No. 828,270. PATENTED AUG. 7, 1906.

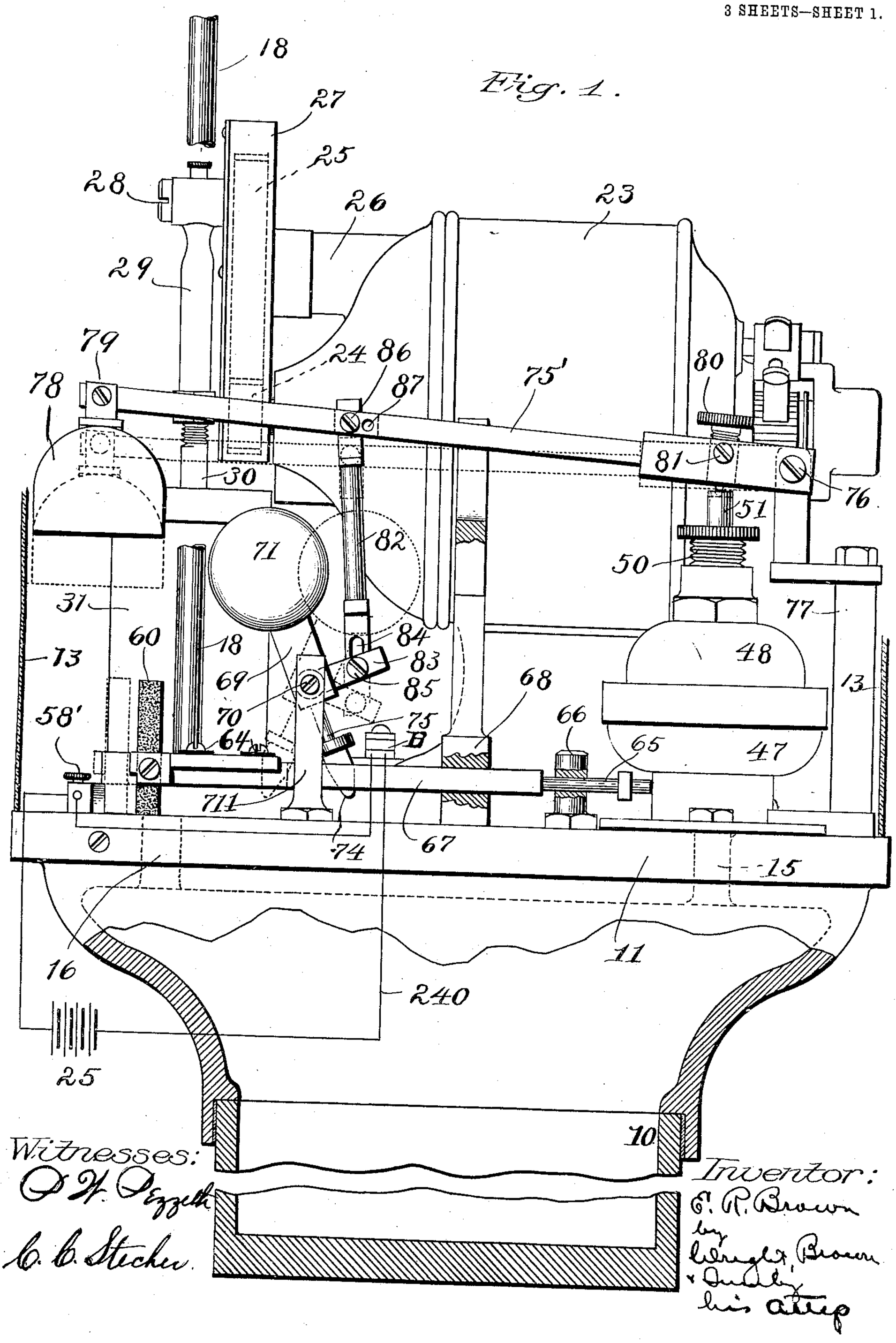
E. R. BROWN.

APPARATUS FOR MAINTAINING AIR PRESSURE IN ALE AND BEER CASKS.

APPLICATION FILED JUNE 4, 1901.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

