No. 769,036. PATENTED AUG. 30, 1904.

H. WALTHER.

VALVE MECHANISM.

APPLICATION FILED SEPT. 11, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

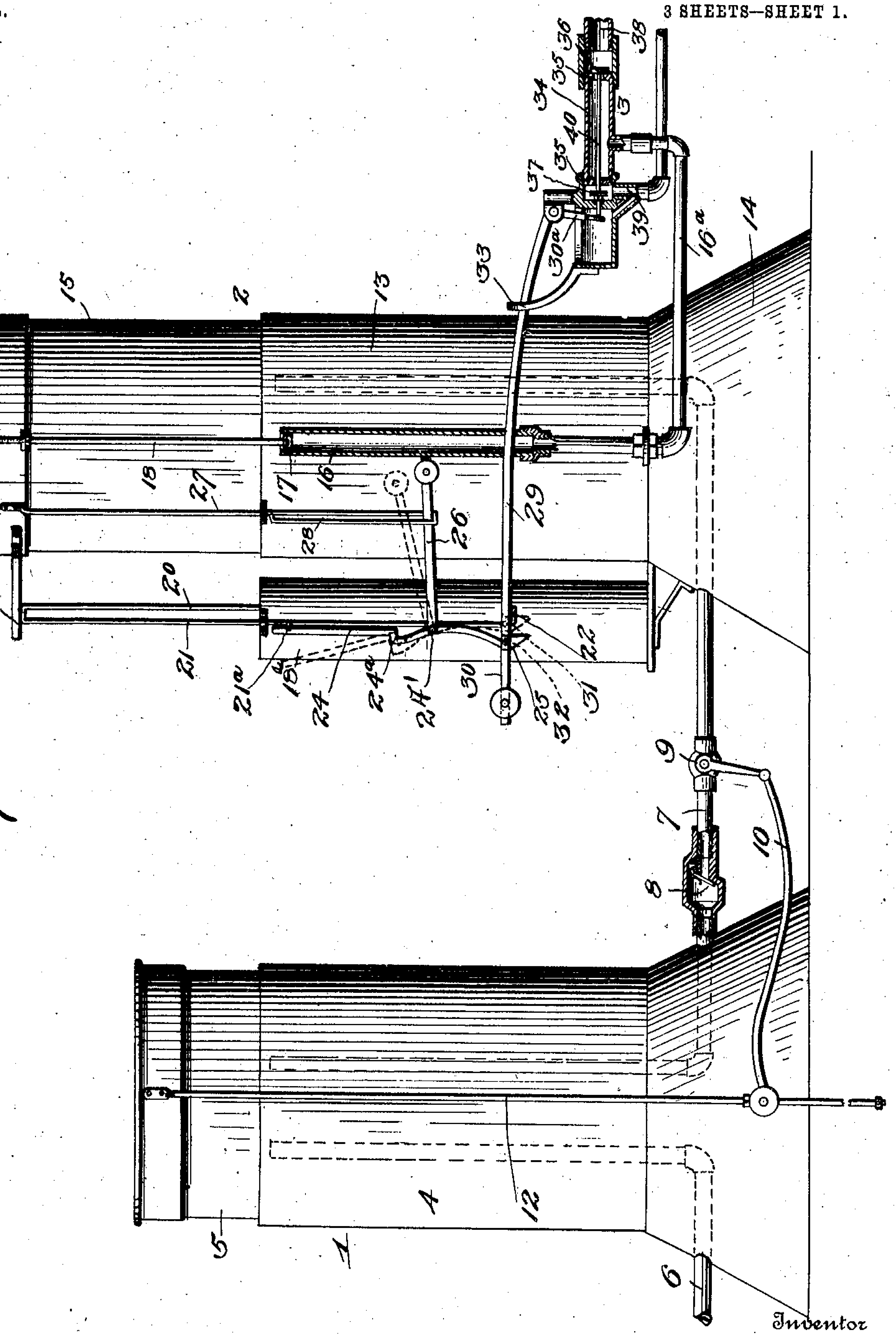

Fig. 1.

