No. 637,925. Patented Nov. 28, 1899.

R. M. DIXON.

COMBINED VISIBLE AND AUDIBLE SIGNAL.

(Application filed Dec. 15, 1898.)

(No Model.) 4 Sheets—Sheet 1.

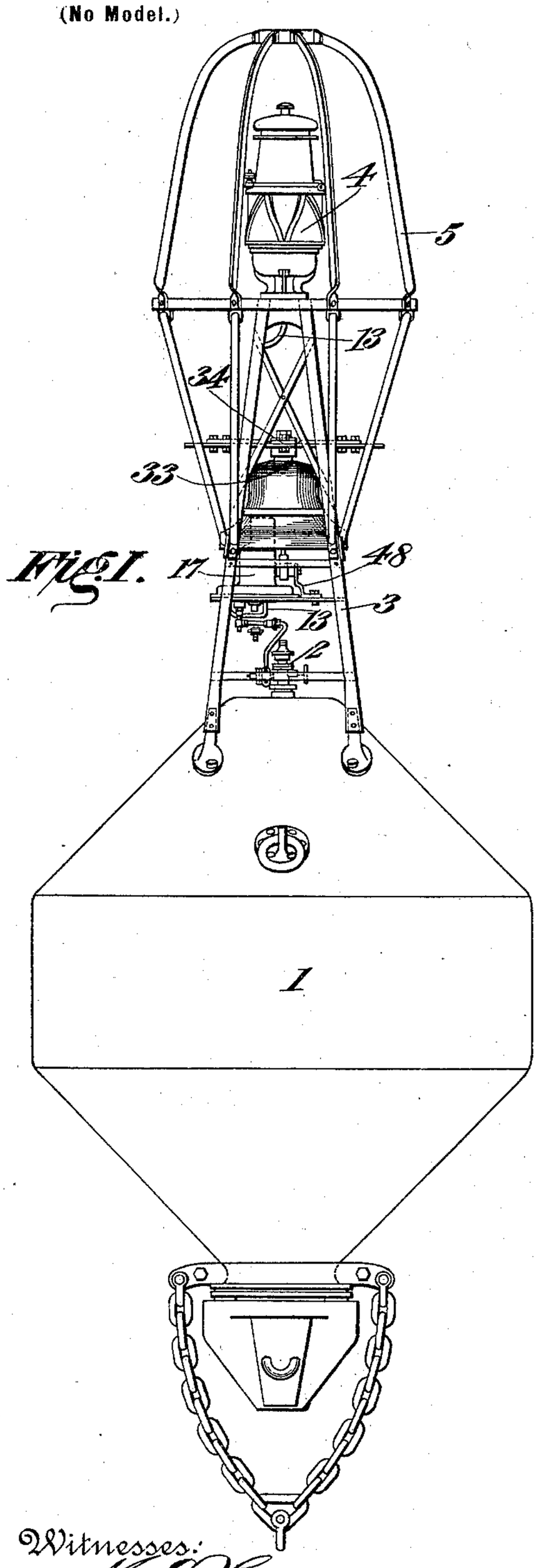

Fig. I.

