M. H. HESS.

PNEUMATICALLY CONTROLLED DRAIN VALVE.

APPLICATION FILED FEB. 15, 1912.

1,028,722.

Patented June 4, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

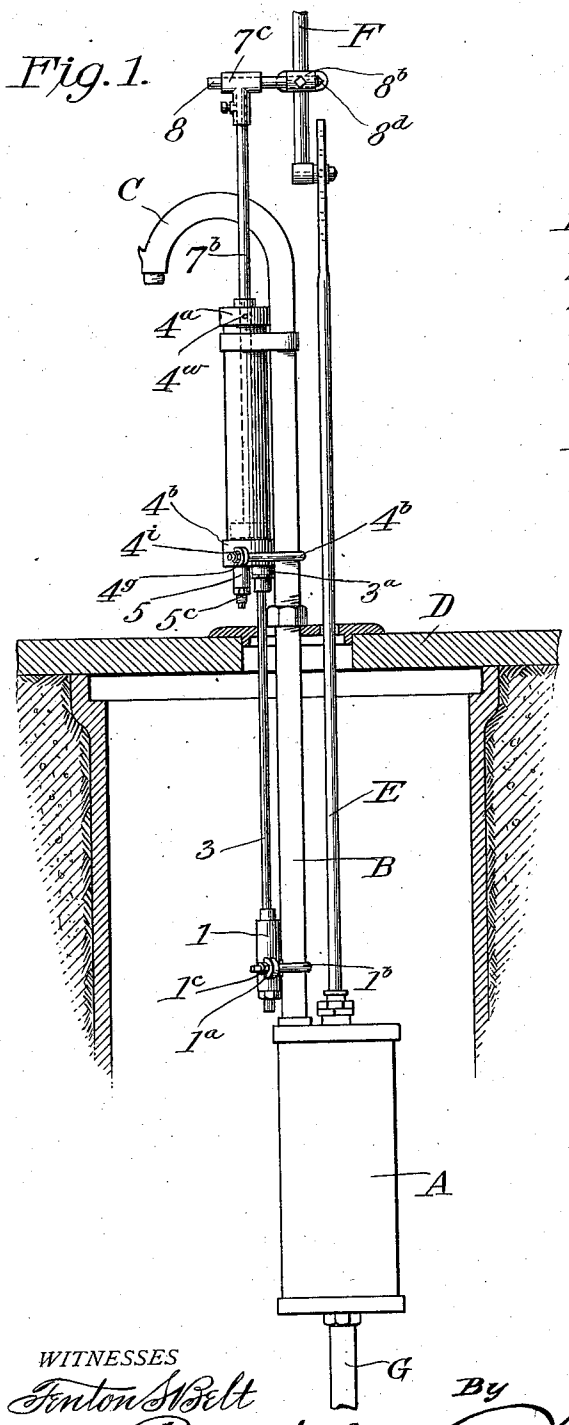


Fig. 4.

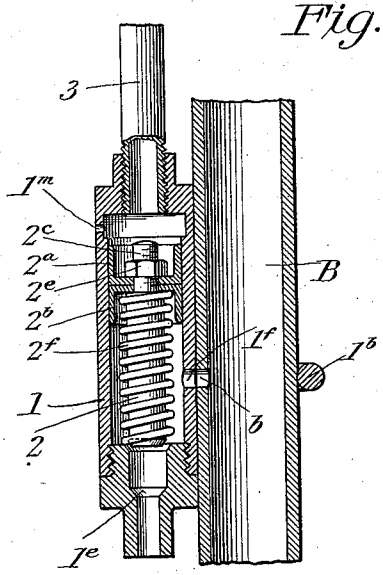
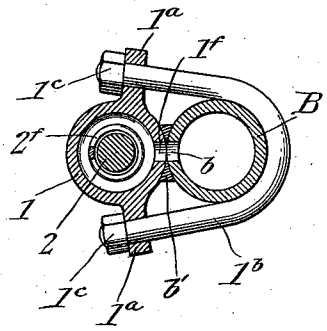


Fig. 5.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 2.

