(No Model.) 2 Sheets—Sheet 1.

J. BIGLER.

SIGNAL BUOY.

No. 508,400. Patented Nov. 14, 1893.

Fig. 4.

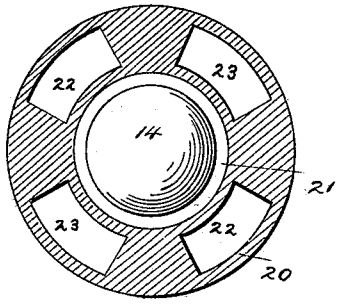

Fig. 1.

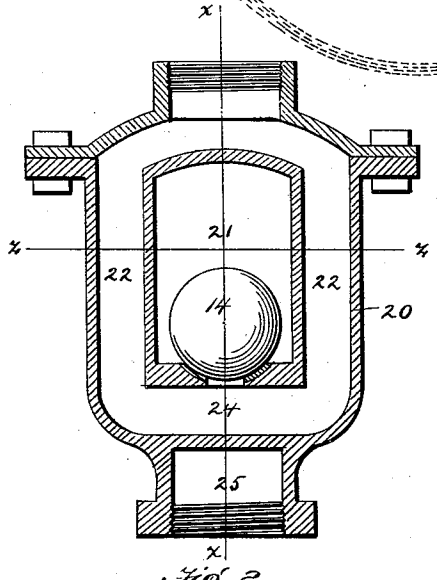

Fig. 2.

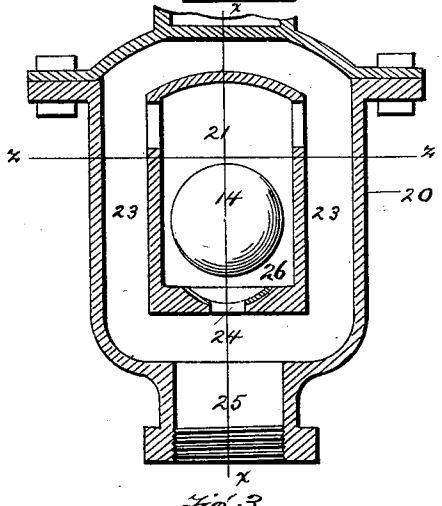

Fig. 3.

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WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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SIGNAL BUOY.

