W. S. FERGUSON.

AUTOMATIC STEAM PUMP.

APPLICATION FILED AUG. 21, 1908.

938,418. Patented Oct. 26, 1909.

Fig. 2.

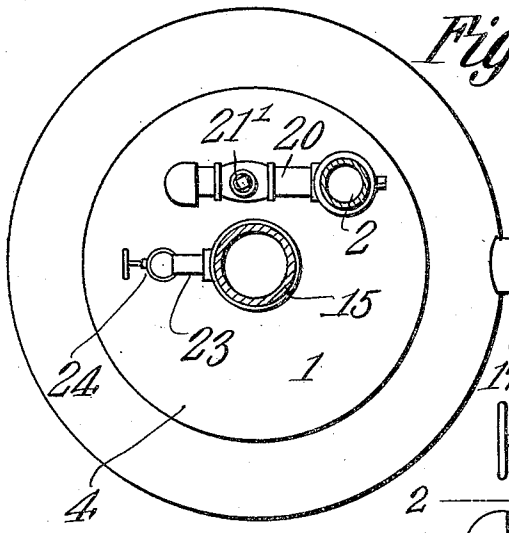

Fig. 1.

Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM S. FERGUSON, OF LEESVILLE, LOUISIANA, ASSIGNOR OF ONE-HALF TO JAMES BEDFORD STERNS, OF LEESVILLE, LOUISIANA.

AUTOMATIC STEAM-PUMP.

938,418. Specification of Letters Patent. **Patented Oct. 26, 1909.**

Original application filed March 18, 1908, Serial No. 421,800. Divided and this application filed August 21, 1908. Serial No. 449,707.

To all whom it may concern:

Be it known that I, WILLIAM S. FERGUSON, a citizen of the United States, residing at Leesville, in the parish of Vernon and State of Louisiana, have invented a new and useful Automatic Steam-Pump, of which the following is a specification.

This invention has reference to automatic steam pumps of the pulsometer type and its object is to provide a means for elevating liquid by the alternate and successive action of pressure and vacuum due to the action of a condensable fluid introduced into the structure under pressure. While there are a number of such fluids which may be used, the invention is designed, though not necessarily confined thereto, for the use of steam as the condensable fluid introduced under pressure and is also designed more particularly for the elevation of water. With this understanding and without limiting the invention to the use of this particular fluid and this particular liquid, and for convenience of description, the following specification will be limited to steam as the condensable fluid and water as the liquid to be elevated, and the same terms will be used with the same understanding in the claims.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings forming a part of this specification in which drawings,

Figure 1 is a vertical cross section of the pumping mechanism with parts shown in elevation. Fig. 2 is a horizontal section on the line 2—2 of Fig. 1. Fig. 3 is a transverse section on the line 3—3 of Fig. 1 showing a perforated plate located in the steam inlet duct of the pump structure.

Referring to the drawings there is shown a tank 1, preferably frusto-conical in shape, though not necessarily confined to such shape, but the transverse area of the tank should be greater at its base than at its top. The upper end of the tank is entered by a water inlet pipe 2 and at the bottom of the tank is a water outlet pipe 3 in which is introduced a check valve 3′. The top of the tank is in the form of a cap 4 which may be removed when necessary and it is through this cap that the water pipe 2 enters. The center of the cap 4 is depressed to form a valve chamber 5 having a valve seat 6 formed therein in a port or passage leading through the lower wall of the chamber into the interior of the tank 1.

Extending transversely across the tank on the interior thereof and attached at its ends to the inner side walls of the tank is a bridge piece 7. A rod 8 is passed through a suitable perforation in the bridge 7 and also extends into the valve chamber 5 and there carries a valve 13 adapted to the valve seat 6 and opening in a direction away from the tank 1. On the rod 8 within the tank 1 is a collar 9 near the valve 13 and spaced therefrom in the other direction is another collar 10. Between these collars the rod 8 carries a float 11 and between the float and the collar 9 is a spring 12 surrounding the rod 8. The float is thus capable of movement along the rod independent of the rod to an extent permitted by the yielding of the spring 12 and when the latter has been compressed to a certain extent the rod 8 will participate in the movement of the float 11 in a direction to compress the spring 12, and this movement is also in a direction to open the valve 13 by moving it away from its seat 6.

In communication with the valve chamber 5 is a steam pipe 15 coming from a source of steam supply and including a cut-off and regulating valve 17. Within the steam pipe near the end thereof communicating with the valve chamber 5 is a diaphragm 14 perforated except at its central portion 16. The imperforate portion 16 of the diaphragm 14 constitutes an abutment for the upper end of the rod 8 and limits the movement of the same under the action of the float 11.

The water inlet pipe 2 is provided with two check valves 18 and 19 in the direction of flow of the water into the tank 1, one check valve being located close to the junction of the pipe 2 with the tank 1 and the other at a point somewhat more remote. Both these valves open toward the tank 1. Connected to the pipe 2 between the two valves 18 and 19 is another pipe 20 leading through the cap 4 to the interior of the tank 1. This pipe 20 between its point of connection with the pipe 2 and its entrance into the tank 1 is provided with a check valve 21′ opening toward the pipe 2. The tank 1 is also entered by another pipe 23 entering

the tank 1 through the cap 4 and communicating with the steam pipe 15 at a point more remote from the tank 1 than is the diaphragm 14. This pipe 23 is provided with a cut-off and regulating valve 24, and this valve 24 as well as the valve 17 may be of the ordinary globe type or of any other type suited for the purpose. In operative relation to the end of the pipe 20 where it enters the tank 1 is a valve 24′ and this valve is normally held away from the end of the pipe 20 by a spring 25, the tension of which may be adjusted at will by a screw plug 26. Within the tank 1 beneath the pipes 2, 20 and 23 is a spreader 22.