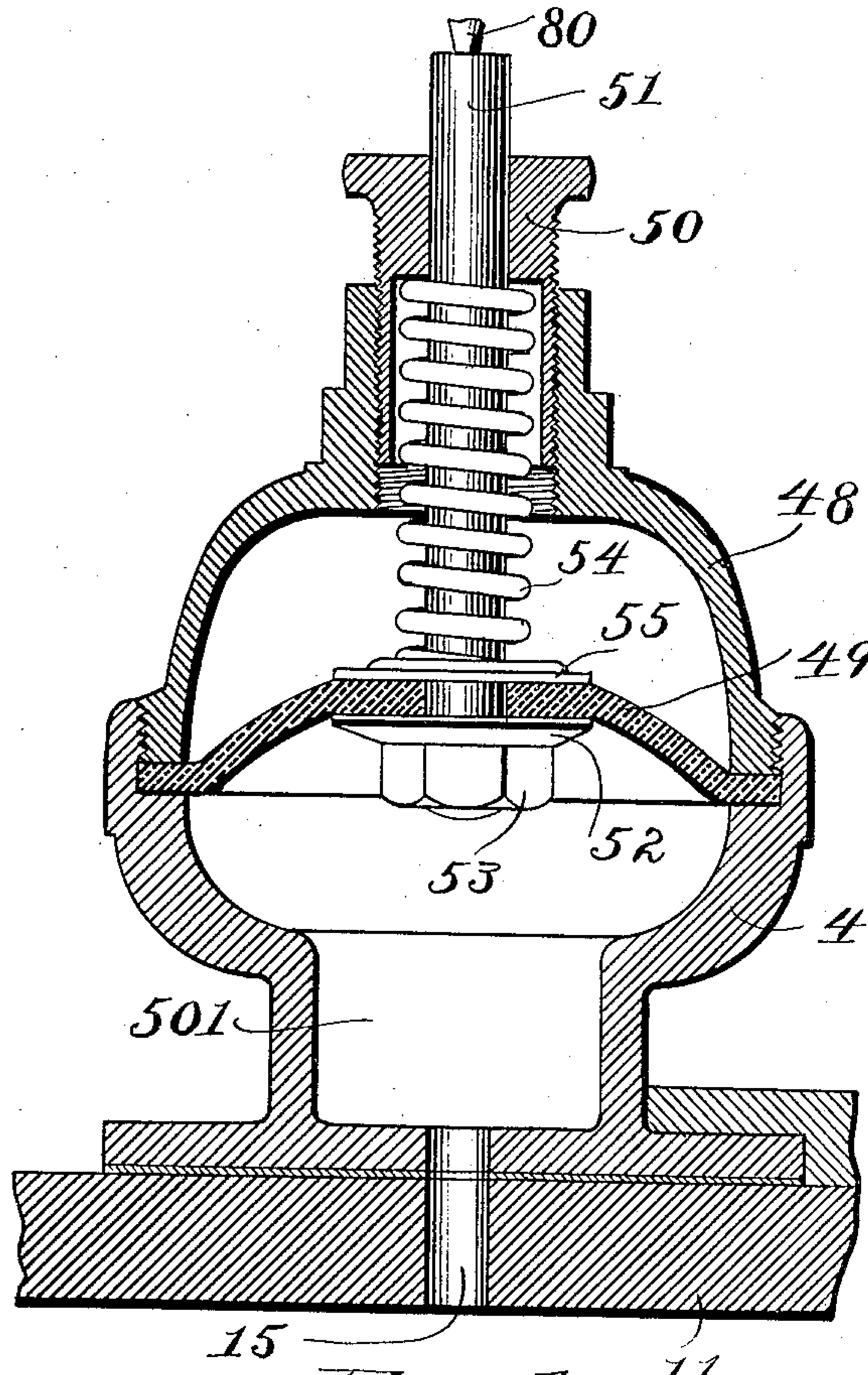

Fig. 3.

