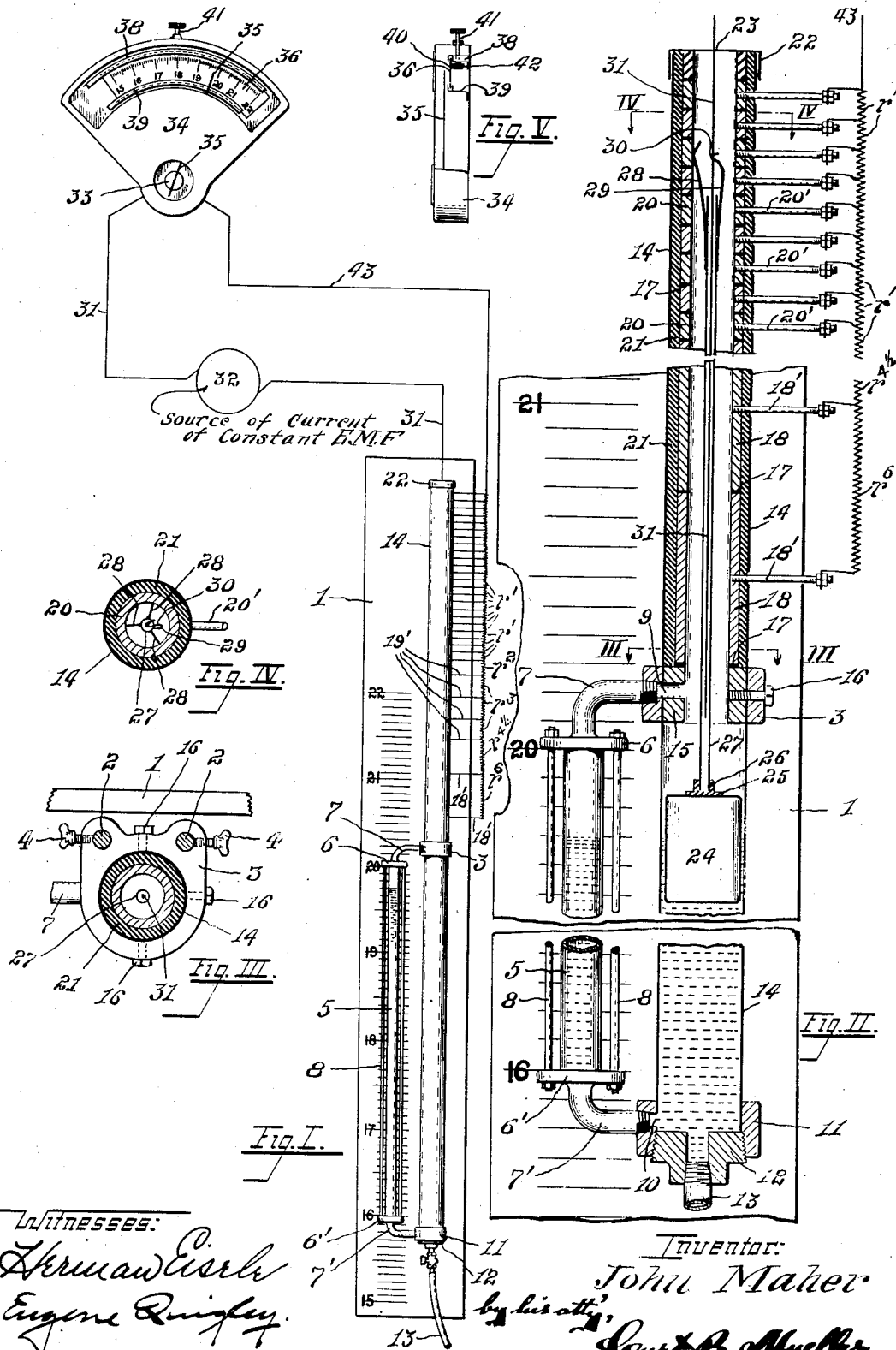


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DRAFT INDICATOR.
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DRAFT-INDICATOR.

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To all whom it may concern:

Be it known that I, JOHN MAHER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Draft-Indicators, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention is adapted to afford the means for knowing at some particular time the existing draft of a vessel. It consists in a construction designed to fulfil, in a modified manner, the inventive principle shown, described and claimed in my copending application under like title filed January 31, 1914, Serial No. 815,689.

