

UNITED STATES PATENT OFFICE.

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PUMPING MECHANISM.

No. 900,669.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDMUND J. D. COXE, a citizen of the United States, and a resident of Houtzdale, Clearfield county, Pennsylvania, have invented certain Improvements in Pumping Mechanism, of which the following is a specification.

My invention relates to pumping mechanism, and consists of an improved form of structure comprising the combination of a force and lift pump, with means for automatically filling the water receiving chamber of said force pump by power developed from the air exhausting from said chamber prior to its subsequent filling.

My invention is fully shown in the accompanying drawings, in which:

Figure 1, is a sectional elevation of the structure forming the subject of my invention; Fig. 2, is a plan view of the same, and Fig. 3, is an enlarged sectional view of a valve employed in connection with the operation of the structure.

1 represents the chamber of a force pump; 2 the discharge pipe leading therefrom; 3 an inlet pipe for air under pressure, and 4 the inlet opening for the water. Pumps of this type are usually submerged in a body of water, and when filled, a float indicated at 5 and mounted on a rod or stem 6, rises under the influence of the water and raises said rod so as to operate a valve 7 in the air pipe through the medium of suitable means, such as a slotted arm 8 carried by said valve and connected with said rod at 9. Such action also opens a valve 10 controlling the outlet to the discharge pipe. The stem is provided with collars or projections 11 for engagement by said float; the latter effecting movement of said rod in both directions by engagement therewith. The discharge pipe carries a check valve 12 to prevent back flow. In order to empty this chamber from the water with which it has filled, air is directed thereto through the pipe 3, and it will be understood that when the chamber has been emptied of water it contains a large volume of air at the full pressure of the air supply, and such air must be vented from the chamber before it can again be filled with water. Under ordinary circumstances, this air is vented to waste, and it is necessary to wait until the chamber again fills by gravity.

I propose to utilize the air exhausting from the chamber 1 for the purpose of fill-

ing a tank disposed at a suitable elevation to provide sufficient head for said water to flow by gravity into said chamber 1, and to raise the water into said tank from a sump 60 by means of the air exhausting from the chamber 1; such water subsequently flowing into said chamber when the pressure in the same has been equalized with that of the atmosphere. In order to accomplish this I 65 provide the chamber 1 with a reducing valve 15, through which the air exhausting from said chamber may pass at constant pressure to a pipe 16 which leads into a sump 17 and is provided with a return bend 18 at its 70 lower end. Disposed adjacent the sump is a suitable tank 19 having a discharge pipe 20 leading to the inlet opening of the chamber 1; such pipe being provided with an ordinary form of check valve 21 to prevent 75 back-flow when the water is being forced from the chamber 1.

For the purpose of conveying water into the tank 19, I provide a pipe 22 leading from the sump 17 and having a suitable 80 spout 23 to discharge into said tank; the lower end of said pipe 22 receiving the return bend 18 of the air exhaust pipe 16 whereby water may be raised therein under the principle of the well-known air lift 85 pumps. To permit flow into the chamber 1 after the air has been discharged therefrom, it is necessary to equalize the pressure therein, and for this purpose I provide an exhaust valve 24 normally held closed by the 90 pressure within the chamber 1 and provided with a spring 25 whereby it may open under the influence of the same or atmospheric pressure when the pressure within the chamber drops to or about 10 lbs. 95

The pressure reducing valve which is shown in enlarged section in Fig. 3, comprises a shell or casing 26, in which is mounted a piston 27 carrying a sleeve 28 adapted when raised to close openings 29 in a pipe 100 30 affording communication between said chamber and valve casing. The sleeve is maintained normally in the lowered position by means of a spring 31; the upper end of which engages the top of the shell or casing, while the lower end is in engagement 105 with an adjustable nut 32 on an upper stem 33 of said piston, which also forms a guide for the spring.

The normal pressure within the chamber 110 1 for discharging the water therein, is sufficient to raise the piston 27 and cause the

sleeve to close the openings 29 in the outlet pipe 30. When such pressure has accomplished its work, it will tend to drop in efficiency and the piston will lower sufficiently to permit a slight opening of the valve to permit discharge of said air to the pipe 16 at the constant pressure desired, which is controlled by the spring 31. This is intended to be sufficient to maintain the tank sufficiently full of water at all times to fill the chamber 1. The exhaust valve is arranged to be moved outwardly by the pressure within the chamber 1 and close an exhaust opening 34; such movement being against the pressure of the spring 25, which may be set by means of an adjustable nut 35 on the stem 37 of the valve so as to open when the pressure within the chamber 1 drops to or below that required to actuate the "air lift" pump.