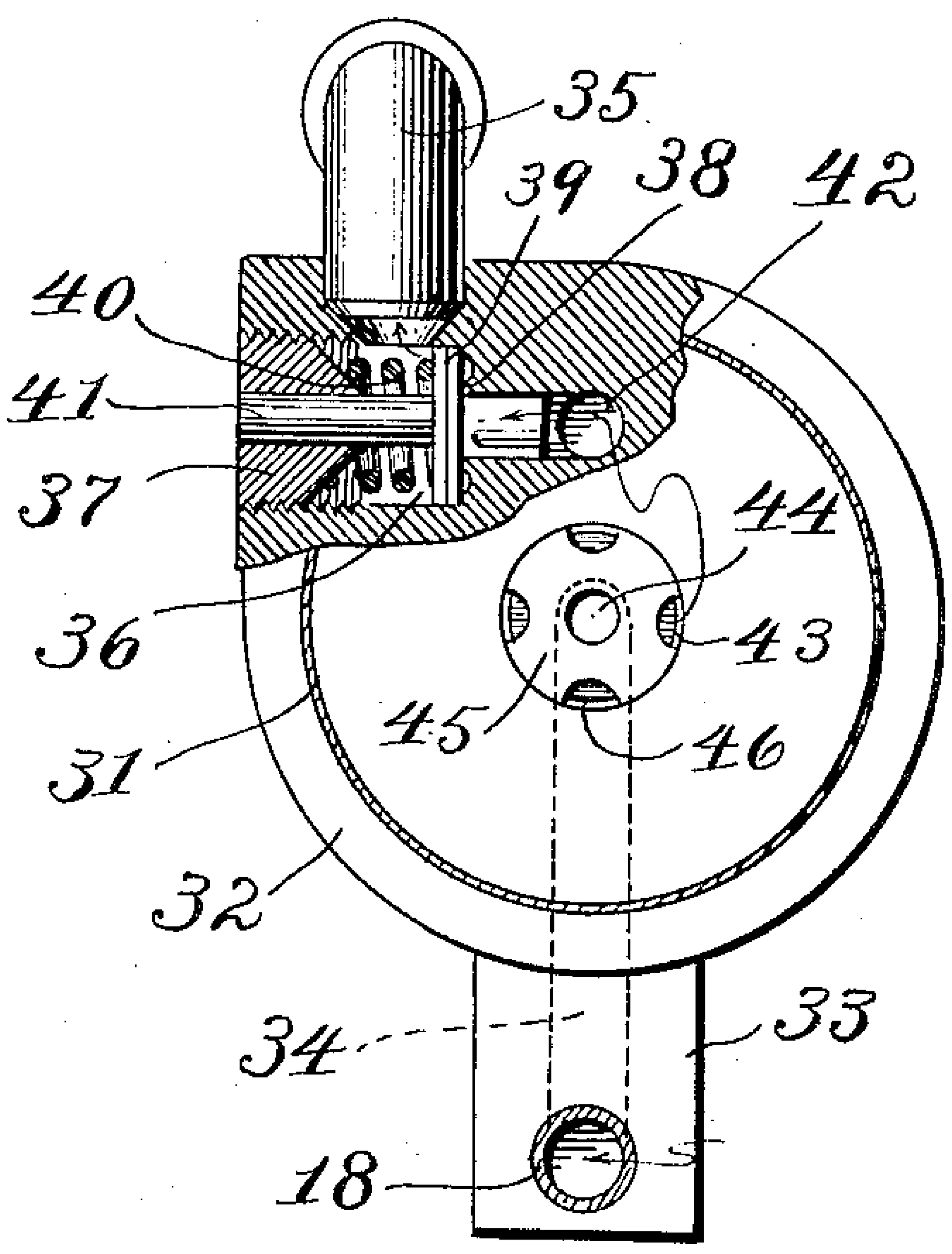

Fig. 4

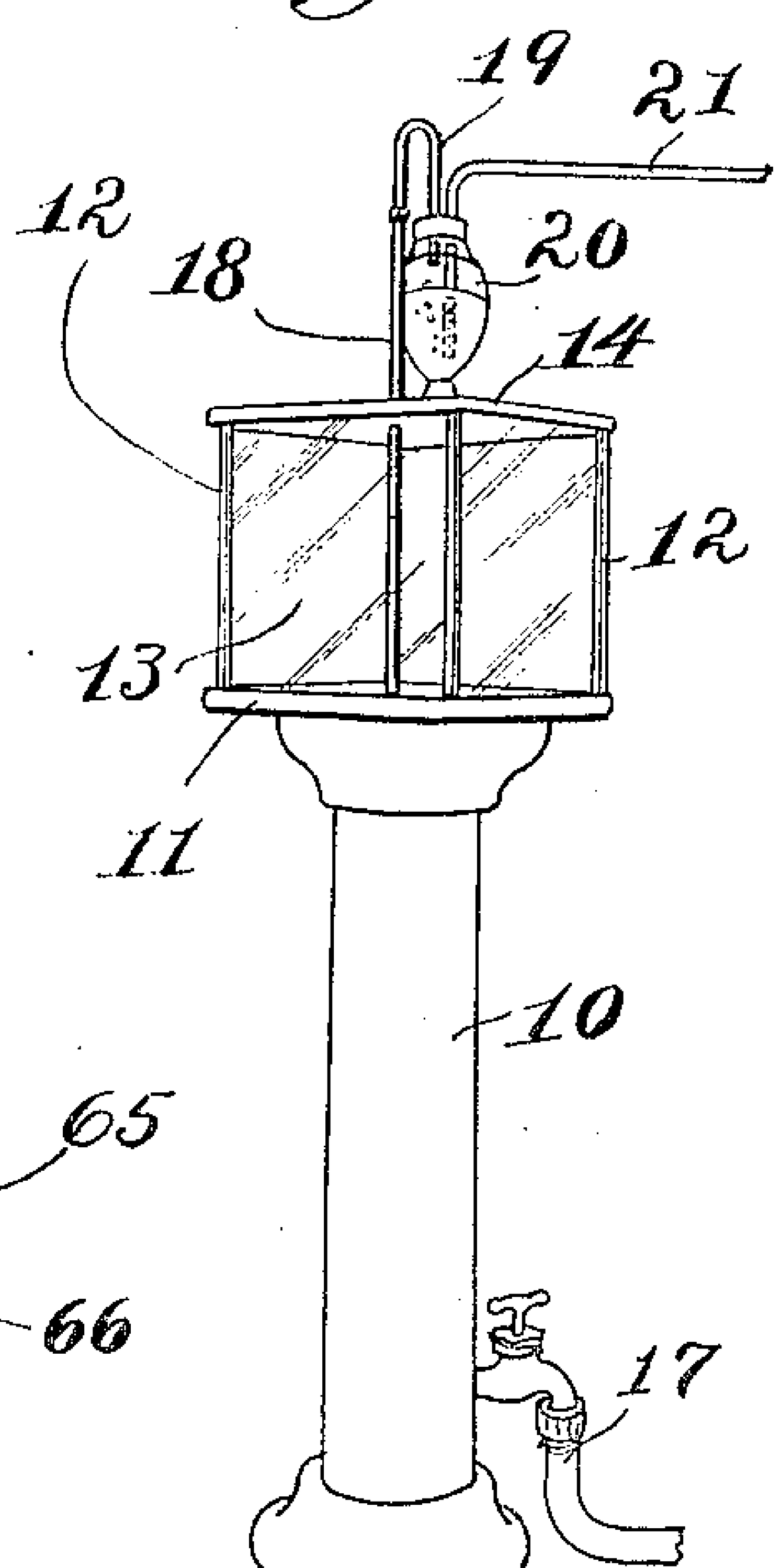

Fig. 5.