The tank 1 may be either submerged in water or located above the same, and when so located above the water the operation is as follows:—Assuming that there is a source of steam supply communicating with the pipe 15 and that the valve 17 is open, it will be seen that the valve 13 remains closed because of the steam pressure on the upper side thereof, and assuming that the valve 24 is also closed no steam can enter the tank 1. Now the valve 24 is opened manually and steam enters from the steam pipe 15 through the pipe 23 to the interior of the tank 1. The steam pressure thus established in the tank 1 causes the closure of the valve 24′ against the action of the spring 25 after having first caused steam pressure in the pipe 2 between the valves 18 and 19 thus closing the valve 19 while the pressure within the tank 1 acting directly on the valve 18 closes this last valve. The valve 24 is then closed. The condensation of steam within the tank 1 quickly follows thus creating a vacuum in the tank causing the valve 24′ to open under the action of the spring 25 and also causing the valves 18 and 19 to open and water to be drawn through the pipe 2 into the tank 1. Eventually the water level of the tank 1 rises sufficiently to engage the float 11 which first rises against the tension of the spring 12 until the steam pressure on the valve 13 is overcome when the said valve 13 will be open and the steam pipe 15 will thereby be put into communication with the interior of the tank 1. Steam now enters the tank through the port in which the valve seat 6 is formed and the pressure thus established again closes the valve 24′ and the valves 18 and 19 in the water pipe 2 and at the same time water is expelled through the pipe 3 to the point of utilization. As the water is expelled from the tank the float 11 lowers and ultimately the valve 13 closes against its seat. Now the steam within the tank again condenses thus establishing a superior steam pressure above the valve 13 and so holding the same closed, the said valve 13 closing before the float 11 has reached its lowermost position. The steam which lodges between the valves 18 and 19 also condenses and the water within this pipe 2 falls by gravity through the valve 18 onto the spreader 22 and is thrown against the side walls of the tank thus tending to cool the same, and thereby aiding in the rapid condensation of the steam subsequently admitted. The actions described follow each other in sequence and cause the rapid and economical forcing of water to the desired point, the pump acting both as a suction and force pump.

The present application is a division of my prior application for a patent for an automatic pump, filed in U. S. Patent Office on March 18, 1908, under Serial #421,800.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A pump comprising a tank, a pipe for the introduction of steam under pressure connected with said tank, an outlet pipe for the tank, a water inlet pipe for the tank having spaced valves exterior to the tank and in the line of flow of the water into the said tank, and a valved pipe leading from the tank into the water inlet pipe between the valves therein.

2. A pump comprising a tank, a pipe for the introduction of steam under pressure and connected with said tank, an outlet pipe for the tank, a water inlet pipe for the tank having spaced valves exterior to the tank and in the line of flow of water into said tank, and a pipe leading from the tank into the water inlet pipe between the valves therein and provided with a valve opening toward the water pipe and another valve closing toward said pipe.

3. A pump comprising a tank, a pipe for the introduction of steam under pressure connected with said tank, an outlet pipe for the tank, a water inlet pipe for the tank having spaced valves exterior to the tank in the line of flow of water into said tank, and a pipe leading from the tank into the water inlet pipe between the valves therein and provided with a valve opening toward the water pipe and another valve closing toward the water pipe and having a normal tendency to move to the open position.

4. A pump comprising a tank, a pipe for the introduction of steam under pressure and connected with said tank, an outlet pipe for the tank, a water inlet pipe for the tank having spaced valves in the line of flow of water into the tank and opening in a direction toward the tank, and a pipe leading from the tank into the water inlet pipe between the valves therein, said last named pipe having a valve opening toward the water pipe and a spring-retained valve closing toward the water pipe and normally opening away therefrom, said last named valve being located in the tank.

5. A pump comprising a tank, a steam inlet pipe therefor, a float valve controlling the entrance of steam to the tank through the steam pipe, an outlet pipe for the tank, a water inlet pipe for the tank having spaced check valves opening toward said tank, a valved pipe leading from the steam pipe to the interior of the tank, and a pipe leading from the tank into the water inlet pipe between the valves therein, said last named pipe having a check valve opening toward the water pipe and a spring controlled valve closing toward the water pipe and having a normal tendency to open under the action of the spring, said last named valve being located in the tank.

6. A pump comprising a tank, a liquid inlet connecting with the tank, a liquid outlet connecting with the tank, a pressure pipe connecting with the tank, a float valve controlling the communication between the pressure pipe and the tank, spaced valves located in the liquid inlet, a valved pipe connected at one end with the tank and at its other end connecting with the liquid inlet at a point between the spaced valves therein, and a bypass pipe connecting at one end with the tank and at its opposite end with the pressure pipe.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WILLIAM S. FERGUSON.

Witnesses:

W. W. THOMPSON,

HEG. BOOKER.