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J. JOHNSON & B. PICKER.

PNEUMATIC WATER ELEVATOR.

APPLICATION FILED JUNE 1, 1903.

NO MODEL.

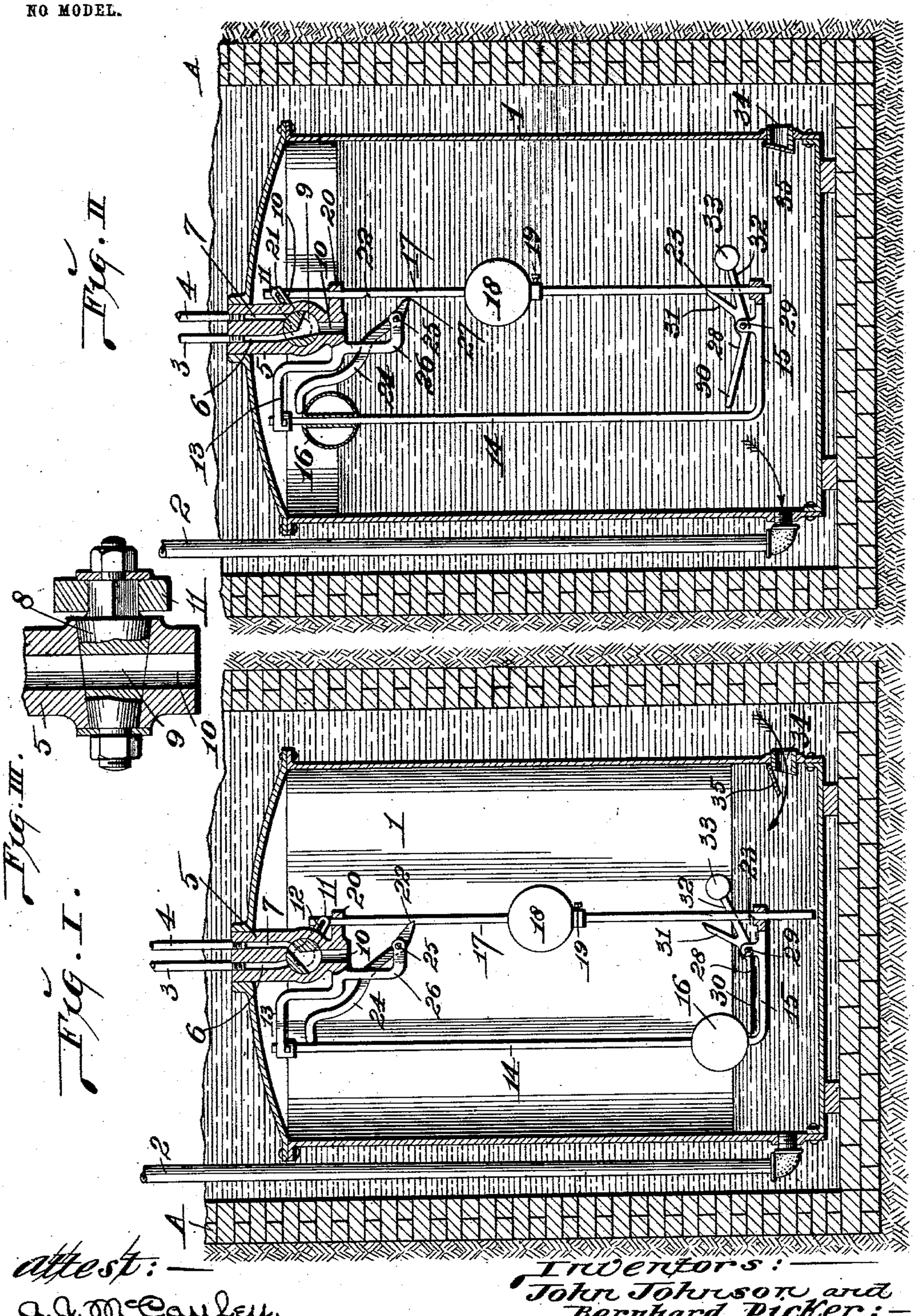

Fig. II.

Fig. III.

Fig. I.

