W. PAINTER.

PUMP VALVE.

No. 187,411. Patented Feb. 13, 1877.

Fig. 1.

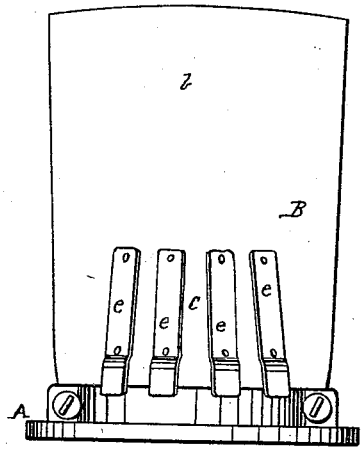


Fig. 2.

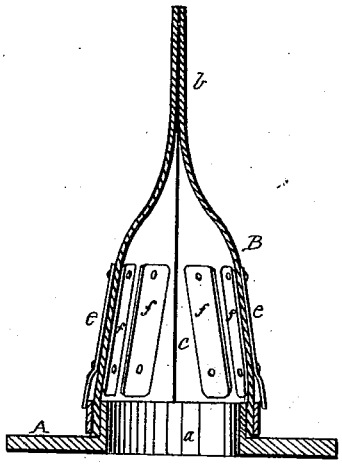


Fig. 3.

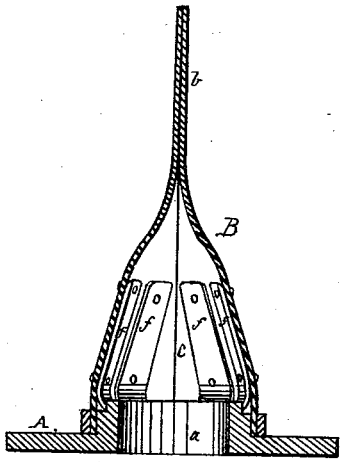
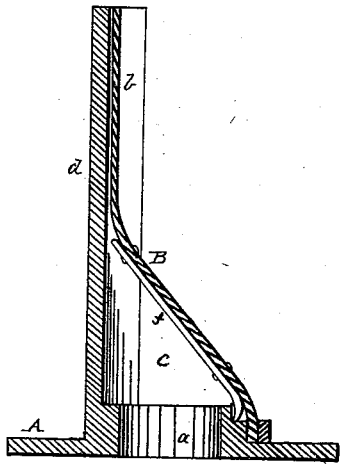


Fig. 4.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN PUMP-VALVES.

Specification forming part of Letters Patent No. **187,411**, dated February 13, 1877; application filed December 24, 1875.

To all whom it may concern:

Be it known that I, WILLIAM PAINTER, of the city and county of Baltimore, in the State of Maryland, have invented a certain new and useful Improvement in Valves; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a true and complete description of my invention and of valves embodying the same.

In Letters Patent heretofore granted to me, dated August 5, 1873, I show and describe "flap-valves," which are particularly adapted for use in connection with pumping apparatus for transferring the contents of privy-vaults, cess-pools, &c., to transit tanks; and my present improvement relates to flexible flap-valves adapted to perform the special service referred to.

Flap-valves of this class are generally of a tubular form, and may embody either two flaps, which engage with each other when the valve is closed, or a single flap arranged to engage when the valve is closed, with a coincident face, having an area corresponding at least with the area of the flap. In order to prevent introversion, it is essential that a flexible flap-valve be provided at its base, with one or more rigid braces or stiffeners, and the valves shown in my Letters Patent referred to are thus provided.

Said braces or stiffeners, when operating purely as such, may be placed on the outside of the flap, near its base, and arranged to bear at their lower ends against the outside of the flange of the valve-plate or upon the intervening portion of the flexible material, and their upper ends arranged to engage with the corresponding ends of other braces or against a stationary surface, the flexible material being interposed in both cases.

Such braces or stiffeners are shown in my former Letters Patent referred to. In operating upon night-soil and similar matters, a flap-valve requires considerably more internal pressure to open it fully than would be requisite if the valve had no flap or flaps, and, therefore, at its entrance it is exposed to serious abrasive contact with sticks, stones, and other earthy matters while forcing open the valve, and while passing through it; and the object of my present invention is not only to prevent introversion as heretofore, but also to so arrange the bracing and stiffening devices at the interior of the base of the valve below the flap or flaps adjacent to the entrance of the valve, that the flexible material, of which the valve is mainly composed, shall be practically protected against undue wear or abrasion, and also afford a hard, smooth surface, with which the passing solid matters will not unduly engage with frictional contact, as is liable to be the case when the flexible material has its surface exposed as heretofore in flap-valves.

My invention consists, therefore, in the combination, with a flexible flap-valve, of one or more suitable rigid, smooth-surfaced braces or stiffeners, located adjacent to the interior of the base or entrance of the valve, and arranged to protect the adjacent surfaces of the flexible material.