Witnesses

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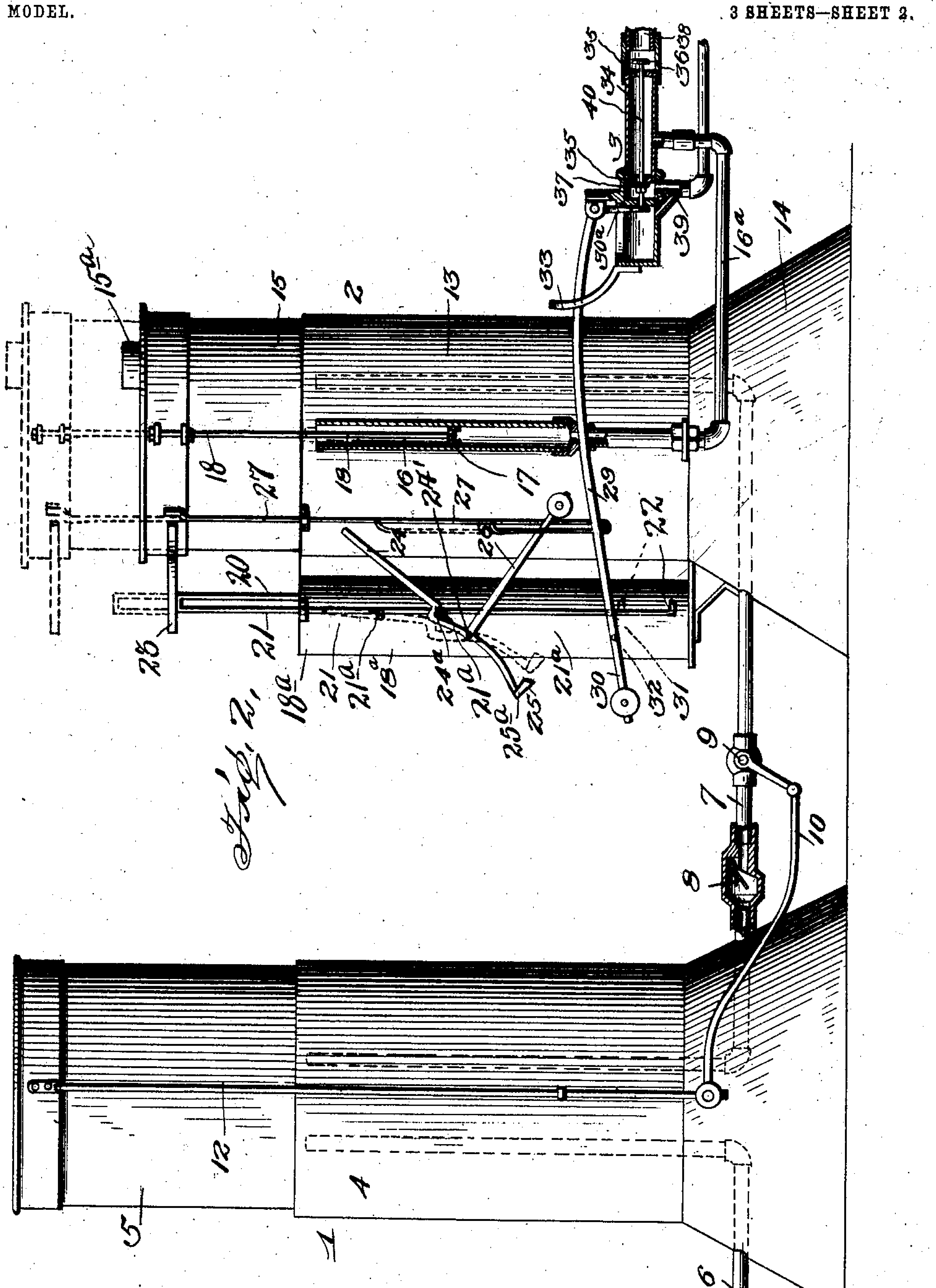