Aside of improvements in respect to sundry details, the object of this conception is to make possible an automatically varying indication of the character stated. Consonantly, the feature which primarily distinguishes my present invention from the earlier one is the provision of a wholly automatic control instead of a cooperating manual control.

Further than what has already been suggested perhaps, the chief difference between this and my earlier idea lies in the disclosure here of one particular mode of practising my invention so as to involve the employment of but a single line connection.

In practice it will seldom be necessary to follow variations in draft beyond the extent of four feet which I have chosen to illustrate. Ordinarily close indications representing divisions in inches or half inches over a single foot will suffice. When, however, either the fore or aft section of a boat is for the time being loaded considerably in excess of the other, it is desirable not to wholly lose track of the draft of such other relatively elevated section. Accordingly I have divided the upper two of the four feet upon the selected scale into inches, these being the ones which are to encompass the usual or maximum loaded line. These two upper feet are each furnished with twelve electric terminals corresponding each with a like division of a foot upon a dial say, in the pilot house and to one side or the other of the predetermined loaded draft limit thereon. The next lower foot has four three inch divisions each provided with a

terminal, while the bottom of the four feet divisions upon the scale has two equispaced terminals which are six inches apart.

When it is preferred to have a continuously changing automatic indication of the progressive alterations in the draft of a vessel while running in comparatively shallow water or during loading or unloading, a suitable type of ammeter operatively connected with the automatic float control will answer when properly calibrated with reference to the actual draft indicia of the vessel. While under ordinary circumstances it is possible to deliver a substantially constant E. M. F. or sufficiently so for most purposes, I have preferred to make impossible a deviation from the absolute accuracy I claim for my invention by providing means for adjusting the calibration of the ammeter to compensate for any variation in electric energy existing at the time a reading is to be relied upon.

The inventive conception is associated with means which are hereinafter explained and variously combined in the claims. While the annexed drawing and particular description thereof, jointly set forth in detail a preferred form embodying my invention, it should be understood that the means only exemplifies one of many diversified mechanical forms with which the principle of my invention may be properly applied.

Adverting to the drawings:

Figure I is a diagrammatic representation of my invention.

Fig. II is an enlarged view (partly sectioned and partly in elevation and also broken in two places) of the mechanism which is to be automatically controlled by the draft of the vessel.

Fig. III is a section on line III—III of Fig. II looking in the direction of the arrows.

Fig. IV is a section on line IV—IV of Fig. II looking downwardly.

Fig. V is a side view of one detail of Fig. I with a portion of its casing removed to disclose the interior mechanism.

A flat standard 1 having fashioned thereon an upwardly extending graduated scale representing feet and inches is intended to be set up either in the bow, stern or amidships of the vessel. Mounted in any approved manner (not shown) in front of the scale on the standard 1 are a pair of supporting rods 2 upon which I prefer to attach

the automatic control mechanism so as to be capable of vertical adjustment. Such attachment I effect by means of a bracket 3 having openings through which the two rods 2 extend. The bracket 3 is also provided forwardly with a considerably larger circular opening. The adjustment of the bracket 3 so as to assume various fixed positions along the rods 2 may be accomplished by means of a pair of thumb-screws 4 extending therethrough to engage such rods. A water container 5, usually a glass tube, is shown mounted in the customary manner between end supports 6 and 6' which engage the top and bottom thereof respectively with a water tight fit. These supports 6 and 6' are formed with integral ducts 7 and 7' adapted to communicate with opposite ends of the tube 5. The supports 6 and 6' are connected to each other through the medium of securing rods 8, and the arrangement in this exemplification is such that exactly four feet of tube 5 is exposed. The open end of the upper duct 7 communicates through a lateral opening 9 in the bracket 3 whereby the tube 5 is carried by the bracket 3 to assume the various positions to which the latter may have been adjusted. The lower duct 7' similarly communicates through a lateral opening 10 in a collar 11 having a screw-threaded opening below in which a hollow screw-threaded plug 12 is seated. Communicating through the plug 12 is a flexible connection 13 adapted to connect with a sea cock.

