(No Model.)

W. F. GARRISON.

VALVE FOR PUMPS FOR MOVING GASEOUS BODIES.

No. 454,646. Patented June 23, 1891.

Fig. 1.

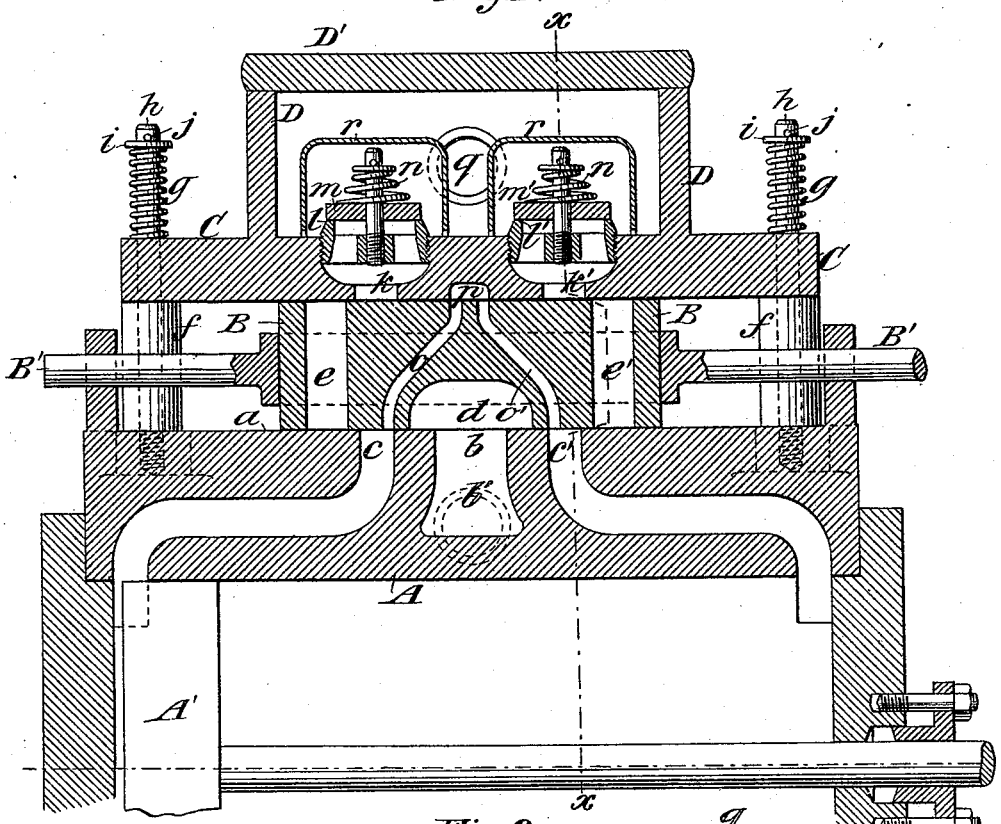
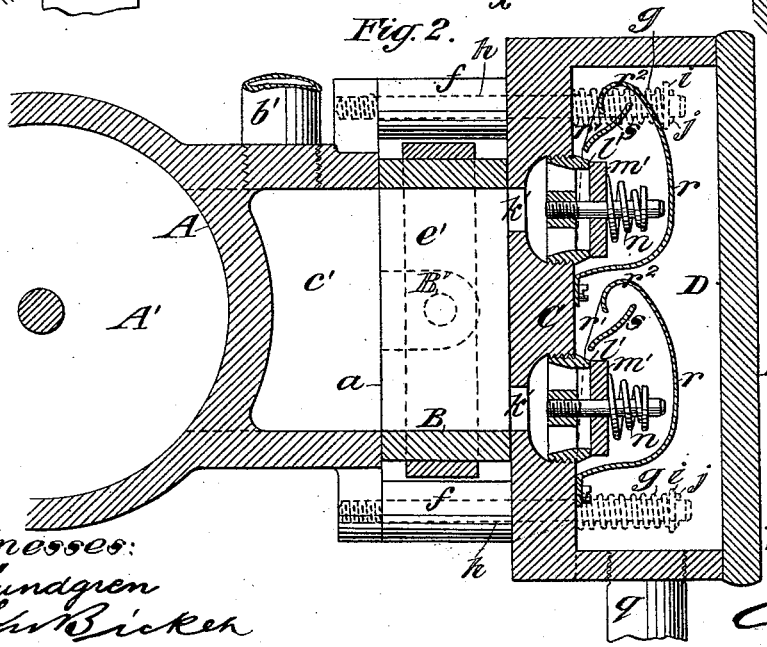


Fig. 2.



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VALVE OF PUMPS FOR MOVING GASEOUS BODIES.