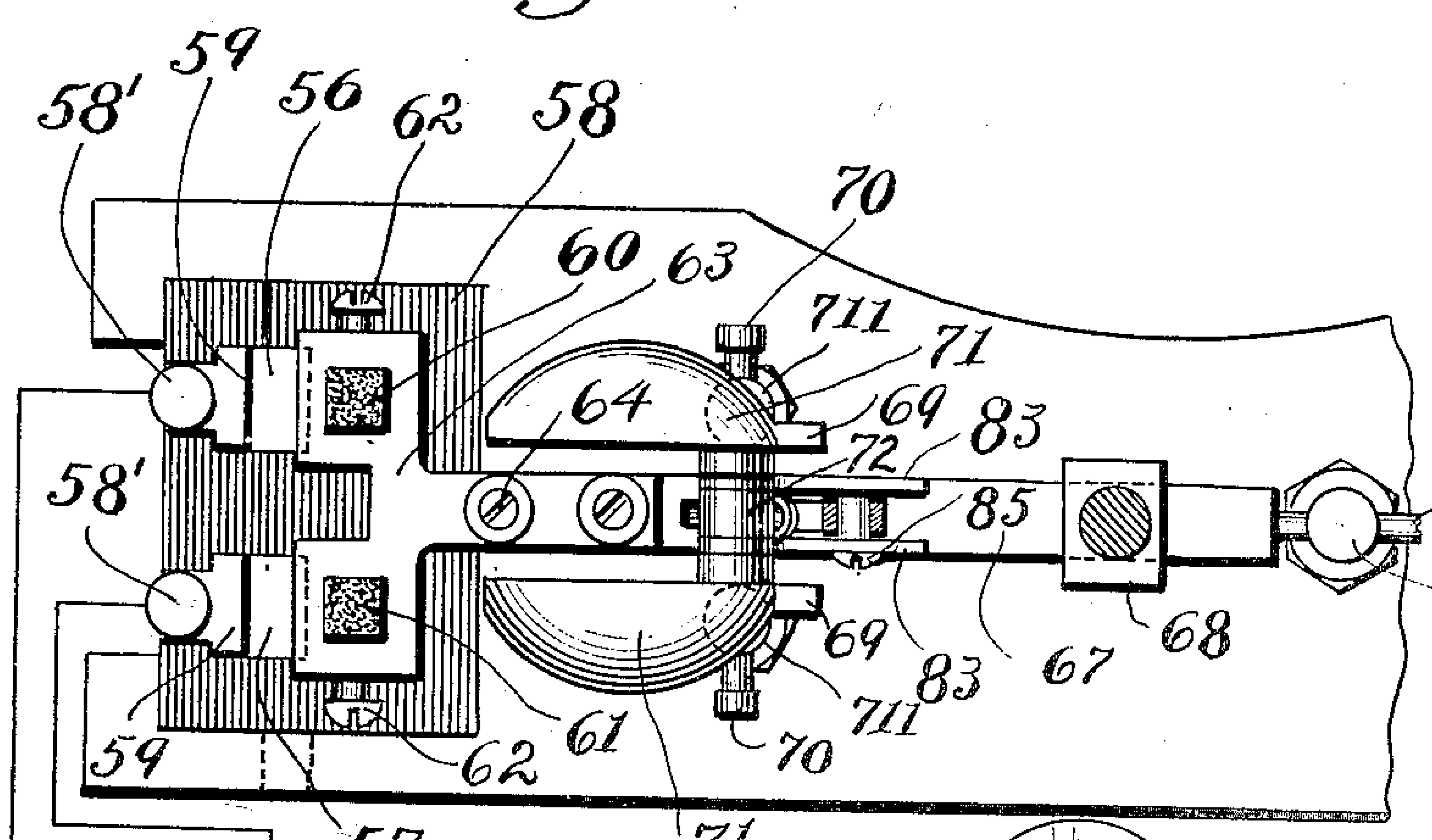

Fig. 2

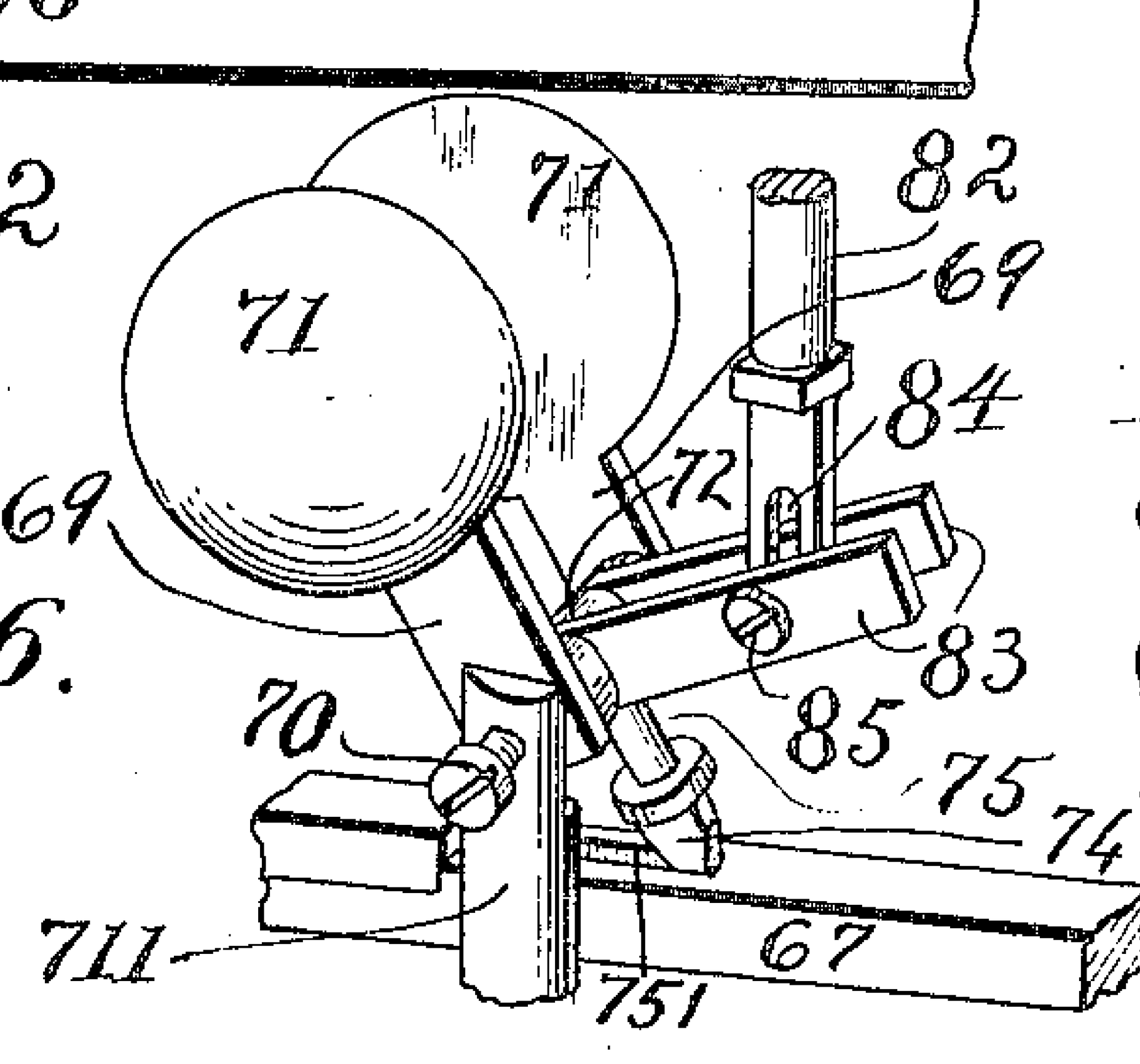

Fig. 6.