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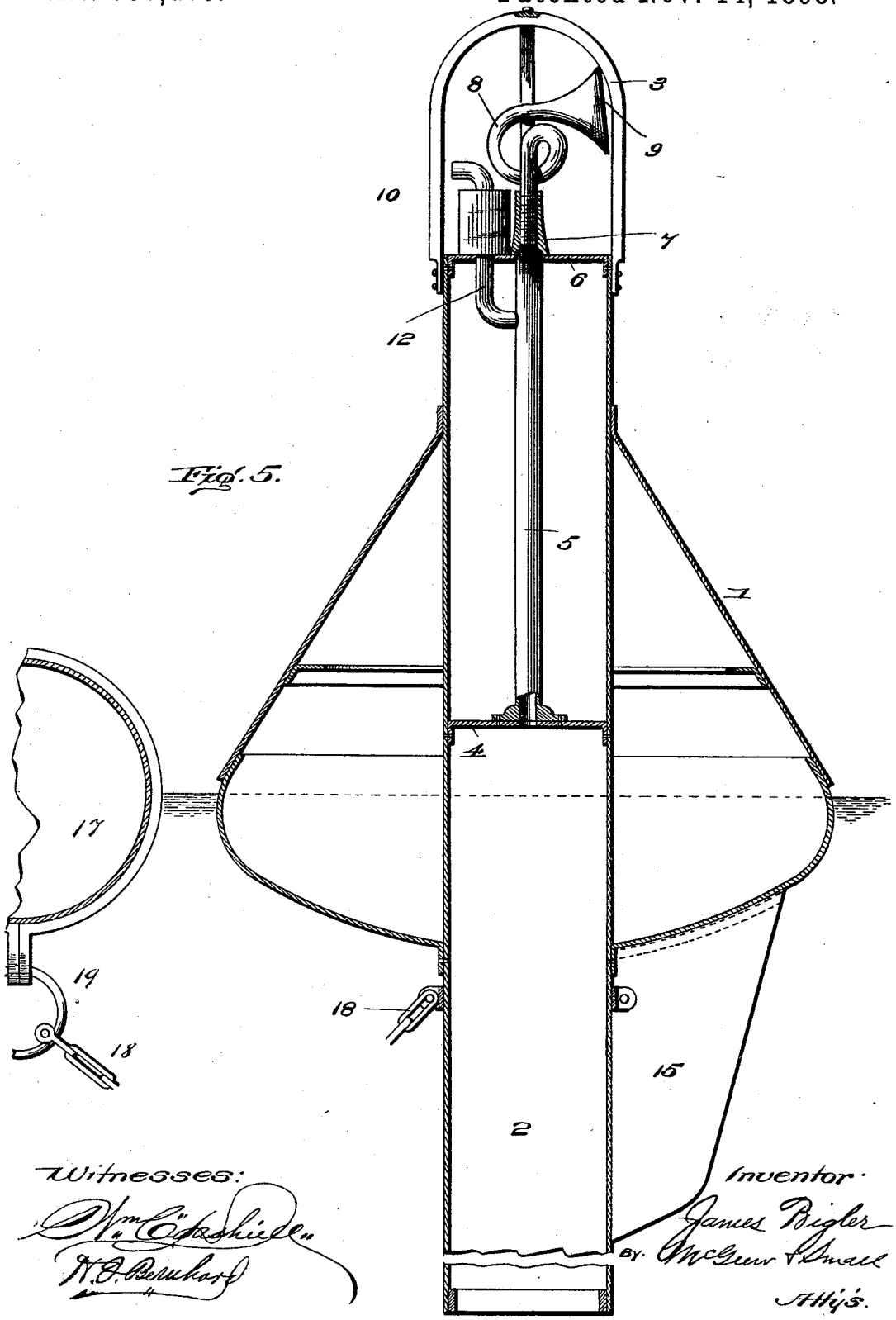

Fig. 5.

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UNITED STATES PATENT OFFICE.

JAMES BIGLER, OF NEWBURG, NEW YORK.

SIGNAL-BUOY.

SPECIFICATION forming part of Letters Patent No. 508,400, dated November 14, 1893.

Application filed November 5, 1892. Serial No. 451,051. (No model.)

To all whom it may concern:

Be it known that I, JAMES BIGLER, a citizen of the United States, residing at Newburg, in the county of Orange and State of New York, have invented certain new and useful Improvements in Automatic Sounding-Buoys; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in automatic sounding buoys of that class which employ a vertical tube depending from the buoy, proper, and adapted to contain a column of water, a valved air-inlet tube, and an air-exit tube to convey the compressed air to a sounding device, the parts being combined to automatically compress a certain volume of air as the buoy rises and falls by the action of the waves thereon, one example of which is shown in United States Patent No. 178,911, issued on June 20, 1876, to John M. Courtenay.

The objects of my present improvement are, first, to simplify the construction of the mechanism for compressing the air and supplying it to the sounding device, and thereby permit the size and weight of the buoy to be decreased as compared with the ordinary buoys in use; to provide means for relieving the buoy of the dragging weight of the anchoring chain or cable which permits the buoy to have more freedom of movement under the action of the waves which contributes materially to the efficiency of the buoy as well as serving to prevent it from breaking loose from its anchoring devices; and to so construct and connect the siren horn with the air compressing devices that it will give a louder blast with less wave-motion and pressure of air.