SPECIFICATION forming part of Letters Patent No. 454,646, dated June 23, 1891.

Application filed July 13, 1889. Serial No. 317,402. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. GARRISON, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in the Valves of Pumps for Moving Gaseous Bodies, of which the following is a specification, reference being had to the accompanying drawings.

This invention is applicable to pumps for the exhaustion and compression of gases and other elastic fluids.

The object of this invention is to provide for more positively controlling the induction and discharge of the aeriform or gaseous fluid or body, and also for the sealing of the valves of such pumps by means of the products of condensation which occur in such fluids or bodies.

In carrying out my invention I use a slide-valve which derives its motion from the prime motor of the pump, and I employ on the back of the said valve a stationary plate longitudinally parallel with the valve-seat and containing openings corresponding with the ports provided in the valve-seat for the induction and eduction of the fluid to and from the ends of the cylinder.

My invention consists in the novel combinations hereinafter described and claimed, in which said valve and plate are elements, and in certain other details hereinafter described and claimed.

Figure 1 is a horizontal longitudinal sectional view of a part of the cylinder and piston and of the entire valve system of a pump illustrating my invention. Fig. 2 represents a transverse vertical section taken in about the dotted line $x\ x$ shown on Fig. 1.

Similar letters of reference designate corresponding parts in both the figures.

A designates the cylinder, having a valve-seat a on one side parallel with its length.

A′ is the piston, which is valveless.

B is the slide-valve.

The valve-seat a has three ports $b\ c\ c'$, arranged like the ports for what is known as the "short D-valve," the port b being in this case the inlet-port and having an inlet-pipe b' connected with it, and the ports $c\ c'$ communicating through proper passages one with one end of the cylinder and the other with the other end of the cylinder, both serving for the induction of fluid thereinto and its eduction therefrom.

The valve B consists of a flat plate having its face and its back parallel longitudinally, as shown in Fig. 1, and having in its face a central cove d, and having provided in it two passages $e\ e'$, which extend right through it and which are so spaced relatively to the cove and to the ports in the valve-seat that one of the said passages $e\ e'$ and one of the ports $c\ c'$ may be in communication with each other while the other of said ports is in communication with the cove d and through it with the outlet-port b.

C is a plate fitted to the back of the valve and supported upon the cylinder in such manner that its face presented toward the valve-seat a is parallel with the said seat and at such distance therefrom that the valve will work between the said face and the valve-seat freely, but gas-tight. In the example represented the said plate C is supported upon the seat by four columns f at its corners, and is represented as confined to these columns by means of spiral springs g, applied to stud-bolts h, which are screwed into the seat. The said stud-bolts h may form part of the said columns, or the said columns may be hollow and the stud-bolts may pass through them. The springs are represented as confined at their outer ends by means of collars i set over the upper ends of the bolts and confined by pins j passing through the said bolts. The plate C has provided through it openings $k\ k'$, the mouths of which terminate in the inner face of the said plate next the valve, and are so spaced that they are exactly opposite the ports $c\ c'$ in the valve-seat, so that when the passages $e\ e'$, respectively, are brought by the movement of the valve opposite the ports $c\ c'$ in the valve-seat there will be communication through said passages from the ports $c\ c'$ to the openings $k\ k'$. The openings $k\ k'$ are continued through the plate to the outside thereof and communicate with valve-seats $l\ l'$ provided in or fitted in the said plate, and to these seats are applied outwardly-opening clack-valves $m\ m'$. These valves are represented as having springs n applied to them for the purpose of closing them. There may be only a single opening k or k' opposite each port c or c', or there may be several.

In the example represented (see Fig. 2) there are two such openings for each. There will be generally a separate valve for each port.

The valve B is provided with a stem B′, to which motion may be given from the prime mover of the pump in any suitable manner, which it is not necessary for me here to describe, because slide-valves for the induction and eduction to and from the cylinders of pumps are commonly so operated. This motion is such that in the movement in one direction the induction of the fluid admitted through the pipe b' to the inlet-port b takes place through the cove d and port c to one end of the cylinder, while the eduction from the other end of the cylinder takes place from the port c', passage e', opening k', and the valve m', and during the movement of the piston in the other direction the induction takes place through b', b, d, and c', and the eduction through c, e, k, and the valve m. The valves m m' are opened by the pressure produced on the eduction side of the piston by the movement of the latter and closed again by the springs on the return movement of the piston.