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# UNITED STATES PATENT OFFICE.

JOHN JOHNSON AND BERNHARD PICKER, OF BETHALTO, ILLINOIS.

## PNEUMATIC WATER-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 745,626, dated December 1, 1903.

Application filed June 1, 1903. Serial No. 159,436. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN JOHNSON and BERNHARD PICKER, citizens of the United States, residing in Bethalto, in the county of Madison and State of Illinois, have invented certain new and useful Improvements in Pneumatic Water-Elevators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

Our invention relates to a water-elevator designed to be submerged in a well or in any body of water and into which compressed air is delivered to force the water therefrom that enters the elevator from the body of water in which it is submerged.

The invention consists in features of novelty hereinafter fully described, and pointed out in the claim.

Figure I is a vertical section of our elevator with parts interior thereof shown in elevation in the positions assumed during the filling of the elevator-tank. Fig. II is a similar view to Fig. I with the mechanism in the tank shown in the position assumed during the water-lifting operation. Fig. III is a section of the controlling-valve, through which the compressed air is admitted to the water-tank and exhausted therefrom.

A designates a well in which our elevator is shown positioned for service. 1 designates a water-tank submerged in said well, and 2 is a water-conducting pipe leading from said tank, to which it is connected at a point preferably near the bottom of the tank.

3 designates an air-inlet pipe, and 4 an air-exhaust pipe, the pipe 3 being connected in the use of the elevator to a suitable air-compressor and the pipe 4 leading to any desirable point for the discharge of air from the tank 1 previous to filling or refilling said tank with water.

5 is a valve-housing fitted to the top of the tank 1 and suspended into the tank therefrom. This housing contains a duct 6, having communication with the air-inlet pipe 3, and a duct 7, having communication with the air-exhaust pipe 4. In the housing is a valve 8, containing a port 9, that is designed to communicate with either of the ducts 6 or 7 and also with a duct 10, opening into the interior of the tank 1. The valve 8 has connected to its stem a crank-arm 11, that is provided with a longitudinal slot 12.

13 designates an arm extending laterally from the valve-housing 5 and in which is secured the upper end of the guide-rod 14, which extends downwardly to a position near the bottom of the tank and is provided with a horizontal arm 15.

16 is a float slidably positioned on the guide-rod 14 to move vertically thereon.

17 designates a float-carrying rod, and 18 is a float held to said rod in a fixed position intermediate of its ends by suitable means, such as a set-screw 19. This float-carrying rod is slidably positioned in the guide-rod arm 15 and an arm 20, projecting from the valve-housing 5. The upper end of the float-carrying rod is connected to the crank-arm 11 of the valve 8 by a pin 21, that is movably seated in the slot of said crank-arm. In the float-carrying rod, near its upper end, is a notch 22, and near its lower end is a notch 23.

24 is a trigger pivoted at 25 to a hanger 26, depending from the valve-housing 5 and having a point 27, that is adapted to enter the notch 22 in the float-carrying rod 17 under certain condition during the operation of our apparatus, as will hereinafter appear. The trigger 24 extends into the path of travel of the sliding float 16, as seen in Fig. II, to be engaged by said float when the float is lifted to the upper end of its guide-rod.

28 designates a trigger pivoted at 29 to the guide-rod arm 15. This trigger has a trip-arm 30, that extends into the path of travel of the float 16 in its downward movement, and a catch-arm 31, designed to enter the notch 23 in the float-carrying rod 17. The trigger 28 is also furnished with a counterbalance-arm 32, bearing a weight 33.

In the water-tank 1, near its lower end, is an inlet 34, through which ingress of water to the tank 1 is obtained. This inlet is controlled by a self-opening valve 35, situated within the tank 1.

