No. 868,487. PATENTED OCT. 15, 1907.

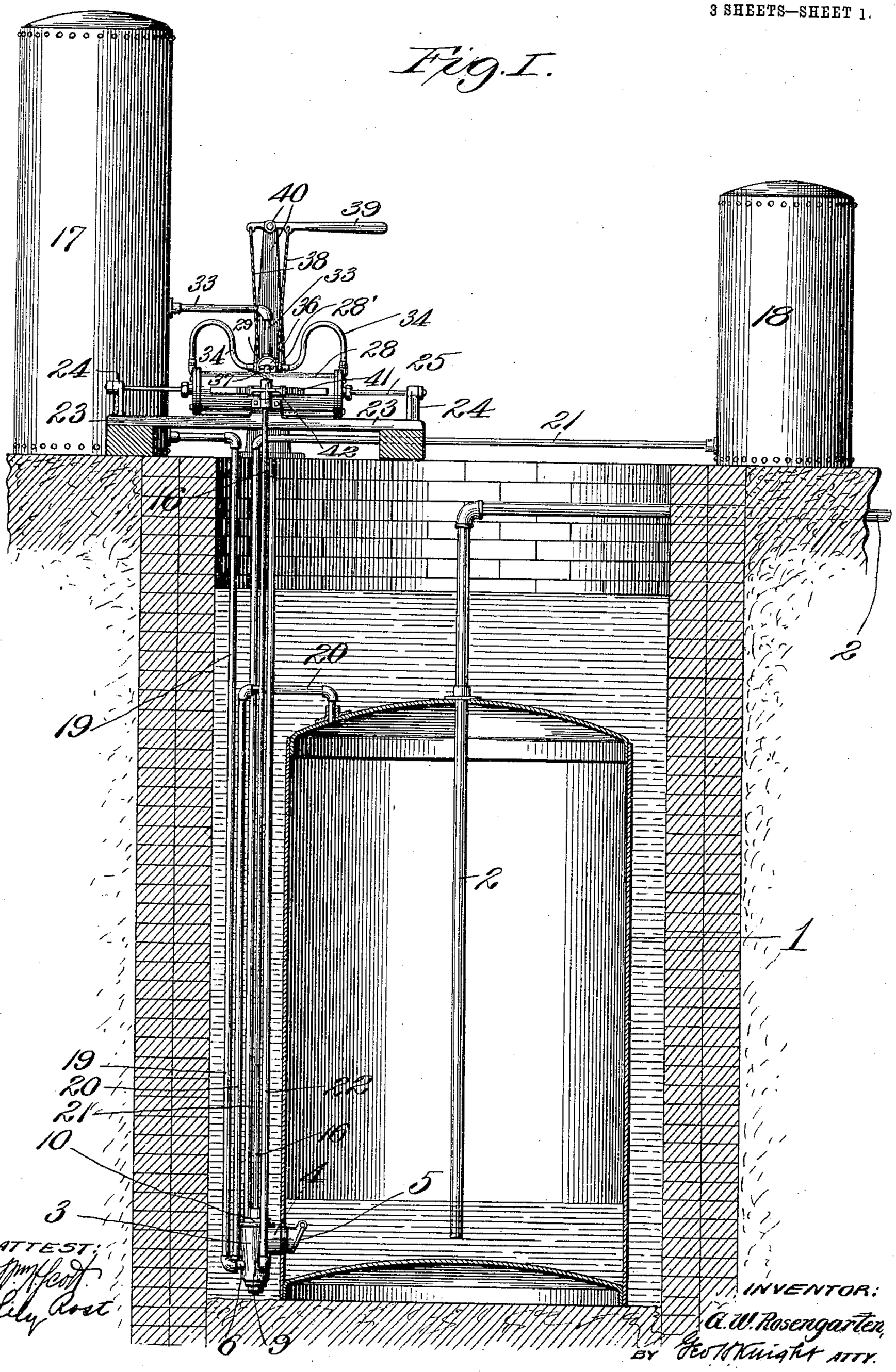
G. W. ROSENGARTEN.

WATER ELEVATING APPARATUS.

APPLICATION FILED MAR. 21, 1907.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. II.

