(No Model.) 2 Sheets—Sheet 1.

S. HAAGENSEN & O. F. SONNE.

APPARATUS FOR RECORDING SOUNDINGS.

No. 342,351. Patented May 25, 1886.

FIG. 1

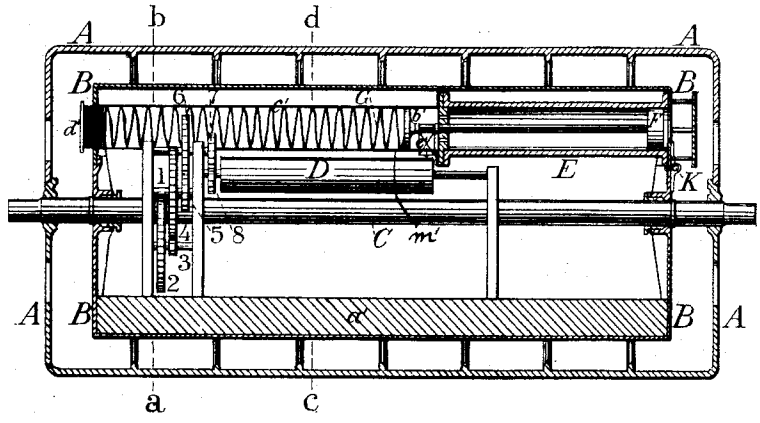


FIG. 2

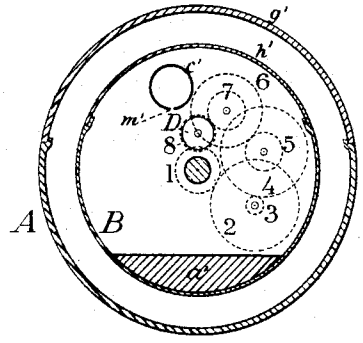


FIG. 3

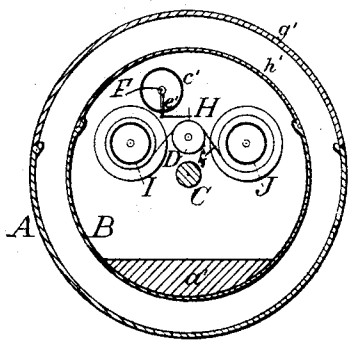


FIG. 4

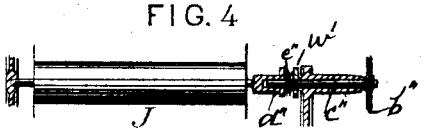


FIG. 5

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FIG. 6

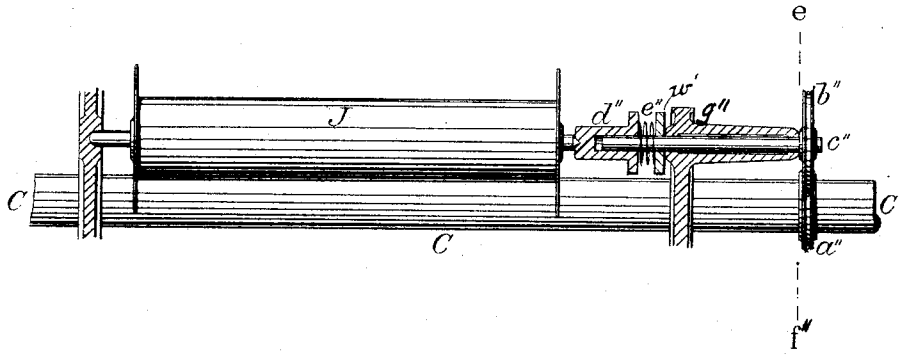
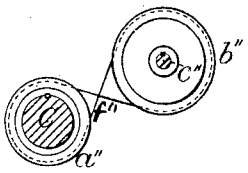


FIG. 7



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UNITED STATES PATENT OFFICE.

SOPHUS HAAGENSEN AND OTTO FREDERIK SONNE, OF BOSTON, MASS.

APPARATUS FOR RECORDING SOUNDINGS.

SPECIFICATION forming part of Letters Patent No. 342,351, dated May 25, 1886.

Application filed March 16, 1885. Serial No. 158,953. (No model.)

To all whom it may concern:

Be it known that we, SOPHUS HAAGENSEN and OTTO FREDERIK SONNE, of Boston, in the county of Suffolk, of the Commonwealth of Massachusetts, have invented a new and useful Improvement in Apparatus for Recording Soundings; and we do hereby declare the same to be described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 is a vertical longitudinal section of the apparatus containing our invention, the nature of which is defined in the claims hereinafter presented, the cylinder E, with its piston and the operative spring thereof, being also shown in section, though arranged in rear of the plane of section of other parts of the mechanism. Fig. 2 is a transverse section on the line *a b* of Fig. 1, showing the arrangement of the train of gears, 1 to 8, connecting the axle C to the paper-supporting roller or cylinder D, to be explained. Fig. 3 is another transverse section taken on the line *c d* of Fig. 1, and showing the paper-supporting rolls I and J, together with the aforesaid roll D and the marker H, to be described. Fig. 4 is a side view of the roll J and a longitudinal section of its sustaining mechanism, which is also represented in Fig. 6, where it is duly lettered. Fig. 5 is an end view of the cylindrical case or drum A, and shows the draft-tongue thereof and its deflector M, as hereinafter explained. Fig. 6 is an enlarged view of the roller J and the shaft C, and showing in longitudinal section parts of the mechanism for revolving the said roll J. Fig. 7 is an end view of the pulleys and belt for revolving the spindle *e''*. (Shown in Fig. 6.)

