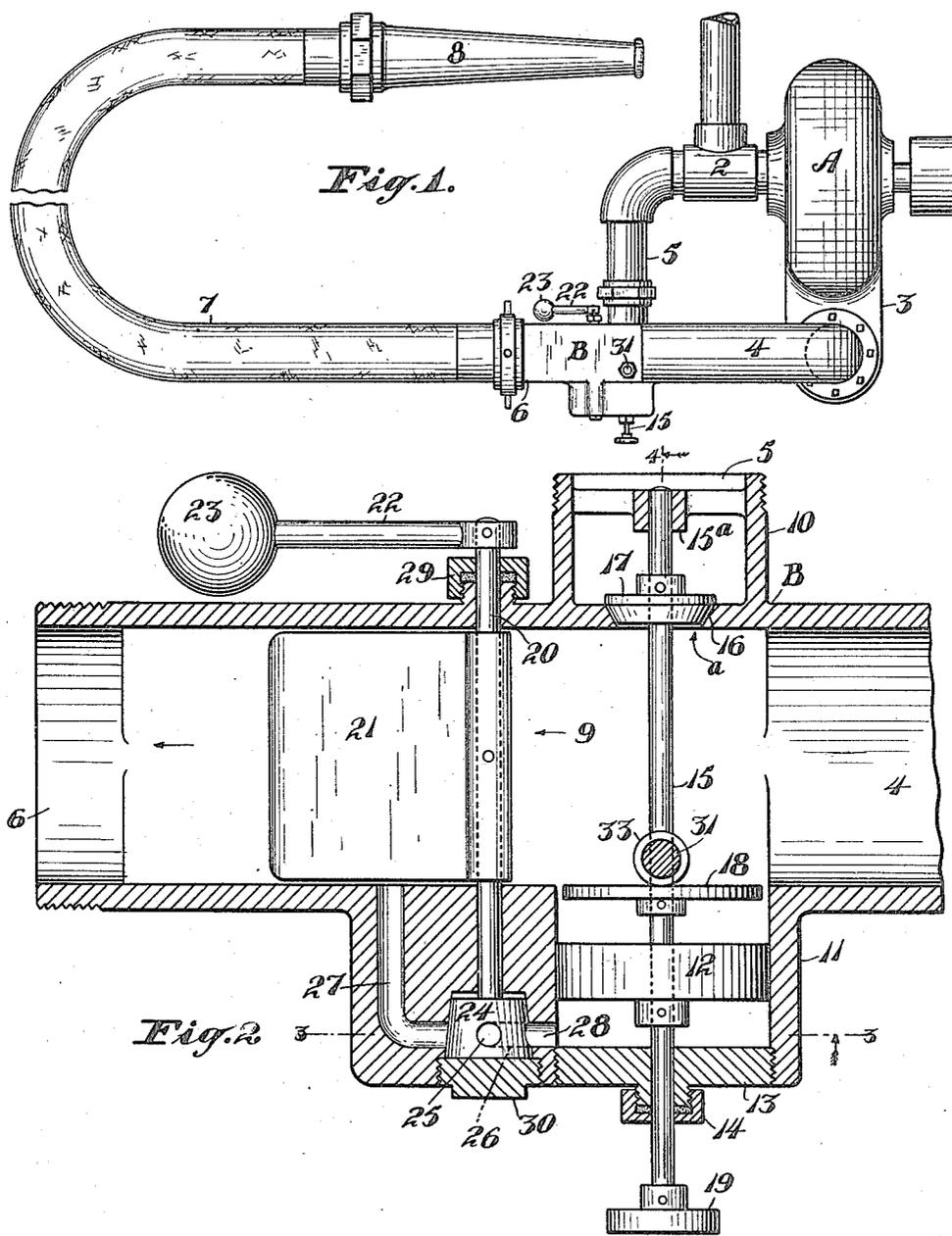


H. J. HOPKINS.
 AUTOMATIC CHURN VALVE.
 APPLICATION FILED NOV. 8, 1917.

1,280,477.

Patented Oct. 1, 1918.
 2 SHEETS—SHEET 1.



WITNESS:

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Fig. 3.

