T. O. PERRY.

PNEUMATIC PUMP.

No. 174,086. Patented Feb. 29, 1876.

Fig. 3.

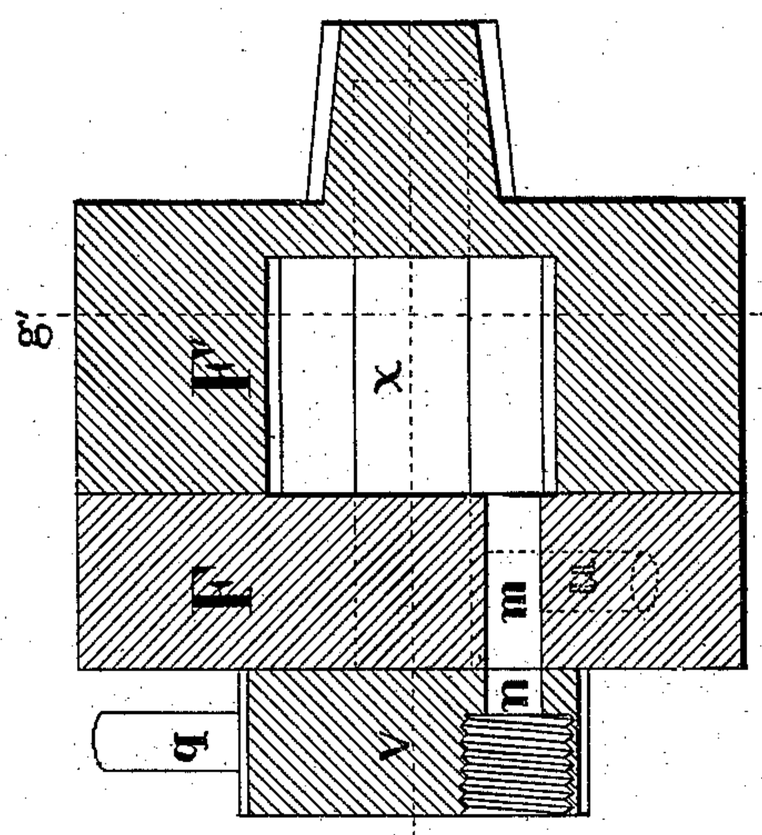
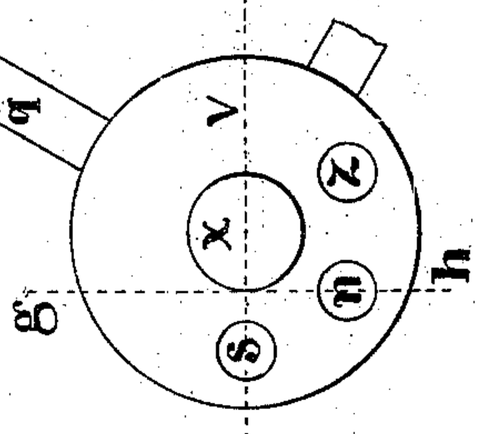
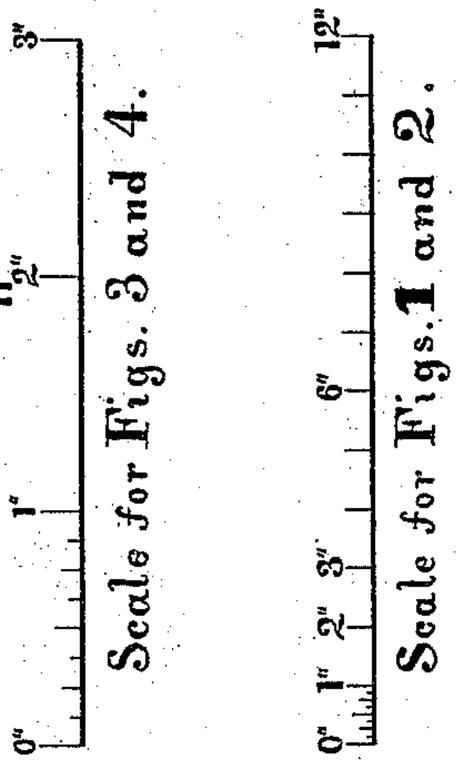



Fig. 4.



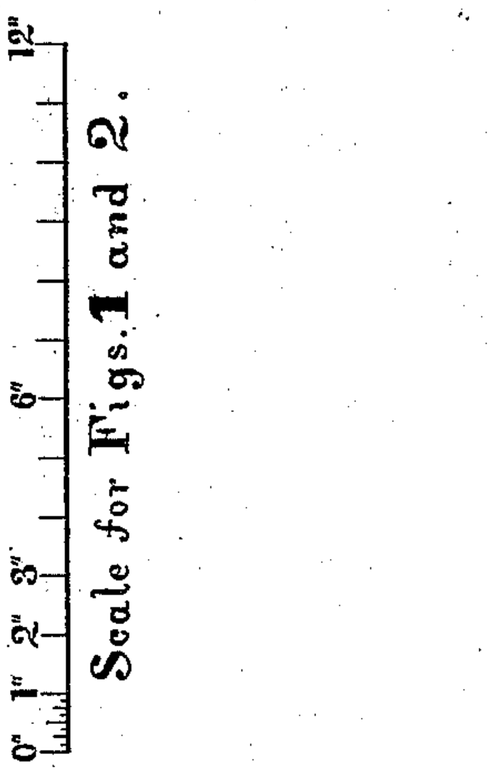




Fig. 2. Fig. 1.




WITNESSES:

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# UNITED STATES PATENT OFFICE.