Witnesses

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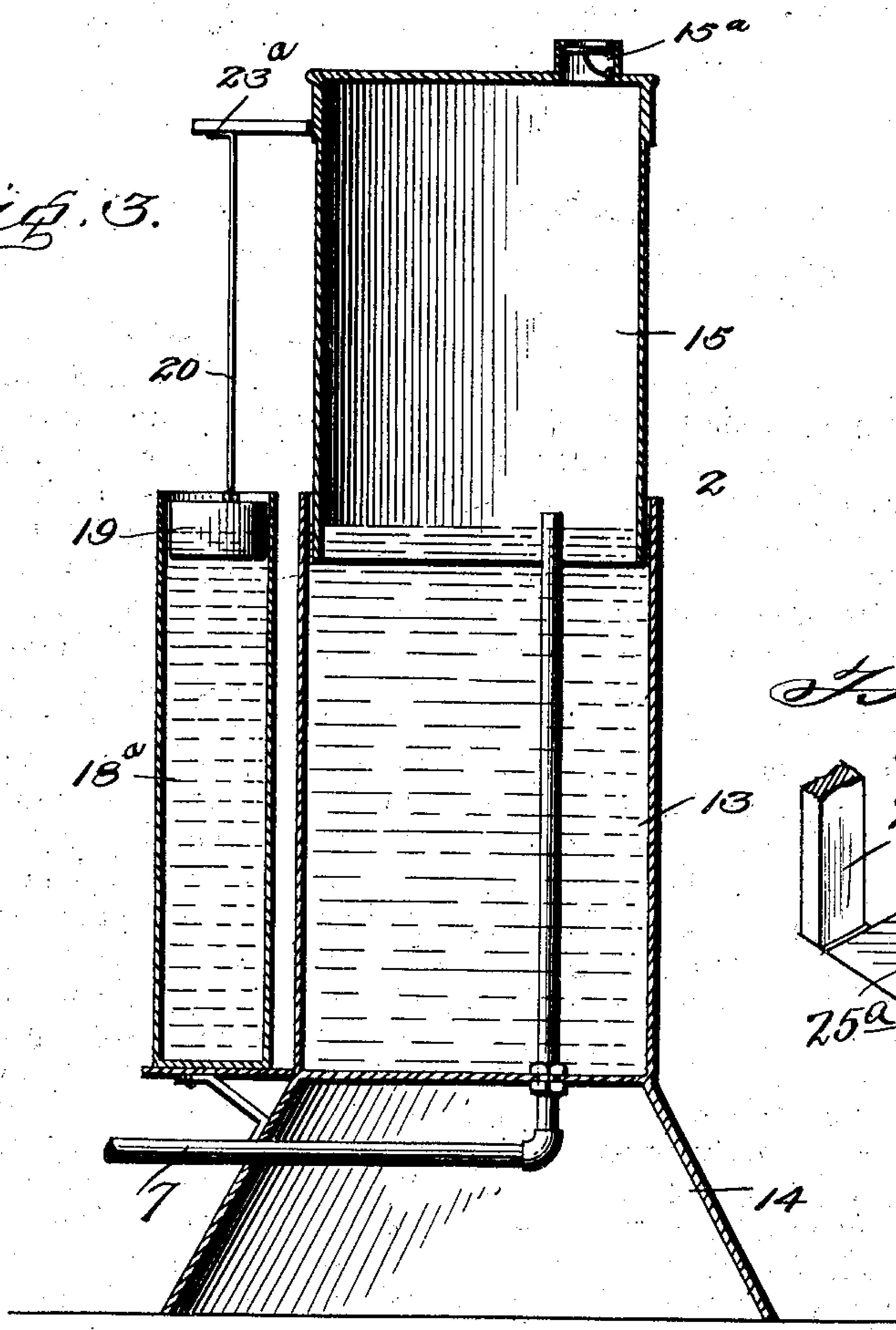