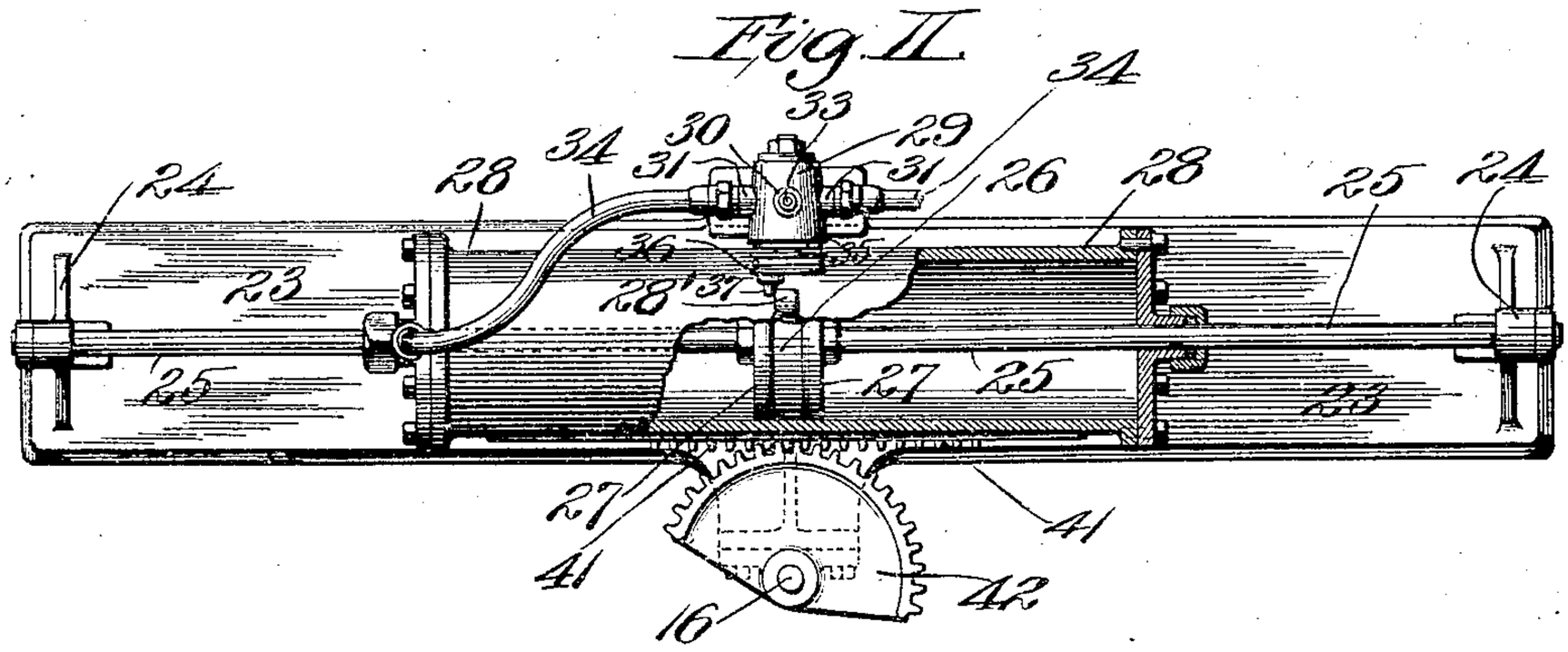


Fig. III.

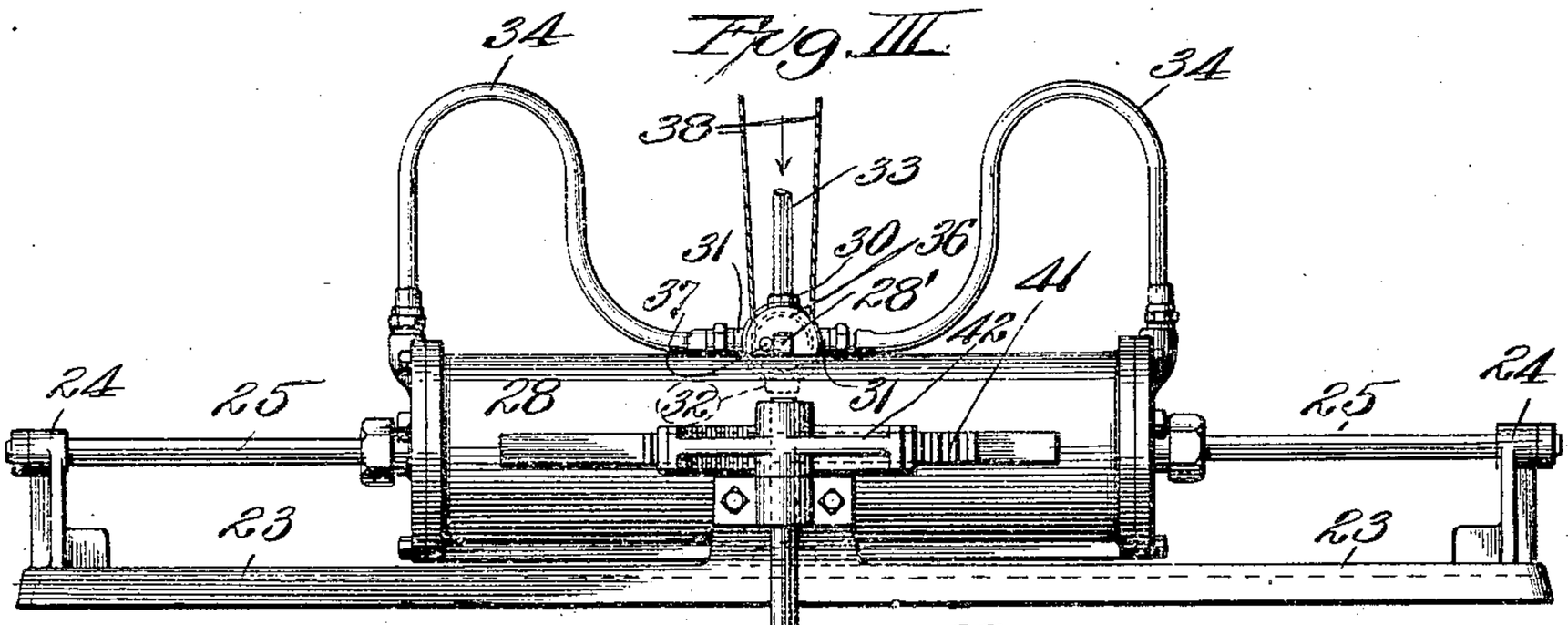


Fig. V.