With these and such other ends in view as pertain to my invention, the first part of the improvement consists in the combination with a buoy, and a water tube depending therefrom, provided at its upper end with a fixed diaphragm, of a single vertical air tube fixed within the body of the buoy and having its lower end opening through the fixed diaphragm in said water-tube, a siren horn fixed to the upper end of said air-tube and communicating directly therewith, an air-inlet chest arranged at the upper end of the buoy and having, at its lower end, a pipe connection that opens into the air-tube below the siren-horn, and an automatic valve contained within said air-chest and adapted, as the buoy is lifted to the crest of the wave, to open for the admission of air to the vertical air-tube and to be closed by the back pressure of compressed air in the tube as the buoy descends, whereby the air is compressed in the tube by the column of water therein and forced into the siren horn to give a sounding blast.

The second part of my invention consists in the combination with a buoy, of a float having a chain or cable connected to said float which sustains the weight of said anchoring cable and relieves the buoy of the dragging weight thereof, thus permitting the buoy to have greater freedom of movement than is possible when the anchoring chain is connected directly therewith. And the invention finally consists in the novelties of construction, and combination and arrangement of parts, which will be hereinafter more fully described and defined by the claims.

The accompanying drawings, forming a part of this specification, fully illustrated my improved sounding buoy, in which—

Figure 1 is a vertical sectional view through the buoy and float, showing the air compressing and sounding mechanism in elevation. Figs. 2, 3 and 4 are enlarged detail views through the valved air chest. Fig. 5 is an enlarged sectional view through the buoy showing the preferred arrangement of the siren horn and valved air chest within the guard on the buoy.

I will now proceed to a detailed description of the preferred embodiment of my improved sounding buoy, reference being had to the accompanying drawings in which like numerals of reference denote corresponding parts in all the figures.

1 is a buoy, proper, constructed in the usual manner of metallic plates riveted or united together in any suitable way.

From the bottom of the buoy depends a vertical water-tube 2, which is fastened rigidly to the buoy, and in the preferred em-

bodiment of my invention this tube passes vertically and centrally through the buoy, its upper end protruding above the body thereof and having an arched support 3 fastened thereto, which upper part of the tube and the support serve as the means for holding the operative devices of the air compressing and sounding mechanism.

Within the water tube 2 is fixed a diaphragm or partition plate 4 that is arranged a suitable distance above the mean water level of the column of water contained in said tube 2, the lower end of the tube being open, as is usual, for the free ingress of water.

In the upper part of the tube 2, above the diaphragm 4 therein, is fixed a single air-tube 5, the lower end of which is secured to and opens through the diaphragm 4 so as to communicate with the chamber between the diaphragm 4 and the mean water level in the tube 2, and the upper end of said air tube being held and braced by a strut 6 that is secured within the upper part of the tube 2 at or near the points where the arched support 3 is united to the upper end of said tube 2. On the upper extremity of said single vertical air tube 5 is secured, in any preferred way, the siren horn 7 having a coiled or twisted body 8 and the flared mouth 9, through which horn the air compressed in the tube 5 is forced to give the warning blast.

10 is the air-chest or cylinder which is situated in the upper part of the buoy, preferably above the fixed strut 6 thereof and secured rigidly thereto. At its upper end, this exposed air chest or cylinder is provided with an inlet mouth or nozzle 11 which is exposed or open for the free rapid ingress of air; and the lower end of said air-chest or cylinder is connected with the single air pipe 5 by means of an intermediate branch-pipe 12 which passes through and is braced by the strut 6 and has its other end connected, by a T-joint 13 to the air-pipe 5 at a point below the siren horn 7. Within the air-chest or cylinder is provided the regulating valve 14 which is of any preferred style and is arranged for automatic operation to admit the air from the cylinder or chest into the air tube as the buoy rises to the crest of the waves and which is closed, by the back pressure of compressed air, as the buoy descends due to the receding wave, thus directing the air compressed in the tube 2 and the tube 5 into the siren horn, to give the warning blast or sound.

The buoy is prevented from turning or rotating on its axis by means of a rudder 15 which is fixed to the lower side of the buoy and the depending part of the water-tube 2.

Instead of connecting the anchoring cable 16 directly to the buoy, I employ a float 17 which has the cable 16 fastened thereto and which in turn is connected to the buoy by the intermediate chain or cable 18. This float is preferably of the cylindrical form shown by Fig. 1, and at its lower side is fastened a swiveled eye 19 to which are loosely connected the contiguous ends of chains or cables 16, 18.

