L. J. KNOWLES.

Improvement in Steam-Pumps.

No. 114,507. Patented May 2, 1871.

FIG. 1

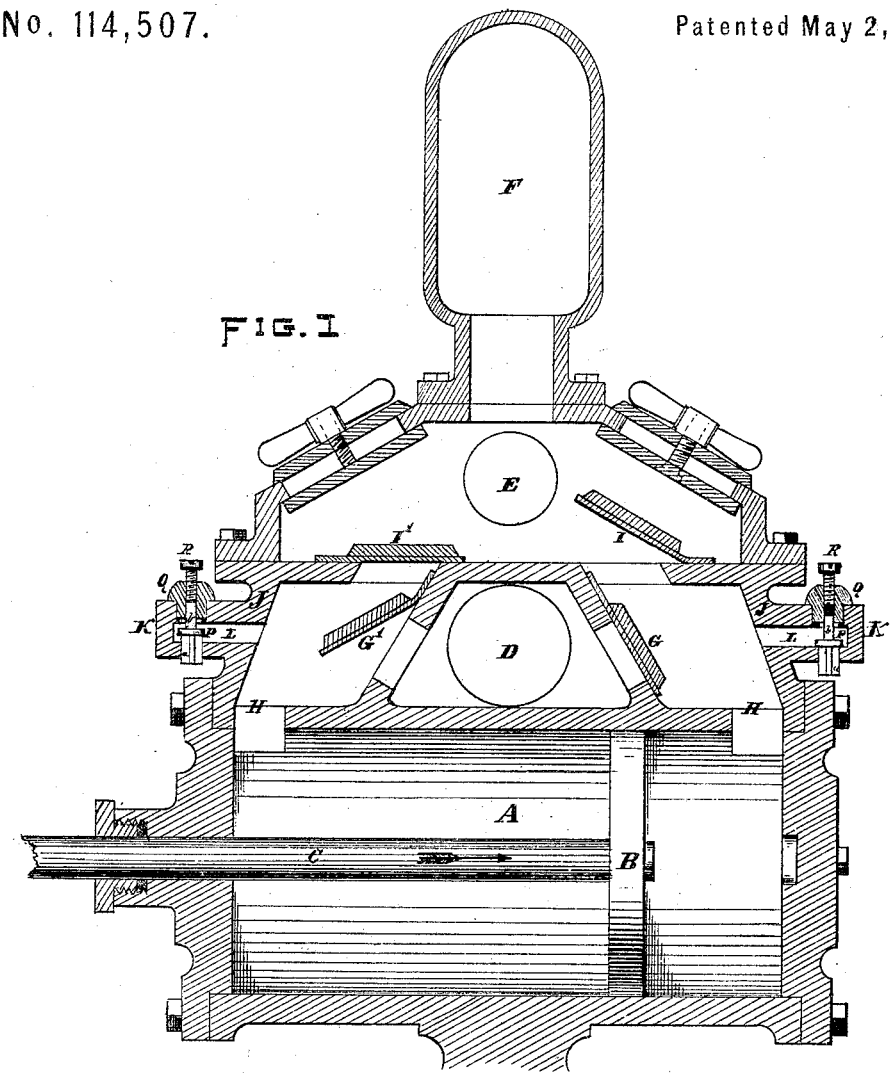


FIG. 3

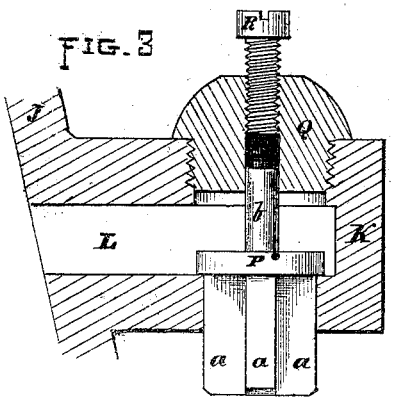
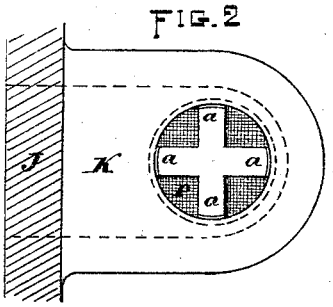


FIG. 2



Witnesses

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IMPROVEMENT IN STEAM-PUMPS.