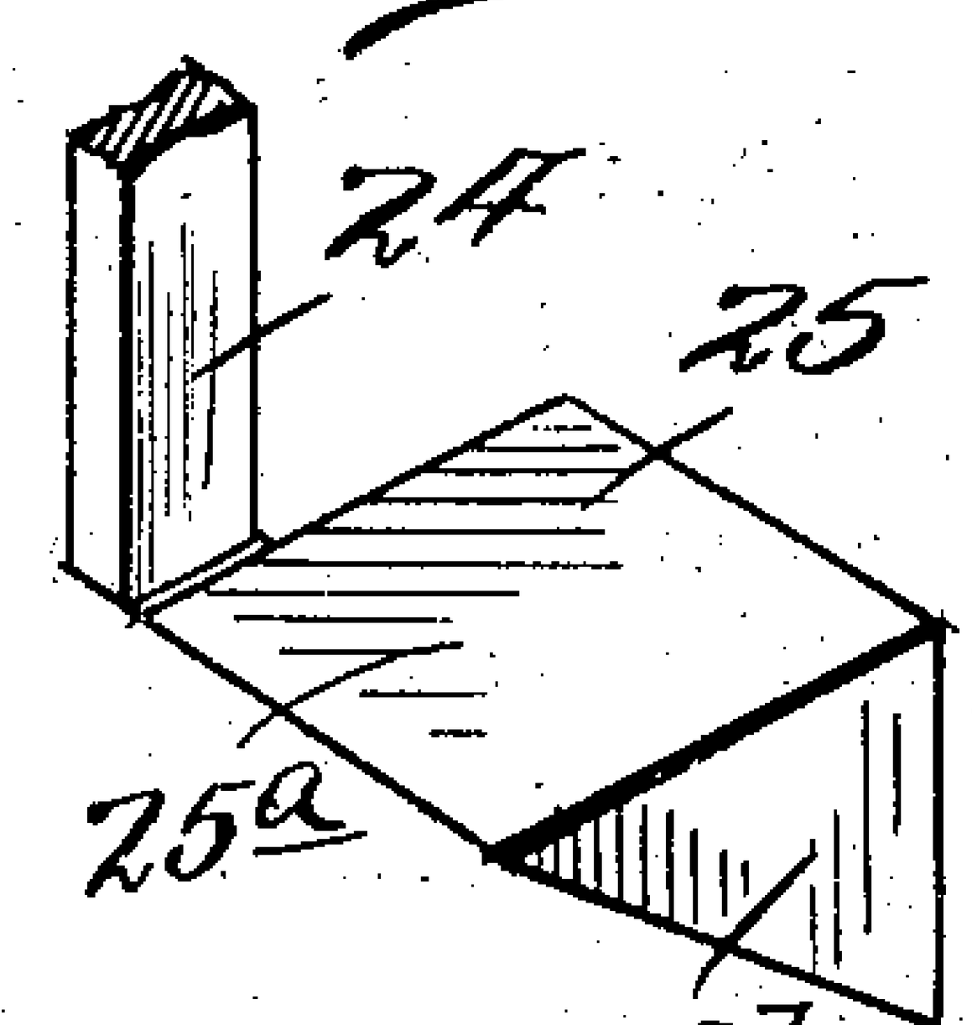
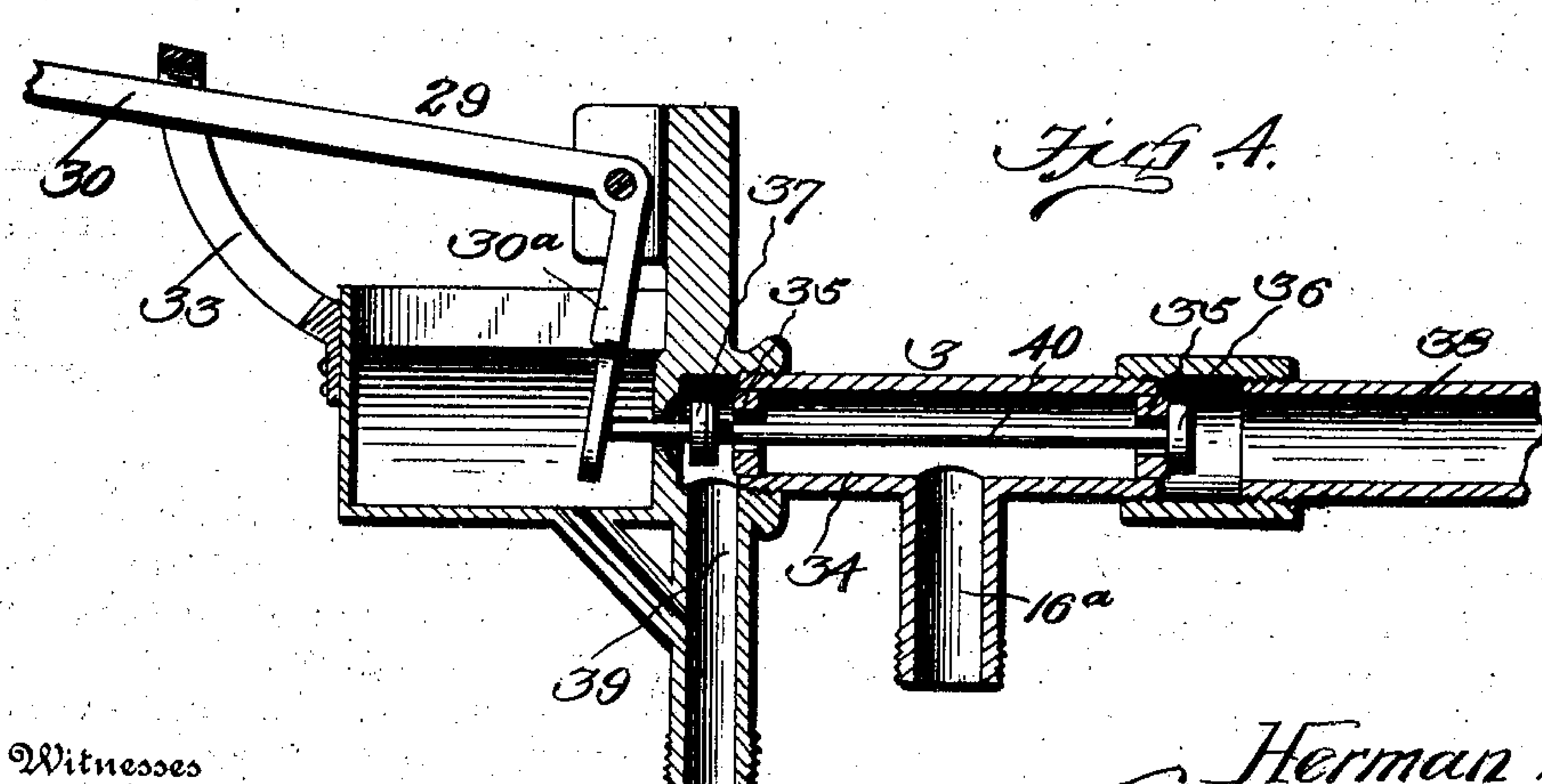
NO MODEL. 3 SHEETS—SHEET 3.







