

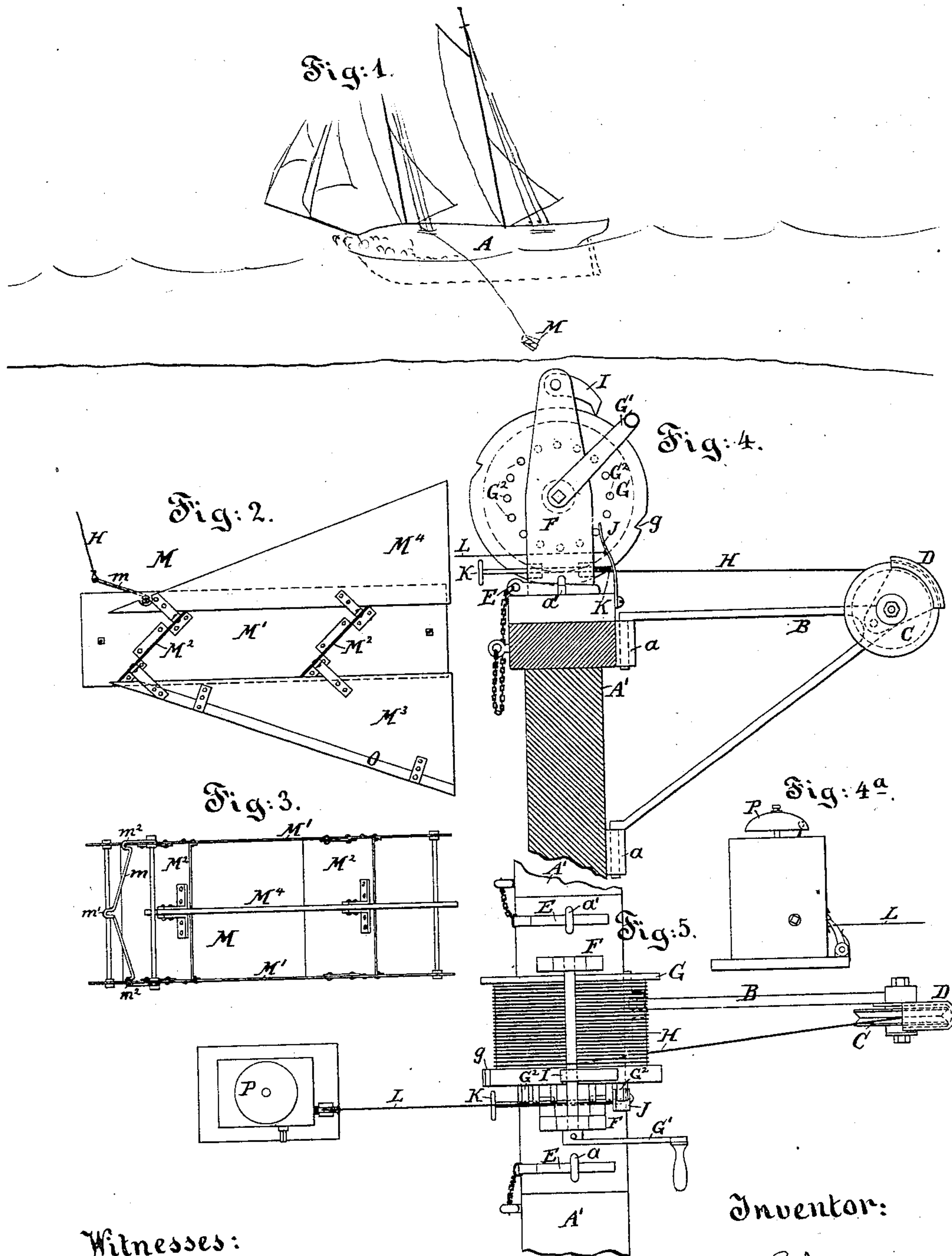
(No Model.)

F. E. FORSTER.

DEVICE FOR INDICATING SHOAL WATER.

No. 282,620.

Patented Aug. 7, 1883.



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# UNITED STATES PATENT OFFICE.

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## DEVICE FOR INDICATING SHOAL WATER.

SPECIFICATION forming part of Letters Patent No. 282,620, dated August 7, 1883.

Application filed February 3, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, FERDINAND E. FORSTER, of New York city, in the county and State of New York, have invented certain new and useful Improvements in Sounding Apparatus, of which the following is a specification.