Specification forming part of Letters Patent No. **114,507**, dated May 2, 1871.

To all whom it may concern:

Be it known that I, LUCIUS J. KNOWLES, of the city and county of Worcester and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Steam-Pumps; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a central vertical section of the pumping-cylinder, valves, and air-chamber. Fig. 2 represents, upon an enlarged scale, a bottom view of one of the air-valves; and Fig. 3 represents a central section of the same.

To enable those skilled in the art to which my invention belongs to make and use the same, I will proceed to describe it in detail.

The nature of my invention consists in the combination, with the valve-box in a steam-pump, of air-passages and valves, substantially as hereinafter described.

In the drawing, the part marked A represents the pump-cylinder. B indicates the piston, and C the piston-rod. D indicates the supply-chamber, E the discharge-chamber, and F the air-chamber. G and G′ indicate the induction-valves for closing the passages between the supply-chamber D and cylinder-ports H; and I I′ indicate the eduction-valves for closing the passages between the ports H and discharge-chamber E.

All of the above-mentioned parts may be constructed and arranged in the ordinary manner, and therefore need not be more fully described.

The shell or casing J of the valve-box is cast with hollow projections K at each of its ends, the spaces L in which open into the interior of the valve-box between the valves G G′ and the cylinder-posts H, in the manner indicated in the drawings.

A small opening is formed in the lower part of each of the projection K for admitting air into the interior of the pump, and valves P are arranged for automatically opening and closing said openings while the pump is in action.

The air-valves P are provided with downward-projecting flanges *a*, arranged radially, so that their outer edges fit against the sides of the openings and prevent the valves from becoming displaced, while sufficient space is allowed at the angles between the flanges *a* for the ingress of the desired quantity of air.

The valves P are also provided with spindles *b*, which project upward from their centers, and the top ends of said spindles *b* fit into openings formed in the plugs Q, and thereby assist in retaining the valves P in proper position.

Set-screws R are arranged through the plugs Q, which can be turned down upon the tops of the valve-spindles *b*, thereby regulating the height to which the valves P rise, and the amount of air admitted to the pump.

The plugs Q are for closing the openings in the projections K, through which the valves P are passed to their seats; and said plugs Q may be secured in place either by means of screw-threads or in any other convenient manner.

By admitting air into the pumps with the supply water, the mechanism of the pumping-engine is relieved from the shock and strain which would otherwise take place when forcing the water to a considerable height. This is owing to the fact that the air mixed with the water in the cylinder and pipes renders the water somewhat elastic, and thus prevents the shock or jar incident to the change in the direction of motion of the piston.

Another advantage gained by the use of the air-valves P is that the air-chamber F is kept constantly supplied with air without the aid of any other mechanism for that purpose, since a portion of the air which is drawn in at the valves P leaves the water as it passes through the discharge-chamber E, and rises into the air-chamber F.

The air being let into the supply water after it has passed the induction G G′, there is no chance for the air to collect in the suction-pipe while the pumping-engine is at rest, and thereby interfere with the sucking up of the water when the engine is again set in motion.

The valves P open and close in conjunction with the induction-valves G G′, respectively, so that the air and water are uniformly mingled in the proper relative proportions as they enter the cylinder A.

Having described my improvements in steam-pumps, what I claim therein as new and of my

invention, and desire to secure by Letters Patent, is—

1. The combination, with the valve-box in a steam-pump, of air-valves, substantially as and for the purposes set forth.

2. The combination, with the shell J of the valve-box in a steam-pump, of hollow projections K and air-valves P, substantially as and for the purposes set forth.

3. The combination, with the valve-box J, provided with hollow projections K, of the air-valves P, plugs Q, and adjusting-screws R, substantially as shown and described.

LUCIUS J. KNOWLES.

Witnesses:
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