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No. 769,036. Patented August 30, 1904.

UNITED STATES PATENT OFFICE.

HERMAN WALTHER, OF WASHINGTON, IOWA.

VALVE MECHANISM.

SPECIFICATION forming part of Letters Patent No. 769,036, dated August 30, 1904.

Application filed September 11, 1902. Serial No. 122,998. (No model.)

To all whom it may concern:

Be it known that I, HERMAN WALTHER, a citizen of the United States, residing at Washington, in the county of Washington and State of Iowa, have invented certain new and useful Improvements in Valve Mechanism; 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.

This invention relates to improvements in air-pumps and valve mechanism therefor to be used in connection with gas-machines, the object being to produce an air-pump and valve and mechanism for operating the same which will be automatically operated, but positive and reliable in action, simple in construction, durable in use, and well adapted to the use for which it is designed.

A further object is to produce a valve for use on gas-machines whereby an even regular flow of gas and air is continuously maintained, thereby insuring clear steady lights.

With these and other objects in view the invention consists in the construction and arrangement of the parts, as will be hereinafter more fully described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the valve mechanism, showing the same applied to the air-pump and receiver of a gas-machine, the parts being in the position they would assume at the end of the air-suction stroke, parts being broken away for illustration. Fig. 2 is a similar view showing the parts at the beginning of a suction-stroke. Fig. 3 is a vertical sectional view of the air-pump and adjacent mechanism. Fig. 4 is an enlarged sectional view through the valve-casing. Fig. 5 is a detail view of the lower end of arm 24.

In the drawings, 1 denotes an air-receiver.

2 denotes an air-pump.

3 denotes the controlling-valve.

The receiver preferably consists of a cylindrical tank 4, open at its upper end and adapted to be filled nearly to the top with water.

5 denotes an inverted tank or bell which is adapted to be inserted in the tank 4 in the usual manner and the lower open end of the tank always being below the surface of and sealed by the water in tank 4. The bell 5 is adapted to rise and lower in the tank 4 under pressure of air that is forced into said bell.

6 denotes a discharge-pipe arranged within the tank 4, the upper end of which projects above the water in said tank and the lower end of which projects through the base of said tank to and communicates with the generator. (Not shown.)

7 denotes an air-conducting pipe similarly arranged within the receiver-tank and communicating at its lower end with the pump 2. 8 denotes a check-valve located in said pipe adjacent to the said tank 4, the purpose of which will be hereinafter described.

9 denotes an air cock or valve also located in the pipe 7 between the check-valve 8 and the pump, and to the stem of the valve 9 is connected one end of an operating arm or lever 10, to the opposite end of which is connected the lower end of a vertically-disposed rod 12, the upper end of which is connected to the side of the bell 5 of the air-receiver, whereby when said bell is raised to its highest point the valve will be closed, and as the air in said bell is used and the same begins to lower the valve 9 will be opened to admit more air. The check-valve 8 is normally closed and opens only to admit air to the receiver when forced through the pipe 7 by action of the pump 2.

13 denotes the stationary tank or cylinder of an air-pump, mounted upon a suitable base 14, and 15 denotes an inverted tank or bell adapted to be inserted and to reciprocate within said stationary tank.

15[a] denotes a check-valve arranged in the upper end of said bell and is adapted to open and take air into said bell when the same is being raised and to close as soon as downward movement of the bell begins.

16 denotes a vertically-disposed cylinder fixed to the side of the tank 13, and 17 denotes a piston adapted to reciprocate within said cylinder.