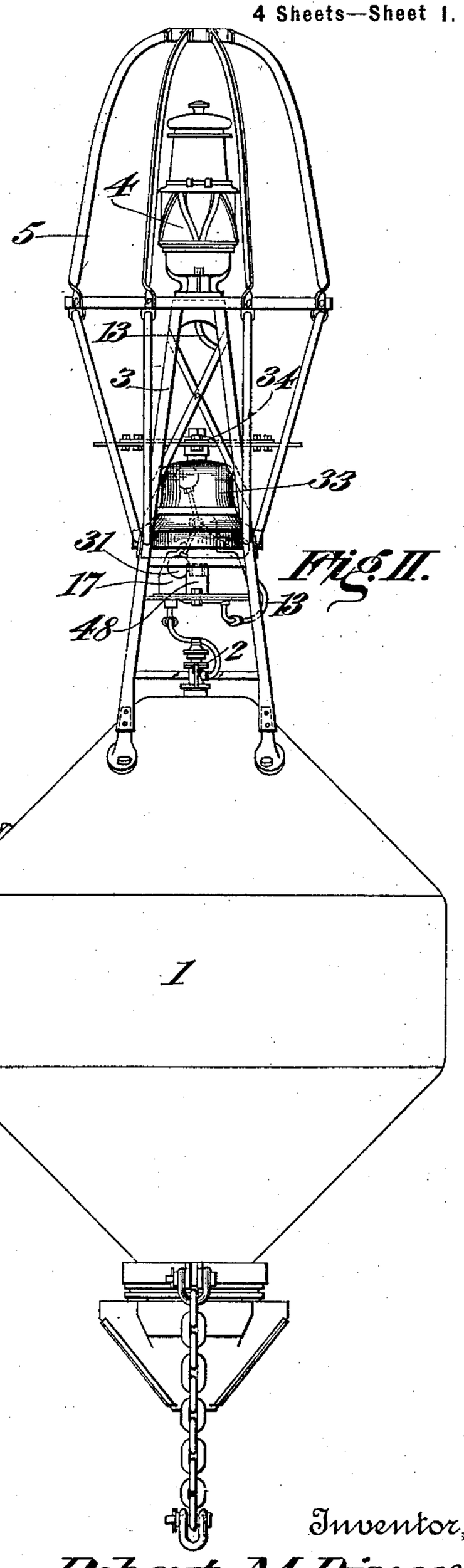

Fig. II.

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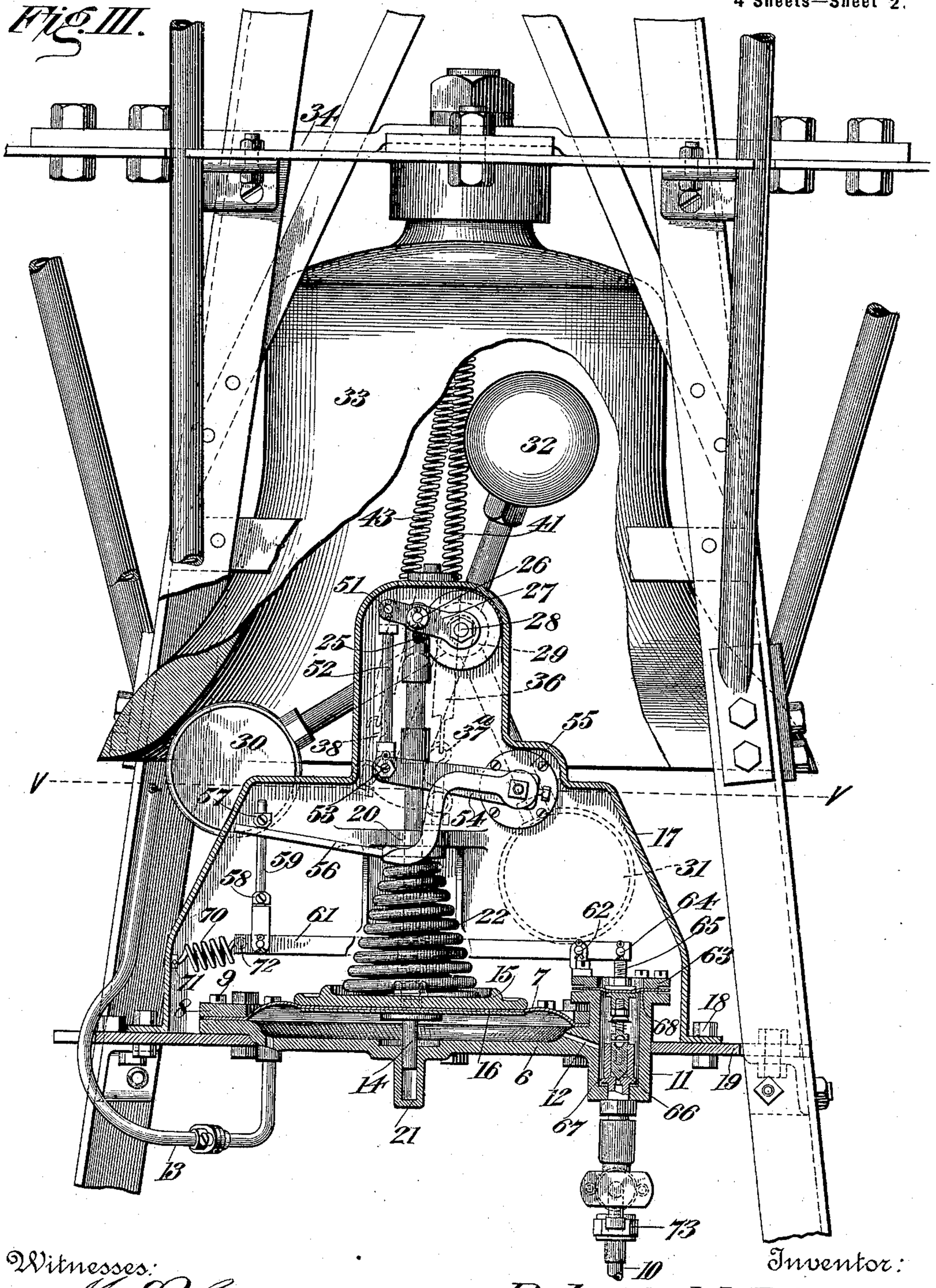
(No Model.) 4 Sheets—Sheet 2.