The operation of my invention may be briefly described as follows:—The rudder prevents the buoy from rotating and the anchoring cable and float hold it in position while allowing the necessary freedom of movement with the action of the waves. The depending water tube being open, a column of water constantly stands therein up to the mean water level, and as the buoy rises to the crest of the wave, the valve is opened to admit air to the tube 5 and the chamber between the mean water level and the diaphragm so that air accumulates in said chamber while the water recedes therein due to the lifting of the buoy. As the buoy descends, due to the receding wave, the valve is instantly closed to shut off further air, so that as the column of water rises in the tube 2, due to the buoy sinking, the air is compressed below the diaphragm and forced through the tube 5 into the siren horn, thus giving the warning signal blast.

One of the important features of my improvement is the simplicity and efficiency of the air compressing and signal mechanism, as I am able to employ a single air tube instead of three tubes in the old style buoy and at the same time produce a much louder blast, which is very desirable in a device of this kind, intended especially for use in foggy weather along the sea coast or in other places to mark dangerous localities. As the float relieves the buoy of the weight of the anchoring chain, it is capable of very free motion under the action of the waves and contributes to produce a louder blast, and the buoy is also relieved of the great strain of the heavy waves thereon which, in the old style of buoys causes the chain to break and sets the buoy adrift.

The buoy, on the whole, is much simpler and less expensive than the ordinary buoy, as its size and weight can be materially decreased without impairing its efficiency in any manner, and it is more reliable in operation as the siren horn produces a louder blast, with less wave motion, that can be heard a long distance in foggy weather while under similar conditions the old style buoy could not be heard at all.

I am aware that changes in the form and proportion of parts and details of construction of the devices herein shown and described as an embodiment of my invention can be made without departing from the spirit or sacrificing the advantages thereof, and I therefore reserve the right to make such changes and alterations as fairly fall within the scope of the same.

In Figs. 2, 3 and 4 of the drawings I have shown in detail the improved form of air chest which is employed in connection with the buoy and siren horn. This air chest has a vertical external shell 20 to the upper end

of which the inlet nozzle is connected and to the lower end of which is fastened the branch pipe 12 that leads to the single vertical air pipe 5. Within this shell 20 is provided an internal chamber 21 closed at its upper end, and said shell 20 is further divided by suitable walls or partitions into four passages 22, 22, and 23, 23. The passages 22 are the inlet passages and they extend from the upper open receiving ends of the shell, down the sides thereof, and beneath the internal chamber so that air can freely pass into the latter chamber through a valved opening 24 provided in the bottom thereof; while the other passages 23 extend from the sides of the chamber 21 down to and open into the neck 25 to which the branch pipe 12 is fastened. It will be understood that the inlet and egress air passages are non-communicating, and that the inlet passages 22 do not communicate with the neck 25 of the branch pipe 12. Around the inlet opening 24 in the bottom of the internal chamber is provided a seat 26 on which rests the ball valve 14; and when the buoy rises the air comes down the passages 22 and lifts the valve 14 so that it is free to pass out through the passages 23 and into the pipes 12, 5, but on the reverse motion of the buoy (its descent on the wave) the air is forced through the pipes 5, 12, down upon the valve so as to hold the latter closed and thereby force the air to pass through the pipe 5 into the siren horn to sound the signal.

In the practical construction of my sounding buoy, I prefer to arrange the siren horn and the air chest wholly within the guard or arched support 3 at the top side thereof so that the parts are protected by said guard from floating or passing objects and prevented from sustaining damage thereby. The siren horn preferably has its lower end screwed into a stand which is fixed to the plate 6 and the coiled body of said horn partially overhangs the valve chest which is made of small size and yet sufficiently large to supply and properly regulate the air to the air-tube 5. The end of the siren horn terminates within the sides of the guard which are extended high enough to cover said horn, and thus both the valve chest and siren horn are compactly and completely disposed within the guard. The upper end of the air tube 5 is connected directly with the stand in which is secured the shank of the siren horn, so that the stand serves practically as a continuation of the air pipe while at the same time it affords a convenient means for rigidly sustaining the siren horn and the upper end of the air pipe and for attaching said siren horn to the plate and the buoy.