18 denotes a piston-rod fixed at its lower end to said piston and connected at its opposite end to the upper end of the bell 15.

To the lower end of the cylinder 16 is connected a water-supply pipe 16[a], through which

water under pressure is admitted to the cylinder 16, forcing up the piston 17, which raises the bell 15. It will be understood from the foregoing that the cylinder 16 and piston 17 constitute a fluid-pressure-actuated motor which operates to raise the bell. The supply of water to the cylinder 16 is controlled by means of the valve 3, which is operated by means of a system of levers and rods now to be described.

18ª denotes a tank adapted to contain water, and within said tank is arranged a float 19, to which is fixed one end of a vertically-disposed rod 20, connected at its upper end to a rod 21, arranged parallel therewith and adapted to pass downwardly through a guide-lug fixed on the outside of the tank 18ª and to extend considerable distance down the side of said tank.

21ª denotes a pin or lug projecting laterally from the rod 21, and the lower end of the said rod is bent at right angles to form a hook 22.

23ª denotes a laterally-projecting arm fixed to the upper end of the pump-bell and is adapted to extend across the connecting-bar of the rods 20 and 21 and to force the same, together with the float 19, downwardly upon the lowering of said bell.

24 denotes an arm pivoted at 24′ to the side of the tank 18ª adjacent to the rod 21, and 24ª denotes an offset or shoulder formed on said arm, and on the lower end of the same is formed a hook or projection 25. As illustrated, this hook or projection 25 comprises a block or foot-piece having an upper horizontal or plane supporting-surface 25ª and an upwardly and rearwardly beveled or inclined surface 25ᵇ, the latter acting as a contact-lip and guiding-surface to guide the pin 32 of the lever 29, hereinafter described, to said supporting-surface 25ª.

26 denotes a weighted lever fixed to the arm 24 and projecting at right angles to the same.

27 denotes a rod fixed at its upper end to the upper end of the bell 15 and passing through guide-lugs on the tank 13 has formed on its lower end an elongated loop 28, through which the lever is adapted to pass.

29 denotes an angularly-shaped lever pivoted to the casing of the valve 3, one arm, 30, of which is extended and has projecting laterally therefrom pins 31 and 32, which are adapted to lie in the path of movement of the hooks 22 and 25, formed on the ends of the rod 21 and arm 24, respectively. The opposite arm 30ª of the lever 29 projects downwardly at right angles to the arm 30 and into a slot formed in the upper side of the valve-casing adjacent to the exhaust-valve and in the path of movement of this end of the valve-stem, whereby said valve-stem is actuated in one direction, as will be hereinafter more fully described. The lever 29 is guided by means of a slotted arm 33, fixed to a portion of the valve-casing.

The controlling-valve 3 consists of a horizontally-disposed casing 34, having formed therein valve-seate 35, which are adapted to be engaged by inlet and exhaust valves 36 and 37, the inlet-valve seat being arranged near the end of the casing adjacent to the water-supply pipe 38 and the exhaust-valve seat being arranged adjacent to the exhaust-pipe 39. The valves 36 and 37 are connected together by means of a centrally-disposed stem or rod 40, which projects through the valve-seats 35 and slightly beyond the valve 36. The supply-pipe 16ª, which communicates with the lower end of the cylinder 16, is connected at its opposite end to the valve-casing 34 about midway between the valves, and when the inlet-valve is open a direct flow of water is had between the cylinder 16 and the main supply-pipe 38. When, however, the pressure upon the valve-stem is relieved, the force of water through the pipes will close the inlet-valve and cut off the water-supply and at the same time will open the exhaust-valve and permit the water in the cylinder 16 and pipe 16ª to be forced out by the downward movement of the piston.

The operation of the pump is as follows: Assuming that the bell of the pump is at the limit of its upward stroke and just about to lower, as shown in full lines in Fig. 1, it will be noticed that when the bell reaches this position the hook 22 on the arm 21 has lifted the long arm 30 of the angular lever 29, thereby disengaging the short arm 30ª of said lever from contact with the end of the valve-rod 40, allowing the pressure of the water through the supply-pipe 38 to force the inlet-valve against its seat and close the same, thereby cutting off the water-supply to the cylinder and simultaneously opening the exhaust-valve, allowing the water in the cylinder 16 and pipe 16ª to run out through the discharge-pipe 39, thus permitting the piston in the cylinder 16 to descend and the pump-bell to lower. As the bell descends the rods 20, 21, and 27 will be forced down thereby, together with the float 19. The rod 27 is forced down until the upper end of the link or loop 28 engages the lever 26, at which time the pin 21ª on the rod 21 has reached the offset 24ª and the hook 22 has passed some distance below the pin 31, as shown in full lines in Fig. 2, and as the loop 28 strikes the lever 26 the latter will be overbalanced and drop, causing arm 24, connected thereto, to tilt from the perpendicular full-line position (shown in Fig. 1) to the inclined position, (shown in Fig. 2,) such tilting of the arm being permitted by reason of the pin 21ª now being opposite the offset 24ª, whereby the hook 25, on the lower end of said arm 24, will be swung outwardly from beneath the pin 32 on the long arm 30 of the lever 29, which will then drop, and the offset 24ª will engage the pin 21ª, thereby locking the float and the rod 21 in their lowered position. The dropping of the long arm 30 of the lever 29

