W. PAINTER.

Valves.

No. 155,668. Patented Oct. 6, 1874.

Fig. 1.

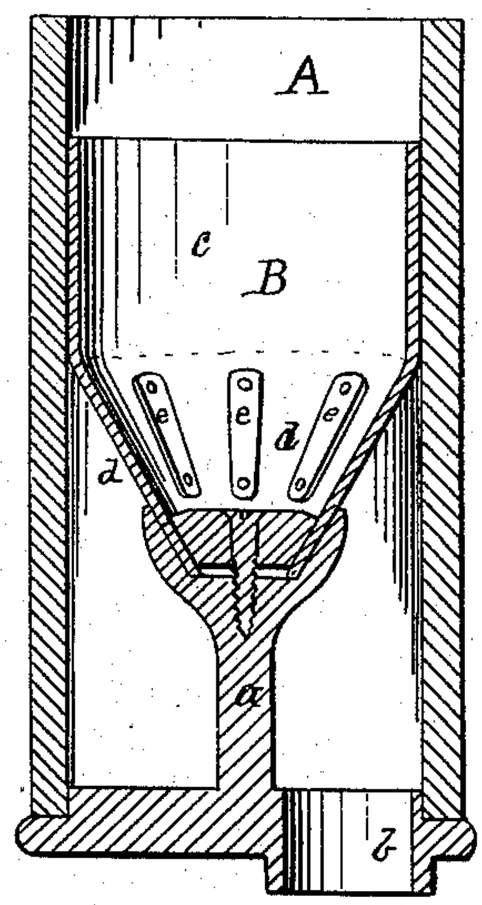


Fig. 2.

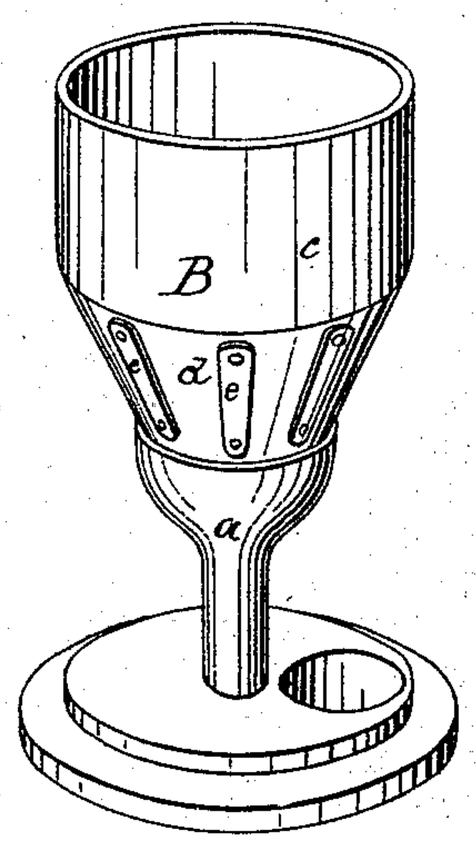


Fig. 3.