In the embodiment of my invention shown by Figs. 1 and 5 the open part or mouth of the siren horn faces in the same direction that the rudder 15 extends from the buoy whereby the blast from the horn issues in the direction in which the wind is blowing. In the use of the buoy it is found that the rudder will turn or change the position of the buoy according to the direction from which the wind blows, and to prevent the wind from blowing into the open mouth of the siren horn, I arrange the horn in the manner shown and described so that the blast or sound will issue therefrom in the direction opposite to the quarter from which the wind is blowing.

The length, and consequently the weight, of the anchoring chain varies according to the depth of water in which the buoy is immersed, and consequently I find it important to use floats of such sizes and proportions as to sustain the different lengths and weights of anchoring chains used in different depths of water. Thus, an anchoring chain may be used to anchor the buoy in ten fathoms of water, and a float is used of such size as to sustain such a chain; but when the anchoring cable is increased or diminished a corresponding change is made in the size of the float employed, to suit the change in the weight and length of the anchoring cable.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a buoy, and a depending water-tube containing a diaphragm, of a single fixed air-tube opening through said diaphragm and provided with a sounding device, and a valved air-supply chest connected to said air-tube below the sounding device, as and for the purpose described.

2. The combination with a buoy, and a depending water tube, of a fixed diaphragm within said tube above the mean level of the water column therein, a single air-tube provided at its upper end with a siren-horn, and an air-inlet chest connected to said air pipe below the siren horn and containing an interior automatic valve, substantially as and for the purpose described.

3. The combination with a buoy and a depending water-tube containing a diaphragm above the mean water-level therein, of a single air-tube fixed at its lower end and opening through said diaphragm and provided at its upper end with a siren horn, and a valved air-chest having an exposed inlet mouth and a pipe that is coupled to the air tube below the siren horn, substantially as described.

4. The combination with a buoy, of a depending tube, having a diaphragm, the single air tube, the siren horn mounted thereon, and a valve chest connected to the air tube and provided with the internal chamber having the valve seat, the valve seated thereon, and the isolated inlet and egress passages communicating with said internal chamber and having connection respectively with air inlet and exit ports of the valve shell, substantially as described.

5. The combination with a buoy, of a depending water tube containing a diaphragm, of an air tube connected to said diaphragm, a siren-horn connected to said air-tube, and a valved air-inlet chest connected to said air-

tube, at a point between said diaphragm and the siren-horn for the purpose described, substantially as set forth.

6. The combination of a buoy, the water tube having its ends extended through said buoy and provided with the fixed support at its upper end and with a diaphragm at an intermediate point of its length, a single air tube connected at its lower end to said diaphragm and stayed at its upper end by the fixed support, the siren-horn fixed to the upper end of said air-tube, and the valved air-inlet chest fixed to the support and having a discharge pipe coupled to the air tube at a point between the siren horn and the diaphragm, substantially as and for the purpose described.

7. The combination of a buoy, a depending water tube containing a diaphragm, a rudder fixed to the buoy and tube on one side thereof, an air tube connected to said diaphragm, a siren-horn communicating with the air-tube and having its open mouth facing toward the side of the buoy to which the rudder is secured, and a valved air-chest coupled to the air-tube below the siren horn, substantially as and for the purpose described.

8. The combination of a buoy, a water tube having its ends extended through said buoy and provided with a diaphragm, the open hood or guard fixed to the upper end of said water-tube, an air-tube connected at its lower end to the diaphragm, a siren-horn fixed to the upper end of the air-tube and arranged wholly within the guard, a valved air chest also arranged within the guard and connected to the air-tube below the siren-horn, and a rudder fixed to the buoy and water tube on the side toward which faces the open mouth of the siren horn, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES BIGLER.

Witnesses:

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JULIA F. BOYD.