J. F. HASKINS.

AIR PUMP.

No. 109,732. Patented Nov. 29, 1870.

Fig. 3.

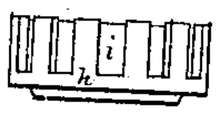


Fig. 4.

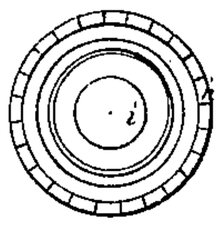


Fig. 1.

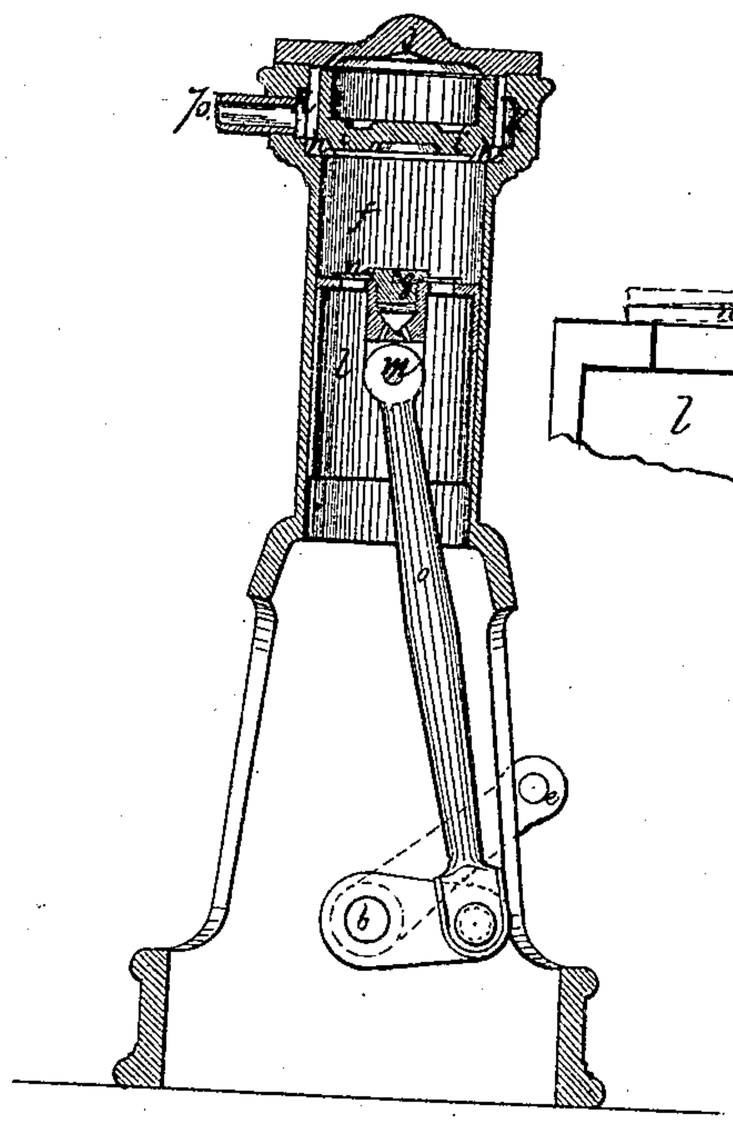
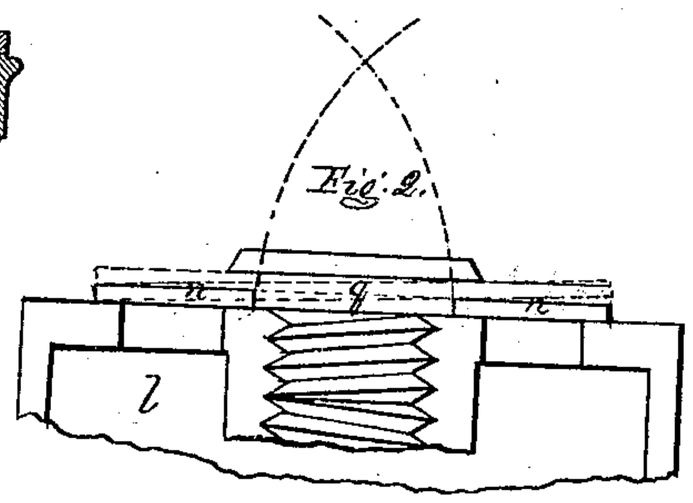


Fig. 2.