It will be understood therefore in the operation of this structure that it is only necessary to connect a source of supply for air under pressure to the pipe 3, whereupon the water which has been flowing into the chamber 1 will be discharged; then as soon as said water is discharged the supply of air will be cut off by the closing of the valve 7 and the air within the chamber will operate to force water into the tank, which in turn will flow back into the chamber 1 as soon as the pressure within the same is equalized with that of the atmosphere, and the presence of such water within the chamber 1 will again cause the float 5 to actuate the valve controlling the air pressure and said chamber will empty in the usual manner, and so on.

The structure forming the subject of my invention is made entirely of wood, and is of particular value for use in connection with the pumping of acid mine waters, as well as other liquids containing acid; the material employed being substantially unaffected by the liquid pumped, and thereby avoiding a large expense for repairs.

I claim:

1. The combination of a closed casing forming a water receiving chamber, inlet and outlet openings communicating therewith, a source of air supply in communication with said casing for discharging water therefrom, means for controlling the passage of air to said chamber, a tank in communication with the water inlet to said chamber, and means for raising water into said tank by air exhausting from said chamber.

2. The combination of a closed casing forming a water receiving chamber, inlet and outlet openings communicating therewith, a source of air supply in communication with said casing for discharging water therefrom, means for controlling the passage of air to said chamber, a tank in communication with the water inlet to said chamber, means for raising water into said tank by

air exhausting from said chamber, and means for exhausting said air at a constant pressure.

3. The combination of a closed casing forming a water receiving chamber, inlet and outlet openings communicating therewith, a source of air supply connected to said casing for discharging water therefrom, means for controlling the passage of air to said chamber by the water therein, a tank in communication with the water inlet to said chamber, and means for raising water into said tank by the waste air exhausting from said chamber.

4. The combination of a closed casing forming a water receiving chamber, inlet and outlet openings communicating therewith, a source of air supply connected to said casing for discharging water therefrom, a float for controlling the passage of air to said chamber, a tank in communication with the water inlet to said chamber, means for raising water into said tank by the waste air exhausting from said chamber, and means for exhausting said air at constant pressure.

5. The combination with a pumping mechanism, of a casing forming a chamber to receive water, said casing having inlet and outlet passages, a source of air supply communicating with said casing for discharging the water therefrom, and means for raising water to a supply tank by the air exhausting from said casing, said means including a reducing valve carried by the casing having a piston, and a spring for regulating the movement imparted to said piston by the air exhausting from said chamber.

6. The combination with a pumping mechanism, of a casing forming a chamber to receive water, said casing having inlet and outlet passages, a source of air supply communicating with said casing for discharging said water, a supply tank, a sump, a pipe leading from said sump to the tank, and means for raising water from said sump to the tank by the air exhausting from said casing, said means including a reducing valve carried by the casing having a piston, a spring for regulating the movement imparted to said piston by the air exhausting from said chamber, and means for delivering air to the end of the pipe within the sump.

7. The combination with a pumping mechanism, of a casing forming a chamber to receive water, said casing having inlet and outlet passages, means for discharging said water by air under pressure, and means for raising water by the air exhausting from said casing, said means including a reducing valve carried by the casing, a piston connected thereto, and a spring for regulating the movement imparted to said piston by the air exhausting from said chamber.

8. The combination with a pumping mechanism, of a casing forming a chamber to receive water, said casing having inlet and outlet passages, means for discharging said water by air under pressure, and means for raising water by the air exhausting from said casing, said means including a reducing valve carried by the casing, a piston connected thereto, and a spring for regulating the movement imparted to said piston by the air exhausting from said chamber.

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10 air exhausting from said chamber, and an equalizing valve for the reduction of pres-

sure within the chamber to atmospheric pressure when such pressure falls to or below a predetermined point.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

EDMUND J. D. COXE.

Witnesses:

JNO. B. McGRATH,
CHAS. T. KINNEY.