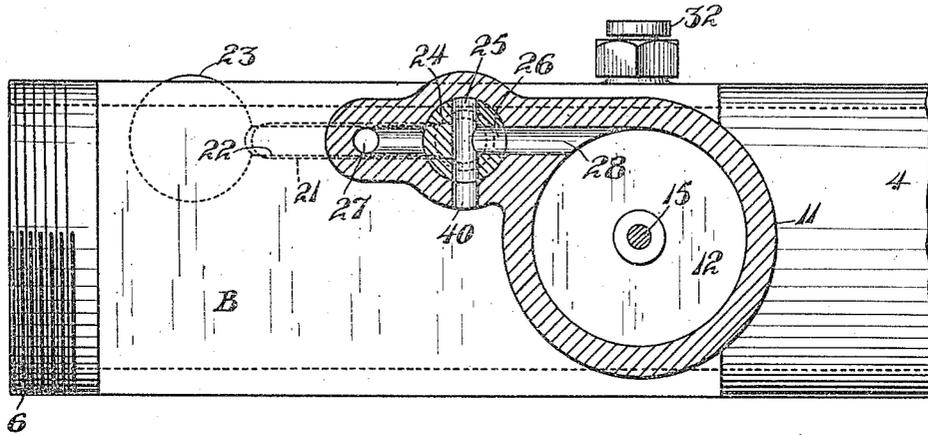
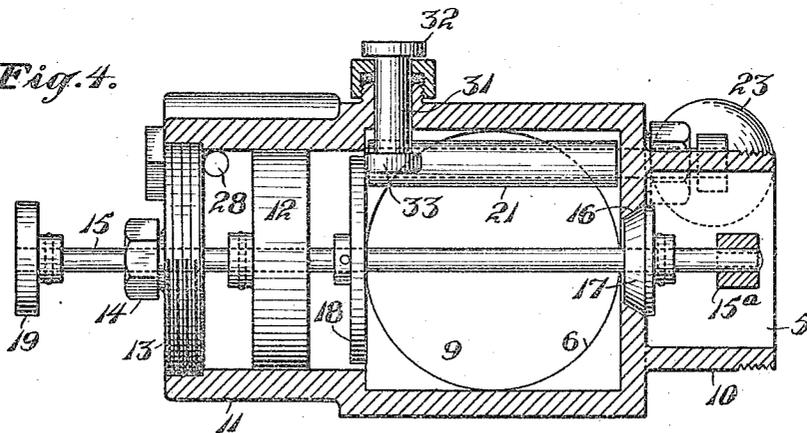


Fig. 4.



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AUTOMATIC CHURN-VALVE.

1,280,477.

Specification of Letters Patent.

Patented Oct. 1, 1918.

Application filed November 8, 1917. Serial No. 200,882.

To all whom it may concern:

Be it known that I, HUBERT J. HOPKINS, a citizen of the United States, residing at the city and county of San Francisco and State of California, have invented new and useful Improvements in Automatic Churn-Valves, of which the following is a specification.

This invention relates to an automatic churn valve.

One of the objects of the present invention is to provide a simple, compact and cheaply manufactured churn valve for fire pumps and the like, and particularly a valve of the character described which will automatically close when the water discharged by the pump is drawn, and conversely, automatically open to permit the water to return to the suction of the pump when in use. Another object of the invention is to provide manually-controlled means for securing the churn valve in closed position when the pump is first started. Further objects will hereinafter appear.

The invention consists of the parts and the construction and combinations of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a diagrammatic view showing the application of the churn valve to a pump.

Fig. 2 is a central longitudinal section through the churn valve.

Fig. 3 is a cross section on the line 3—3 of Fig. 2.

Fig. 4 is a cross section on the line 4—4, certain parts being shown in full lines.

Referring to the drawings in detail, A indicates a suitable form of pump, 2 the suction connection of the pump, 3 the discharge, B the churn valve in general, 4 a connection between the discharge of the pump and the intake of the churn valve, 5 a return connection between the churn valve and the suction of the pump, 6 the discharge of the churn valve by casing, 7 a hose connected thereto and 8 a nozzle of any suitable description.

The churn valve consists of a casing, generally indicated at B, in which is formed a central passage 9. This passage connects at one side with a discharge pump, as at 4, while the opposite end communicates with the discharge or hose connection 7. Formed

at right angles to the main passage 9 is an extension 10 which is connected by means of pipe 5 with the suction side of the pump. Formed on the opposite side of the casing B in direct alinement with the extension 10 is a second extension 11 in which is slidably mounted a piston 12. The extension 11 is otherwise provided with a removable head 13, and a stuffing box 14 through which extends a valve stem 15, the valve stem being supported at one end in the head 13 and at its opposite end in a central bearing 15^a formed in the extension 10. Forming a communication between the main passage 9 and the extension 10 is an opening in which is formed a valve seat 16 and secured on the stem 15 and adapted to move into and out of engagement with the seat 16 is a churning valve 17. Also secured on the valve stem is a disk 18 and a head or handle member 19.