Fig. III.



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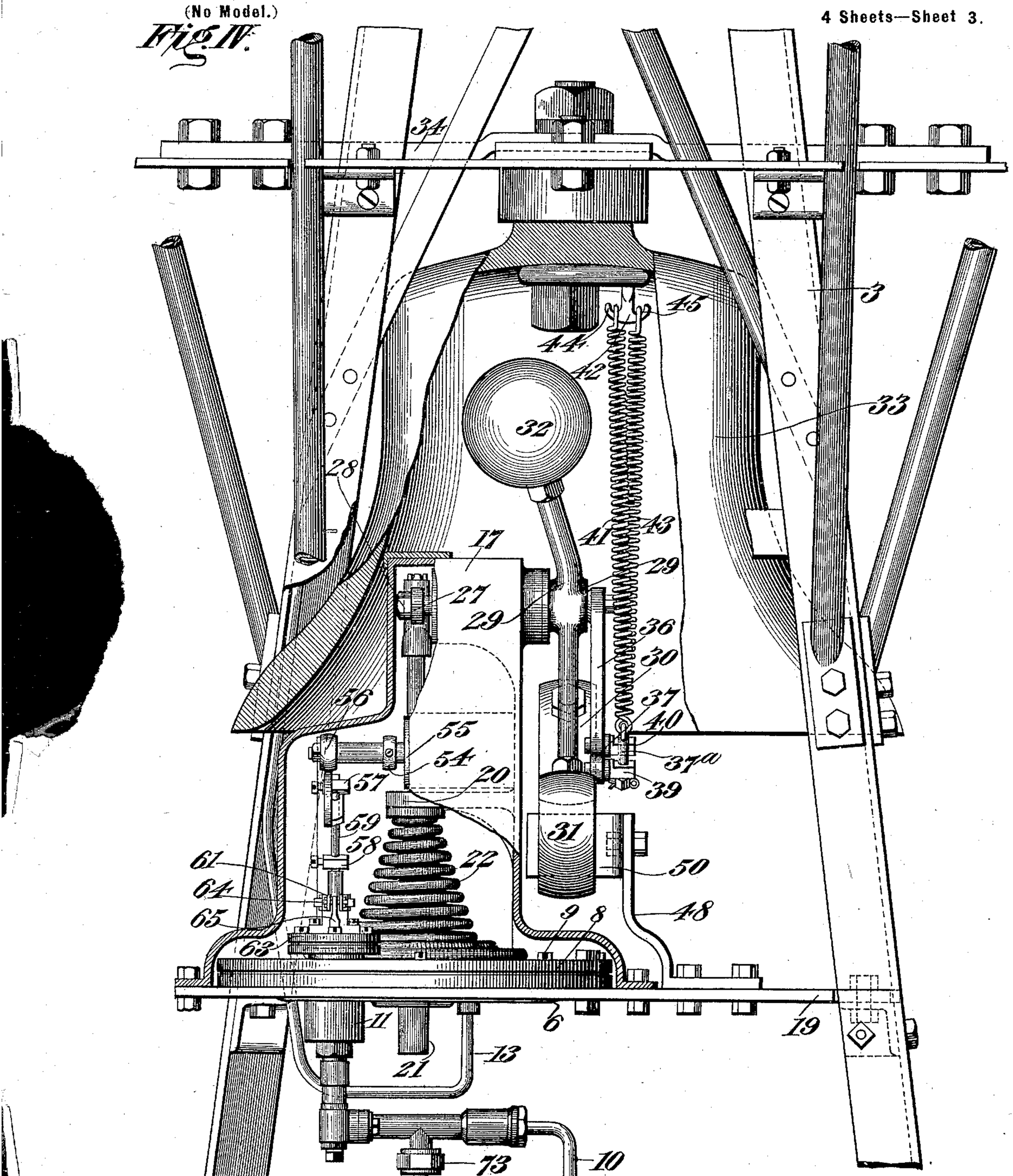
(No Model.) 4 Sheets—Sheet 3.