In the practical operation of our water-elevator the parts of the mechanism in the water-tank occupy positions shown in Fig. I when the tank is being filled, and the valve 35 opens automatically to permit free entrance of water into the tank through the inlet 34, as indicated by the arrow in Fig. I. At this

time the port in the valve 8 is in communication with the exhaust-duct 7, and therefore air under pressure is not communicated to the tank. While the tank is being filled the float 16 occupies a position at the lower end of the guide-rod 14 and rests upon the trigger trip-arm 30 to hold the catch-arm 31 away from the float-carrying rod 17, and the point 27 of the trigger 24 is in engagement with said float-carrying rod, in the notch 22 of which it is seated. While the parts are in the position stated the valve 8 is held in communication with the exhaust-duct 7 through the medium of the float-carrying rod 17, that is connected to the arm of the valve. As the water rises in the tank 1 the float 16 is elevated therewith and carried to the trigger 24, during which movement the float-carrying rod 17 remains in a stationary position and the float 18 fixed thereto becomes submerged in the water in the tank, and owing to the release of the trip-arm 30 by the float 16 moving away from it the catch-arm 31 is moved to said rod under the action of the counterbalance-arm 32 and its weight 33. When the float 16 strikes the trigger 24, said trigger is tripped out of engagement with the float-carrying rod 17, as seen in Fig. II, and as a consequence said float-carrying rod is released to move upwardly under the action of the float 18 fixed thereto, which naturally rises in the water by reason of its buoyancy. The rod 17 is thereby reciprocated vertically, and the valve 8 is rocked to position the port therein in communication with the air-inlet duct 6 and allow the passage of compressed air through the valve and duct 10 to the interior of the water-tank. Immediately upon the float-carrying rod 17 moving upwardly, as stated, the trigger catch-arm 31 engages in the notch 23 of said rod. Pressure of air then enters the water-tank, and the force thereof against the body of water in the tank acts to exert pressure of water against the inlet-valve 35 to close it, and the water contained by the tank is forced therefrom through the conducting-pipe 2, thereby elevating it to a desirable point of delivery to which said pipe leads. The introduction of compressed air to force the water from the tank is continued as long as it is desired to force the water from the tank and elevate it through the conducting-pipe or until the water reaches a low level in the tank, at which the float 16 comes to rest. During the entire period of elevating water from the tank the float 17 is maintained in a fixed position by reason of the rod 17 being held by the trigger 28, this being the case even after the water has reached a lower level than that at which the float is positioned. When the float 16 approaches the lower limit of its travel on the guide-rod 14, it strikes the trip-arm 30 of the trigger 28 and swings said arm downwardly into the position seen in Fig. I, thereby withdrawing the catch-arm 31 from engagement with the float-carrying rod 17, such disengagement being permitted by a slight upward travel of said rod 17. The rod 17 is thereby permitted to fall from the position seen in Fig. II to that seen in Fig. I, and in its descent it carries therewith the valve-arm 11, thereby rocking the valve 8 into the position in which its port communicates with the duct 10 and exhaust-duct 7 in the valve-housing 5, and the compressed air previously present in the water-tank is liberated through said exhaust-duct to the exhaust-pipe 4, thereby relieving the pressure within the tank and permitting inflow of water through the inlet 34 on the opening of the valve 35. The tank therefore is again filled and the parts actuated, as before described, to be in condition for the renewed introduction of compressed air to force water out of the tank and elevate it. When the float-carrying rod 17 descends, as stated, it is engaged by the point 27 of the trigger 24 and held in such position until freed on the rise of the float 16 in the manner hereinbefore stated, and when so freed it automatically moves the valve 8 to furnish communication from the air-inlet pipe 3, through the ducts 6 and 10, to the tank. It will therefore be seen that as long as the supply of compressed air is maintained the water-tank will be alternately filled and emptied without attention.

We claim as our invention—

In a water-elevator, the combination of a tank having a valve-controlled inlet, a conducting-pipe leading from said tank, a valve-housing having inlet and exhaust ducts, a valve in said housing for communication with either of said ducts, a float-carrying rod connected to said valve, a float fixed to said rod, an upper and a lower notch in said rod, a guide-rod located parallel with said float-carrying rod, an upper and a lower trigger located between said rods and alternately engaging with the notches in the float-carrying rod, and a float loosely mounted on said guide-rod for engagement with one of said triggers when in its lower and with the other of said triggers when in its upper position, thus disengaging the triggers from the float-rod and allowing the falling or the rising of the same and consequently the shifting of the valve.

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In presence of—
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