

No. 729,013.

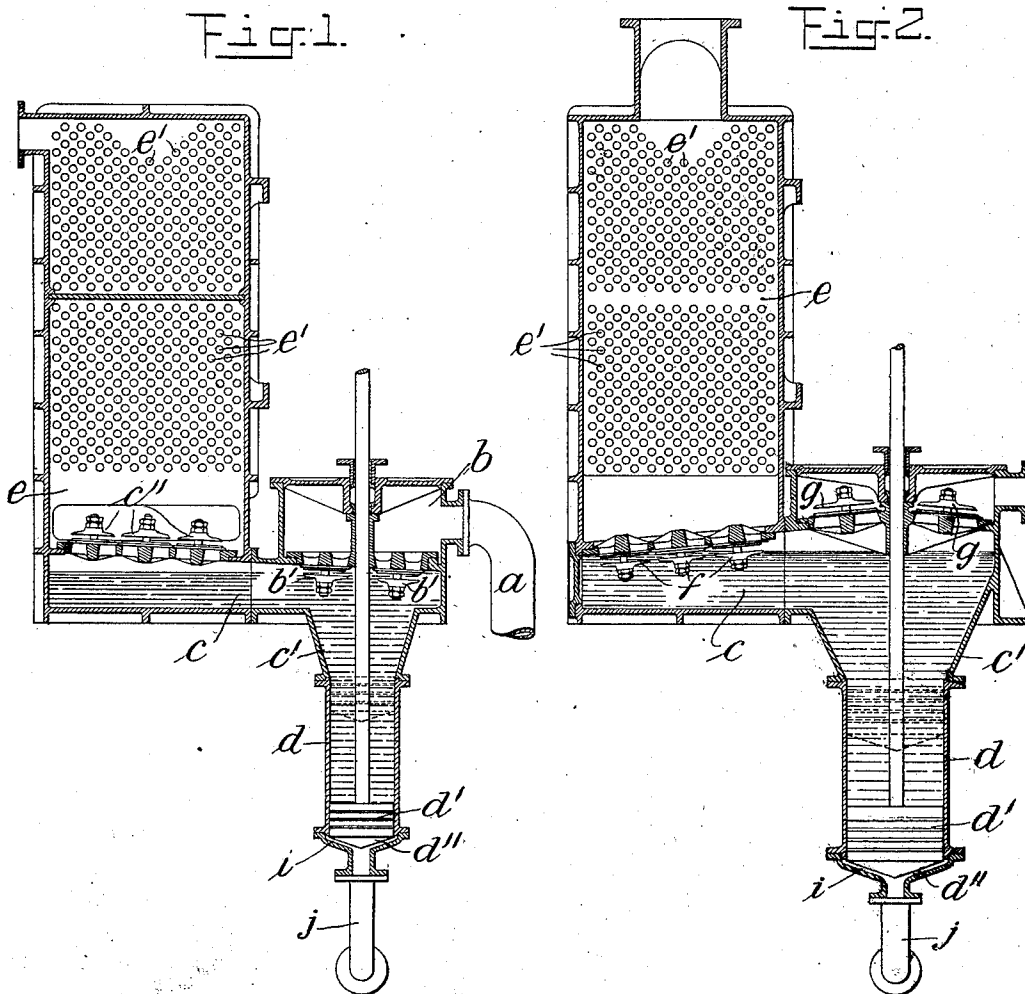
PATENTED MAY 26, 1903.

P. THOMAS & J. S. MARSLAND.
PUMP.

APPLICATION FILED SEPT. 8, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses.
Mr. N. Bates
Geo. C. Miller

Inventors.
Percy Thomas and
John S. Marsland
by Herbert W. Farmer.
Attorney.

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APPLICATION FILED SEPT. 8, 1902.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 3.