Journalled cross-wise of the main passage 9 is a shaft 20 upon which is secured a clapper 21. Secured on one end of the shaft is a lever 22 which is provided with a counterweight 23 and secured on the opposite end of the shaft is a three-way valve 24. This valve is provided with two passages 25 and 26 and the main casing B is slightly enlarged, as shown in Fig. 3, to receive the valve 24 and also to permit the formation of the two passages 27 and 28. The passage 27 communicates with the main passage 9 while the passage 28 communicates with the cylinder extension 11. The shaft 21 carrying the lever 22, clapper 21 and the three-way valve 24 extends through a stuffing box 29 and is secured against endwise movement by a removable plug or head member 30.

Mounted at right angles to the valve stem 15 is a latch member, generally indicated at 31. This latch is mounted in the path of travel of the disk 18 and consists of a stem on which is secured an upper and a lower member 32 and 33 respectively. The latch 31 as a whole is normally adapted to be lifted to its uppermost position by the water pressure within the casing, but it may be depressed at any time into the path of travel of disk 18, as will hereinafter be described.

The whole purpose of the churn valve here shown is to provide means for automatically circulating the water in the pump when the

hose line 7 is not employed, that is, the nozzle 8 which is commonly employed may be opened and closed when required. It is therefore of considerable importance to provide means for automatically circulating the water through the pump to prevent the pressure otherwise created from bursting the hose.

In actual operation, when the pump is started it is first necessary to pull the valve stem by means of the handle or head extension 19 until the valve 17 engages its seat. The valve and stem together with the piston 12 and disk 18 carried thereby are locked against movement in this position by depressing the latch 31. This closing of the valve when the pump first starts prevents any air from entering the suction and thus permits the pump to start to discharge its water through the main passage 9 of the churning valve. The velocity of the water now discharged through the passage 9 swings the clapper 21 into a horizontal position, such as shown in Fig. 2, and thereby holds the valve in a position where the main passage 25 in the valve will be out of register with the passages 27 and 28.

Water will continue discharging through the casing of the churning valve and the hose line 7 as long as water is being drawn or the nozzle 18 remains open, but the flow therethrough will automatically pass through the return connection 5 to the suction and circulate around and around the moment the nozzle 8 is closed. This is accomplished in the following manner: Closing of the nozzle 8 or any valve connected with the hose line 7 immediately stops the flow through the discharge end 6 of the valve housing B. The velocity of water which formerly held the clapper 21 in a horizontal position is thus entirely destroyed and the clapper will naturally settle down to vertical position, being aided in this movement by the counter-weight 23. The turning movement of the clapper from the horizontal to the vertical position is approximately 90°. This movement is, of course, transmitted to the valve 24 and the passage 25 formed therein will then aline with the passages 27 and 28, thus permitting water under considerable pressure to pass through the valve and exert its pressure on the rear side of the piston 12. This will then move forward in the direction of the arrow *a* and will thus move the churning valve 17 away from its seat and permit the water to return to the suction of the pump and circulate as long as no water is being drawn by the hose line. Opening of the hose line, however, immediately permits the water to discharge therethrough. The velocity thus produced will instantly raise the clapper into its horizontal position and turn the valve 24 to the position shown in Fig. 3.

The water under pressure previously delivered to the cylinder 11 is now permitted to drain out through the passage 28 and the passages 26 and 25, the water being expelled from the cylinder by the pressure exerted on the forward face of the piston. The area of this piston is considerably larger than the valve 17 and the pressure exerted will therefore force the piston back to normal position and simultaneously close the valve 17, thus automatically closing the by-pass or return connection and permit the full discharge of the pump to enter the hose line.

The latch 31 is only used, as previously stated, when the pump is first started and it is not necessary to lift it out of engagement with the disk 18 after the pump is started, as the pressure created will automatically lift or raise the latch out of the path of travel of the disk 18. The disk 18 cooperates with the latch to lock the valve 17 in its closed position and it also serves another function, that is, it serves as a cover for the cylinder extension 11, and as it normally assumes the position shown in Fig. 2, it can readily be seen that it prevents the formation of any eddies when the water discharges through the main passage 9.

The device as a whole is absolutely automatic in action as it not only automatically opens the churning valve when required, but it also closes the churning valve when required, thereby saving the hose line from being subjected to unnecessary pressures and also relieving the motor or other driving means connected with the pump from being overloaded from time to time. The draining water escaping from the cylinder 11 when the piston 12 returns to close the valve 17 may discharge through passage 40 or a pipe may be provided which is directly connected with the suction of the pump, if necessary.

The materials and finish of the several parts may otherwise be such as the experience and judgment of the manufacturer may dictate.

I wish it understood that various changes in the form, proportions and minor details of construction may be resorted to within the scope of the appended claims, and that I do not wish to limit myself to the specific design and construction here shown.