Fig. IV.



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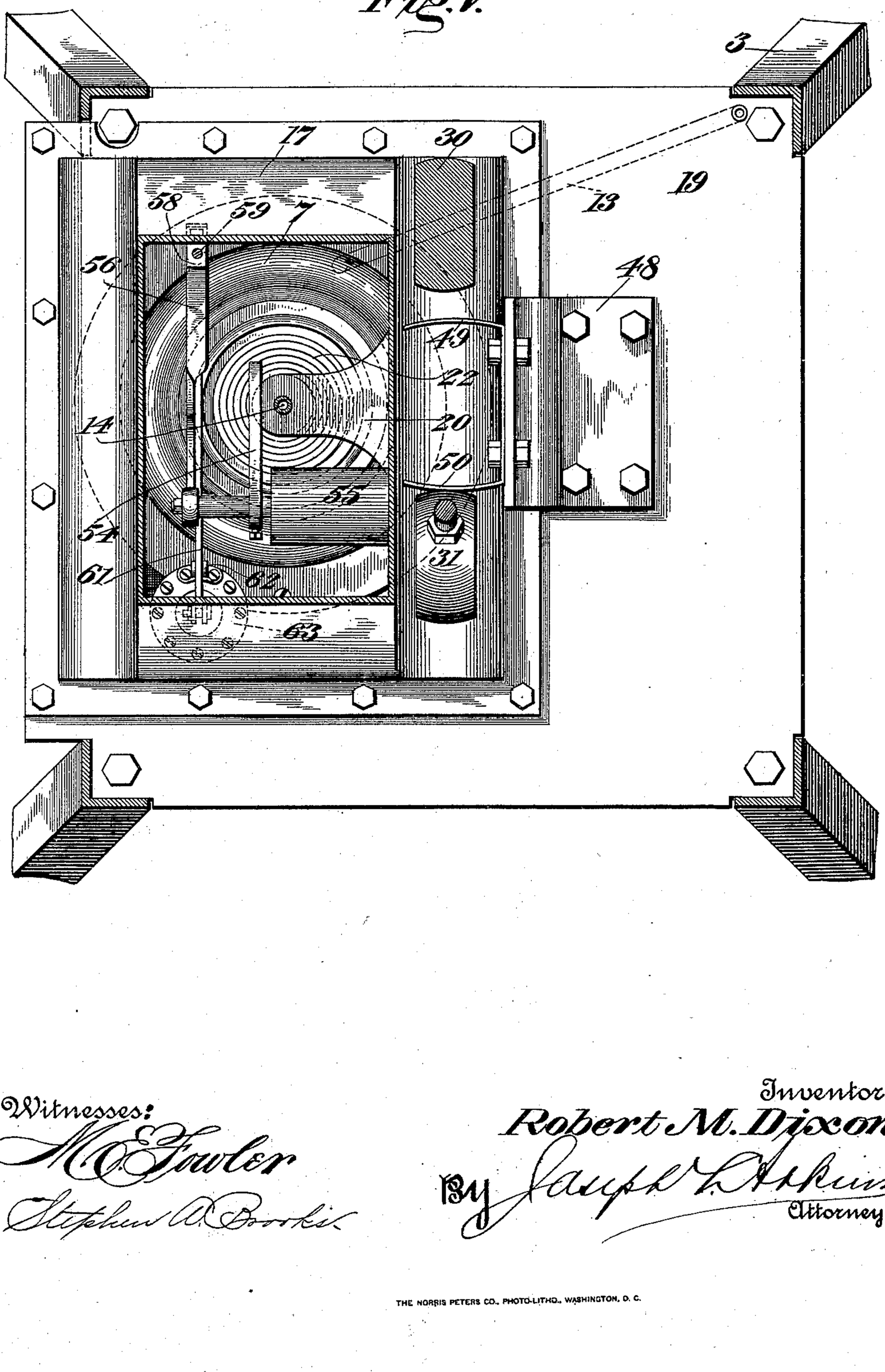
COMBINED VISIBLE AND AUDIBLE SIGNAL.

