

No. 635,531.

Patented Oct. 24, 1899.

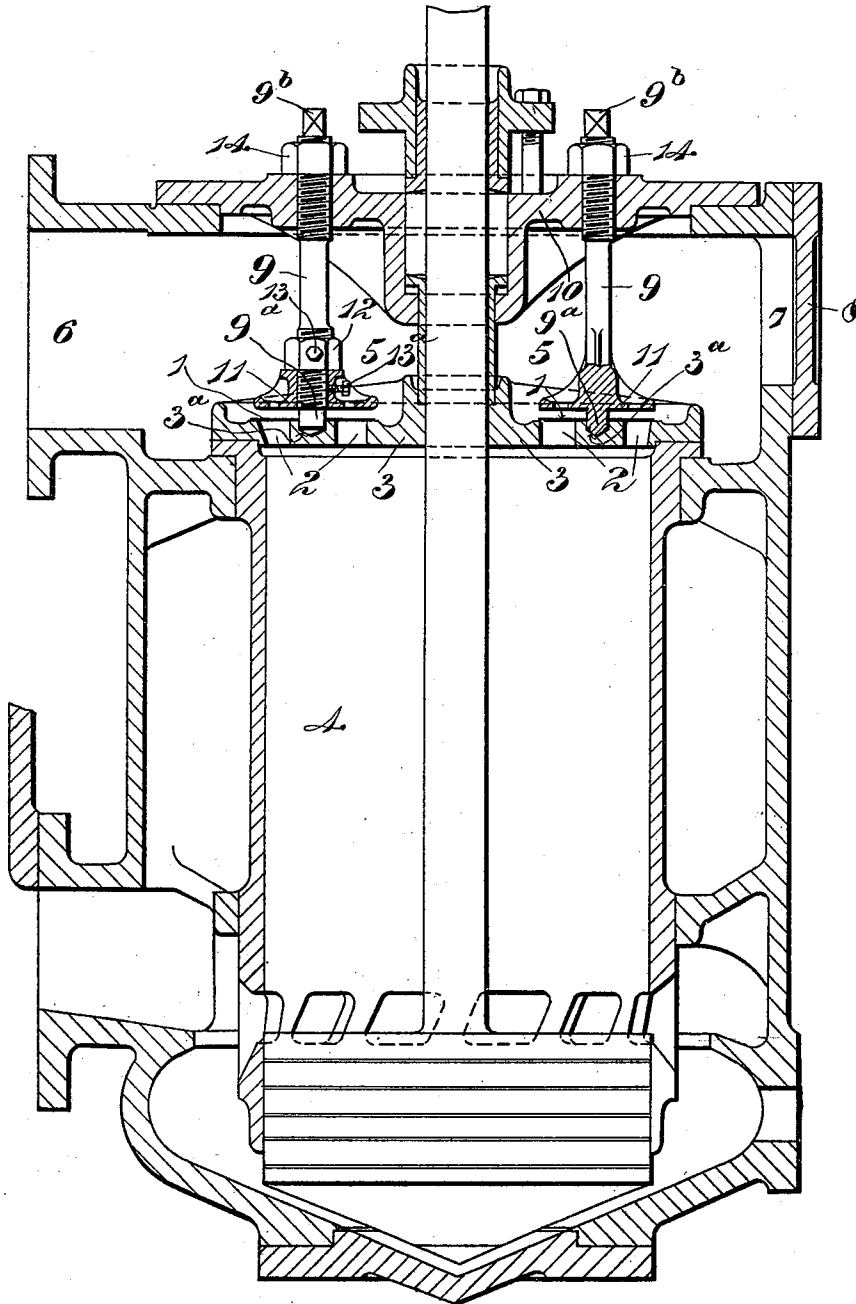
F. EDWARDS.
PUMP.

(Application filed June 10, 1897.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



Witnesses.

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2 Sheets—Sheet 2.

Fig. 2.