Witnesses { R. H. Fitch. C. Warren Brown

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United States Patent Office.

JOHN F. HASKINS, OF FITCHBURG, MASSACHUSETTS.

Letters Patent No. 109,732. dated November 29, 1870.

IMPROVEMENT IN AIR-PUMPS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JOHN F. HASKINS, of Fitchburg, in the county of Worcester and State of Massachusetts, have invented Improvements in Pumps for Compressing Air; and I do hereby declare that the following, taken in connection with the drawing which accompanies and forms part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

In compressing air into a receiver, where it is stored and from which it is drawn and used as a motor, the valves of the pumps employed are subjected to great strain, and are often broken, consequent upon such strain and the momentum which they acquire in their rapid reciprocations, and, when broken and displaced, are jammed between the pump-piston and the pump-head, causing breakage of the pump-cylinder or its head or the pump-piston.

This invention may be stated as an improvement upon the valvular arrangement shown in the United States Patent No. 93,051, dated July 27, 1869, in which is shown an air-pump, designed for the purpose of compressing air into a receiver.

My invention consists, first, in such a construction and arrangement that, while the spindle or stem, commonly made on the piston-valve to guide the valve in its movements and moving with the valve, is dispensed with, my piston-valve, which is kept in place by a central guide fixed to the piston, will not, in rising or falling, bind upon such guide, even although it does not maintain a horizontal position in rising or falling. This I accomplish by giving to the central guide of the valve fixed to the piston a convex outline, so that, if the valve tilts in rising or falling, or, in other words, if one edge of the valve moves and the other remains on the valve-seat, the valve will not bind or jam on the central guide, but will freely move over it.

The convexity of the valve-guide is made to correspond to lines described by radii which reach from the outer lower edge of the valve to the further boundary of the central hole in the valve encompassing the guide. When the piston or inlet-valve has been made with a spindle fixed to and moving with the valve, the metal of the valve is strained each time the valve closes by resisting the momentum of the spindle, which has a tendency to break down through the valve. When the valve is checked in rising the tendency is to tear the value away from the spindle in an upward direction, so that, when a light thin valve has a spindle moving with it, it is only a question of time when the valve and its spindle will separate. As it is a matter of considerable practical importance to make the inlet piston-valve quite thin and light, to prevent pounding of the valve, it is found to be a desideratum to guide and confine the valve at its center without attaching to it a spindle, and it has hitherto been considered impracticable to use a thin value, guided and confined by a fixed central spindle, because of the griping of said fixed spindle by the valve, consequent upon its not moving with perfect parallelism to its seat. But, by making the fixed central guide with a convex outline, as described, I am enabled to dispense with central spindles moving with the valve, and to prevent the valve, without such moving spindle and moving over a fixed central guide, from sticking or binding on said guide.

In the patent before referred to it will be seen that the upper or delivery-valve has a seat which projects inwardly beyond the periphery of the piston, and that said seat is confined between the upper end of the pump-cylinder and a chest, from which the air-pipe leads to the receiver. In said arrangement, if it becomes necessary or desirable to take the piston out of the pump at its upper end, as is frequently the case, this can only be done by disconnecting the air-pipe between the pump-chest and the receiver, and taking off said chest, which involves so much labor that the apparatus is often allowed to run for some time after it needs attention to its piston or piston-valve.

Now another part of my invention consists in the arrangement, herein described, of the pump-chest, delivery-valve seat and valve, and upper head, so that said valve-seat and valve and the piston and piston-connecting rod and valve, can all be withdrawn upward from the pump-cylinder on removal of the head, and disconnecting the connecting-rod from its crank, and without disturbing the connecting-pipe between the pump and the receiver. Moreover, if between the upper part of the piston and the under surface of the head any part gets loose or broken, or any obstruction is introduced, the bolts which hold the head in place will give way, and the delivery-valve and valve-seat will be saved from damage by being pushed upward, the bolts which secure the head being proportioned to resist the strain of actual work, and not to resist the strain which the piston will exert on foreign or misplaced bodies.