Besides the cove d in the valve-face and the passages e e' through it, there are two other passages o o' provided through the valve, one on each side of the cove between it and the passage e or e'. These passages o o' terminate in the face of the valve with ports so spaced that they will when the valve is in its central position, which it occupies at the ends of the stroke of the piston in either direction, communicate with the ports c c', as shown in Fig. 1. The said passages terminate in the back of the valve in ports which are very near together, and which when the valve is in its central position are both opposite a little cove p provided in the inner face of the plate C. By means of these passages o o' and cove p communication is made between the ports c c', and through them between opposite ends of the cylinder, as shown in Fig. 1, when the piston is at either end of its stroke, and by that means the pressure is equalized on both sides of the piston.

On the back or outside of the plate C is a chest D, which covers all the openings k k' and the valves m m', and at one side of which there is an outlet q, through which the discharge of the pump takes place. This chest is represented as made integral with the plate C and as fitted with a removable cover D′, by which access may be had to the valves.

In order to provide for the moistening or lubrication of the valves m m' by the products of condensation from the gaseous fluids or bodies which are moved by the pump and thereby keeping them sealed when closed, I have represented as applied near the said valves outside thereof deflectors for the purpose of obstructing the gaseous fluids discharged through said valves in such manner as to intercept the said products of condensation. These deflectors are shown in both figures of the drawings; but their form is best shown in Fig. 2. They are represented as consisting of boxes r, which may be of light sheet metal closed at the bottom and on all sides, but open at the top, as shown at r' in Fig. 1, and having their upper edges turned downward to form a sort of hood r^2 within the box. Below this hood r^2 and within the box r is a slanting plate s, the lower edge of which is very near the valve-seat and the upper edge of which is within or under the hood r^2. The gaseous fluids escaping when the valves are open are caused to strike against the interior of the box r and against the lower surface of the deflecting-plate s and have for the most part to escape between the upper edge of the plate s and the interior of the hood r^2, within which they have to descend before escaping into the upper portion of the chest D or to their final outlet. The gases striking the lower surface of the deflecting-plate s and the interior of the hood have the products of condensation which takes place deposited upon the under surface of the plate s and also thrown down from the hood r^2 upon the upper surface of the deflecting-plate s, and these products run down said plate onto the valve-seat, which they keep always lubricated or moistened, so that they seal the valve when closed. There may be a deflector or deflectors, such as I have above described, provided for each valve, or one deflector or set of deflectors may be constructed to operate in connection with several valves arranged near each other.

I have hereinbefore spoken of the plate C as a fixed plate. It might be positively fixed in any suitable manner at a proper distance from the valve-seat a, so that the valve would work between it and the seat gas-tight and almost free from the pressure of the fluid being pumped and from friction; but I prefer, instead of using rigid and unyielding fixtures for holding the said plate in place, to use the springs g, as herein described, which are sufficiently positive in their action and hold the plate in proper fixed position, while they provide for the easy removal of the said plate to obtain access to the valve when necessary, and also for the lifting of the said plate by the pressure of the fluids, if that should become necessary in the operation of the pump owing to the disorganization of any of its parts.

I have represented the space between the plate C and the valve-seat as entirely open at the sides, except where the columns f are placed; but this space may be inclosed by a wall or curtain attached to the said plate and fitting closely to or around the valve-seat, if such inclosure should be desirable in case of the gaseous fluids moved by the pump being of such deleterious or offensive nature that their escape by any leakage of the valve would be objectionable.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a pump-cylinder having a valve-seat in which are ports communicating with each end of the cylinder for induction and eduction and an interposed inlet-port, a slide-valve having two passages through it and a cove in its face interposed between said passages, the said passages and cove being so spaced that one of said passages and one of said ports for induction and eduction may be in communication with each other while the other of said ports is in communication with the cove and through it with the inlet-port, a plate fitted to the back of said valve and having openings through it corresponding with the said ports for induction and eduction, fixed supports for said plate to maintain it at a proper distance from and parallel with the valve-seat, a chest on the back of said plate covering said openings and provided with an outlet, and outwardly-opening clack-valves fitted to said openings, substantially as and for the purpose herein set forth.

2. The combination, with a pump-cylinder having a valve-seat containing ports communicating with each end of the cylinder for induction and eduction and an interposed inlet-port, of a slide-valve having two passages through it and a cove in its face, spaced as herein described, and a stationary plate fitted to the back of said valve and having in it openings corresponding with the said ports for induction and eduction, the said valve also having two smaller passages through it, and the said plate having in it a cove through which and said smaller passages communication is made between the two induction and eduction ports and through them between the ends of the cylinder when the valve is in its central position, substantially as and for the purpose herein set forth.

3. The combination, with the cylinder and the discharge-chest of a pump for moving gaseous bodies and valve-seats in said chest, of clack-valves opening and closing by a movement toward and from said seats, and deflectors near said seats and valves for the purpose of intercepting the products of condensation in the discharged gaseous body and throwing them back upon the valves and seats for lubricating and sealing the valves, substantially as and for the purpose herein described.

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