the figures.

The sounder consists of a plane A, having an upwardly-projecting longitudinal fin A' extending centrally of its upper face and weighted at the forward end to present the plane angularly to the motion through the water to induce its descent and also cause it to travel forward in a position nearly perpendicularly below its point of attachment to the vessel. The plane A is preferably rectangular, as shown, and my experiments indicate that the best results will be attained with a rectangular fin of a length about equal to the plane and having about half the area thereof set a short distance in rear of the front edge and overhanging a corresponding distance beyond the rear edge. The weight at the forward edge is preferably in the form of a cylinder or roller A², of lead, carried in a yoke A³, attached to the under face of the plane and free to revolve. In addition to ballasting the sounder the roller also allows the plane to be dragged along the bottom, if the latter be sufficiently smooth and hard, and tends to prevent engagement of the forward edge with slight obstructions in its path.

The sustaining-wire B, by which the sounder is attached to the vessel, is of steel of the quality known as "piano-wire" and is preferably silvered or coppered better to withstand the action of the water and is as fine as is consistent with strength. In practice the sounder is removably secured to the end of the wire B by a short length B' of similar wire permanently secured to the sounder by engagement with an eye or small hole a' at the extreme rear upper angle of the fin and extending forward along the upper edge thereof and through a closed loop or ring A⁴ of wire engaged in one of a series of holes a, arranged parallel with and near to the upper edge of the fin at the front. Thus attached the normal point of strain is at the front end

of the fin, and by selecting one or another of the series of holes the angle at which the sounder will travel relatively to the vessel motion may be varied within certain limits, and thus a certain range of adjustment is secured in adapting the apparatus for service at given speeds. The loop A^4 is of copper wire or other material offering a breaking resistance less than that of the wire B or B', so that in the event of collision with any considerable obstacle on the bottom the loop A^4 will break and the strain be immediately transferred to the rear point of attachment a' and cause the sounder to overturn and rise to the surface behind the vessel, thus considerably lessening the danger of losing the sounder. This portion of the apparatus may be secured in any desirable manner to the vessel, and any suitable means may be employed to indicate contact with the bottom—as, for instance, the slackening or change of direction of the wire B. I prefer the apparatus shown in the drawings, consisting of a spar M, removably secured to the rail N of the vessel by engaging in a yoke N' of strap-iron and held by a clamp M', compressing the inboard end of the spar firmly to the rail. The spar projects sufficiently outboard to carry the wire and sounder clear of the vessel. Near the inboard end is a base-plate D, having a pair of standards D', serving as bearings for the shaft D² of a reel D³, mounted between them. One end of the shaft carries a ratchet-wheel D⁴, acted upon by a spring-pawl D⁵, serving to prevent unwinding when engaged, and also with a drum D⁶ and friction-band D⁷ therefor, operated by a hand-lever D⁸ and forming a brake to check the too-rapid unwinding when the pawl is disengaged. The opposite end of the reel-shaft carries a worm D⁹, acting upon a worm-wheel D¹⁰, the shaft of which is supported in a portion of the framing attached to the base-plate and carries a dial D¹¹, having radially-arranged lines and figures properly distributed to indicate the length of wire unwound from the reel, and consequently the approximate depth at which the sounder is traveling. The indications are read by means of a fixed index D¹², mounted on the framing near the dial.

A gear-wheel D¹³ on the drum is in mesh with a pinion D¹⁴ on a short counter-shaft D¹⁵, mounted in bearings on the plate D. The other end of the counter-shaft is squared to receive a crank D¹⁶, by which the reel may be turned to wind up the sustaining-wire B.

On the outboard end of the spar is removably mounted a peculiarly-formed antifric-tion-wheel, over which the wire B passes in changing its direction from the horizontal to the vertical. The wheel consists of two circular disks C² C³, mounted with freedom to revolve independently on a fixed center C', carried in a yoke C, attached to the spar. One of the disks is provided with a raised concentric portion on one face of smaller diameter than the disk, which matches to and

is received in a corresponding but shallower circular recess on the adjacent face of the other disk, thus producing a deep narrow groove in which the bight of the wire is guided and allowed to pay in or out with perfect freedom, without friction, and with but little liability to catch or buckle. A lug C⁴, carried by the projecting ends of the yoke C, lies close to the peripheries of the disks at the point where the wire leaves and serves to prevent accidental displacement of the wire by motions of the vessel.

G is a hollow cylinder of sheet metal closed at the inner end and provided with a flexible arm G', by which it is secured to an arm C⁵, extending outward and downward from the plate C⁶, on which the yoke C is mounted. The arm G' is formed of two or more stiff helical springs. The cylinder lies transversely below the spar, with its outer rounded face held by the arm G' in yielding but close contact with the wire B, and serves as a resonator in augmenting the sound produced by vibrations of the wire. The variations and interruptions in the sound thus produced indicate to the trained ear of the attendant the contact of the submerged sounder with the bottom and may also indicate the character of the obstruction encountered or the nature of the surface if the sounder be in rolling contact therewith.

In order that the sounds may be heard in the pilot-house or other distant part of the vessel, I inclose at the inner end of the resonator a sound-transmitting device H, which may be an ordinary magneto-telephone connected through a metallic circuit to a similar receiver H', located in the pilot-house or other part of the vessel, or there may be several such receivers in the circuit placed in position for convenient use in various parts of the vessel.