(Application filed Dec. 15, 1898.)

(No Model.) 4 Sheets—Sheet 4.

Fig. V.



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UNITED STATES PATENT OFFICE.

ROBERT MUNN DIXON, OF EAST ORANGE, NEW JERSEY.

COMBINED VISIBLE AND AUDIBLE SIGNAL.

SPECIFICATION forming part of Letters Patent No. 637,925, dated November 28, 1899.

Application filed December 15, 1898. Serial No. 699,376. (No model.)

To all whom it may concern:

Be it known that I, ROBERT MUNN DIXON, of East Orange, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in a Combined Visible and Audible Signal, of which the following is a complete specification, reference being had to the accompanying drawings.

My invention relates to means for producing both visible and audible signals for the guidance of mariners; and its object is to provide, in a gas-light signal-station, means for utilizing the flow of gas for sounding a bell, for example, and thereby to produce with certainty in one station warning-signals through the aid of both light and sound. Gas-lighted buoys are now in extensive use, and for that reason in the subsequent specification I describe my invention as applicable to that class of buoys, upon which, for economical reasons, it would, perhaps, generally be employed. It should be understood, nevertheless, that my invention is not limited to the application to a gas-lighted buoy or sound-producing mechanism actuated by the flow of gas to the lamp of a buoy, although it is deemed probable that in practice it would be more largely employed upon buoys than elsewhere.

In the accompanying drawings, Figure I is a side elevation of a complete gas-lighted buoy equipped with my preferred form of sounding mechanism. Fig. II is a view similar to Fig. I, taken at right angles thereto. Fig. III is a detail view, on an enlarged scale, partly in section, of a portion of the tower and the sounding mechanism carried thereon, the lower portion of the bell incorporated with the sounding mechanism being shown as broken away and the parts being shown in the position illustrated in Fig. II. Fig. IV is a view similar to Fig. III, showing the parts in the position illustrated in Fig. I. Fig. V is a section as upon line V V of Fig. III, showing a horizontal section of the complete apparatus.

Referring to the figures on the drawings, 1 indicates the strong shell or reservoir that is adapted to hold gas under required pressure and which in the form illustrated constitutes the float or body of a buoy.

2 represents the filling-valve, through which gas may be supplied to the interior of the shell 1.

3 indicates a tower of any usual or suitable construction. It is firmly planted upon and secured to the upper portion of the shell 1. Upon its upper end the tower supports a lamp 4, which is preferably surrounded by a suitable protective cage or skeleton hood 5, that is secured to and incorporated with the tower 3. The particular form of tower and cage may be varied as to structure in any wise, and being exhibited only by way of example does not require to be described in detail.

In the ordinary gas-lighted buoy gas from the interior of the shell 1 is piped to the lamp 4, the pipe being intercepted by suitable regulating or pressure-reducing mechanism, as required.

It is the object of my invention to employ without waste of the gas the energy derivable from the flow of gas transmitted through the pipe connection from the shell 1 to the lamp 4 as a means of sounding an audible signal, preferably a bell, at regular or frequent intervals. To this end I provide a gas-chamber defined by a suitable bottom plate 6, secured to the tower, and a flexible diaphragm 7, surmounting the same and united thereto, as by a rim 8, secured by screw-bolts 9 in such manner as to render the joint between the diaphragm and the shell gas-tight. A pipe 10 establishes communication between the interior of said chamber and the interior of the shell 1, making connection at one end through the case of the valve 2 with the shell and at the other end through a valve-case 11, preferably formed integrally with the plate 6, a gasway 12 constituting the means of communication between the interior of the case 11 and the interior of the chamber. A pipe 13 establishes communication between the interior of the chamber and the lamp 4.

For accomplishing the object of my invention I utilize the movement of the diaphragm 7 for the purpose of actuating an audible signal. The mechanism which I prefer to employ for that purpose consists of a rod 14, firmly secured, as by plates 15 and 16, to the diaphragm 7, upon the opposite sides of which they are respectively located. The rod 14 reciprocates within suitable bearings provided

for it in the plate 6 and within the cover 17, that is bolted, as indicated at 18, to the platform 19, that supports the plate 6 upon the tower.