It is in the arrangement herein described and shown of the delivery-valve and valve-seat, the pump-chest and the chest or pump-head, by which, on the removal of the said head, the delivery-valve and its seat can be removed, allowing the piston to be withdrawn upward, when the connecting-rod is uncoupled from the crank-pin, and by which the parts are saved from serious breakage by the giving way of the head-bolts, that the second part of my invention consists.

Figure 1 of the drawing shows, in vertical central section an air-compressing pump, in which my invention is embodied.

Figure 2 shows, on a large scale and in vertical cen-

tral section, the upper part of the pump-piston and the inlet-valve working therewith.

Figure 3 shows the delivery-valve seat and valve combined in side elevation, the same being shown in plan in Figure 4.

The pump-cylinder *f* is made integral with the chest *k*, the internal diameter of which is greater than the bore of the pump-cylinder *f*, a groove being made in the inner wall of the chest to serve as a passage-way, with which the delivery-pipe *p* connects.

The delivery-valve seat *h* is made, as a ring, with bars extending upward therefrom, so as to fill the distance between the upper end of the pump-barrel and the lower side of the head *j*, so that the head *j* confines the seat *h* upon the upper end of the pump-barrel. The bars from the pump-seat are turned concentric, both outside and inside, with the axis of the pump-barrel, so that the outside of the bars fits the space in the chest above and below the passage around the chest, and so as to guide the delivery-valve *i*, which is a short section of a cylinder with a closed bottom, on which bottom a valve-face is formed to fit the valve-seat face. Between the top of valve *i* and the lower surface of the head *j* space is allowed enough to permit the valve to rise the amount needed to permit the air to escape past the valve, and to flow through the spaces between the bars attached to the valve-seat *h*, through the passage or groove, around the chest *k*, to and out of the delivery-pipe *p*.

The piston *l* is like that shown in the patent alluded to heretofore, and is provided with a wrist-pin, *m*, from which a connecting-rod, *o*, passes to a crank-pin, *d*, which is fixed in a crank secured to the main shaft *b*, on which is fixed the the engine-crank *e*. These condensing-pumps are usually and preferably connected in pairs and with a steam-engine, the cranks of the pumps and engine bearing the relation set forth in the aforesaid patent.

The inlet or piston-valve *n* is a thin plate perforated with a round hole, which embraces a guide, *q*, fixed in the piston, said guide having a head which limits the amount of lift which the valve can receive relatively to the piston, which is made as a hollow cylinder, with a closed upper end perforated, to allow air to enter the cylinder by lifting-valve *n* as the piston makes its downward stroke.

This guide *q* is preferably made to screw into a hub on the under side of the piston-head, and between the upper side of the piston-head and the under side of the head of the guide the outline is turned to conform to circles, the centers of which are at or near the outer lower corners of valve *n*, so that, when valve *n* assumes the position denoted by dotted lines in fig. 2, it will not gripe or bind upon the fixed central guide.

The guide *q* is screwed into the piston-hub to a shoulder formed on the guide, and the guide thus forms a cover to an oil-reservoir, which is made by having the hole in the hub of the piston deeper than is needed for the guide, and holes are made through the piston-hub into the oil-reservoir, to allow the oil to flow upon and to lubricate the wrist-pin *m*. In practice this oil-reservoir is supplied by a syringe from below, the pipe of the syringe being made to enter a hole in the side of the hub just below the end of the guide *q*.

To facilitate drawing the piston and connecting-rod upward out of the pump-cylinder I tap the guide *q* centrally to receive an eye-bolt, to which a tackle can be connected to lift out of the pump the piston and connecting-rod.

I claim—

1. The centrally-perforated disk-valve, in combination with a fixed central guide formed, substantially as described, in the part over which such valve moves in action, for the purpose specified.

2. The combination of the pump-barrel, chest, delivery-valve seat, delivery-valve, and pump or chest-head, when arranged substantially as and for the purpose set forth.

JOHN F. HASKINS.

Witnesses:

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C. WARREN BROWN.