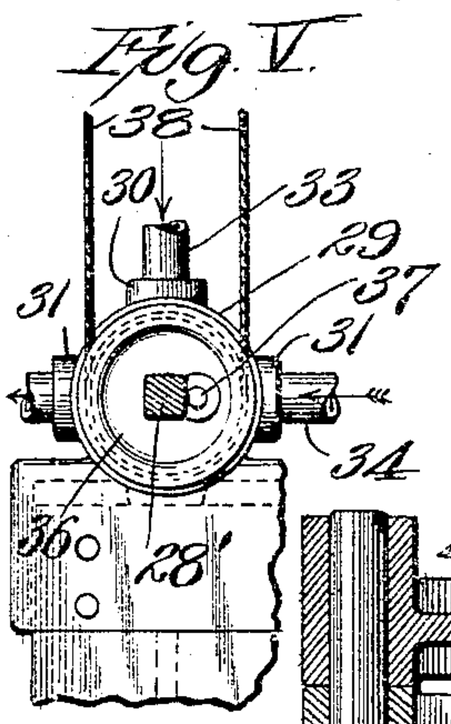


Fig. IV.

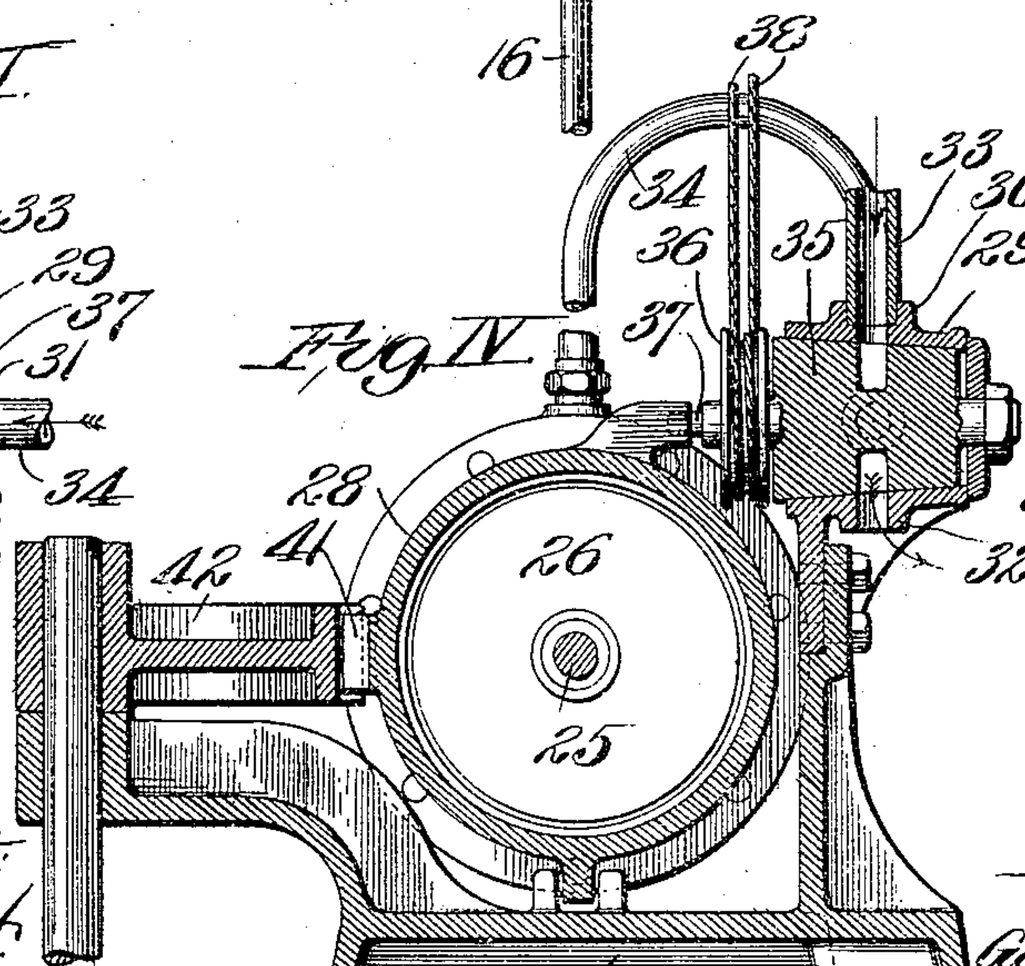
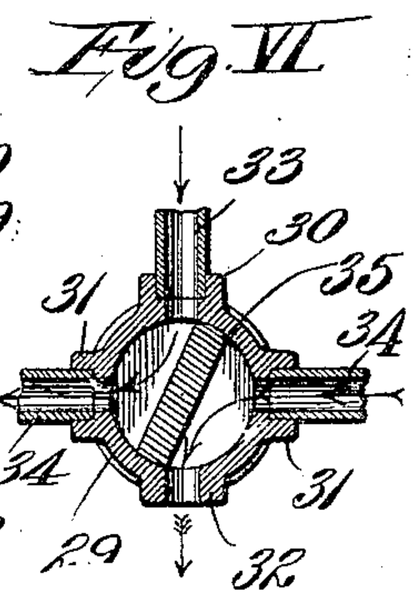


Fig. VI.