THOMAS O. PERRY, OF TECUMSEH, ASSIGNOR OF ONE-HALF HIS RIGHT TO FRANKLIN W. DICKEY, OF MARSHALL, MICHIGAN.

## IMPROVEMENT IN PNEUMATIC PUMPS.

Specification forming part of Letters Patent No. **174,086**, dated February 29, 1876; application filed July 17, 1875.

*To all whom it may concern:*

Be it known that I, THOMAS O. PERRY, of Tecumseh, in the county of Lenawee and State of Michigan, have invented certain Improvements in Pneumatic Pumps, of which the following is a specification:

My invention relates to a device for raising water by means of compressed air; and consists, first, of an air-valve to allow the alternate admission and escape of air to and from a submerged water chamber, for the purpose of driving the water out and letting the chamber refill; second, of a device for rendering the operation of said valve automatic by means of a float in the water-chamber.

The air-valve may be connected with either one or two water-chambers.

In the drawing, Figure 1 is a vertical section of the pump, cutting the air-valve through *g' h'*, Fig. 3, and showing the float and interior of the water-chambers. Fig. 2 shows the exterior of the air-valve revolved half around from the position of Fig. 1, omitting the air-tubes *f* and *t*. Fig. 3 is a section of the air-valve to the right of the line *g h*, Fig. 1, omitting the pieces *l w w'* &c. Fig. 4 is an end elevation of the piece V, showing the inner face.

A and B are submerged water-chambers, into which water is admitted through the valves *a* and *b*. The water passes out through the short pipes C and D, which are screwed into the top of the chambers, and reach nearly to the bottom. These pipes connect with the discharge-pipe P by means of the connecting-chamber E and the valves *c* and *d*, which prevent water from flowing back. Now, if air is forced into either of the water-chambers from the top, the water will be forced into the discharge-pipe P, through which it may be led anywhere it may be desired. Air is forced, by means of a condenser, into the air-tube *t*, which may be of any desired length, so that the condenser may be placed wherever it is most convenient to apply the power. The piece V is connected, at the aperture *n*, with the air-tube *t* by means of a flexible tube, *f*. The piece V turns upon its axis, *x*, and is pressed by a spring or weight (not shown in drawing) against the flat surface of the piece F.

The aperture *n*, in V, is shown, Fig. 3, opposite to the aperture *m* in the piece F, so that air passes through and into the tube M, which connects with the top of the water-chamber A. To the axis *x* is attached a short arm, *l*, Fig. 1, the end of which is connected, by means of a rod, *r*, passing through the tube M, to a float, H, in the chamber A. The water being forced out of A, the float drops, turning the piece V so that the aperture *n* is turned away from the aperture *m* and brought opposite to another aperture, *u*, which goes a little way into the piece F, turns and connects with the tube U, leading to the top of the water-chamber B. The piece V has also two other apertures, *s* and *z*, so situated that when the aperture *n* is opposite to the aperture *m* the aperture *z* will be opposite the aperture *u*, and when the aperture *n* is opposite the aperture *u*, *s* will be opposite *m*; so that while air is being forced into the chamber A the air in B may escape through the apertures *u* and *z*, and when forced into B through *n* and *u* that in A may escape through *m* and *s*, thus allowing one chamber to fill while the other is being emptied. When water refills the chamber A, the float H rises and turns the piece V back to its former position.

The chamber B is only needed to keep the flow of water constant. If the tube U were either removed or obstructed, the chamber A would act alone, and the flow would be interrupted while refilling. The float H is made to reach nearly from top to bottom of chamber A, allowing only the necessary movement.

In order to prevent the float from falling or rising before the proper time, an adjustable weight, *w*, is attached to a rod, *q*, screwed into the top of the piece V, Figs. 2 and 1, at right angles to the arm *l*. This weight *w* resists the tendency of the float to fall or rise, and offers the greatest resistance at starting. Indeed, after passing a vertical line through *x*, the weight assists the float in its movement, so that when the float overcomes the starting resistance of *w* it falls or rises at once. In order that the float may act with equal force in either direction, its specific gravity should be $\frac{1}{2}$. But if its specific gravity exceeds $\frac{1}{2}$, the float may be made to act with equal force in

either direction by subjecting the rod *r* to a suitable tension by means of an adjustable weight, *w'*, attached to a rod screwed into the piece V opposite to the arm *l*.

By making the float just heavy enough to sink, the rod *r* may be replaced by a wire, and the air-valve may be placed as far above the water-chamber as is desirable. Of course this pump, without the float H and weight *w*, will operate if the piece V is turned by hand.

I claim as my invention—

1. The float H, rod *r*, arm *l*, piece F', and weight *w*, in combination with the air-valve *v* F, constructed as shown and described, for the purpose of rendering automatic the alternate admission and escape of air to and from the water-chamber of a pneumatic pump.

2. The air-valve *v* F, with apertures *n*, *s*, and *m*, in combination with the piece F', weight *w*, arm *l*, rod *r*, and float H, all connected, by means of the tube M, with the water-chamber A, with its valve *a*, outlet-pipe C, check-valve *c*, and discharge-pipe P, as and for the purpose herein described and shown.

3. The air-valve *v* F, with apertures *n*, *s*, *z*, *m*, and *u*, in combination with the piece F', weight *w*, arm *l*, rod *r*, and float H, all connected by the tubes M and U with the water-chambers A and B, with their valves *a* and *b*, outlet-pipes C and D, check-valves *c* and *d*, and discharge-pipe P, substantially as shown and described.

4. In a pneumatic pump the weight *w*, combined with the piece V and float H, as and for the purpose herein described.

5. The weight *w*, in combination with the piece V and float H, as and for the purpose set forth.

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