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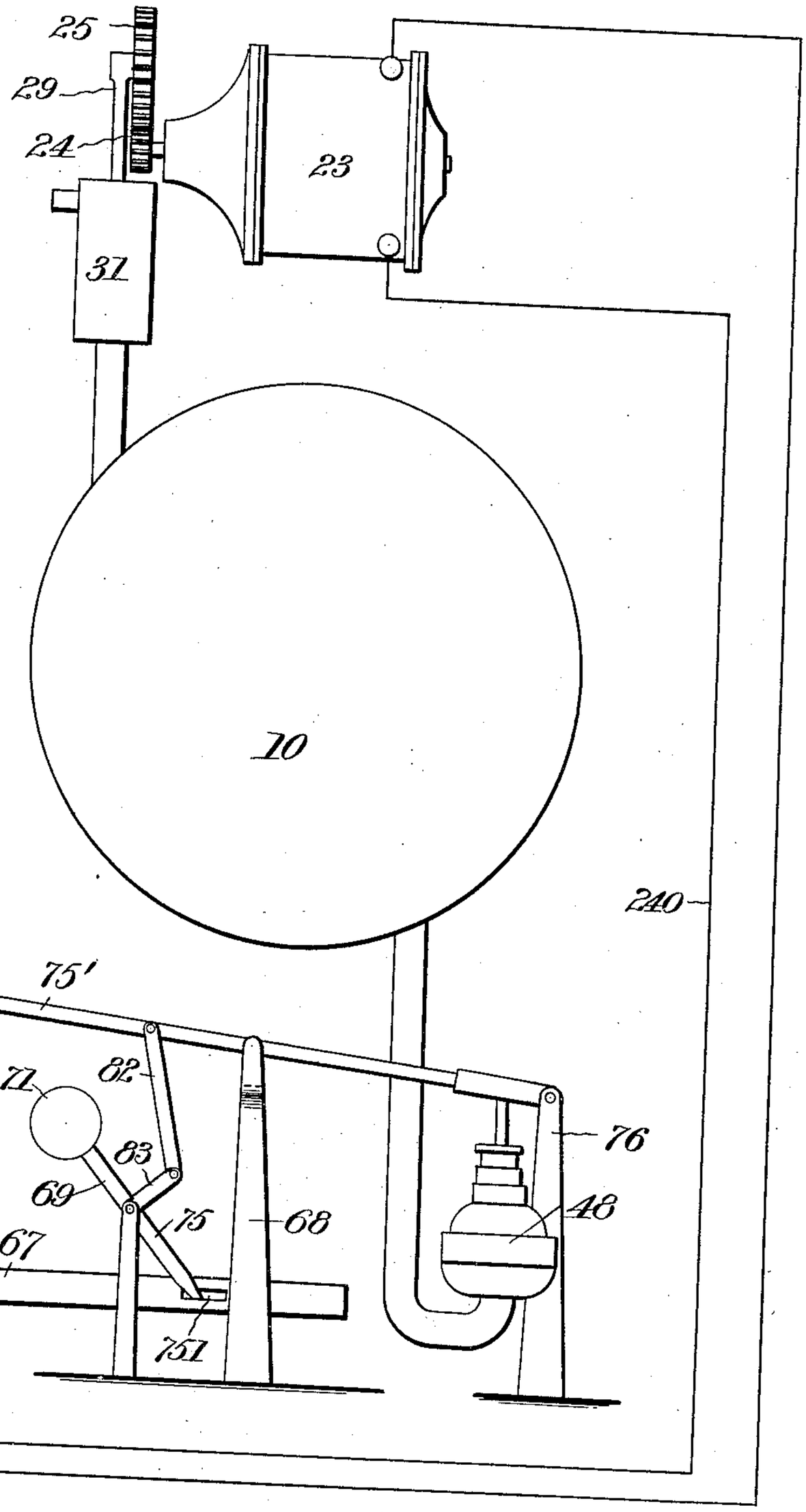
3 SHEETS—SHEET 3.

Fig. 7.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAINTAINING AIR-PRESSURE IN ALE AND BEER CASKS.

No. 828,270. Specification of Letters Patent. Patented Aug. 7, 1906.

Application filed June 4, 1901. Serial No. 63,058.

To all whom it may concern:

Be it known that I, EDWARD R. BROWN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Maintaining Air-Pressure in Ale and Beer Casks, of which the following is a specification.

This invention has relation to apparatus for the automatic control and regulation of air-pressure in beer or ale casks or containing-receptacles whereby a column of the beverage may be raised and dispensed at a point relatively remote from its containing vessel. Such apparatus usually includes an air-tank communicating with the receptacle for the beverage, a diaphragm communicating with the tank and operated by the air-pressure, an air-pump for storing air in the tank, an electric motor for actuating the pump, and automatic switch mechanism for controlling a circuit through said motor, whereby the motor is set in motion when the pressure in the tank falls to a predetermined point and until the pressure is raised to a higher predetermined point. This combination of instrumentalities has hitherto occupied considerable space, and as there is but little waste room, as a general rule, in places where the apparatus is necessarily employed one of the objects of the present invention is to render the said apparatus compact, so as to have it occupy a relatively small space. In fact, according to my invention, I so construct the various parts of the apparatus and so confine them that said apparatus may be placed in a bar-room or other place where beverages are dispensed to add to its attractiveness. The electric motor, the pump, the diaphragm, and the switch mechanism are located upon a pedestal which is hollow and which serves as an air tank or receptacle. The operative parts I inclose in a glass case, so that they may be seen as they operate and at the same time are protected from handling or from the deposit of dust or dirt thereon.

Another object of the invention is the provision of means for preventing access of dirt or impure air to the contents of the containing receptacle or cask. Such beverages as beer and ale are "tender"—that is to say, they are liable to constant change according to the varying conditions found in bars and hotels. Hence where the supply of air which is pumped into the containing vessel, such as a cask, from which the beer or ale is drawn, is drawn from the bar-room itself or from proximity to a closet or other place in which the air is impure the quality of the beverage is deteriorated. For instance, if tobacco-smoke be forced with the air-supply into the tank the taste is immediately noticeable in beer or ale. According to my invention the air is purified and cleansed of dust, lint, and smoke.

A further object of the invention is to provide certain improvements in the apparatus or the various parts thereof to render it more simple, more durable, and more efficient than heretofore.

To these ends the invention comprises certain features of improvement which I have illustrated upon the drawings now to be described in detail in the following specification and then pointed out in the claims hereunto appended.

Referring to the drawings, Figure 1 represents an apparatus embodying my invention. Fig. 2 represents in horizontal section a portion of the switch mechanism. Fig. 3 represents a vertical section through the diaphragm. Fig. 4 represents the lower end cylinder-head of the pump and illustrates the valve mechanism. Fig. 5 is a perspective view of the pedestal, the case which incloses the movable parts of the apparatus, and the air-cleansing device on top of the case. Fig. 6 is a detail perspective view of the parts of the mechanism for preventing arcing at the contacts. Fig. 7 is a diagrammatical view illustrating my invention.

Referring to the drawings, 10 designates a hollow pedestal which serves as an air-tank for the compressed air, the same being provided at its top with a table or plate 11, upon which the movable and operative parts of the apparatus are supported. In the drawings the pedestal is shown as provided with a casing consisting of corner-posts 12 and glass sides 13 and a top 14, within which the said operative parts are inclosed, said casing being constructed to be practically air-tight and to prevent the access of dust to such parts of the apparatus as may be so inclosed.