The object of the invention is to provide a continuous means for determining automatically when the depth of the water has diminished to a dangerous extent. The device is drawn along with the vessel and at a depth sufficiently below the same to feel the bottom, and gives warning by the variation in the tension of its attaching cord or wire, or by other suitable means, when the bottom is struck. It may be adjusted to run two fathoms, four fathoms, or any other moderate amount deeper than the keel of the vessel. I provide means for giving a distinct notice on the deck or any other part of the vessel when the sounder, in being dragged along at a nearly uniform level deeper than the bottom of the vessel, commences to scrape on the bottom, or strikes forcibly against any rock or other hard obstacle. The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a general diagram representing the mode of operation. Fig. 2 is a longitudinal section of the sounding device. Fig. 3 is a plan thereof. Fig. 4 is a cross-section of the rail of the vessel, showing my operating mechanism of the sounder attached thereto. Fig. 4<sup>a</sup> shows the alarm device, which may be placed in any convenient part of the vessel. The cord L thereof is intended to be a continuation of the cord L shown in Fig. 4. Fig. 5 is a plan of the parts illustrated in Figs. 4 and 4<sup>a</sup>.

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

A is the hull of the vessel, and A' one of the side rails thereof, provided with eyes *a*, in which may be rigidly socketed a removable bracket, B, which supports a grooved sheave, C, having a guard, D. The rail is also provided with suitable eyes, *a'*, and keys E, by which is secured a removable framing, F, which

supports a reel, G, on which is wound a wire or line, H, which is led over the sheave C, and thence down into the water, and attached to the bail *m* of my sounder.

I will use the single letter M to designate the entire sounder, attaching additional marks, as M' M<sup>2</sup>, &c., when necessary, to distinguish special parts thereof. A hard twisted cord of fibrous material, or a single wire, may be used for the connecting means H; but I prefer a cord composed of a sufficient number of fine brass wires.

The bail *m* is arranged to turn in bearings in two parallel side pieces, M' M', which are drawn through the water in an upright or approximately upright position. They are rigidly connected by two blades, M<sup>2</sup> M', which are parallel to each other, and are moved through the water in horizontal or approximately horizontal positions.

M<sup>3</sup> is a blade projecting further downward, and loaded at its lower edge with lead or other weighty material O. The duty of this bottom blade is to ballast the device and to steady it by preventing lateral vibrations. M<sup>4</sup> is a blade extending upward. This aids to resist lateral vibrations.

The blades M<sup>2</sup> determine the angle at which the device shall stand. The whole is arranged so that it shall constantly tend to draw deep into the water as it is moved forward. This arrests the upward pull of the cord H. All the material is thin, and may be sharp edged, so that the sounder moves horizontally through the water with little resistance, and the angle at which the sounder will draw backward on the cord H will be ordinarily small. The resistance of the water against the movement of the cord H tends to induce the curved position of the latter, as indicated in Fig. 1.

The reel G is wound up, when desired, by the aid of a crank, G'. In its periphery are two or more deep notches, *g*, adapted to receive a pawl, I, which may be lifted to allow the cord H to run out, and when dropped holds it firmly against further running out. In the side of the rail I fix a series of pins, G<sup>2</sup>, which are arranged to strike and deflect the spring J, which latter is mounted on the framing F and adjustable by the screw K, so as to resist the ordi-



nary pull of the sounder as communicated through the cord H, but to yield and let the pins pass when the ordinary force is much exceeded by the sounder striking the bottom.

5 L is a cord or wire leading directly or indirectly to the pilot-house or other convenient point, where it is connected to a suitable device to give distinct notice by striking a bell, P, which may be similar to the alarm of a  
10 clock, and be let off by a very gentle movement.

In adjusting the apparatus the reel unwinds a sufficient length of the cord H to allow the sounder to trail at the required depth—say  
15 twenty feet below the lowest point in the vessel's keel—and is then temporarily but strongly held by the pawl I. The next step is to give a partial turn to the reel G and engage the spring J with one of the pins  $G^2$ , and to adjust the tension of the spring J by means of the  
20 screw K, so that it shall be only a little more than sufficient to resist the pull on the cord H when the sounder M is moving along unobstructedly through the water. The pawl, being then disengaged, is allowed to rest upon a  
25 smooth portion of the periphery of the reel G. So long as the conditions are unchanged the sounder will be drawn smoothly through the water, with a nearly-uniform tension on the cord H; but the moment the bottom is struck  
30 the forward motion of the sounder is arrested or partially arrested, the marked increase of pull on the cord H overcomes the resistance of the spring J, turns the reel G, causing the pin  $G^2$  to pass the end of the spring J, and continuing to turn until the revolving of the reel  
35 and the further delivery of the cord is arrested by the engagement of the stout pawl I in one of the notches  $g$ . This movement of the spring J pulls on the connection L and strikes  
40 the bell P.

The reel G may be so set that two or more of the pins  $G^2$  pass the ends of the spring J before the notch  $g$  meets the pawl I. This increases the certainty of giving the desired  
45 alarm on the bell P. On receiving the alarm the man at the wheel recognizes the fact that he has moved into shoal water, and puts the vessel about or takes such other action as the emergency requires. The crank  $G'$  may then  
50 be operated to take the sounder entirely out of the water, or to reset it at the same or a different depth, as circumstances shall render expedient.

