(No Model.)

J. HARDMAN, Jr.

SYRINGE.

No. 523,345. Patented July 24, 1894.

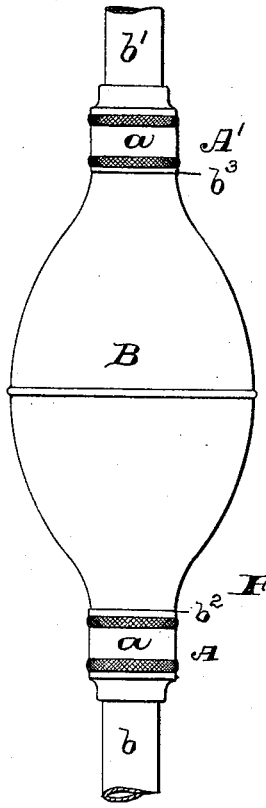

Fig. 1

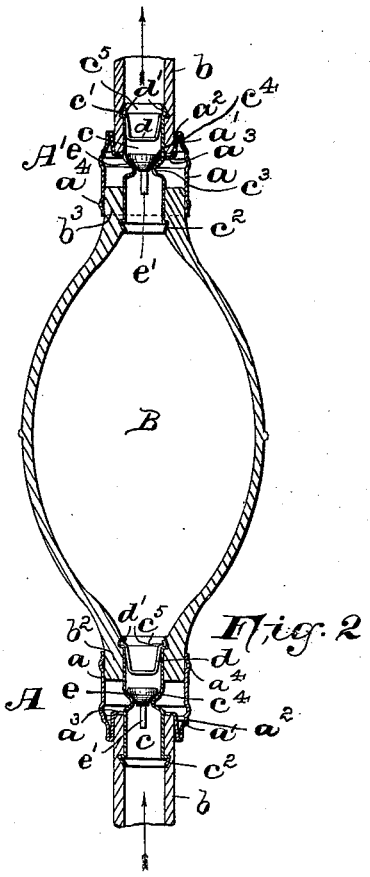

Fig. 2

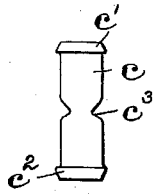

Fig. 3

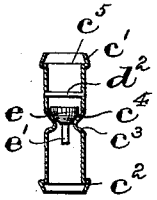

Fig. 4

Fig. 5

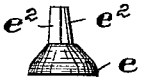

Fig. 7

Fig. 6

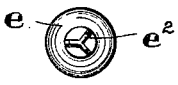

Fig. 8

WITNESSES:

Wm. H. Canfield, Jr.

A. Basil Hooper

INVENTOR:

James Hardman, Jr.

BY Fred'k Fraentzel, ATT'Y

UNITED STATES PATENT OFFICE.

JAMES HARDMAN, JR., OF BELLEVILLE, NEW JERSEY.

SYRINGE.

SPECIFICATION forming part of Letters Patent No. 523,345, dated July 24, 1894.

Application filed November 7, 1893. Serial No. 490,305. (No model.)

To all whom it may concern:

Be it known that I, JAMES HARDMAN, Jr., a citizen of the United States, residing at Belleville, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Valves for Syringes, Atomizers, &c.; and I 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, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My present invention relates to improvements in valves for syringes, atomizers and the like, and consists essentially in the novel construction and form of valve shown and described, and the invention further consists in other novel arrangements and combinations of parts, such as will be hereinafter fully described and finally embodied in the clauses of the claim appended to this specification.

The invention is illustrated in the accompanying sheet of drawings, in which—

Figure 1 is a view of an air reservoir or bulb usually employed in the ordinary form of syringes, which is provided with an inlet and outlet valve of my novel form of construction, all of the parts being illustrated in front elevation. Fig. 2 is a longitudinal vertical section of said reservoir or bulb and its valves, clearly illustrating the arrangement and construction of the several parts of the valves. Fig. 3 is a front view of a tube drawn into shape to form what is termed the "necking" forming the seat for the valve. Fig. 4 is a vertical section of said tube and its valve, but illustrating a slightly different means for retaining the valve within the tube. Fig. 5 is a side view and Fig. 6 a plan of the valve employed; and Figs. 7 and 8 are a side view and plan respectively, of a valve of a slightly modified form of construction.

Similar letters of reference are employed in each of the above described views, to indicate corresponding parts.