Passing through the table or plate 11 is an aperture 15, which communicates with the diaphragm-casing. There is another aperture (indicated in Fig. 1 by dotted lines at 16) through which the air is pumped into the hollow pedestal, and from the lower portion thereof there is a cock 17, which is connected with, by a pipe or hose, the air-space of a cask or other vessel containing a beverage to pump the air thereunto. The location of the said cock 17 is immaterial, and it may project from the base of the pedestal directly through the floor of the bar-room to the containing vessel in the cellar or room therebeneath. Air is forced by the pump through the casing, and it is purified before it enters the casing.

18 indicates a pipe which is arranged vertically and projects from the table 11 through the top 14. At its upper end it is crooked, as at 19, and extends downwardly into the top of a vessel or jar 20, which is secured to or rests upon the top 14 of the casing. The upper end of the vessel or jar is closed by a removable stopper through which the lower end of the pipe 19 projects a short distance. A second pipe or tube 21 extends through the stopper, and its lower end is at a point adjacent to the bottom of the vessel. The upper end of the last-mentioned tube is connected to a hose 22, the end of which may be carried to the atmosphere outside of the building in which the apparatus is located. The lower end of tube 21 is provided with a plurality of minute apertures, as indicated in dotted lines, Fig. 5. The vessel is half filled with water or other air-cleansing substance, the perforated end of the tube 21 being below the level of the water, while the end of pipe 19 is above the water-level. Consequently when the pump is actuated, as will hereinafter be described, and a partial vacuum is created in the upper part of the vessel 20 air will be drawn through the tube 21, and as it passes through the water in fine bubbles the impurities will be removed therefrom and will remain in the water. The provision of the removable stopper or top enables the changing of the water several times a day and as often as it may become impure.

Upon the table and within the casing there are placed an electric motor, a diaphragm-casing, a pump, and a switch mechanism. The electric motor 23 is indicated in a conventional form, the same being operated by a circuit 240, the wires of which terminate in a binding-post B, connected to the motor-frame. I have not shown the exact connections of the circuit with the motor, as they form no part of the present invention. The circuit is broken or closed according to the variations in the pressure of air in the hollow pedestal, the circuit being closed to cause actuation of the motor when the pressure falls to a predetermined point and is not broken or the motor stopped until the pressure is raised to a certain predetermined point. Usually an air-pressure of between fifteen and twenty pounds to the square inch is sufficient to raise a column of beverage from the containing vessel or cask to the dispensing-faucet, and hence the motor is set in operation when the pressure falls to fifteen pounds and operates steadily until the pressure rises to twenty pounds, at which time the circuit is broken and the motor remains quiescent until the pressure falls again.

The armature-shaft is provided with a pinion 24, intermeshing with a gear 25 on a stud-shaft in a bracket 26. The pinion and gear are shown in dotted lines; but the said shaft is not indicated, as it is not material to the invention save in imparting power from the armature-shaft to the pump-piston, and it may be replaced by other parts, if desired. The gear and pinion are inclosed within a casing 27, said casing being cut away to permit of a crank-pin 28 projecting forward from the gear 25. Said crank-pin is connected by a connecting-rod 29 with the piston-rod 30 of the air-pump.

The cylinder for the air-pump is indicated at 31, its lower end being screwed upon the table 11. The pump is single-acting, being provided with a piston (not shown) on the end of the piston-rod 30. The lower cylinder-head 32 (see Fig. 4) is provided with an offset 33, into which the lower end of pipe 18 is inserted. A duct 34 extends from said pipe to the center of the cylinder-head to admit air to the cylinder when the piston rises, and valve mechanism for preventing the escape of air when the piston descends is provided, thereby causing the air to traverse another path into the hollow pedestal. The aperture 16, previously referred to as being formed in the table 11, communicates with an elbow 35, whose end in turn communicates with a small chamber 36 in the cylinder-head 32. The outlet of the chamber is closed by a nut 37, while the other end of the chamber is formed with a valve-seat 38. A valve 39 is held against said seat by a spring 40, inserted between it and the nut 37, the inner end of said nut being tapering to center the spring. The valve has a spindle 41 to freely slide through the nut to guide its movement.

The chamber 36 communicates with the interior of the pump-cylinder by a short angular duct 42, which is normally closed by the valve 39. The duct 34, previously referred to, communicates with a similar chamber, in which is provided a valve-seat s milar to that of 38. The valve is indicated at 43 and the spindle at 44. The nut 45 is provided with notches in its periphery to permit the ingress of air when the valve is raised, in other respects being similar to that at 37.

A spring similar to that at 40 is inserted between the nut 45 and the valve 43, said

spring, however, not being illustrated on the drawings. When the pump-piston is raised, air is drawn through the pipe 18, the duct 34, and the notches 46 (the spring being sufficiently yielding to permit the raising of the valve) into the cylinder, the valve 39 at this time being seated. Upon the descent of the piston the egress of the air through the duct 34 is prevented by the valve becoming seated, and the air is forced through the duct 42 and past the valve 39 through the elbow 35 and aperture 16 into the hollow pedestal. The duct 42, it will be observed, is extremely short, so that there is but little space for the storage or compression of air between the valve 39 and the pump-cylinder. Consequently the full capacity of the pump is always secured.

The diaphragm-casing is indicated in Fig. 3 and consists of the lower section 47 and the upper section 48, the two having a threaded connection. Between the two sections is inserted the diaphragm 49. The lower chamber 501 of the casing below the diaphragm communicates with the hollow pedestal through the duct 15. The upper end of the section 48 is internally threaded to receive a hollow nut 50, through which passes the spindle 51, connected to the center of the diaphragm by the washer 52 with the nut 53. A helical spring 54 is coiled about the spindle 51, and its lower end bears against a washer 55, resting against the diaphragm, and its upper end bears against the nut 50. The said nut is milled so that it may be easily turned to vary the tension of the spring upon the diaphragm. The washer 55 may be secured to the spindle 51 or may rest against a shoulder thereon, and the diaphragm is clamped between it and the washer 52 by the nut 53, so that any movement of the diaphragm is immediately communicated to the spindle 51, and thereby to the switch mechanism.

The switch mechanism includes two stationary contacts and two movable contacts. The stationary contacts are indicated at 56 and 57, respectively. They are set in an insulating-block 58, preferably of soapstone, so that their operative faces are flush with the faces of the block. Terminal wires of the electric circuit are connected to the contacts by set-screws 58, said set-screws projecting into upright portions in said contacts, which form shoulders 59 to limit the movement of the movable contacts.