A tube 14 corresponding in diameter with the larger opening in the bracket is adapted to extend therethrough and be seated in the collar 11 so as to have lateral communication through a pair of openings with the ducts 7 as clearly shown in Fig. II. It will be apparent, therefore, that water can be permitted to seek its level both within the tube 5 and within the tube 14. A hollow annular member 15 having also a lateral opening adapted to register with the opening 9 and hence with the duct 7, is fixedly mounted interiorly of the tube 14 by means of three screws 16 as indicated in Figs. II and III. This member is intended to serve as a support for a plurality of superposed metal tubular sections of various height and which sections when properly insulated from each other by washers all of which are indicated as 17, and spaced from the tube 14, as will be later described, are intended to serve as electric terminals. The two lowermost sections 18 are each six inches in length and together correspond with the lowermost of the four feet covered by the tube 5. According to the exemplification of Fig. I, the sections 18 correspond each with six inches rise of the water level between the actual draft of 16 and 17 feet. Connected with the middle of each of the sections 18 is a binding post 18' extending outwardly through the tube 14 and there connected by a resistance element r^6 . Superposed upon the sections 18 are four sections, each of which is three inches in height and with the middle of each one of which a binding post 19' is connected as suggested diagrammatically in Fig. I. The lowermost of the binding posts 19' is connected with the upper of the binding posts 18' with a lessened resistance r^{41} . The binding posts 19' are connected each to the other with a resistance coil r^3 . Superposed in turn with regard to the sections 18 and 19 are twenty-four sections 20, each one an inch in height and each similarly connected with a post 20'. The lowermost of the posts 20' is connected in series with the upper of the posts 19' with a reduced resistance coil r^2 . All the rest of the posts 20' are connected in series with lesser resistance coils r' , that is, with resistance coils offering one-third the resistance of the coils r^3 and one-sixth of the resistance of the coils r^6 . After all the sections have been superposed upon the member 15 and each insulated from the one adjacent to it they may be held in place by a plaster of Paris filling 21. The upper end of the tube 14 is supplied with a cover 22 having a small central opening 23.

A float 24 somewhat smaller in circumference than the tube 14 is adapted for movement below the member 15. The top of the float carries an insulating collar 25 having a depression 26 above, in which a tube 27 is fixedly mounted. The tube 27 is of considerable length to correspond approximately with the combined extent of all of the sections 18, 19 and 20. At its upper end the tube 27 carries three spring fingers 28 adapted to frictionally engage the sections 18, 19 and 20 depending upon the position of the float. The tube 27 also carries near its top a spring member 29 provided with a hook 30 normally tending to also engage the interior surface of one or the other of the sections 18, 19 or 20. A wire 31 of indeterminate length is connected with one pole of a source of constant E. M. F., 32 such that its free extremity extends downwardly through the opening 23 in the cover 22 and through the tube 27 to a point near the bottom thereof, when the float is in its most elevated position. The wire 31 is engaged by the hook 30 whereby a rubbing connection therebetween is assured as will be readily understood. The other pole of the source of constant electrical energy is connected with the armature 33 of an ammeter 34. This armature carries a pointer or index finger 35 adapted to oscillate across an arcuate scale 36 divided into feet and inches as shown in Fig. I. In order to permit of an adjustment of the calibration of the scale 36 with respect to the actual draft graduations of the vessel, I have mounted the scale for movement between two brackets 38 and 39. Upon the rear of the

scale a gear segment 40 is attached. The upper bracket 38 is provided with a bearing through which a thumb screw 41 extends, and the inner end of the thumb screw carries a pinion 42 adapted to mesh with the gear segment 40. In this manner the rotation of the thumb screw 41 permits of a limited adjustment of the scale 36 with reference to any particular position of the pointer 35. The armature is also connected in series by means of a wire 43 with the uppermost of the coils *r'*.

In operation, as the float rises, the spring fingers 28 successively engage different of the sections and therefore successively reduce the amount of resistance through which the current is compelled to pass whereby the pointer 35 is permitted to climb in corresponding degree. By watching the ammeter it would therefore be possible to have a continuous record not only of the momentary draft but of any momentary variation due to various causes. In case one had reason to doubt whether the calibration was still accurate owing to a variation in the measure of electrical energy supplied, it would merely be necessary to learn the actual level of the water in the tube 5 and hence the actual draft of the vessel below the point where the particular instrument had been set up and then ascertain whether the indication of the pointer 35 was correct. A slight manipulation of the thumb screw 41 can readily reestablish a precise calibration.

