(No Model.)

H. D. SMITH.

BULB FOR SYRINGES.

No. 541,639. Patented June 25, 1895.

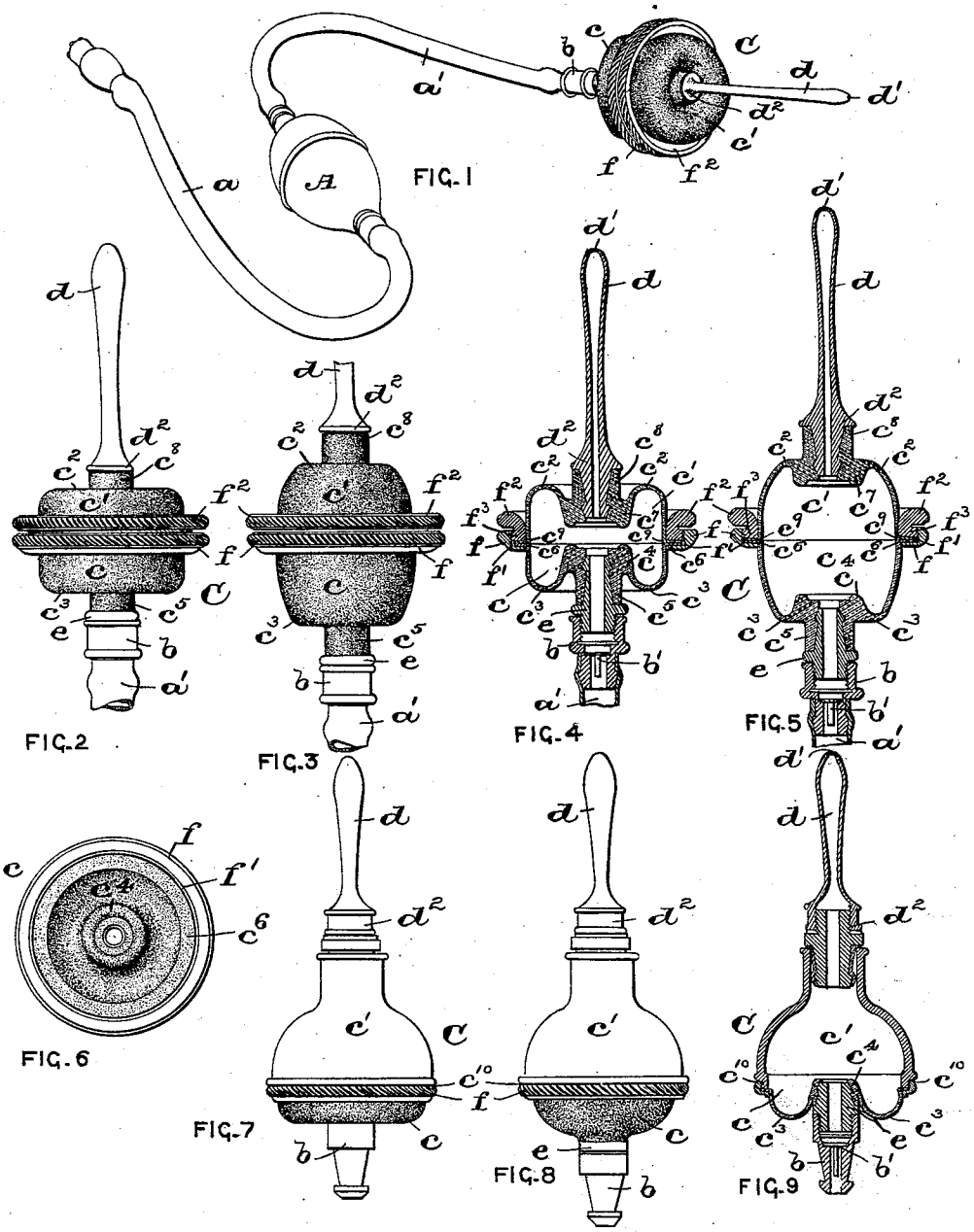


FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

FIG. 6

FIG. 7

FIG. 8

FIG. 9

WITNESSES:

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BULB FOR SYRINGES.

SPECIFICATION forming part of Letters Patent No. 541,639, dated June 25, 1895.

Application filed November 3, 1894. Serial No. 527,827. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. SMITH, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Continuous-Flow Syringes, &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.