causes the short arm 30ª of said lever to strike the end of the valve-stem 40, thereby closing the exhaust-valve 37 and opening the inlet-valve 36, which will again permit water from the service-pipe to flow into the cylinder 16 and force the piston 17 upwardly, which through the medium of the piston-rod 18 will force the pump-bell up, drawing in an additional supply of air through the check-valve 15ª. As the bell rises it moves at first independently of the float (owing to the fact that the rod 21 is locked from upward movement by the engagement of the pin 21ª with the offset 24ª) and carries the rod 27 upwardly with it, which as the bell nears the limit of its upward movement brings the lower end of the link or loop 28 into engagement with the lever 26 and elevates said lever nearly to its former horizontal position, (shown in Fig. 1,) thereby causing said lever to tilt the arm 24 backward sufficiently to disengage the offset 24ª from the pin 21ª, as shown by the dotted-line position of said lever and arm in Fig. 2. The rod 21 then, being unrestrained from upward movement, jumps quickly upward from the full to the dotted line position in Fig. 2, under the action of the float 19, thus bringing the hook 22 beneath the pin 31 and raising the arm 30, and as the bell continues to rise the float will rise also, and the rod 21 and loop 28 will complete the elevation of the long arm 30 of the lever 29 and tilt the arm 24 back to its upright position, thereby causing the short arm 30ª of the said lever 29 to release the valves and permit the inlet-valve to close and the exhaust-valve to open, allowing the pump-bell to descend again. The lever 29 is automatically locked in this position to prevent a reverse movement of the valves until the pump-bell has reached the limit of its downward movement in the following manner: As the arm 24 moves to an upright position the pin 32 on the lever 29 engages and rides upward on the beveled surface 25ᵇ of the hook 25, causing the arm to tilt in the reverse direction, as shown in dotted lines in Fig. 1, in which direction of course the hook 25 moves inwardly, and this upward movement of the pin is continued until it comes above the supporting-surface 25ª, when the lever 26 will swing the arm back to its normal position and bring the surface 25ª beneath said pin 32, thus holding lever 29 elevated until pin 32 is again released in the manner heretofore described.

It will be seen, of course, that the backward or reverse tilting of the arm 24, just described, will be permitted by the freedom of upward movement of the lever 26 within the loop 28, whereby an effective locking action is insured. As the bell approaches the limit of its upward movement the rods 20 and 21 contact with the arm 23, causing the float at such period to move at the same rate of speed as the pump-bell and to come to a gradual stop, so that the arm 24 will move easily and gradually to its upright position.

It will be understood from the foregoing that the float is not only effective as an element to control the operation of the valves, but also serves as a cushioning device the tendency of which is to resist the downward movement of the bell and prevent irregularities in the descent of the bell, so that the air compressed thereby will be steadily and regularly expelled therefrom and forced to the air-receiver. When the invention is used for supplying air to a carbureter employed in connection with one or more burners, this prevents the burners from flaring when in use.

As the air in the receiver is used and the receiver-bell is lowered the valve 9 is opened and more air from the pump-bell is forced into the receiver, again raising the bell and closing the cock 9. Thus it will be seen that the pump and valve are automatically operated and are entirely controlled by the consumption of the air from the receiver.

While I have described the invention in connection with an air-pump of a gas-machine it is obvious that the same may be advantageously employed in other capacities.

Various changes in the form, proportion, size, and minor details of the construction may be resorted to without departing from the principle of my invention or sacrificing any of any advantages thereof.

Having thus described my invention, I claim—

1. In an air-pump of the class described, the combination of a pumping-bell mounted in a tub, a motor-barrel provided with water connection, a piston mounted in said motor-barrel and connected to said bell, a valve mounted to regulate the flow of water into and out of said motor-barrel, a float arranged to be operated by the said bell, and means controlled by said float to operate said valve, substantially as described.