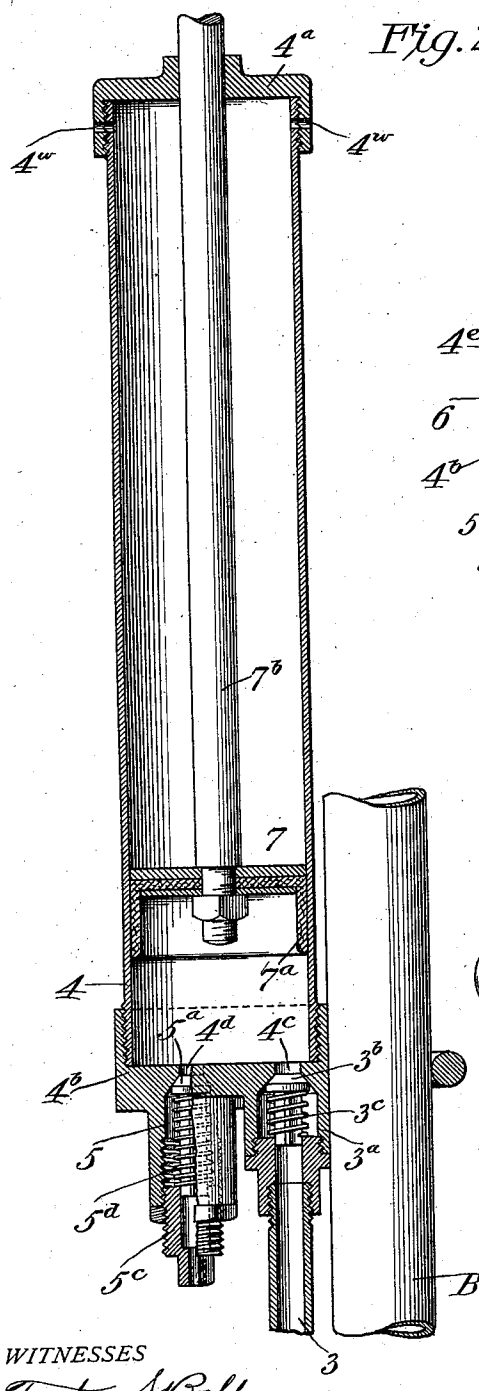
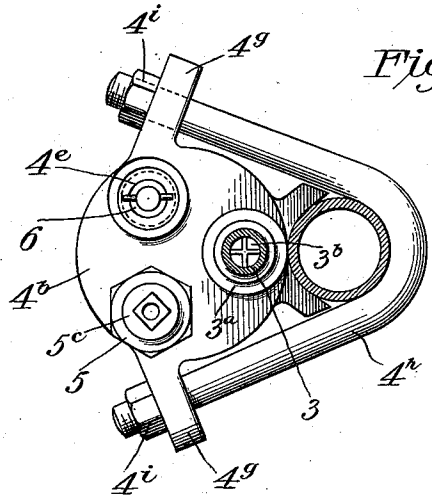


Fig. 3.



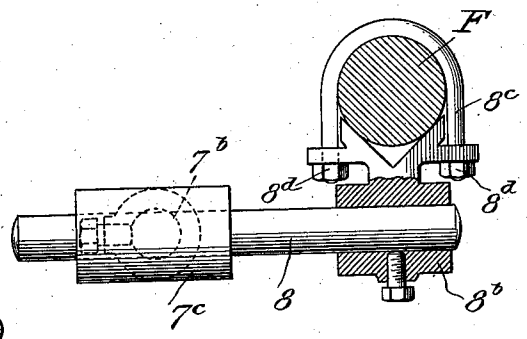


Fig. 6.

WITNESSES

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UNITED STATES PATENT OFFICE.

MARTIN H. HESS, OF DAVENPORT, IOWA.

PNEUMATICALLY-CONTROLLED DRAIN-VALVE.

1,028,722. Specification of Letters Patent. Patented June 4, 1912.

Application filed February 15, 1912. Serial No. 677,751.