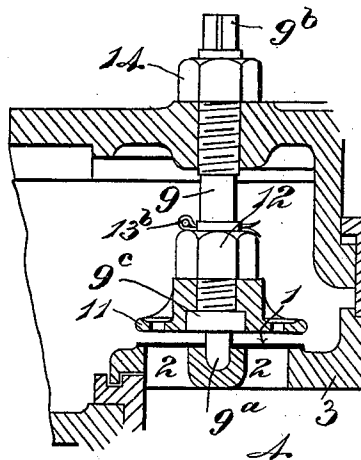
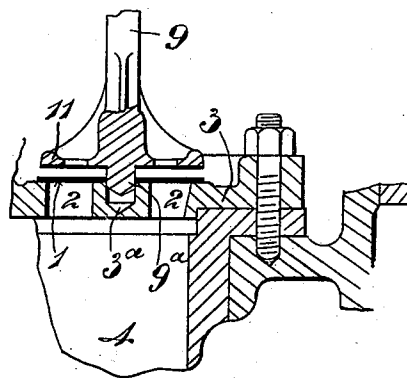


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

FREDERICK EDWARDS, OF LONDON, ENGLAND.

PUMP.

SPECIFICATION forming part of Letters Patent No. 635,531, dated October 24, 1899.

Application filed June 10, 1897. Serial No. 640,151. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK EDWARDS, a subject of the Queen of Great Britain and Ireland, residing at London, England, have invented Improvements in Pumps, of which the following is a specification, and for which patents have been granted in the following countries: United Kingdom of Great Britain, No. 9,653, dated 6th of May, 1896; Belgium, No. 130,107, dated 16th of August, 1897; Italy, No. Vol. LXXXVIII, 487, dated 30th of September, 1897; Hungary, No. 10,710, dated 15th of October, 1897; Austria, No. 47/4,513, dated 3d of November, 1897; France, No. 274,742, dated 7th of February, 1898; Spain, No. 22,321, dated 3d of May, 1898, and Canada, No. 62,075, dated 16th of December, 1898.

My invention of improvements in pumps relates more particularly to improvements in the construction and arrangement of valve-studs, valve-guards, and valve-seats for the lift-valves used in pumps. The ordinary lift-valves at present in use usually have their guards kept in place by studs screwed into the valve-seats, each guard being held down by being screwed onto the stud, and further secured by a lock-nut and split pin or by two nuts and a split pin, the result being that the guard and valve may work loose without this being seen, and the valve cannot be renewed without removing and replacing the split pin, nut or nuts, and guard, all of which, owing to their inaccessible position, occupy considerable time to remove and by repeated removals wear and become slack at the parts which require to be tight.

In the old-fashioned type of pump, containing foot, bucket, and head valves, it is the foot or bucket valves which give the most trouble. Consequently with such a pump it is practically of no use to make special provision for the security of the head-valves and their renewal while the other valves, which give more trouble and necessitate the pump being specially overhauled from time to time on their account, remain in existence. In the specification of my application for Letters Patent Serial No. 622,640 I have shown how to construct a steam-engine air-pump without foot and bucket valves, so that the only valves requiring attention are the head-valves

remaining at the top of the pump. Now according to this invention in order that such valves may be readily examined, cleaned, or renewed, even when the pump is at work, and also to add to the security of the valves and their guards and studs I construct and arrange these parts and the pump-casing as I shall now explain by the aid of the accompanying drawings, wherein—

Figure 1 is a vertical section of a steam-engine air-pump embodying my invention, and Figs. 2 and 3 are vertical sections showing modified arrangements.

1 are the valves controlling openings 2 in a valve or seat plate 3 at the top of the pump-barrel 4, the said valves opening into a valve-chamber 5, that is provided at one side with a discharge branch 6 and at the opposite side with an opening 7, normally closed by a door 8, the arrangement being such that upon removing the said door access can be readily gained to the valves for the purpose of examining, cleaning, or renewing them, as may be desired, even when the pump is at work. Each valve is fitted to slide vertically on the end 9^a of a long substantial stud 9, which is screwed through the top or cover 10 or outer part of the pump and has its outer end 9^b always accessible from the outside, even when the pump is at work and the door 8 is not off. The inner end 9^a of the stud is held in a hole or recess 3^a in the valve-seat 3. 11 is a guard on the stud 9 to limit the opening movement of the valve. The advantages of this arrangement are as follows: The size and strength of the stud 9 are not dependent upon the size of the hole through the valve 1, and the size of that part 9^a of the stud on which the valve works can be retained the same size in the valve, and instead of being the strongest part of the stud, as it is in the old type of stud, becomes the weakest part, in consequence of all other parts being made stronger. In fact, these other parts can be made of any desired strength without reducing the width of the valve-seating or the area of the holes 2 through the valve-seat 3. Also that part of the stud which enters the valve-seat can be made of the same diameter as the part on which the valve works, or less, as may be desired.