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

1. The combination with the suction and discharge connections on a water pump of a valve casing connected with the discharge of the pump, a return connection connecting the valve casing with the suction of the pump, a discharge connection formed on the valve casing, a hose line connected with said discharge, a churn valve mounted in the return connection, a clapper pivotally mounted in the casing adapted to be raised

when water is flowing through the casing and lowered when the flow is stopped, a valve connected with the clapper adapted to be turned thereby, a cylinder extension on the valve casing, a piston in said cylinder secured to a stem carrying the churning valve, said piston adapted to be moved by water admitted under pressure to open the churning valve when the flow through the casing is stopped and to close the churning valve when the water is flowing through the discharge.

2. A churning valve comprising a casing having an inlet opening adapted to be connected with the discharge of a pump, a discharge opening formed on the casing adapted to be connected with a hose line, a return opening in the casing adapted to be connected with the suction of the pump, a valve in said return connection adapted to be opened or closed to open or close said return connection, a stem supporting said valve, a cylinder extension on the casing, a piston in said cylinder secured upon the valve stem, a clapper mounted adjacent the discharge opening of the casing adapted to be raised by the flow of water through the discharge opening and adapted to be automatically lowered when the flow through the discharge is stopped, and means actuated by the movement of the clapper for transmitting a reciprocating movement to the piston and the churning valve.

3. A churning valve comprising a casing having an inlet opening, a discharge opening and a return opening formed therein, a cylinder extension formed in alinement with the return opening, a churning valve mounted in the return opening, a stem extending through the return opening and the cylinder extension adapted to support the churning valve, a piston mounted in the cylinder extension secured to the stem, a passage formed in the casing connected with the rear side of the piston, a valve mounted in said passage adapted to open or close said passage, a stem extending through the casing carrying said valve and a clapper within the casing secured upon said stem adapted to turn the valve to automatically open or close the passage.

4. A churning valve comprising a casing having an inlet opening formed therein adapted to be connected with the discharge of a pump, a discharge opening formed on the casing adapted to be connected with a hose line, a return opening in the casing adapted to be connected with the suction of the pump, a valve in said return connection adapted to be opened or closed to open or close said return connection, a clapper pivotally mounted within the casing adjacent to the discharge opening, said clapper adapted to be actuated by the flow of water through the casing and the discharge open-

ing to assume a horizontal position when the water is flowing, said clapper also adapted to assume a vertical position when flow of water through the casing is stopped, a cylinder in the casing, a piston in the cylinder connected with a valve in the return opening, and means actuated by the movement of the clapper for admitting or releasing water from the cylinder, said admission or discharge of water adapted to move the piston and connected valve to open or close the return connection to the suction of the pump.

5. A churning valve comprising a casing having an inlet opening formed therein adapted to be connected with the discharge of a pump, a discharge opening formed on the casing adapted to be connected with the hose line, a return opening in the casing adapted to be connected with the suction of the pump, a valve in said return connection adapted to be opened or closed to open or close said return connection, a clapper pivotally mounted within the casing adjacent to the discharge opening, said clapper adapted to be actuated by the flow of water through the casing and the discharge opening to assume a horizontal position when the water is flowing, said clapper also adapted to assume a vertical position when flow of water through the casing is stopped, a cylinder in the casing, a piston in the cylinder connected with a valve in the return opening, means actuated by the movement of the clapper for admitting or releasing water from the cylinder, said admission or discharge of water adapted to move the piston and connected valve to open or close the return connection to the suction of the pump, and means for manually moving the piston and connected valve to open or close same.

6. A churning valve comprising a casing having an inlet opening formed therein adapted to be connected with the discharge of a pump, a discharge opening formed on the casing adapted to be connected with the hose line, a return opening in the casing adapted to be connected with the suction of the pump, a valve in said return connection adapted to be opened or closed to open or close said return connection, a clapper pivotally mounted within the casing adjacent to the discharge opening, said clapper adapted to be actuated by the flow of water through the casing and the discharge opening to assume a horizontal position when the water is flowing, said clapper also adapted to assume a vertical position when flow of water through the casing is stopped, a cylinder in the casing, a piston in the cylinder connected with a valve in the return opening, means actuated by the movement of the clapper for admitting or releasing water from the cylinder, said admission or discharge of water adapted to move the pis-

ton and connected valve to open or close the
return connection to the suction of the
pump, means for manually moving the pis-
ton and connected valve to open or close
5 same, and manually operated means for lock-
ing the valve and piston against movement
when the valve is closed.

In testimony whereof I have hereunto set
my hand in the presence of two subscribing
witnesses.

HUBERT J. HOPKINS.

Witnesses:

JOHN H. HERRING,
W. W. HEALEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."