The same apparatus may be used in different  
55 positions, according as the weather and other conditions may vary. It is desirable to support the sounder at as nearly a uniform depth as practicable. In a head-sea the pitch is reduced by dropping the cord H from a bracket  
60 amid-ships. In a cross-sea the rolling may make it expedient to drop it from a sheave on the bowsprit.

The sounder may be made of different sizes. My experiments have been made with one about  
65 two feet long, with the parallel sides  $M'$  six inches deep and nine inches apart. I believe

a smaller one will succeed well. I propose in some instances to make the same construction much larger, providing its lower edges with  
70 steel shoes, and to perform useful service in some situations by dragging it across bars and on other points where the bottom is soft and only needs stirring to allow it to be removed by the current. The tensile pull of a large device of  
75 this kind may be utilized in some emergencies where a rudder is disabled, by adding to steer the vessel by simply shifting its attachment by hand or otherwise from one side to the other of the stern of the vessel. I can  
80 greatly increase the pull of the device to one side and the other for this purpose by taking the device on board and attaching two ropes—one to each of the side pieces,  $M'$ —and pulling on one or the other alternately. The bail  
85  $m$  is represented as formed with a bend,  $m'$ , at the center, to hold the cord H firmly at that point when used as a sounder, and with an additional bend,  $m^2$ , near its junction, with the respective side pieces,  $M'$ , to facilitate the attachment of ropes to aid in steering when re-  
90 quired in emergencies.

I will designate the principle on which the device M is induced to trail deeply in the water, as that of a kite inverted. When a kite  
95 held by a string is moved through still air, it rises by acting with its inclined face against the fluid. My device M presents one or more inclined faces,  $M^2$ , acting similarly against the fluid, but in a reverse direction, so as to draw  
100 the device down.

Modifications may be made in the forms and proportions. Some of the parts may be used without the whole. I can dispense with the  
105 bracket B and support the axis of the sheave by a spun yarn attached to the jib-boom or to other rigid part extending over the bow, or side, or stern. I can extend the device rearward by an attachment analogous to a fish-tail.

I propose in some instances, where the expense will be warranted, to make the attaching-cord H contain one or more insulated  
110 wires, and connect it with a battery and some device on the sounder, which, by being disturbed in position when the device strikes the bottom, shall communicate an electrical signal. A simple lever, analogous to a telegraph-key,  
115 projecting from the lower part may suffice to make and break the circuit on touching the bottom. I do not esteem such a portion of my invention but only one of the means by which  
120 my invention may be utilized.

In many cases I propose to mark the line or cord H in fathoms by tying knots in the same, or by introducing small pieces of leather  
125 or other material between the strands thereof at the proper distances apart, which will be held by the twist of the cord, as is well known in similar devices.

If desired, the device M may be used for sounding by hand, thus dispensing with the  
130 reel G and the operating parts thereof. The device M may also, if desired, be used as a



sinker on fishing-lines, in which case the attaching-cord H will preferably be connected at a point farther backward than shown in the figures, so as to keep the device in a substantially upright position in the water, with the points of the blades  $M^3 M^4$  directed downward.

I claim as my invention—

1. As a means for indicating the shallowness of water within certain limits from a vessel in motion, a submerged mechanism, serving on the principle of an inverted kite, said mechanism being flexibly connected to the vessel, as set forth.

2. The shoal-alarm described, consisting of a device adapted to be trailed at a depth below the vessel, and provided with one or more blades arranged to depress the device by acting on the water, and attached by a cord or equivalent to a moving vessel, substantially as herein specified.

3. The parallel plates  $M'$  and transverse inclined plates  $M^2$ , in combination with a cord, H, attaching it to a vessel, A, substantially as herein specified.

4. The weighted bottom blade,  $M^3 O$ , in combination with the upright sides  $M'$  and hori-

zontal plates  $M^2$ , and with means, H, for attaching it to the vessel A, as herein specified.

5. The top blade,  $M^4$ , bottom loaded blade,  $M^3$ , horizontal plates  $M^2$ , and side pieces,  $M'$ , in combination with each other and with a hinged bail and attaching-cord, adapted to serve substantially as herein specified.

6. The alarm-bail  $m$ , having a central eye,  $m'$ , and side eyes,  $m^2$ , in combination with the uprights  $M'$  and horizontal plates  $M^2$ , adapted to serve as herein specified.

7. The alarm device P and connection L, in combination with a spring, J, operating-reel G, and with a cord, H, and sounding device M, adapted to be moved with the vessel at a depth below the bottom thereof, as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, New York, this 29th day of January, 1883, in the presence of two subscribing witnesses.

FERDINAND E. FORSTER.

Witnesses:

W. C. DEY,

B. E. D. STAFFORD.