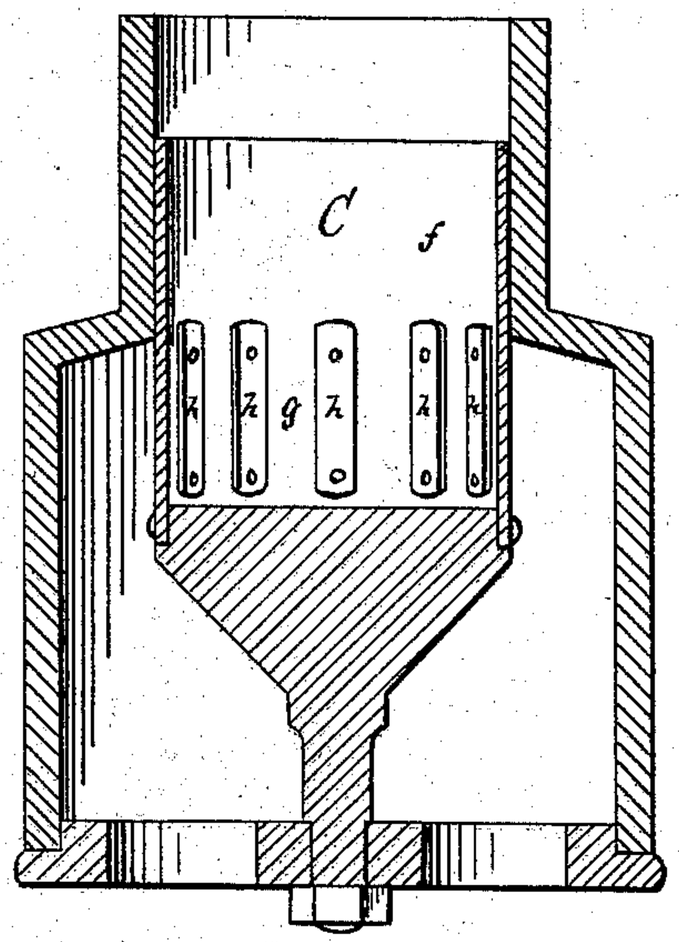
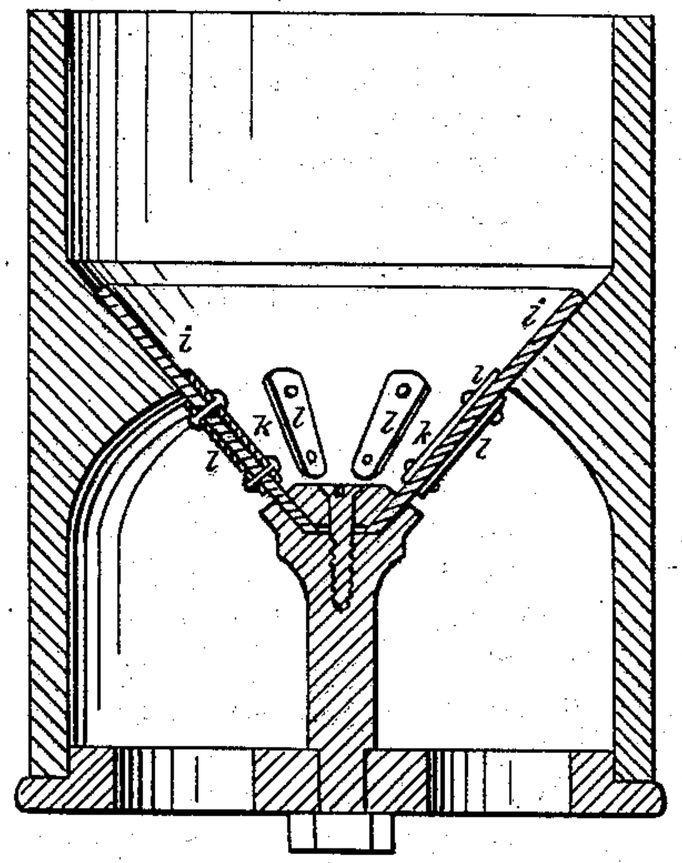


Fig. 4.



Witnesses.
P. F. Larner
A. B. Cauldwell

Inventor.
William Painter
By Wm. C. Wood
Attorney

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

WILLIAM PAINTER, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN VALVES.

Specification forming part of Letters Patent No. **155,668**, dated October 6, 1874; application filed September 19, 1874.

CASE B.

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 certain new and useful Improvements in Valves.

My improvements relate to that class of valves which may be properly termed "flexible cup-valves," from the fact that they approximate more or less closely to the form of a cup, with sides parallel with the axial line of the valve-opening, or inclined outward therefrom. These valves close by contact of their exterior surfaces with an annular valve-seat, and depend largely for their successful operation upon the pressure of a fluid within the cup, whereby its sides are distended or forced against the seat.

The object of my improvement is to adapt this class of valves for use in apparatus intended for the removal of the contents of privy-vaults, cess-pools, &c., and their transfer to tanks for transit. As heretofore constructed, cup-valves have been employed in connection with seats provided with numerous ports of necessarily small dimensions, in order to secure proper closure by the cup without the liability of the cup or any portion of it being forced into said ports.

My invention consists in a peculiar construction of the cup, whereby the seated portion will be flexible in all directions, in order that it may adapt itself freely to its seat, and encompass and form a valve-tight joint upon and around any ordinary quantity or bulk of extraneous matter which is liable to be temporarily deposited on the seat, and also whereby the portion of the cup which guards the port or water-way will be flexible in lines practically parallel with the axial line of the water-way, but absolutely rigid in lines at right angles thereto, in order that the cup may be prevented from being forced backward into the valve-port or the passage which it guards, and at the same time be free not only to adapt itself to the seat at all sides, but also to any extraneous matter which may be temporarily deposited thereon; 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 clear and accurate description of my invention, and of several valves embodying it.

Referring to the drawings, Figure 1 represents, in section, one of my valves as if located at the foot of a pump-barrel. Fig. 2 represents, in perspective, the cup-valve detached. Figs. 3 and 4 represent modifications of the same.

A denotes the valve-chamber. It may be, as shown, the barrel of a pump, or it may be separately constructed for attachment to the pump-barrel. B denotes one form of cup-valve, shown in perspective in Fig. 2. In outline it resembles in this instance a wine-cup or goblet. It is mounted upon a standard at *a*, which is united to the pump-head, through which fluid and other matter enters by one or more openings, as at *b*.