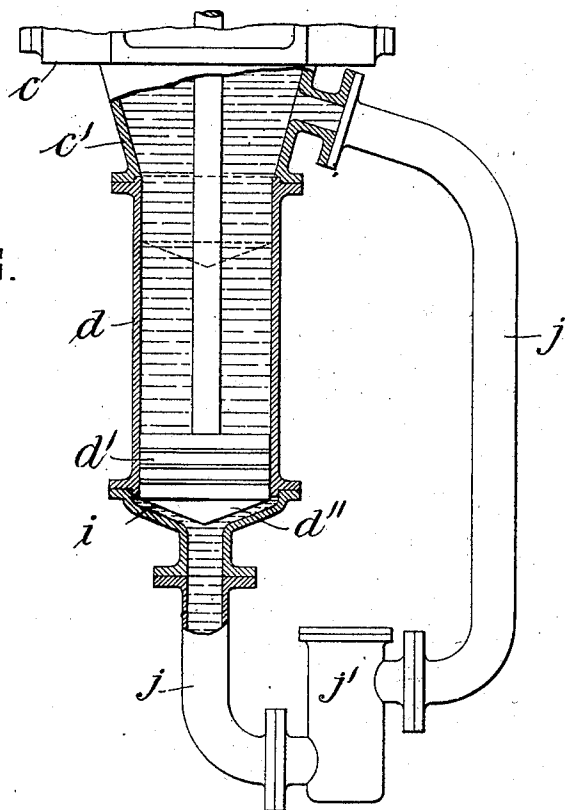
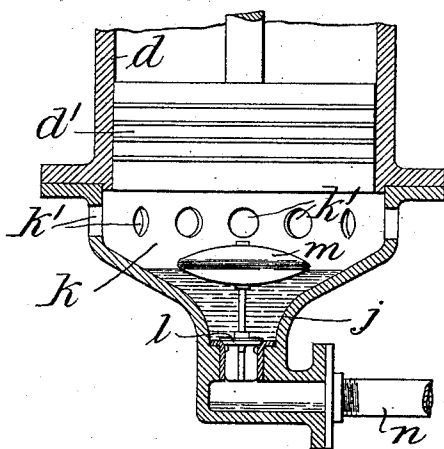


Fig. 4.



Witnesses.

Wm. A. Bates
Geo. C. Puller

Inventors.

Percy Thomas, and
John S. Marsland.
by Herbert W. Jenner
Attorney

UNITED STATES PATENT OFFICE.

PERCY THOMAS, OF MANCHESTER, AND JOHN S. MARSLAND, OF HALIFAX,
ENGLAND.

PUMP.

SPECIFICATION forming part of Letters Patent No. 729,013, dated May 26, 1903.

Application filed September 8, 1902. Serial No. 122,607. (No model.)

To all whom it may concern:

Be it known that we, PERCY THOMAS, residing at Manchester, in the county of Lancaster, and JOHN S. MARSLAND, residing at Halifax, in the county of York, England, subjects of the King of Great Britain, have invented certain new and useful Improvements in Pumps; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has reference to pumps for lifting and forcing liquids, air, or gases, and particularly to pumps of the single-acting vertical-displacement type, the object of our invention being to obtain efficiency in action at high velocity.

Our invention consists in forming or attaching the cylinder or barrel of the pump below or at the bottom of the displacement-chamber in such a position as to provide a head of water or other liquid on the top of the pump bucket or plunger sufficient to insure said water or other liquid following the bucket in all its movements and remaining in constant contact with it whatever may be the velocity with which it is impelled or drawn through the pump barrel or cylinder. We also provide suitable means, to be hereinafter described, for dealing with any water or other liquid which through wear or other cause leaks or finds its way past the pump-bucket.

Those skilled in the art to which our invention refers will readily understand our improvements by the aid of the annexed drawings, in which—

Figure 1 is a sectional side view of a single-acting vertical-displacement pump embodying our improvements and applied as a circulating-pump of a steam-engine condenser. Fig. 2 is a similar view of a single-acting vertical-displacement pump embodying our improvements and applied as a steam-engine air-pump. Fig. 3 is a detail of the means we employ for returning the leakage-water or other liquid to the displacement-chamber of the pump, and Fig. 4 shows a modification of our improvements for dealing with the leakage-water or other liquid.

Referring first to Fig. 1, our improvements for the sake of illustrating one application of

same are shown applied to the circulating-pump of a steam-engine condenser.

In the drawings letter *a* represents the inlet-pipe, and *b* the inlet-chamber, provided with valves *b'*, opening into the displacement-chamber *c* of the pump. To the downwardly-extending portion *c'* of the displacement-chamber *c* is attached the cylinder or pump-barrel *d*, in which works the bucket or plunger *d'*. The displacement-chamber *c* is provided with exit-valves *c''*, opening into the circulating-chamber *e* of the condenser.

The displacement-chamber *c* and the extension *c'* thereof are of a capacity to contain a sufficient supply of water or other liquid to provide a "head" on the bucket *d'* to insure the water or liquid always following said bucket and remaining in constant contact therewith.

The action of the pump is as follows: As the bucket *d'* descends the valves *b'* are opened by suction and water is drawn from the inlet-chamber *b* to fill the space occasioned in the displacement-chamber by the alteration in position of the bucket. On the bucket rising the valves *b'* close and the water displaced by the upward movement of the bucket is forced or lifted past the valves *c''* into the circulating-chamber *e* of the condenser to circulate through the condenser-tubes *e'*.