20 indicates the bearing for the rod 14 within the cover 17, and 21 a corresponding bearing in the plate 6, consisting of a hollow projection or cup within which the lower end of the rod 14 fits.

22 indicates a conical spring that surrounds the rod 14 and is seated at one end against the bearing-frame 20 and at the other end against the plate 15, surmounting the diaphragm 7. It is of such length as will tend to cause it to depress the diaphragm 7 toward the plate 6 and to force the end of the rod 14 toward the bottom of the cup 21.

The rod 14 is provided at its upper end with a slot 25, by means whereof and the aid of a pin 26 it is loosely pivoted to a crank-arm 27, that is secured at one end to a rock-shaft 28, carried in a suitable bearing provided for it in the upper part of the cover 17. Outside of the cover 17, near the end of the shaft 28 opposite that to which the arm 27 is secured, (see Fig. IV,) is fixed a spider or three-legged frame 29. The downwardly-extending legs of the spider respectively carry strikers 30 and 31, while the upwardly-projecting leg carries a counterweight 32. The counterweight 32 is free to oscillate within the upper part of a bell 33, that is suspended, as from cross-pieces 34, secured to the tower 3. The strikers 30 and 31 and the legs of the spider which carry them, respectively, are so disposed as to permit the strikers in vibrating backward and forward upon the shaft 28 to impinge against opposite sides of the bell, and thereby to sound it. To the extremity of the shaft 28 is secured a crank-arm 36, that is provided upon its free end with a yoke 37, upon the opposite ends of which, respectively, are secured hooks 37ª and 38, that are preferably mounted in studs 39 and 40, respectively, pivotally fixed to the yoke.

41 indicates a coiled spring secured at one end to the hook 37 and at the other end to a hook 42, depending from the crown of the bell.

43 indicates a corresponding spring secured at one end to the hook 38 and at the other end to the hook 42, the hook 42 preferably being provided with two horns 44 and 45 for the accommodation of the respective springs.

The arm 36 and the springs 41 and 43, secured to it, are so disposed with respect to the remaining members of the mechanism carried by the shaft 28 as that the respective tensions of the two springs serve to counterbalance one another when the strikers 30 and 31 are respectively equidistant from the bell 33. If, however, one of the strikers—for instance, the striker 30—be moved toward the bell, the effective tensile force of the spring 43 will predominate over that of the spring 41 until finally the aforesaid movement of the striker 30 having advanced sufficiently the power of both springs will be exerted upon the arm 36, so as to drive the striker 30 against the bell with a quick sharp movement.

In view of the foregoing explanation it will be apparent that the springs 41 and 43 constitute the actuating mechanism of the bell-striking mechanism, of which the diaphragm 7, with its connecting mechanism, constitutes the prime mover—that is to say, the movement of the diaphragm 7 in one direction or the other, impelled either by the force of the spring 22 or the gas-pressure between it and the plate 6, operates, by means of its connection, through the rod 14 and the crank-arm 27, with the shaft 28, to swing the arm 36 into such a position as will enable the springs 41 and 43 to actuate the bell-striking mechanism in the manner above described.

It may be noted here that the loose connection between the rod 14 and the crank-arm 27, afforded by the slot 25 and pin 26, will permit the effective actuation of the strikers 30 and 31, respectively, by the force of the springs 41 and 43, as above described.

Upon the platform 19 I provide a bracket 48, (see particularly Fig. V,) that supports a pair of oppositely-acting leaf-springs 49 and 50 in the path of the respective strikers 30 and 31. The office of these springs is to compel the quick rebound of the acting striker after each impact against the bell in order to develop the clear sounding of the bell. If, for example, the striker 30 be the acting striker or the one that is about to sound the bell, the other striker 31 at the moment of the impact of the striker 30 with the bell impinges against the spring 50 and is thereby caused to rebound, carrying with it the striker 30. On the other hand, if the striker 31 be the acting striker the striker 30 impinges against the spring 49 and causes the rebound above described.