The movable contacts consist of carbon sticks 60 61, which are adjustably clamped by set-screws 62 to the front end 63 of a movable carrier. The said end is preferably formed of copper or other good electrical conducting material, so that when the movable contacts are resting upon the stationary contacts a current may pass from one of the stationary contacts to the carbon block resting thereupon, thence through the front end of the carrier to the other carbon block, and out from the stationary contact upon which the last-mentioned block rests. The front end of the carrier 67 is insulated from the rear end thereof, being connected thereto by set-screws 64. The carrier as a whole consists of a two-part sliding bar, the rear extremity of which is cylindrical, as at 65, and passes through an aperture in a small post 66. Between its ends the carrier passes through a guiding-aperture in a second post 68, the upper portion of which forms a guide for a lever, to be described.

In order to prevent arcing at the contacts, it is desirable to engage and disengage the movable contacts with the stationary contacts with a quick movement or jerk, and to accomplish this I employ an upright tilting weighted lever 69, having a certain amount of lost motion with respect to the carrier. The last-mentioned lever is split, as shown, to escape the connections to be described, and each section is provided at one end with a semispherical weight 71 and is secured at its other end to a rock-shaft 72, journaled in screw-pins 70, passed through small uprights 711 711. An arm 75 is secured in said rock-shaft 72 and extends downward, being provided with a flat pointed end 74, which projects into an elongated slot 751 in the carrier 67. (See Fig. 6.) The slot 751 is of such length that the carrier is moved only as the arm 75 approaches the limit of its movement, the movement of the bar being sufficient merely to slide the carbon sticks in contact with the stationary contacts 56 and 57, or to slide them completely out of engagement therewith, as indicated in Fig. 1, in which the carbons are shown at the extremities of movement. The reciprocating movement of weights 71, lever 75, and carrier 67 is limited by the stationary contacts 59 and post 66, respectively.

The weights 71 are adapted to swing to points at an equal distance on either side of the vertical axial plane of the shaft 70, and as they fall from a vertical position they acquire considerable momentum. In order to operate the weighted lever, I provide an elongated lever 75′ of the third class, the rear end of said lever being fulcrumed at 76 in a post, (indicated as a whole at 77.) At its other end the lever is provided with a weight 78, secured thereto by a screw-pin 79, and intermediate its ends the lever is adapted to slide in a notch in the upper end of post 68. A screw-pin 80 is passed through said lever and is provided with a pointed end bearing against the top of the diaphragm-spindle 51, whereby as the spindle rises and falls, according to the varying pressure in the chamber 501, the lever will be correspondingly moved. The screw-pin 80 is adjustable to compensate for the adjustment of the nut 50 and may be held after adjustment by set-screw

81. The lever at a point comparatively near its front end is connected with the split weighted lever 69 by a connecting-rod 82 and arms 83, there being a certain amount of lost motion between the last-mentioned parts. The arms 83 are secured to the rock-shaft 72 and extend at a right angle to the lever 69 and the arm 75. There is a pin-and-slot connection between the arms 83 and the connecting-rod 82, the slots being indicated at 84 and the screw-pins at 85. The upper end of the connecting-rod 82 is pivotally connected to the lever 75′ by a screw-pin 86, adapted to be passed through any one of the plurality of holes 87 in said lever, and for convenience the lever is slotted to receive the end of the connecting-rod. By providing the lost motion between the arm 73 and the carrier 67 and between the arms 83 and the connecting-rod 84 I am enabled to provide for the movable contacts being connected with and disconnected from the stationary contacts with a quick movement or jerk.

The operation of the apparatus is as follows: Assuming that the pressure in the pedestal is twenty pounds, the withdrawal of the contents of the containing vessel causes a gradual decrease in the pressure in the pedestal with a consequent movement of the diaphragm 49 and the spindle 51. As the spindle drops gradually, the lever 75′ swings downward until the end of the slot 84 in the connecting-rod bears against the screw-pin 85. Then as the lever 75′ continues its downward movement the connecting-rod 82 forces the arms 83 downward, thereby raising the weights 71 until the lever 69 is perpendicular. At this time the pressure in the pedestal has decreased to almost fifteen pounds to the square inch. A slight further movement of the lever 75′ downward overbalances the weights 71, and said weights swing to the dotted position shown in Fig. 1, acquiring such momentum during their movement that before they reach the limit of movement the end of arm 75 engages the end of the slot 751 in the carrier 67 and moves the movable contacts with a jerk into the position shown in dotted lines. This establishes a current through the motor, which immediately begins to operate, and air is forced by the pump into the pedestal until it reaches its maximum pressure therein. The movable contacts remain in engagement with the stationary contacts until the weighted lever 69 is raised to perpendicular position and swings down in the opposite direction. It will be observed that the provision of the slots 84 permits the overbalancing of the weights 71 and the movement of the carrier 67, since it is essential that when the carrier swings forward the arm 83 should have a free limited movement relatively to the connecting rod or link. It will also be noted that the weights 71, lever 75, and carrier 67 are limited in their reciprocating movements by the stationary contacts and the posts 66, respectively. By splitting the weighted levers 69 and the arms 83 I am enabled to arrange the lever 75′ and the carrier in the same vertical plane and to connect them by the link 82 and arm 75 also in the same plane, thereby saving space and securing a direct action of the parts. The lever 75′ directly actuates the arms 83 and the arm 75, and thereby indirectly moves the carrier for the movable contacts, whereas the weighted lever 69 serves as an accelerating device and directly furnishes motive power for the said carrier to give it a quick movement. This prevents arcing of the current and the burning away of the contacts. In case of a small amount of sparking at the making or breaking of contact the inclosing air-tight glass casing prevents the ignition of inflammable gases which may be adjacent the apparatus.

Having thus explained the nature of the invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, it is declared that what is claimed is—

1. A device of the character described comprising an electric motor, a pump actuated thereby, an air-storing tank connected with said pump, an electric switch, an operating-lever therefor, means for automatically controlling said lever, a post serving to guide both said lever and said switch, and connections between said switch and said lever, said connections including means for imparting an accelerated movement to the switch as the latter shifts its position.

2. An apparatus of the character described comprising an electric motor, a pump actuated thereby, an air-storing tank connected with said pump, a diaphragm also connected with said tank, an electric switch, an operating-lever therefor connected with said diaphragm, a post serving to guide both said lever and said switch, and connections between said switch and said lever, said connections including means for imparting an accelerated movement to the switch as the latter shifts its position.