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3 SHEETS—SHEET 3.

Fig. VII.

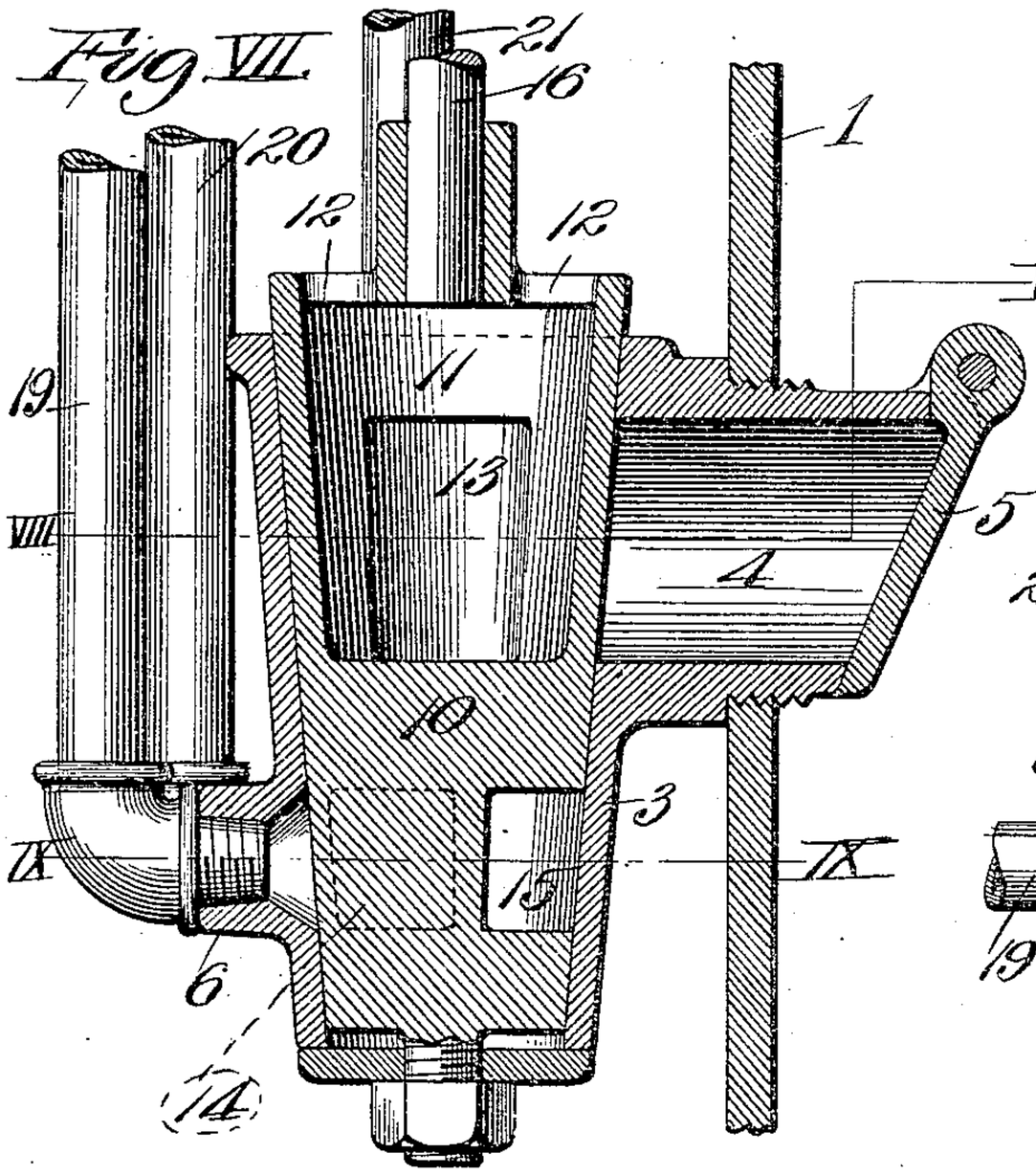


Fig. IX.