2. In an air-pump, the combination of a pumping-bell, of a water-motor connected to operate said pumping-bell, a valve mounted to regulate the supply of water to said motor, a float mounted in a barrel, and arranged to be depressed by said pumping-bell, and means operated by said float to operate said valve, substantially as described.

3. In an air-pump, the combination of a pumping-bell mounted in a tub, a water-motor connected to operate said bell, a valve arranged to regulate the supply of water to said motor, a lever constructed to operate said valve, a float, means carried by said float to engage said lever, a lever arranged to hold said float depressed, means carried by said bell to operate said last-mentioned lever, substantially as described.

4. In an air-pump, the combination of a

pumping-bell mounted in a tub, a water-motor connected to operate said bell, a float mounted in a barrel, a yoke carried by said float, a pin carried by said yoke, means for depressing said float, a lever constructed to engage said pin to hold said yoke depressed, a valve mechanism mounted to be engaged and operated by said yoke to control the flow of water to the motor, and means for operating said lever to engage and disengage said pin, substantially as described.

5. In combination with a pumping device having a movable element, a conduit for fluid under pressure, a motor mechanism including a piston and cylinder, the former connected to the movable element of the pumping device and the latter having a supply connection with said conduit, a valve mechanism operated in one direction by the pressure in the conduit, the said valve mechanism controlling the admission of the fluid to and its exhaust from the cylinder, a lever for positively operating the valve mechanism in the opposite direction, and means controlled by the said movable element of the pumping device to govern the operation of said lever.

6. In combination with a pumping device having a movable element, a conduit for fluid under pressure, a motor mechanism including a piston and cylinder, the former connected to the movable element of the pumping device and the latter having a supply connection with said conduit, a valve mechanism controlling the admission of the fluid to and its exhaust from the cylinder, said valve mechanism being actuated in one direction by the pressure of the fluid, a lever movable in one direction to release the valve mechanism and in the opposite direction to positively operate the same, and means controlled by the said movable element of the pumping device to govern the operation of said lever, whereby in one movement of the lever the valve mechanism will be released and allowed to be moved independently of the lever by the fluid-pressure to cut off the flow of fluid to the conduit, and in the other movement of the lever the valve mechanism will be positively actuated by said lever to let on the flow of fluid.

7. In combination with a fluid-pressure mechanism comprising a tank and bell, a motor comprising a cylinder and piston, the latter connected to the bell to raise it, a valve to control the flow of fluid under pressure to and from the cylinder, a gravity-lever to operate the valve in one direction, a float lowered with the bell, the latter being free to rise independently of the float, means operated by the rise of the float to lift the gravity-lever, means to secure the float in the lowered position, and means operated by the bell to release the float when the bell is in an elevated position.

8. The combination of an air-pump, having a bell, a float movable independently thereof, a motor to raise the bell, a valve to control the admission of fluid under pressure to the motor, and means controlled in action by the bell and float to alternately cause the valve to be moved in reverse directions.

9. In combination with a pumping device having a movable element, a conduit for fluid under pressure, a motor operated by fluid under pressure and having a supply connection with the conduit and connection with the movable element of the pumping device to operate said element, a valve to control the supply from the conduit to the motor and to relieve pressure in the latter, said valve being adjusted in one direction by the pressure of the fluid, a lever movable in one direction to positively operate said valve and in the reverse direction to release the valve and allow it to close under fluid-pressure, means controlled by the movable element of the pumping device to move the lever in the reverse direction, a lock device to secure the lever at the limit of the last-mentioned movement, and means controlled by the movable element of the pumping device to release the lock device from said lever.

10. In combination with a conduit for fluid under pressure, a pumping device connected thereto and supplied with fluid under pressure thereby, and having a movable element, a valve mechanism, including a gravity-lever, for alternately supplying and relieving pressure through said conduit, and controlling mechanism for said lever automatically governed by the movable element of the pumping device, said controlling mechanism including a float for moving the lever in one direction, a pivoted hook-arm having a weighted lateral extension, said hook-arm being adapted to engage said lever when raised by the float and disengage said lever to allow the same to drop by gravity, and a link or loop to engage said lateral extension of the hook-arm at the limits of its movement.

11. An air-pump having a water-tank and a bell movable therein, a supplementary tank and a float therein having a stem in the path of an arm of the bell so as to be lowered thereby, said float cushioning the descent of the bell, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HERMAN WALTHER.

Witnesses:
J. J. KELLOGG,
LEE SCRANTON.