To the free end of the crank-arm 27 is pivotally secured, as indicated at 51, a rod 52, that is in like manner secured, as indicated at 53, to an arm 54, pivoted upon a fixed stud 55, projecting inwardly from the wall of the cover 17. Working upon the same stud 55 is an arm 56, that being secured to the arm 54 is actuated by it. The free end of the arm 56 works between stop-pieces 57 and 58, adjustably secured to a rod 59, carried upon the longer end of a lever 61, that is fulcrumed, as indicated at 62, upon a cap 63, secured to the valve-case 11. The short arm of the lever 61 is pivotally united, as indicated at 64, to a valve-stem 65, that operates a valve 66, working within a suitable guide 67 within the case 11, the office of the valve being to permit or shut off communication between the pipe 10 and the interior of the valve-case 11, which, as above specified, communicates through the gasway 12 with the gas-chamber defined between the diaphragm 7 and plate 6.

I do not limit myself to any particular form of valve or valve mechanism, that illustrated being shown merely by way of example. As

illustrated, the limited requisite movement of the valve is provided for by a flexible diaphragm 68, secured between the top of the case 11 and the cap 63 thereof.

A spring 70, secured at one end, as indicated at 71, to the interior of one wall of the cover 17, and, as indicated at 72, to the long arm of the lever 61, serves, accordingly as the lever is in one position or another, to assist both in opening and in closing the valve 66.

The operation of my apparatus is as follows: Gas under pressure is supplied from the interior of the shell 1 through the pipe 10 to the interior of the chamber defined by the plate 6 and diaphragm 7, the valve 66 being open, except when the spring 22 is compressed by gas-pressure under the diaphragm 7, as will hereinafter more clearly appear. From the interior of the chamber underneath the diaphragm 7 the gas passes to the lamp 4, which comprehends, as usual, a pressure-regulator for controlling the immediate supply of gas to the burner. As the gas accumulates under the diaphragm 7 the increasing pressure tends to elevate the diaphragm against the opposing force of the spring 22 and compressing the spring drives the rod 14 upwardly. The rod in turn, through its connection with the crank-arm 27, imparts motion to the rock-shaft 28 and through it to the striker 30, impelling the striker toward its impact against the bell 33. The gradual upward movement of the rod 14 finally, in the manner previously specified, brings the force of the combined springs 41 and 43 into play upon the arm 36, and thereby in the manner previously described drives the striker 30 against the bell, which instantly rebounds under the coöperation of the spring 50 and striker 31, as previously specified. During the upward movement of the rod 14 and in consequence of the movement imparted thereby to the crank-arm 27 the arm 54, through its connection with the arm 27, causes the free end of the arm 56 to rise until, coming in contact with the stop 57 on the rod 59, it lifts the longer end of the lever 61, tending to close the valve 66 until the spring 70 comes into play and completes and maintains the closing of that valve. The closing of the valve 66 shuts off the gas supplied to the gas-chamber underneath the diaphragm 7, from which chamber a continuous supply of gas to the pipe 13 is maintained under pressure derived from the expansion of the spring 22. The expansion of the spring 22 depresses the diaphragm 7, which carries with it the rod 14.

The above-described operation of the striking mechanism is in consequence of the downward movement of the rod 14 reversed, the arm 27 being actuated to impel the striker 31 toward the bell 33 until the arm 36 passes the point at which the combined force of the springs 41 and 43 will be exerted to drive the striker 31 against the bell. Upon impact of the striker 31 against it the bell instantly rebounds, in consequence of the impingement of the striker 30 against the spring 49.

The downward movement of the arm 27, above described, produces a corresponding movement in the arm 54 until the free end of the last-named member strikes the stop-piece 58 and depresses the long arm of the lever 61 until the spring 70 operates to hold it in the depressed position. The said downward movement of the long arm of the lever 61 opens the valve 66 and permits a reinflux of gas.

From the foregoing it will appear that the cycle of operation of my apparatus comprehends for its accomplishment two intervals, one determined by the time required for filling the chamber underneath the diaphragm 7 with gas and the other for exhausting the gas from said chamber. The interval required for filling the chamber under the diaphragm 7 may be controlled by the adjustment of a valve 73 in the pipe 10. The interval occupied in exhausting the gas from said chamber is controlled by the consumption of gas in the lamp 4.

What I claim is—

1. The combination with a gas-containing shell and lamp, of means of supplying gas from the shell to the lamp, and audible-signal apparatus in operative communication with said means of gas-supply and continuously actuated as the lamp burns.