3. An apparatus of the character described comprising an electric motor, a pump actuated thereby, an air-storing tank connected with said pump, a diaphragm also connected with said tank, and provided with a spindle, a pivotally-supported lever resting on said spindle, an electric switch, a post serving to guide both said lever and said switch, and connections between said switch and said lever, said connections including means for imparting an accelerated movement to the switch as the latter shifts its position.

4. An apparatus of the character described, comprising an electric motor, a pump actuated thereby, an air-storing tank connected

with said pump, a diaphragm also connected with said tank, means for varying the tension on said diaphragm, a spindle formed with said diaphragm, a pivotally-supported lever, a supporting-screw working therein and resting on said spindle, an electric switch, a post serving to guide both said lever and said switch, and connections between said switch and said lever, said connections including means for imparting an accelerated movement to the switch as the latter shifts its position.

5. An apparatus of the character described, comprising an electric motor, a pump actuated thereby, an air-storing tank connected with the pump, a diaphragm also connected with the tank, an electric switch, a weighted lever engaging said switch and adapted to impart an accelerated movement to said switch as the same shifts its position, an operating-lever connected with said diaphragm, a post serving to guide both said operating-lever and said switch, and connections between said operating-lever and said weighted lever.

6. An apparatus of the character described, comprising an electric motor, a pump actuated thereby, an air-storing tank connected with the pump, a diaphragm also connected with the tank, an electric switch, a weighted lever engaging said switch and adapted to impart an accelerated movement to said switch as the same shifts its position, an operating-lever connected with said diaphragm, a post serving to guide both said operating-lever and said switch, a connecting-rod depending from said operating-lever, and an arm extending from said weighted lever and loosely connected with said connecting-rod.

7. An apparatus of the character described, comprising an electric motor, a pump actuated thereby, an air-storing tank connected with the pump, a sliding switch member provided with a slot, a weighted lever having a reduced end working in said slot, an operating-lever connected with said weighted lever, a post serving to guide both said operating-lever and said switch member, and means for automatically controlling said operating-lever.

8. An apparatus of the character described, comprising an electric motor, a pump actuated thereby, an air-storing tank connected with said pump, a diaphragm also connected with said tank, a sliding switch member provided with a slot, a weighted lever having a reduced end working in said slot, an operating-lever connected with said diaphragm, a post serving to guide both said operating-lever and said switch member, and connections between said weighted lever and said operating-lever.

9. An apparatus of the character described, comprising an electric motor, a pump actuated thereby. an air-storing tank connected with said pump, a diaphragm also connected with said tank and provided with a spindle, a sliding switch member provided with a slot, a weighted lever having a reduced end working in said slot, a pivoted operating-lever overhanging said spindle and resting thereon, a post serving to guide both said operating-lever and said switch member, and connections between said weighted lever and said operating-lever.

10. An apparatus of the character described, comprising an electric motor, a pump actuated thereby, an air-storing tank connected with said pump, a diaphragm also connected with said tank, a sliding switch member provided with a slot, a weighted lever having a reduced end working in said slot, an operating-lever connected with said diaphragm, a post serving to guide both said operating-lever and said switch member, connections between said weighted lever and said operating-lever, means for regulating the pressure upon said diaphragm, and means for regulating said operating-lever to conform to the regulation of said diaphragm.

11. An apparatus of the character described comprising an electric motor, a pump actuated thereby, an air-storing tank connected with the pump, a diaphragm also connected with the tank and provided with a spindle, an adjusting-screw for said diaphragm, a sliding switch member provided with a slot, a weighted lever having a reduced end working in said slot, an operating-lever overhanging said spindle, an adjusting-screw working therein and resting on said spindle, a post serving to guide both said operating-lever and said switch member, and connections between said weighted lever and said operating-lever.

12. An apparatus of the character described comprising an electric motor, an air-pump actuated thereby, an air-pressure-regulated device, and switch mechanism controlled by said device, said mechanism comprising a stationary contact, a sliding carrier, a movable contact mounted thereon, a lever loosely engaging said carrier with its lower end to permit lost motion, whereby said lever will move a predetermined distance before operating said carrier, loose connections between said lever and said pressure device to permit lost motion, and means carried by the lever for accelerating the movement of the carrier in both directions.

13. An apparatus of the character described comprising an electric motor, an air-pump actuated thereby, an air-pressure-regulated device, and switch mechanism controlled by said pressure device, said mechanism comprising a stationary contact, a sliding carrier, a movable contact mounted thereon, means loosely connected to said carrier to permit lost motion whereby said

carrier is moved by a jerk in first one direction and then the other, and means connecting said moving means with said pressure device and permitting lost motion between them.

14. An apparatus of the character described comprising an electric motor, an air-pump actuated thereby, an air-pressure-regulated device, and switch mechanism controlled by said pressure device, said mechanism comprising a stationary contact, a sliding carrier, a movable contact carried thereby, an upright weighted lever having a lower free end engaging said carrier to allow lost motion, whereby said lever will move a predetermined distance in either direction before operating said carrier, and means for moving said weighted lever to a perpendicular position and then allowing it to drop first on one side and then on the other.

15. An apparatus of the character described comprising an electric motor, an air-pump actuated thereby, an air-pressure-regulated device, and switch mechanism controlled by said device, said mechanism comprising a stationary contact, a movable contact, a carrier for said movable contact, an upright tilting weighted lever connected to said carrier to provide loose play or lost motion between them, a second lever acted upon by said device, and a loose connection between said levers to permit lost motion between them.

16. An apparatus of the character described comprising an electric motor, an air-pump actuated thereby, a diaphragm, and a switch mechanism, said mechanism comprising a stationary contact, a movable contact, a weighted lever fulcrumed between its ends and having a loose connection with said carrier to permit of lost motion relatively thereto, a weighted lever actuated by the diaphragm, a lateral arm secured to the first-mentioned lever, and a link loosely connecting the end of said arm with the second-mentioned lever to permit lost motion between the said levers, whereby said carrier is moved with a quick jerk in first one direction and then the other.

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

EDWARD R. BROWN.

Witnesses:
M. B. MAY,
E. BATCHELDER.