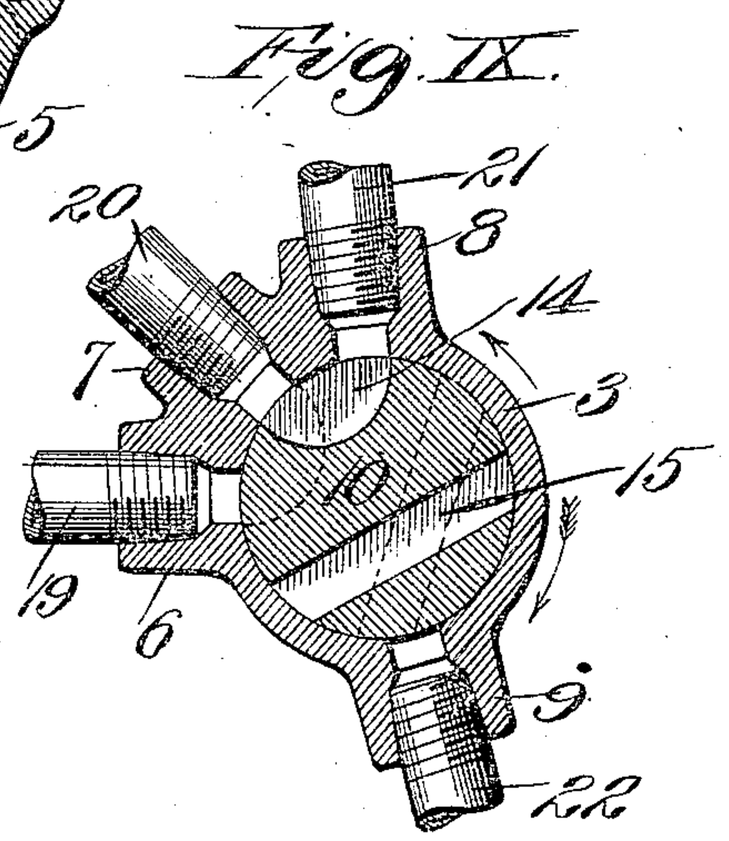


Fig. VIII.

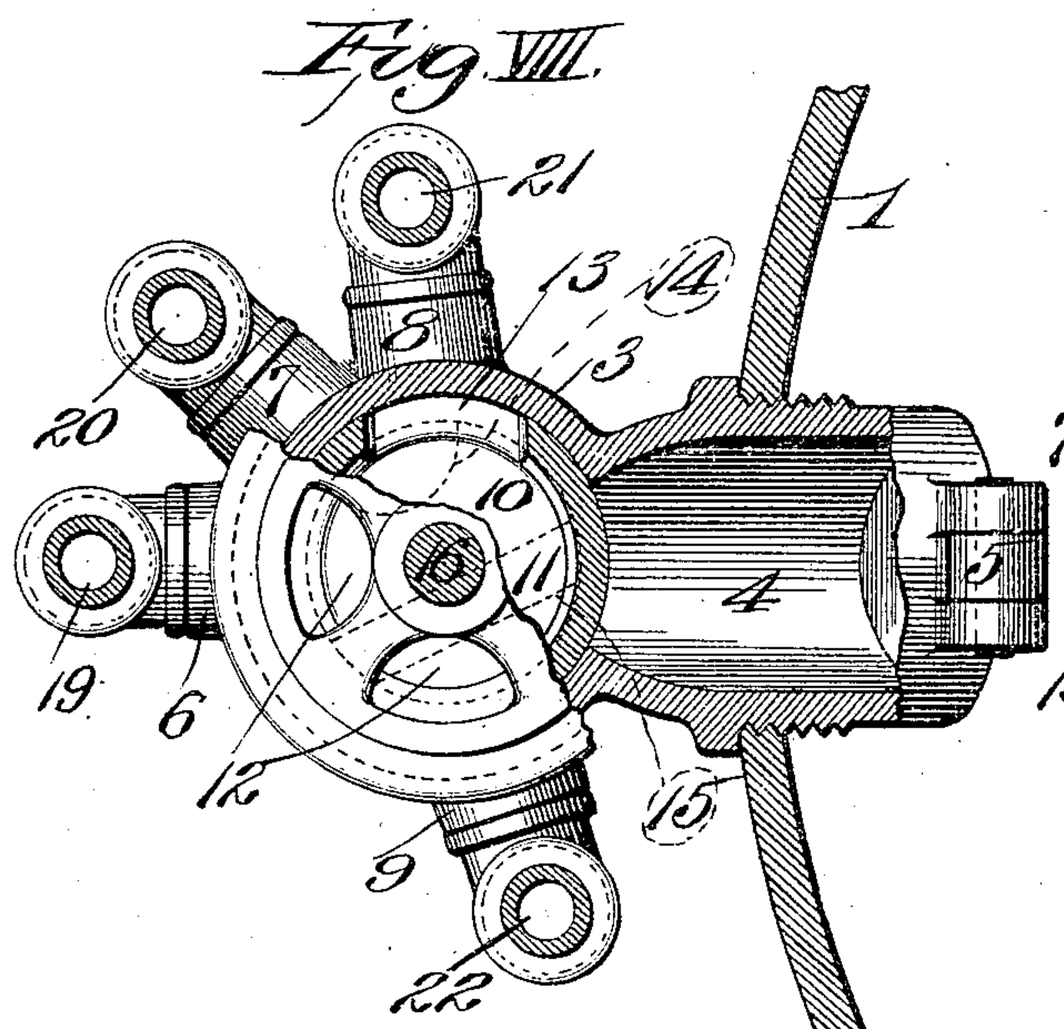
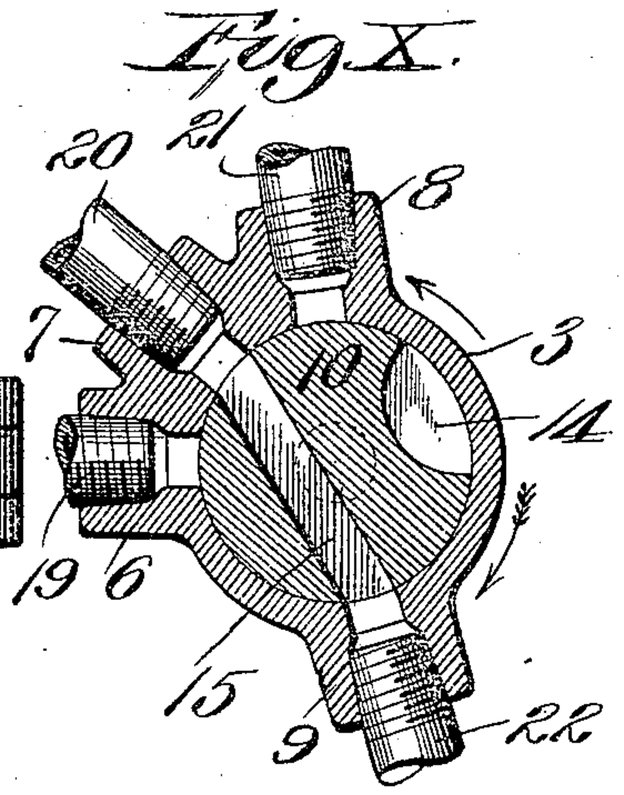