To more particularly describe my invention, I will refer to the accompanying drawings, in which—

Figure 1 represents in side view one of my improved valves, which in this view resembles such a flexible flap-valve as is described in my Letters Patent before referred to. Fig. 2 represents the same in central longitudinal section, showing at the interior of the valve at its base the interior braces or stiffeners operating as protecting-plates in accordance with my present invention. Fig. 3 represents in vertical central section one of my improved flexible flap-valves, having no exterior braces or stiffeners, and provided with interior braces or stiffeners, which serve also as protecting and anti-friction plates. Fig. 4 represents a flexible flap-valve with a concave rigid seat and a single flap.

In each of the figures, A denotes the valve-plate, and *a* the valve-port or opening. B denotes the flexible flap-valve. The flap is shown at *b*, and the base of the flexible material which immediately guards the valve-opening is shown at *c*.

In Fig. 4, *d* denotes a rigid seat, with the concave surface of which the flap *b* engages. The braces or stiffeners at *e*, Figs. 1 and 2, are

composed, preferably, of metal, and are arranged outside of the valve at its base below the flaps.

So far as relates to the details thus described, the valves shown differ in no material respect from those shown, described, and claimed in my Letters Patent before referred to.

In Fig. 2 the interior braces and protecting-plates are shown at *f*. In Fig. 3 the interior braces at *f* are shown to be arranged, so that they are enabled to perform the function of protecting and anti-friction plates. Their lower ends engage with the exterior surface of the flange, and when external pressure is applied to the valve the upper ends of those stiffeners on one side of the valve-opening engage with the upper ends of the corresponding stiffeners or braces on the opposite side thereof.

In Fig. 4 the interior braces *f* are arranged to engage with the flange at their lower ends, as in Fig. 3, and their upper ends with the rigid concave surface constituting one side of the valve.

It will be seen that the interior plates in Fig. 2 will operate as stiffeners or braces without the presence of the exterior braces, for the upper ends must engage with each other as before, and their lower ends are connected to the flange by means of the flexible material which operates as a hinge on which they may vibrate.

It will be seen that in Figs. 1 and 2 I have shown a flap-valve provided with interior and exterior braces or stiffeners, and that each inner brace is connected by means of rivets to a corresponding exterior brace, and that the lower end of the exterior brace extends below the top of the flange on the valve-plate, which surrounds the valve-port, and also that the inner brace, by reason of its being connected with the outer one, operates in this instance with said outer brace as a single stiffener; and still further, that this inner portion of the compound brace also performs the function of a protecting-plate to the flexible material of which the valve is mainly composed, and affords a hard, smooth interior surface at the entrance to the valve, along which solid matters may freely pass without objectionable frictional contact.

It will also be seen that the interior protecting-plates may readily be adapted to perform the function of a brace or stiffener independently of any exterior brace, as is illustrated in Figs. 3 and 4, and as described in connection with Fig. 2.

It is to be distinctly understood that I do not broadly claim herein the combination, with a valve composed of flexible material, of stiffeners which operate as protecting-plates, because in certain Letters Patent heretofore issued to me, dated October 11, 1875, and numbered, respectively, 168,775 and 168,776, I show and describe valves having flexible covers and interior and exterior braces or stiffeners; and also because I am well aware that valves have long been made to operate as hinged or clack valves, in which the valve-cover, composed of flexible material, is incased between a top plate and a bottom plate, leaving only a narrow projecting rim of said flexible material beyond said bottom plate. In these valves, however, the flexible material is also necessarily elastic, in order that the valve may close promptly, as the elastic material operates as a spring-hinge in a clack-valve, and is assisted in so operating by an abutting surface above the hinge, with which the upper rear portion of the upper plate forcibly engages when the valve is opened.

My present invention is confined to flap-valves, and was invented and practically applied by me to such valves long prior to dates of the inventions described in my said Letters Patent of October 11, 1875.

The flap-valve necessarily requires more internal pressure for opening it than a flexible valve without the flap, and the interior braces and protecting-plates serve without undue friction to guide the solid and abrasive matters into the interior portion of the valve which is bounded on one or both sides by the flap, which latter, by folding or longitudinally incasing long objects, such as sticks, &c., interposed at the time the valve should close and operate as a valve, thereby render the flap-valve stiffened at its base peculiarly and effectually adapted to perform the special service for which it was intended by me. These flap-valves necessarily have an extensive surface with which matters passing through them frictionally engage, and this frictional contact is materially lessened by having the interior of the valve for a portion of its length provided with the hard-surfaced protecting-plates, along which said matters freely pass without objectionable friction, and proportionately less power is required for pumping than would be the case if they were not employed.

Having thus described my invention, I claim as new and desire to secure by these Letters Patent—

The combination, with a flexible flap-valve, of a suitable brace or stiffener located at the interior of the base of the valve at its entrance, and arranged to operate as a protecting medium, substantially as described, whereby the flexible flaps are readily opened, the valve protected from introverting, and the flexible material protected against undue abrasion, as set forth.

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