In consequence of the guard 11 not having

to be taken off the stud 9 each time a valve has to be examined, cleaned, turned, or renewed the guard can be so secured to the stud that it will be quite impossible for it to work loose. Thus the stud and guard may be made in one piece, as shown at the right-hand side of Fig. 1, or it can be screwed tightly on the stud, as shown at the left-hand side of Fig. 1, and be locked in position by a deep tightly-fitting nut 12, with set-screw 13. A set-screw 13^a may also be passed through the guard 11, if desired, or the guard may be recessed at its under side and screwed tight against a collar 9^a on the stud, as shown in Fig. 2, a tightly-fitting lock-nut 12 serving, as before, to prevent the guard working loose, and being further secured by a split pin 13^b, so that it is impossible for it to work adrift and yet causes no inconvenience when a valve has to be renewed. With the arrangement of guard shown at the left-hand side of Fig. 1 the valve, valve-stud, guard, and lock-nut can, if required, all be renewed while the pump is going full speed without loss of vacuum and without loss of water. The firmness of each stud can be readily tested, and, if necessary, the stud can be screwed down more tightly while the pump is at work and the door 8 is in place. Again, if it be required that the pump shall be capable of throwing a larger quantity of water the lift of the valves can be increased while the pump is at work by screwing up the studs to the required extent.

To renew a valve when the pump is going full speed without loss of vacuum and without loss of water, the door 8 is removed, the jam-nut 14 on the outside of the corresponding stud 9 is released, and the stud screwed quickly up with a ratchet-spanner from the outside until the inner end 9^a of the stud is sufficiently above the top of the seat 3 to enable a valve to pass, the old valve still being in place and still working, but with an increased lift. Then a new valve is inserted under the old one, after which the stud is raised high enough to allow the old or upper valve to be withdrawn, which is then done, after which the stud is again screwed down in place and locked by the jam-nut 14 on the top.

By the arrangement described each stud can be entirely manipulated by a man from the outside without being in the way of the man who is changing the valve, the result being that the whole of the valves can be changed in a very short time without stopping the pump, without loss of vacuum, and without loss of water. Another feature of the arrangement described is that when it is desired for any reason to dispense with studs for holding down the valve-seat 3 and pump-barrel 4 the studs 9 can be made to serve this purpose by simply screwing them tight against the valve-seat 3. A further feature of the arrangement is that if through any cause it is necessary to lift the air-pump cover 10 the

mere lifting of the cover will release the whole of the valves and leave them lying on their seats ready for examination. It will also leave the valve-seat free to be lifted and examined if separate fastenings, such as studs and nuts, be dispensed with.

In some cases I so construct the valve studs, seats, and guards that the lower ends of the studs do not bear on the seats, so that if any one of the valves become faulty and a new one be not ready for insertion the corresponding guard can be screwed hard down onto the defective valve, so as to jam it on its seat and put it out of use, the pump then working with the remaining valves. Fig. 3 shows an arrangement of this kind in which the inner end 9^a of the stud and the depth of the hole 3^a in the valve-seat are such that there is sufficient clearance to permit of the endwise movement of the stud to fix the valve on its seat when required.

What I claim is—

1. In a pump, a valve-chamber provided with a removable door and a valve-seat, a stud having its outer end adjustably mounted in the wall of said chamber opposite said valve-seat and its inner end extending freely into a hole in said valve-seat, a guard carried by said stud, and a valve fitted to slide on the inner end of said stud between said valve-seat and guard, substantially as described.

2. In a pump, a valve-chamber having a removable door, a head-plate resting against the delivery end of the pump-cylinder, openings formed in said plate, endwise-adjustable studs having their outer ends carried by and extending through the wall of said valve-chamber so as to be capable of adjustment from the exterior thereof, guards adjustably mounted on said studs and valves mounted to slide on the inner ends of said studs between the valve-plate and guards, substantially as described.

3. In a pump, the combination with the pump-cylinder and perforated valve-plate at the head or delivery end of the cylinder, of a valve-chamber having an outlet branch, a removable cover, and a removable door, studs screwed through said removable cover so as to be capable of endwise adjustment from the exterior thereof and having their inner ends normally extending freely into holes in said valve-plate, guards carried by said studs, and head-valves mounted to slide on the inner ends of said studs between the guards and valve-plate and control the openings in the latter plate, substantially as described.

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

FREDERICK EDWARDS.

Witnesses:

PERCY E. MATTOCKS,
WM. O. BROWN.