To all whom it may concern:

Be it known that I, MARTIN H. HESS, of Davenport, in the county of Scott and State of Iowa, have invented certain new and useful Improvements in Pneumatically-Controlled Drain-Valves; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a novel improvement in pneumatically controlled drain valves for wind-mill and force pumps, and water pumps of any kind used in cold climates. It is also useful in connection with other pipes or receptacles from which water has to be drained to prevent freezing. Customarily such pumps are provided at some point in the pump chamber or water pipe with a small drain hole which is intended to allow the superposed water to drain out when the pump ceases operating and thereby prevent freezing of the pump. Such device is unreliable in practice for if the drain hole is large enough to insure the pump against freezing, it will when the pump is operating allow much of the water pumped to escape through the drain hole back into the pit or well; and if the drain hole is small enough to prevent material waste when pumping, the water does not drain out fast enough when the pumping ceases, and such small drain can be easily stopped up by sediment or impurities, thereby retaining the water and allowing the pump to freeze.

My invention comprises a pneumatically controlled drain valve which may be located at the most desirable position to drain the pump or pipes; an air compressor which may be operated by the pitman of the pump proper; and certain valves and connections whereby when the pump is started the compressor is operated and the resultant compressed air promptly closes the drain valve and holds it closed as long as the pump is working; but when the pumping ceases the air pressure is released and the drain valve opens allowing the water to rapidly escape, thereby preventing pipes above ground from freezing.

I will explain the invention fully with reference to the accompanying drawings, which illustrate diagrammatically one form of pump to which the invention is applied; and summarize in the claims the novel features of the invention for which protection is desired.

In said drawings—Figure 1 is a diagrammatical elevation of a pump with the drain valve, air compressor and connections. Fig. 2 is an enlarged sectional view of the air compressor. Fig. 3 is a bottom plan view of Fig. 2 partly in section. Fig. 4 is an enlarged vertical sectional view of the drain valve connected to a pipe. Fig. 5 is a transverse sectional view of the drain valve connected to the water pipe. Fig. 6 is a detail view partly in section of the connections between the pump rod and the air compressor rod.

In the drawings A designates the pump cylinder which may be of any ordinary or preferred construction, and connected, as usual, by a pipe B to the discharge head C which is usually located above the platform D. The pump cylinder A is connected with a suction pipe G extending into the water to be pumped. The pump plunger (not shown) in cylinder A is connected to the piston rod E, which in turn is connected to an operating device, which is indicated in the drawings as a pitman rod F of a wind-mill, or engine, (not shown), by which the pump plunger can be operated.

At a suitable point below the platform and preferably above pump cylinder A is located a pneumatically controlled drain valve (Figs. 4 and 5) which comprises a casing 1 provided with perforated ears 1^a which enable it to be securely clamped to the pipe B by means of U-shaped bolts 1^b and nuts 1^c. The casing 1 is provided at its lower end with an opening 1^e the inner end of which is closable by a valve 2, which is shown as connected to double cup-washers 2^a, 2^b, which fit closely within the casing 1, and may be strung on the reduced upper end or stem 2^c of the valve, and secured thereon by a nut 2^e as shown. A helical spring 2^f is interposed between the valve washers and the bottom of the casing, and tends to normally hold the valve unseated as indicated in Fig. 4.

In the side of the valve casing above the seat 1^e is an opening 1^f which when the valve casing is properly attached to pipe B registers with a similar opening *b* in the pipe B, see Fig. 5. An annular washer *b'* may be interposed between the casing 1 and pipe B to form a water-tight joint between the pipe and casing around the openings 1^f and *b*.

The drain-valve casing is provided with a small aperture 1^m above the plunger 2^a to relieve the pressure when the pumping ceases.

The top of the casing 1 is connected to the lower end of an air pipe 3, which in turn is connected to a nipple 3^a attached to the lower end of the air compressor cylinder 4; so that air may be forced from said cylinder through the pipe 3 into the pneumatic-valve casing above valve 2. A check valve of any suitable construction preferably placed at the opening in the cylinder prevents compressed air passing back into the compressor. A conical check valve 3^b is shown adapted to close an opening 4^c communicating with the interior of the cylinder 4, see Fig. 2, said check valve being normally closed by a spring 3^c.

The air compressor comprises a cylinder 4 which may be closed at top by a suitable head 4^a below which are openings 4^w. The bottom of the cylinder may be closed by a head 4^b in which is an opening 4^c communicating with the pipe 3 when the check valve 3^a is open. In head 4^b is an opening 4^d which communicates with a relief-valve-casing 5, in which is a conical valve 5^a, adapted to close opening 4^d, and controlled by a spring 5^d, the pressure of which spring can be regulated by an adjustable bushing 5^c. This relief-valve prevents excessive pressure accumulating in the pipe 3 and drain-valve casing when the compressor is operated. The head 4 is also provided with an opening 4^e provided with an inwardly opening valve 6 of any suitable construction, which allows air to enter the cylinder 4 when the piston 7 therein rises, but closes opening 4^e when the said piston descends.