Fig. X.



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UNITED STATES PATENT OFFICE.

GEORGE W. ROSENGARTEN, OF HOME HEIGHTS, MISSOURI.

WATER-ELEVATING APPARATUS.

No. 868,487. Specification of Letters Patent. Patented Oct. 15, 1907.

Application filed March 21, 1907. Serial No. 363,729.

To all whom it may concern:

Be it known that I, GEORGE W. ROSENGARTEN, a citizen of the United States of America, residing in Home Heights, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Water-Elevating Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an apparatus for elevating water from a well by the use of compressed air, the invention having for its object the construction of an apparatus of this character of efficient nature that may be readily controlled and one in which provision is made for the saving of a portion of the compressed air after it has been once brought into use and the re-use of such saved air with the obvious gain.

Figure I is a view partly in elevation and partly in vertical section of my apparatus. Fig. II is an enlarged view partly in plan and partly in horizontal section of the motor by which the air controlling valve of the apparatus is operated. Fig. III is a side elevation of the motor shown in Fig. II. Fig. IV is an enlarged vertical cross section taken through the motor. Fig. V is an enlarged elevation of the grooved valve actuating wheel associated with the supply valve of the motor and parts adjacent thereto. Fig. VI is a vertical cross section taken through the motor supply valve. Fig. VII is an enlarged vertical section of the air and water controlling valve. Fig. VIII is a horizontal cross section taken on line VIII—VIII, Fig. VII. Fig. IX is a horizontal cross section taken on line IX—IX, Fig. VII. Fig. X is a similar view to Fig. IX with the valve that controls the flow of air shown in an altered position from that in which it is seen in Fig. IX.

1 designates a water receiving tank that is placed in the bottom of a well and is adapted to receive water that is permitted to enter into it from the well and is forced therefrom under air pressure in the manner to be hereinafter explained.

2 is a service water conducting pipe that has an open end terminating in the water tank preferably near the bottom thereof, and which may extend to any point at which it may be desired to deliver water that is forced from the tank through the pipe.

3 designates a valve housing through which the entrance of water into the water tank from the well takes place and through which the flow of compressed air occurs in the operation of the apparatus. This housing is provided with a tubular neck 4 that communicates with the interior of the water tank and which is equipped with a flap valve 5 that opens inwardly in the tank, see Figs. I and VII. The housing is also provided with port nipples 6, 7, 8 and 9 through which compressed air enters and departs from the housing as will hereinafter appear.

10 is a plug valve that is seated in the valve housing 3 and is provided at its upper end with a chamber 11 that has communication with the exterior of the valve by means of ports 12 in order that water may enter said chamber from the well in which the water tank and the valve are located. In the wall of the valve 10 is a port 13 that is adapted to be turned into and out of registration with the duct in the housing neck 4 in order that water may flow from the well into the chamber 11 of the valve and therefrom into the water tank or such flow may be cut off when desired. The valve 10 is provided at its lower end with a port 14 and a port 15, see Figs. VII, IX and X, that are adapted to register with the ports in the nipples 6, 7, 8 and 9 in the valve housing 3 as will be described. The valve 10 has fixed to it an operating rod 16 which extends to the exterior of the well in connection with which the apparatus is used and is operated for the manipulation of said valve by a motor to be hereinafter fully described.

17 designates a main compressed air reservoir in which air may be confined under any desired degree of pressure and 18 is an auxiliary compressed air reservoir.

19 designates an air conducting pipe leading from the main air reservoir 17 and connected to the port nipple 6 of the valve housing 3, this pipe being designed to deliver compressed air from the main reservoir to the interior of the water tank 1 in conjunction with an air conducting pipe 20 that is connected to the port nipple 7 of the valve housing 3 and which pipe 20 leads to the upper end of the water tank, as seen in Fig. I. When the delivery of air from the main air reservoir to the water tank is to take place, the valve 10 is turned into the position in which it is seen in dotted line Fig. IX, whereby the port 14 in said valve coincides with the ports in both of the port nipples 6 and 7, while the port 15 in said valve is out of registration with any port in the valve housing. When the compressed air from the main reservoir is admitted into the water tank and water is present therein, said water is readily forced under the air pressure from the water tank through the service conducting pipe 2, as will be readily understood.