In the said drawings, A denotes a cylindrical case or drum, provided with an axle or shaft, C, extending through it from end to end of it and somewhat beyond the ends, and arranged concentrically with the said case. The case has openings in its ends or heads to allow water to have free access to the interior of it when the apparatus may be in use. The case or drum is made fast to the said shaft, whose ends are connected to the prongs of a furcated tongue, L. (See Fig. 5.) Within the case, concentrically, and to revolve freely on the shaft, is another cylinder or drum, B, that contains the machinery for recording the depth of water.

In dragging the apparatus over the bottom of a river, lake, or sea, the cylinder A is to rest peripherally thereon, and to revolve as it moves along, which it will do. The cylinder, drum, or case B will at the same time not revolve, owing to a heavy weight, *a'*, being within it and fixed to its bottom. Such weight by the action of gravity operates to keep the said cylinder B from revolving, though the shaft will turn in the ends thereof. The cylinder B is to be water tight. Within the upper part of it, and opening through one end of it, there is a cylinder, E, provided with a piston, F, whose head is exposed to the pressure of the water, which increases as the depth or sounding increases. The inner end of the piston-rod is provided with a head, *b'*, to rest against a spiral spring, G, disposed within a tube, *c'*, arranged, as shown, within the cylinder B, and opening through one end thereof, and there provided with a cap or cover, *d'*, screwed into it water-tight. From the above it will be seen that the greater the depth of water the farther will the piston be moved inward. From the piston-rod an arm, *e'*, extends and carries a pencil or marker, H, arranged directly over a roll, D, disposed between two other such rolls, I and J. (See Fig. 3.) These rollers are to be duly supported to enable them to revolve as occasion may require. The spring-case is slotted in its bottom longitudinally to allow of the movements of the arm *e'*, which extends through the slot shown at *m'* in Fig. 2. The said pencil or marker H is intended to rest on a strip of paper, *f*, wound on the rolls I and J, and extending over and upon the intermediate roll D. A train of gears, 1, 2, 3, 4, 5, 6, 7, and 8, (see Figs. 1 and 2,) connects the shaft C with the axle of the roll D, in order that the periphery of the said roll D may have a velocity of revolution proportionate to that of the drum or cylinder A—as, for instance, one to two hundred.

The revolving of roll J, upon which the paper is wound, during the sounding operation is effected by mechanism thus described: On the shaft C (see Figs. 6 and 7) there is a pulley, *a''*, about which and a pulley, *b''*, fixed

on a spindle, c'', an endless crossed belt, f'', runs. The said spindle c'' is disposed in line with the axis of the roll J, and is supported in a suitable fixed bearing, g'', and enters a thimble or socketed head, d'', into which the shaft of the roll J is stepped or pivoted. A spiral spring, e'', arranged between the thimble d'' and a washer, w', on the spindle c'', serves, when the spindle is revolved, to turn the thimble with friction, and to cause it by its friction on the axle of the roll J to turn such roll in the same direction. The roll I is to revolve with sufficient friction to keep the paper from wrinkling or running loosely off such roll. The roll D, which may be fluted on its periphery, will draw the paper from the roll I, after which it will be delivered to and wound upon the roll J, which will revolve only while the paper is being advanced toward it. Each drum A and B should have on its periphery an opening to be closed by a cover, such cover being shown at g' and h' in Figs. 2 and 3, the same being to enable access to be had to the interior of the drum or case B, as occasion may require; and the rolls I and J shall be readily removable, in order for them to be supplied with paper from time to time. The cover of the drum B may be attached to the rest of the drum by hinges K, and may have within it the cylinder E, and its piston and spring-case, which, when the cover is lifted, will be raised with it to admit of access being had to the rolls I, D, and J.

The covers g' and h' may be secured in any proper manner to their openings in the drums A and B, to render water-tight the joints between the edges of such covers and those of such openings.

The draft-tongue L is provided with a plate or deflector, M, to extend down from it, in manner as represented in Fig. 5, in which it is shown as substantially tangential to the drum A. As the apparatus may be drawn along over rocks or other obstructions at the bottom of the water, the deflector will prevent such from arresting it, as by being drawn against them it will cause the drum to rise over them.

The apparatus, having been duly prepared with paper, is to be dropped into the water to the bottom thereof, and to be attached to a boat or vessel by a line extending from it to the eye k, at the end of the tongue L. As the boat or vessel may move along, the apparatus will be moved along on the bottom, and as the depth of the water may increase or diminish the pencil will mark the paper, the line drawn by the pencil serving to indicate or record the variations in the said depth.

At any point a test of the regular working of the instrument can be had, if desired, by lifting it up, and again lowering it, in which case the piston will move as the instrument may approach or recede from the surface of the water, the paper remaining at rest, so that there will be a distinct mark on the paper. A direct sounding by the lead and line at the place will indicate whether the apparatus has at the time of being lifted properly registered the sounding.

We claim—

1. The automatic sounding-recorder, substantially as described, composed of the two drums A and B, the draft-tongue L, the cylinder E, its piston F, spring G, shaft C, arm e', and marker H, rolls I, D, and J, and the mechanism for revolving the said rolls D and J, the inner drum being furnished with the gravitating weight, and the said mechanism for revolving the said rolls D and J, consisting of the train of gears, as described, and the pulleys a'' b'', endless crossed belt f'', spindle c'', spring e'', and thimble d'', all being arranged and adapted to operate substantially as set forth.

2. The combination of the deflector M, applied to the tongue L, and arranged therewith and with the drum A, as represented, with the automatic sounding-recorder, essentially as described, consisting of the two drums A and B, the said tongue L, the cylinder E, piston F, spring G, shaft C, arm e', marker H, rolls I, D, and J, and the mechanism for revolving the said rolls D and J, all being arranged substantially and to operate as represented.

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