The compressor piston 7 may be of any suitable construction, and is shown as provided with a cup leather 7^a and attached to a piston rod 7^b which extends through a suitable opening in the upper head 4^a and is provided on its upper end with a casting 7^c (Figs. 1 and 6) having a transverse bore by which it is loosely engaged with a rod 8, that may be adjustably fastened to a casting 8^b; which casting can be clamped to the pump rod or piston rod F by means of U-shaped clamps 8^c and nuts 8^d.

The cylinder may be provided with ears 4^g which enables it to be fastened to the side of the outlet pipe B, above the platform, by means of U-shaped clamps 4^h and 4^i shown in Figs. 1 and 3.

From the foregoing description it will be understood that whenever the water pump is operated the air compressor is also operated; and that on the first downward stroke of the piston 7 air is forced from the cylinder 4 through pipe 3 into the casing 1, and will compress spring 2^f, thereby forcing valve 2 to its seat and closing the drain valve, so that all the water must pass to the outlet C of the pump. When the pumping ceases the air escapes through vent 1^m decreasing the pressure in the casing and allowing spring 2^f to open the drain valve, whereupon the water in pipe B above the opening b can escape through the openings b, 1^f and 1^e, back into the well, thus draining the pipe B above the valve 1; and thereby preventing freezing and bursting of any parts above the valve. The opening 1^m is so small that it will not prevent the drain-valve being closed and held closed by the air pressure as long as the air compressor is operating.

What I claim is:

1. In combination with a water pipe having a drain outlet, a drain valve casing connected with said water pipe, a valve in said casing closing the outlet thereof, a plunger in the casing connected with the valve, a spring for normally holding the valve open, an air compressor, means whereby compressed air may be admitted from the air pump into the casing above the plunger when water is flowing through the pipe thereby causing the closing of the valve, and means for relieving the air pressure when the water ceases flowing thereby permitting the spring to open the valve.

2. In combination with a pump having a drain opening, a drain valve casing communicating with the drain opening and having an outlet, a valve in the casing closing said outlet, a spring for opening the valve, a plunger in the casing connected with the valve, an air compressor, pipe connections between the air compressor and the valve casing above the plunger; means for operating the air compressor when the pump is operated whereby compressed air is supplied to the casing and closes the valve during the pumping operation; and an air vent whereby when the pumping ceases the air pressure is reduced and the spring permitted to open the valve, thereby draining the pipe.

3. A drain valve comprising a casing adapted to be attached to a water pipe or container and provided with an opening adapted to register with an opening in the pipe, and with an outlet in its lower end, a valve for closing said outlet; cup leathers attached to the upper end of the valve and fitting the casing; a spring for opening said valve; an air compressor, an air pipe connected with the compressor and with the casing above the cup leathers, and an air vent above the said cup leathers.

4. A drain valve comprising a casing adapted to be attached to a water pipe and provided with an opening adapted to register with an opening in the water pipe, and an outlet, a valve for closing said outlet, cup leathers attached to the upper end of the valve and fitting the casing, a spring for opening said valve, an air supply pipe con-

nected with the end of the casing above the cup leathers; with an air compressor provided with an inlet valve, and a relief valve; an air pipe connecting the compressor chamber with the said drain valve casing, and a check valve in said air pipe between the air compressor and the said casing.

5. In combination with a pump cylinder, a piston rod and delivery pipe; a valve casing controlling the drain opening of said pipe, and having an outlet in its lower end, and a minute air vent at its upper end, a valve in the casing for closing said outlet; cup leathers attached to said valve, and a spring for opening the valve; with an air compressor cylinder, a piston therein, and means for operating said piston from the pump rod; a relief valve connected with the compressor cylinder, an air pipe connecting the compressor cylinder with the upper end of the valve casing, and a check valve for preventing back flow of the air from the casing into said compressor.

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

MARTIN H. HESS.

Witnesses:
D. H. SNOKE,
D. E. BUMP.