21 designates an air conducting pipe leading from the port nipple 8 of the valve housing 3 to the auxiliary air reservoir 18. This pipe is designed at certain times during the operation of the apparatus to conduct compressed air from the water tank to the auxiliary air reservoir instead of the air being exhausted to the atmosphere from said tank and this delivery of air from the water tank to the auxiliary reservoir takes place when the port 14 in the valve 10 coincides with the ports in the port nipples 7 and 8 of the valve housing 3 (as seen in full lines Fig. IX), to which the air conducting pipes 20 and 21 are connected, the said flow of air

being permissible due to the pipe 20 leading from the water reservoir to the valve housing 3 and the pipe 21 leading from said valve housing to the auxiliary reservoir. 22 is an exhaust pipe leading from the port nipple 9 of the valve housing 3 and extending to a point above the water level in the well in which the water tank 1 is located. The air present in the water reservoir is permitted to escape at certain times through said exhaust pipe and this occurrence takes place when the valve 10 is moved so that the port 15 in said valve will coincide with the ports in the port nipples 7 and 9, (as seen in full lines in Fig. X) thereby permitting the flow of air from the water tank through the pipe 20, the duct 15 in the valve 10 and into the exhaust pipe 22.

It is also to be here noted that the passageway in the tubular neck 4 of the valve housing 3 and the port nipples 7 and 9 in said housing are so located relative to each other and the ports 13 and 15 in the valve 10 are so located relative to each other that when the valve 10 is moved to permit exhaust of air through the exhaust pipe 22 the port 13 will coincide with the passageway in the tubular neck 4 and water will pass through the valve 10 and into the water tank 1.

I next come to the operating mechanism for the valve 10 that controls the flow of water into the water tank 1 and the flow of air through the pipes 19, 20, 21 and 22. 23 is a bed that is placed in a fixed position preferably adjacent to the main air reservoir 17 and is surmounted by standards 24. 25 is a piston rod immovably mounted in the standards 24 and upon the central portion of which is rigidly mounted a piston 26, preferably provided at its sides with cup leathers 27 (see Fig. II). 28 is a cylinder reciprocally mounted upon the piston rod 25 which serves as a guide for the cylinder. 29 is a horizontal valve housing supported by the bed 23 and located adjacent to the cylinder 28. This housing is provided with an inlet port nipple 30, branch pipe nipples 31 and an exhaust port 32. 33 is an air conducting pipe leading from the main air reservoir 17 to the inlet nipple 30 of the valve housing 29 for the purpose of delivering air to said housing. 34 are flexible branch air conducting pipes connected to the valve housing nipples 31 and leading to the ends of the cylinder 28. 35 is a double-ported plug valve that is seated in the valve housing 29 and is adapted to control the flow of air through said housing in order that the air may be delivered at the proper times to either end of the cylinder 28 and simultaneously exhausted from the other end of the cylinder. 36 is a grooved valve actuating wheel fixed to the stem of the plug valve 35 and which is provided at its outer face with a stud 37 located eccentrically to the axis of the wheel.

For the purpose of rocking the grooved wheel 36 and rotating the valve 35 to which said wheel is attached, I utilize a cord or rope 38 that is wrapped around the wheel and attached thereto and at a certain point. The ends of this cord are connected to a hand lever 39 at opposite sides of a point of pivotal support 40 for said lever. It will be seen that when the lever 39 is moved in one direction the valve 35 will be rotated in one direction in the valve housing 29 and when the hand lever is moved in the opposite direction said valve will be rotated in a direction the opposite to that first named, with the result of causing the air delivered to the valve housing through the conducting pipe 33 from the main air reservoir 17 to be directed as required through a branch conducting pipe 34 to the proper end of the cylinder 28. When air enters the cylinder at either end it is confined between the stationary piston 26 and the head of the cylinder at the end into which the air has entered for pressure action against said cylinder head to carry it in a direction away from the piston, whereby the cylinder is moved upon the piston rod 25.

The valve 10 is caused to coöperate with the cylinder 28 through the medium of a rack 41 carried by the cylinder and a gear member 42 that is fixed to the upper end of the valve rod 16 to which said valve 10 is rigidly connected. It will therefore be seen that when any movement is imparted to the cylinder the valve 10 will be rotated in a degree corresponding to the movement of the cylinder with the result of controlling the admission of water into the water tank and the flow of air through the valve 10 and the surrounding housing 3 and through the air conducting pipes 19, 20, 21, and 22 that are connected to said valve housing. 28′ is a stop lug carried by the cylinder 28 and adapted to engage the stud 37 carried by the grooved valve actuating wheel 36 for the purpose of maintaining said cylinder in a stationary central position at certain times during the operation of the apparatus.