The invention is intended to serve in indicating shoal water as the vessel approaches land, and when so used the sounder is put overboard and the number of fathoms to which it is to be submerged is reeled off. As long as the water equals or exceeds that depth the sounder travels through the water unimpeded and the resonator gives out a continuous humming note, due to the passage of the fine wire through the water; but as soon as the water becomes shallower the sounder contacts with the bottom either intermittently or continuously and the fact becomes immediately apparent by the cessation or change in the resonator note. The invention also aids in enabling fishing vessels to locate above or near reefs, submerged wrecks, or other fishing-grounds. When thus used, I equip the sounder with one or more baited hooks J, attached to short lengths of line secured to any convenient portion of the sounder and to the short portion B' of the wire. The action of the sounder will indicate the depth and character of the bottom and the presence of fish will be shown by their attack upon the

baited hooks, thus confirming the location sought.

I propose to attach to the sounder, preferably at the rear, an electric lamp of the incandescent type, supplied with energy from a dynamo or battery through properly-insulated wires either connected temporarily to the lamp-terminals on the sounder or formed into a small cable with the sustaining-wire B. This modification is shown in Fig. 10. The illumination thus produced serves to attract fish to the vicinity of the vessel.

Other modifications may be made without departing from the invention. The form and proportions of the sounder may be varied. Other means for taking up the sustaining-wire may be employed. The telephone may be omitted from the resonator and the contact with the bottom indicated by the sound emitted by the resonator alone. For some uses the resonator may be dispensed with or its character varied. The addition of the baited hooks is intended for the special purpose before mentioned and for general service in indicating shoal water is not employed.

I claim—

1. In a shoal-water indicator, a sounder adapted to be submerged and travel with the vessel, a sustaining-wire attached to said sounder, and a resonator actuated by the vibrations of said wire and adapted to indicate audibly the contact of said sounder with the bottom, all combined substantially as herein specified.

2. In a shoal-water indicator, a sounder adapted to be submerged and travel with the vessel, a sustaining-wire attached to the latter and to said sounder, a resonator in contact with said wire and adapted to indicate audibly the contact of said sounder with the bottom, and a sound-transmitting device located in such relation to said resonator as to receive and transmit the sounds thereof to a distant receiver, all combined substantially as herein specified.

3. In a shoal-water indicator, a sounder adapted to be submerged and travel with the vessel, a sustaining-wire attached to the latter and to said sounder, a reel upon which said wire may be wound, and means actuated by said reel for indicating the depth at which said sounder is submerged, and a resonator in contact with said wire between said reel and sounder, all combined substantially as herein specified.

4. In a sounder of the character set forth, a plane weighted at the forward end, a fin located on the central longitudinal line of said plane and perpendicularly thereto, and extending from a point in rear of the front edge to a point beyond the rear edge of said plane, and a sustaining-wire attached to the rear portion of said fin and a frangible short-length wire attached to said fin and to the sustaining-wire, all combined and arranged to serve substantially as herein specified.

5. In a sounder of the character set forth, a

plane weighted at the forward end, a fin located on the central longitudinal line thereof and perpendicular thereto, a short-length wire connected to the fin at front thereof and a sustaining-wire secured to the rear portion of said fin and attached by said short-length wire which forms an easily-broken connection to the front end of said fin, all combined and arranged to serve substantially as herein specified.

6. In a sounder of the character set forth, a plane and its sustaining-wire adapted to be drawn through the water at an angle to the line of motion, a heavy roller carried on the under face of said plane at the forward edge and free to revolve on the ground and adapted to perform the double function of ballasting the plane and enabling the latter to encounter obstructions with less liability of entanglement therewith, all combined and arranged to serve substantially as herein specified.

7. In a shoal-water indicator, the combination of a spar adapted to be extended outboard from a vessel, a registering-reel mounted on the inboard end of said spar, and an antifriction-roller at the outer end, a sustaining-wire attached to said reel and passing over said roller to a sounder adapted to be submerged and travel with the vessel, and a resonator carried by said spar and held in yielding contact with said wire between said roller and sounder, substantially as herein specified.

8. The antifriction-roller described consisting of two circular disks mounted side by side with freedom to revolve independently upon an axis, a concentric raised portion on one matching to and received in a corresponding but shallower recess in the adjacent face of the other, adapted to serve with a reel, sounder, and sustaining-wire of a shoal-water indicator, substantially as and for the purpose herein specified.

9. The plane A ballasted at the forward end, the fin A' thereon having the eye a' at the rear and series of holes a at the front, an easily-broken loop A' engaged in one of the holes of said series, and a sustaining-wire secured to said eye and passing through said loop, all combined substantially as herein specified.

10. The plane A ballasted at the forward end, fin A' thereon and a sustaining-wire secured to said fin, means for varying the angle of said plane relatively to the vessel motion in combination with short lengths of line attached to said wire and plane and carrying hooks J, all arranged to serve substantially as and for the purpose specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

F. E. FORSTER.

Witnesses:

ROBT. CONNOR,

CHARLES R. SEARLE.