It will be observed that in this instance the entire interior of the pump-barrel constitutes, in fact, a port, which the cup-valve is to control, admitting the fluid matter to pass in one direction, and preventing its return. Although preferably made without seam, and of molded vulcanized caoutchouc, the valve, for the purpose of illustration, will be considered as constructed in two sections—the seated section *c* and the port-guarding section *d*. The seated section has parallel sides, and engages in valve contact with the interior of the pump-barrel, which, in this instance, constitutes the valve-seat. The port-guarding section has inclined sides, extending upward from the standard *a* to their junction with the lower end of the seated section, and thus guards the entire opening within the pump-barrel, which, in this instance, constitutes the valve-port. Both of these sections are made sufficiently flexible to admit of their collapsing to any required extent for admitting the passage of solid matter, as, for instance, sticks, shavings, articles of clothing, &c. It is obvious that all such solid matter must move in line with the axis of the pump-barrel, and that such matter is liable, at the closure of the valve, to be temporarily deposited upon the valve-seat, and, therefore, it is essential that both sections be flexible in lines parallel with the axial line of the water-way. At the same time, in order to retain the

charge already passed through the valve, it is essential that the port-guarding section *d* be inflexible or rigid as against interior pressure; otherwise the cup-valve would be inverted and rendered inoperative. Therefore I attach to the section *d*, by riveting thereto or embedding therein, certain longitudinal braces *e*, which are set radially and at intervals, and extend from the standard *a* to the sides of the pump-barrel or valve-chamber, as the case may be. These braces or stiffeners may be composed of thin sheet metal, or of any material of sufficient rigidity to withstand the back pressure on the section.

In Fig. 3 the cup-valve C is wholly straight-sided, and is mounted, as in Fig. 1, on a standard. It has also two sections, as in Fig. 1. The upper section *f* is the seated section, and engages with the interior surface of the barrel, as in Fig. 1. The lower or port-guarding section *g*, instead of having inclined sides, is, in outline, a continuation of the upper section, and the water-way is formed below the seated portion by an enlargement of the barrel at its base, constituting a valve-chamber. As in Fig. 1, the lower section *g* is provided with the braces or stiffeners *h*, of the character already described, which extend within the cup from the standard to a point slightly above the lower edge of the valve-seat. These braces are all parallel with the axial line of the water-way, and consequently the cup is flexible above the standard in lines parallel with the braces, but rigid in resisting interior pressure.

In Fig. 4 the cup-valve has no vertical sides for contact with the interior of the barrel, but has inclined sides only, therefore necessitating a valve-seat having an annular surface correspondingly inclined. It has, however, as in the previously-described instances, a seated section, as at *i*, and a port-guarding section, as at *k*, and a standard. The section *i* is provided with braces or stiffeners, as at *l*, which extend from the standard to the seat, as in Figs. 1 and 3.

It will be observed that these three forms of valve possess common characteristics. They are all cup-shaped, and are closed by pressure inside the cup. Each has its seated section, which is wholly flexible, and can close down upon and around a stick or stone, for instance, and make a valve-tight joint. Each has its braced section, which is flexible in one direction and rigid in another. In each of these valves a rope or small stick would afford no serious obstruction to their proper operation. Either of them at the stiffened section, by being flexible in the line of direction which the rope or stick must take in passing through the valve, would enable it to sufficiently close around the obstacle to prevent its return or any return of viscous matter, while the wholly flexible section would also freely close around that portion of the obstacle located between the valve and the seat, effecting a fluid-tight closure thereof.

It will be seen that the proper valve contact of the wholly flexible portion of the valve will be attained by any general pressure within the cup, whether it be induced directly by the matter which is passed through the valve, or whether the cup be provided with an elastic close cap, and the pressure of the matter thereon so drives it inward as to induce pressure upon air contained within the cup, or upon any other denser fluid with which it may be specially charged.

It is to be distinctly understood that I make no claim herein broadly to the stiffeners or braces *per se*, or in combination with a flexible valve, as that feature constitutes in part the subject of Letters Patent granted to me August 5, 1873, No. 141,587, in which is also described a valve having a laterally-concave seat and a flap fitted thereto, and provided with longitudinal stiffeners or braces at its base.

I am aware that it has been proposed, prior to my invention, to construct a pump-piston by combining with a perforated basket a flexible cup-valve filling said basket, and supported from top to bottom by interior springs. Such a valve is not adapted to perform the service herein described, for the reason that the numerous perforations in the basket constitute numerous ports, through which viscous or solid matter could not practically pass. Moreover, the interior springs, extending from one end of the cup to the other, prevent that degree of adaptability of the seated portion to its seat, and to obstructions temporarily deposited thereon, which is practically requisite in valves employed in this special service.

I claim as new, to be secured by these Letters Patent—

A flexible cup-valve having the seated portion wholly flexible, and the port-closing portion partially flexible and partially rigid in the line of the radial stiffeners or braces, substantially as described.

Witnesses: WILLIAM PAINTER.
WM. C. WOOD,
P. F. LARNER.