In the practical use of my water elevating apparatus the operations are carried on as follows: Assuming first, with reference to the drawings, that the cylinder 28 is located at the extreme right hand upon the piston 25. When the cylinder is moved to this position it has, through coöperation with the valve rod 16, caused the valve 10 to be so turned that communication is established between the water tank through the valve port 13 and the tubular neck 4 of the valve housing 3 in order that water will enter the tank. While the valve is in the position stated, free egress of air from the water tank is permitted through the air conducting pipe 20, the duct 15 in the valve 10 and the exhaust pipe 22. Now, by manipulation of the governor valve 35 through the medium of the hand lever 39 and intermediate parts said governor valve is moved until passage of air will be permitted through the valve housing 29 from the air conducting pipe 33 leading from the main reservoir while the valve 35 in said housing is in the position illustrated in Fig. VI. Air is thereby permitted to enter into the left hand end of the cylinder 28 and said cylinder is first moved to a central position providing communication between the water tank 1 and the auxiliary reservoir 18, but said auxiliary reservoir being empty at this time, the forming of the communication between the auxiliary reservoir and water tank is of no importance. The cylinder 28 is then permitted to move to the extreme left hand upon its supporting piston rod with the result of causing a movement of the valve 10 in the direction indicated by the featherless arrow, Figs. IX and X, and when the cylinder reaches the limit of its movement, communication is established from the main air reservoir 17 with the water tank through the air conducting pipes 19 and 20, due to said air conducting pipes being placed in communication with each other as a result of the port 14 in the valve 10 being in the dotted

line position illustrated in Fig. IX. Air therefore passes from the main air reservoir to the water tank and acts by pressure upon the water in said tank to force it from the tank through the service conducting pipe 2 in which connection it should be here stated that the delivery of water from the tank is discontinued before the water seal at the lower or entrance end of the service conducting pipe is broken. The cylinder 28 is next moved from the left hand end to a central position, due to manipulation of the valve 35 to cause delivery of air into the right hand end of the cylinder 28, whereby the valve 10 is moved in the direction indicated by the feathered arrow, Figs. IX and X and the port 14 in the valve 10 is caused to be placed in communication with the pipe 20 leading from the water tank and the pipe 21 leading to the auxiliary air reservoir 18. The air under pressure in the water tank is therefore permitted to flow from said tank into the auxiliary reservoir until the pressure in each of these members becomes equalized with the object in view of saving the air that is delivered into the auxiliary reservoir for future service. As the cylinder reaches its central position it is stopped and held thereat by the engagement of the stop lug 28′ carried by the cylinder with the stud 37 carried by the valve actuating wheel 36. The cylinder is then released from its central position by disengagement of the valve actuating wheel stud from the stop lug 28′ and the cylinder is permitted to move to the extreme right hand until the port 15 in the valve 10 is in the position illustrated in Fig. X and communication is established between the air conducting pipe 20 leading from the water tank and the exhaust pipe 22 so that the air present in the water tank will be exhausted to the atmosphere. While the valve 10 is in the position just referred to, communication is established between the water tank and the well in which it is located, due to the port 13 in the valve 10 coinciding with the tubular neck 4 of the valve housing 3 and the tank is therefore again filled with water, the air present in the tank and which was not delivered to the auxiliary reservoir 18 readily escaping from the tank through the pipes 20 and 22. Air is next admitted through the valve casing 29 upon the actuation of the valve 35 and passes into the left hand end of the cylinder 28 with the result of causing the cylinder to be moved again toward the left hand and to a central position with a consequence of so moving the valve 10 that the pipe 20 leading from the water tank to the valve casing 3 and the pipe 21 leading from the valve casing 3 to the auxiliary air reservoir 18, are put into communication with each other. The air present in said auxiliary reservoir is thus permitted to pass to the water tank and exert force upon the water therein until its pressure has become so diminished as to be unsusceptible of water elevating action. The cylinder is then freed and permitted to move to the extreme left hand, whereby the air conducting pipes 19 and 20 are again placed into communication with each other and air is permitted to flow from the main air reservoir 17 to the water tank to continue the water elevating action for a period sufficient to deplete the supply of water in the tank. Air pressure is then again permitted to enter the cylinder 28 at its right hand end to carry the cylinder to a central position so that a portion of the air present in the water tank will flow therefrom to the auxiliary reservoir 18 for renewal of the supply therein after which the cylinder is permitted to move to the extreme right hand for the purpose of opening the passageway through the valve 10 to the water tank for the inflow of water into the tank and the escape of air from the tank through the air conducting pipe 20 and the exhaust pipe 22.

The foregoing specifies all of the steps in the operation of the apparatus and these steps are carried out over and over in the manner specified, it being understood that the step last named is the same as that first referred to in setting forth the operation.

Claims:

1. In a water elevating apparatus, the combination of a water tank, a main compressed air reservoir, means for conducting air from said main reservoir to said tank, and an auxiliary compressed air reservoir arranged for communication with said water tank to receive the compressed air from the tank and deliver it back in a compressed state and without recompression to said tank for reuse, substantially as set forth.

2. In a water elevating apparatus, the combination of a water tank, a main compressed air reservoir, an auxiliary compressed air reservoir, means of communication independent of each other between each of said reservoirs and said water tank, a valve for controlling said means of communication, and means for moving said valve whereby communication is established first between said main reservoir and said water tank and then between said auxiliary reservoir and said water tank, substantially as set forth.

GEORGE W. ROSENGARTEN.

In the presence of—
LILY ROST,
HOWARD G. COOK.