2. The combination with a gas-containing shell and lamp, of means of supplying gas from the shell to the lamp, and bell-ringing apparatus in operative communication with said means of gas-supply and continuously actuated as the lamp burns.

3. The combination with a gas-containing shell, bell, bell-support and lamp, of a pipe connecting the lamp and the interior of the shell, a chamber intercepting the pipe, a flexible diaphragm constituting one wall of the chamber, means for producing movement of the diaphragm through the flow of gas to the lamp, bell-sounding mechanism, and mechanism operatively connecting the diaphragm and bell-sounding mechanism.

4. The combination with a gas-containing shell, bell, bell-support and lamp, of a pipe connecting the lamp and the interior of the shell, bell-sounding mechanism comprehending actuating mechanism, and a prime mover for the actuating mechanism of the bell-sounding mechanism in operative communication with the shell.

5. The combination with a gas-containing shell, bell, bell-support and lamp, of a pipe connecting the lamp and the interior of the shell, a chamber intercepting the pipe, a flexible diaphragm constituting one wall of the chamber, a spring adapted to actuate the diaphragm in opposition to force generated by the flow of gas within the chamber, and bell-sounding mechanism operatively connected with the diaphragm as a prime mover.

6. The combination with a gas-containing

shell, bell, bell-support and lamp, of a pipe connecting the lamp and the interior of the shell, a prime mover in operative communication with the pipe, bell-sounding mechanism operatively connected with the prime mover, and gas-supply-controlling mechanism operatively connected with the sounding mechanism.

7. The combination with a gas-containing shell, bell, bell-support and lamp, of a pipe connecting the lamp and the interior of the shell, a prime mover in operative communication with the pipe, bell-sounding mechanism operatively connected with the prime mover, and gas-supply-controlling mechanism operatively connected with the prime mover.

8. The combination with a supporting member and bell, of a rock-shaft and striker carried within operative proximity to the bell upon the supporting member, a crank-arm secured to the rock-shaft, and a spring secured at one end to the crank-arm, and attached at the other end to the supporting member, whereby the movement of the rock-shaft in one direction will cause the spring to actuate the striker against one side of the bell, and its movement in the opposite direction will cause it to strike the other side of the bell.

9. The combination with a supporting member and bell, of a rock-shaft and strikers carried within operative proximity to the bell upon the supporting member, a crank-arm secured to the rock-shaft, a yoke upon the crank-arm, and springs secured to the yoke and attached to the supporting member at their opposite ends, respectively, whereby the movement of the rock-shaft in one direction will cause the springs to actuate one of the strikers, and its movement in the opposite direction will cause them to actuate the other striker.

10. The combination with a gas-containing shell, bell, bell-support and lamp, of a pipe connecting the lamp and the interior of the shell, a rock-shaft and striker in operative proximity to the bell, striker-actuating mechanism, and a prime mover in operative communication with the pipe and adapted to be actuated by flow of gas through the same, said prime mover being operatively connected with the striker-actuating mechanism, substantially as set forth.

11. The combination with a gas-containing shell, bell, bell-support and lamp, of a pipe connecting the lamp and the interior of the shell, a swinging striker-frame in operative proximity to the bell, striker-frame-actuating mechanism, and a prime mover, in operative communication with the pipe, and operatively connected with the striker-frame-actuating mechanism.

12. The combination with a gas-containing shell, bell, bell-support and lamp, of a pipe connecting the lamp and the interior of the shell, bell-sounding mechanism in operative proximity to the bell, a prime mover operatively connected with the sounding mechanism, and in operative communication with the pipe, a valve controlling the flow of gas from the shell, and mechanism operatively connecting the said valve with the sounding mechanism.

13. The combination with a gas-containing shell, bell, bell-support and lamp, of a pipe connecting the lamp and the interior of the shell, a rock-shaft, and strikers in operative proximity to the bell, striker-actuating mechanism, a valve controlling the flow of gas from the shell, a spring-actuated lever operatively connected with the valve, a rod upon the lever provided with stops, an arm operatively connected with the rock-shaft and working between the stops, and a prime mover operatively connected with the rock-shaft, and in operative communication with the pipe.

In testimony of all which I have hereunto subscribed my name.

ROBERT MUNN DIXON.

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