Fig. 2 shows our improved pump applied as a steam-engine air-pump. The function of the pump in this instance is to remove the vapor and condensed steam from the condenser, and in the case of a jet-condenser the condensing-water also, and to maintain a vacuum in the condenser. The bucket *d'* is shown in its low position with a head of water on its upper surface, as previously set forth. As the bucket rises the vapor and condensed steam drawn from the condenser on the previous downward stroke of the bucket are expelled through the valves *g*. On the bucket descending again the valves *g* close, and a volume of vapor and condensed steam corresponding to the stroke capacity of the pump is drawn through valves *f* from the condenser into the displacement-chamber to be expelled therefrom on the next upward stroke of the bucket.

It will of course be understood that a pump constructed as described may be put to vari-

ous uses other than the applications of it shown, which are simply given by way of illustration. For instance, the pump might be used for lifting water from a low level and forcing it to a higher level, or by slight alteration in details the pump might be used as an air-compressor without in any way departing from our invention.

Owing to wear which is bound to take place, there will be a certain amount of leakage past the bucket or plunger d' , and we therefore provide means for dealing with this leakage-water or other liquid, as shown clearly in Fig. 3. At the bottom of the barrel or cylinder d , Fig. 3, is formed or attached a chamber i , preferably conical in shape, as shown. The under side of the bucket is formed with or has attached thereto a correspondingly-shaped cone or secondary plunger d'' , adapted when the bucket is in its low position to fill or partly fill said chamber i and force out any water therein contained through a pipe j past a suitable form of non-return valve j' of ordinary construction and back into the displacement-chamber c of the pump. In some cases this method of dealing with the leakage-water would be unsatisfactory, owing to the formation of a vacuum in the barrel or cylinder d as the bucket makes its upward stroke. For dealing with the leakage-water in such cases we provide alternative means shown in Fig. 4 and to which reference is now made. At the bottom of the barrel or cylinder d is formed or attached a chamber k , provided in the upper portion thereof, below the limit of downward movement of the bucket, with a number of air inlets or openings k' . At the bottom of said chamber is a valve l , provided with a float attachment m . When the leakage-water reaches a predetermined height in the chamber k , the float m rises and opens the valve l , permitting the water collected in said chamber to pass into a pipe n . This pipe may be connected with the interior of the condenser, so that the vacuum in the condenser will act to clear it. When the mechanism is at rest and the condenser consequently does not act to clear the pipe n , the leakage-water overflows through the openings k' . The pipe n may be connected with any other available means of exhaust equally as well as with the condenser. This method of dealing with the leakage-water is specially applicable where the pump is being employed to lift water from a very low level, necessitating the employment of long and consequently heavy connectors between the bucket or plunger and

the actuating mechanism, as the atmospheric pressure acting on the under side of the bucket or plunger assists in balancing the parts.

Where it is not desirable that the leakage-water shall be returned to the water-space of the pump or to the condenser, the bottom of the barrel or cylinder d may be left perfectly open to the atmosphere, in which case the leakage-water may be dealt with as found most convenient.

What we claim, and desire to secure by Letters Patent, is—

1. The combination, with a displacement-chamber provided with suction and delivery valves at its upper part and a downwardly-projecting extension on its lower part under the said suction-valve, of an inlet-chamber over the said suction-valve, a pump-barrel secured to the said extension, a piston slidable in the said barrel, and a piston-rod which is secured to the said piston and which passes upward through the said extension and through the displacement and suction chambers.

2. The combination, with a pump-barrel, and a solid piston slidable in the said barrel; of a drainage-chamber secured to the lower end of the said barrel and provided with outlets at its upper and lower parts, a valve controlling the said outlet at the lower part of the drainage-chamber, and a float connected to the said valve and operated by the liquid in the said chamber, substantially as set forth.

3. In a single-acting vertical-displacement pump, the combination, with a displacement-chamber provided with inlet and exit valves, and having capacity to hold a head of water or other liquid, a vertical barrel or cylinder on the under side of and open to said chamber and a bucket or plunger working in said barrel or cylinder and exposed to the head of water or other liquid in the displacement-chamber, of a chamber formed at or attached to the bottom of the barrel or cylinder, air openings or inlets in the upper portion of said chamber, a float-actuated valve in the lower portion of the said chamber, and a pipe connecting said chamber with the interior of a steam-engine condenser or other means of exhaust, substantially as shown and described.

In testimony whereof we affix our signatures in presence of two witnesses.

PERCY THOMAS.

JOHN S. MARSLAND.

Witnesses:

THOMAS H. BARRON,
FRANK LEWIS.