My invention should commend itself to the Government as a safeguard against unintentional approach shoreward or into dangerously shallow water. When the officer in charge desires to reassure himself as to the approximate depth of outlined channel, he has merely to observe the ammeter indication. If he discovers that the draft of his vessel under given speed is progressively exceeding that which has been initially established, such circumstance may be justifiably construed as a warning.

My invention being thus described with sufficient thoroughness, what I desire to secure by Letters Patent and therefore claim specifically, is:

1. A draft indicator comprising the combination with a vessel, of an electric circuit including a source of energy, a wire, a scale in one part of said circuit and having divisions corresponding with graduated draft indicia of the vessel respectively, a second scale superposed in a row in another part of said circuit and having terminals corresponding with said divisions respectively and serially connected in said circuit, a member adapted to move over one of said scales, a switch member adapted to play over said terminals, and automatically operating means controlled by the draft of

the vessel and adapted simultaneously to move said switch along said row and wire whereby to actuate said member together with it over corresponding divisions and terminals for the useful purpose specified. 70

2. A draft indicator comprising the combination with a vessel, of an electric circuit including a source of energy, an indicating device provided with graduations corresponding with the draft of the vessel and a movable pointer, a water container having open communication through the vessel and provided with a plurality of terminals corresponding with certain of said graduations respectively, said terminals having varying resistance elements connected in series, and an automatically operating switch controlled by the draft of the vessel and adapted to engage said terminals whereby the extent of movement of said pointer is controlled in accordance with the resistance factor. 85

3. A draft indicator comprising the combination with a vessel, of an electric circuit including in series; a source of energy, a signal, a tube in communication through such vessel and provided with a terminal, a float in said tube, a hollow member carried by said float and provided with a spring finger adapted to engage said terminal, a wire loosely extending into said hollow member, and a catch upon the latter adapted to frictionally engage said wire. 95

4. A draft indicator comprising the combination with a vessel, of an electric circuit including in series; an ammeter, a source of energy, a signal, a water container adapted to have open communication through the vessel, and provided with a pair of terminals, said terminals being connected by a resistance element likewise serially connected, and means including a float in said container for automatically effecting contact with one or the other of said terminals whereby to vary the resistance and automatically control the reading of said ammeter. 100

5. A draft indicator comprising the combination with a vessel, of an electric circuit including in series; a wire connected with one pole thereof, a source of energy, an ammeter calibrated to read in inches, a water container inclosing the end of said wire having communication through the vessel, said container being provided with terminals corresponding with inch draft graduations of the vessel, equal resistance elements connecting said terminals in series, a float in said container and a duplex device carried by said float and adapted frictionally to engage said terminals and wire whereby to actuate said ammeter. 115

6. A draft indicator comprising the combination with a vessel, of an electric circuit including a source of a normally con- 120

stant E. M. F., a water container adapted to have open communication through the hull of the vessel, said container being provided with terminals corresponding with
 5 a like number of actual graduated draft indicia of the vessel, correspondingly graduated resistance elements connecting said terminals in series, and an ammeter calibrated to indicate lineal measurement
 10 whereby the movements of the float are automatically registered by said ammeter.

7. A draft indicator comprising the combination with a vessel, of an electric circuit including in series; a source of energy, a
 15 signal, a tube in communication through such vessel and provided with a plurality of terminals, a wire, a float in said tube having an upward extension, and means carried by said extension and adapted simultaneously to engage said wire and one
 20 of said terminals.

8. A draft indicator comprising the combination with a vessel, of an electric circuit including in series; a source of energy,
 25 a signal, a tube in communication through such vessel and provided with a row of terminals, a float in said tube having an upward extension, a line wire extending

along said extension in the general direction of alinement of said row of terminals, 30 a spring finger adapted to frictionally engage said terminals, and a device yieldingly engaging said wire.

9. A draft indicator comprising the combination with a vessel, of an elongated contact member, an upright tube in communication with the exterior, a series of terminals carried thereby and insulated from each other, a float in said tube and constantly connected with said contact member and adapted to close the circuit between said member and any one of said terminals, resistances interposed between and connecting said terminals, a source of electrical energy in series circuit with said
 45 contact member and said resistances, and an ammeter also connected in series with the contact member and said resistances whereby movements of said float are automatically indicated upon said ammeter. 50

Signed by me, this 24th day of June, 1914.

JOHN MAHER.

Attested by—

MARY COLEMAN,
 W. L. SCHLEGEL.