In said drawings, B indicates an air-reservoir made from flexible material, such as rubber, for a syringe, said bulb being provided with the usual form of inlet tube b and outlet tube b', as will be understood. Connecting said tube b with the reservoir B is the inlet valve A, and connecting said tube b' with said reservoir B is the outlet valve A', as will be clearly seen from Fig. 1. Said valves A and A' which form the novel part of my present invention, are both of a similar construction, except that they are differently arranged in the necks b^2 and b^3 of said reservoir or bulb B, to form a suction valve in the one end, and a force valve in the other end of the bulb.

The construction and arrangement of the valve is as follows: The parts comprising the valve casing consist of a shell a, of any ornamental shape, being preferably drawn or spun into shape to form a metal tube, but said shell may be made of hard rubber, if desired. The one end a' of said shell or tube is slightly smaller in diameter than the upper portion and is bent inwardly, as at a^2 and provided with a shoulder a^3, which serves as a stop for the end of the tubing b or b' forced into this portion of the casing a. The upper portion of said casing is forced into one of the necks b^2 or b^3 of the air reservoir and is held or secured thereon, preferably by means of an annular flange a^4, substantially as illustrated. Connecting either of the necks in said reservoir B with one of the tubes b or b' is the main valve chamber c, which is preferably spun up from tubing and is provided at its ends with the annular flanges or rims c' and c^2 respectively, by means of which said tube is securely held by the inner surfaces of the openings in said necks b^2 and b^3 and said tubes b or b'. Said valve chamber, in being spun up, is formed with a suitable indentation c^3, termed a "necking," which forms a seat c^4 for the valve e, loosely arranged in said chamber c.

The valve may be of the construction illustrated in Figs. 2, 4, 5 and 6, being provided with a stem or post e', or the valve may be provided with the arm e^2 radiating toward the circular edge of the inclined or cone-shaped valve, as clearly shown in Figs. 7 and 8. By this arrangement of the radiating arms e^2 the valve can be retained more centrally on the valve seat c^4, but the construction of the valve shown in Figs. 5 and 6 is equally as good.

As will be seen from Fig. 2, in order to pre-

vent the valve from dropping from the valve chamber *c*, a wire loop *d* made from spring wire is forced into the end of the chamber *c* and the free ends of said loop *d*, which is preferably U-shaped, are sprung or forced into the annular recess c^5 formed by the rim *c'*, substantially as illustrated in Fig. 2. This is a very good and simple means for retaining the valve within the chamber *c* when the air reservoir B is compressed.

Another arrangement of retaining the valve within the valve chamber *c* is illustrated in Fig. 4, and consists simply in providing the tube *c* with oppositely arranged holes and securing a piece of wire or a pin, as d^2, across the valve chamber.

When the bulb B is compressed, by the arrangement of the valves A and A' in the opposite necks b^2 and b^3 of said bulb, the valve A is forced shut allowing the liquid contained in the bulb to force the valve A' open, and when the bulb is again released, and allowed to retain its normal shape, then the valve A' is closed automatically, while the valve A opens to allow the entrance into the bulb B of a new supply of liquid.

I prefer to make the several parts or fittings comprising the valves, from sheet metal, being drawn out by means of proper tools, said fittings being made from a ductile and non-corrosive metal, such as aluminum.

Of course the fittings may be made of brass or any other suitable metal, and may be polished or nickel-plated.

Having thus described my invention, what I claim is—

1. In a syringe or atomizer, the herein described valve comprising therein, a shell *a*, a valve chamber *c* provided with a "necking" c^3 forming a valve seat, a valve on said seat, and a wire loop having the ends *d'* thereof in engagement with an annular recess c^5 to prevent the displacement of said valve from said valve chamber, substantially as and for the purposes set forth.

2. In a syringe or atomizer, the herein described valve comprising therein, a shell *a*, having an inwardly turned portion a^2 provided with an annular shoulder a^3, a valve chamber *c* provided with a "necking" c^3 forming a valve seat, a valve on said seat, and a wire loop having the ends *d'* thereof in engagement with an annular recess c^5 to prevent the displacement of said valve from said valve chamber, substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 20th day of September, 1893.

JAMES HARDMAN, JR.

Witnesses:
FREDK. C. FRAENTZEL,
WM. H. CAMFIELD, Jr.