This invention relates to that class of syringes, atomizers, or the like, operated by means of an elastic bulb provided with an inlet tube, for injecting the liquid into the bulb, and an outlet tube communicating with the discharge nozzle, through which the liquid is forced when the elastic bulb is compressed.

In the usual form of syringes when constructed with the usual form of compressible bulb and inlet and outlet tubes connected therewith, an intermittent stream is the result when the syringe is operated, the flow of the liquid being stopped as the compression bulb is expanding or re-filling. Such intermittent discharge from the nozzle of the syringe, is in many cases, very objectionable, when used by a patient, causing a painful sensation and perhaps being dangerous to the patient. This form of construction also permits air to be drawn back through the nozzle and outlet tube, which is objectionable. To overcome these objectionable features is the main purpose of my invention, the primary object being to produce, in connection with a flexible bulb, and its outlet tube, an expansible section or bulb, acting automatically in the manner of a diaphragm pump, into which the liquid is forced to expand the same and will automatically cause the production of a continuous flow from the nozzle of the syringe.

A further object of the invention is to provide in connection with the usual form of syringe, an expansible section or bulb for the purposes stated, which is composed of separable sections, which, when the device is used, are secured together to form a double action bulb, but may be separated to enable the cleaning and removal of any poisonous matter that may have become lodged in the parts comprising my novel form of automatically operating expansion bulb or "pump" of the syringe.

The invention therefore consists in the novel arrangements and combinations of parts to be hereinafter fully described and finally embodied in the clauses of the claim.

In the drawings herewith accompanying, Figure 1 is a perspective view of a syringe comprising therein the usual form of compression-bulb and its inlet and outlet tubes, provided with my novel form of automatically-operating expansion bulb or pump. Fig. 2 is a side view of the expansion bulb or pump, illustrating the parts in their normal and inoperative positions; and Fig. 3 is a like view of the expansion bulb or pump with its half-sections expanded and in active operation to automatically force the liquid in a continuous stream from the discharge-nozzle. Fig. 4 is a longitudinal vertical section of the parts illustrated in Fig. 2, and Fig. 5 is a like section of the parts illustrated in Fig. 3. Fig. 6 is a plan view of one of the half-sections of the expansion bulb or pump. Fig. 7 is a side elevation of an expansion bulb or pump of a slightly modified form of construction, comprising therein two half-sections, but only one of them being expansible. These parts are illustrated in their normal and inoperative positions. Fig. 8 is a view similar to Fig. 7, but illustrating the flexible half-section expanded; and Fig. 9 is a longitudinal vertical section of the parts illustrated in said Fig. 7.

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

In the drawings, A represents the compression bulb of the syringe, provided with the inlet tube *a* and the outlet tube *a'*, having any form of fitting *b* with any well-known form of valve *b'* therein.

C represents the automatic expansion bulb or "pump."

In Figs. 2 to 6 inclusive, I have shown the peculiar construction of the parts comprising the expansion bulb or pump C. The same consists essentially, of two half sections *c* and

c', which are of greater elasticity than the discharge tube a', so that when the liquid is forced into the two half-sections c and c', secured together, as will be fully described hereinafter, the reservoir formed by said sections will become expanded by the pressure of the liquid which is forced into the same, while the pressure from the expanded half-sections c and c' is of sufficient force to cause the liquid to pass from the opening d' in the nozzle tube d in a continuous and non-intermittent stream. The valve b' is of such a construction as to permit the liquid to be forced into the pump C when the bulb A is compressed but closes by the back-pressure in the liquid in the pump C, when said bulb A is returning to its original form.

As will be seen from Fig. 4, the half-section c is suitably curved, as at c^3, and is formed with an enlarged or reinforced portion c^4, having a central hole or opening, forming a sleeve c^5 for the tubular fitting e onto which the valve fitting b is screwed or otherwise secured, as will be evident from an inspection of said Fig. 4. Said half-section c is also provided with an outwardly extending annular flange c^6, which fits snugly in the annular recess f' of a screw-threaded ring f, made of metal, hard rubber or any other well-known material. The other half-section c' is also suitably curved, as at c^2, and is formed with an enlarged or reinforced portion c^7, having a central hole or opening forming a sleeve c^8 for the fitting d^2 of the discharge nozzle d, as will be clearly seen from an inspection of said Fig. 4. Said half-section c' is also provided with an outwardly extending flange c^9, which fits upon the flange c^6 of the half-section c and the two flanges are firmly secured down upon the annular recess f' of the ring f, by a screw-threaded portion f^3 of a ring f^2, which can be made of metal, hard rubber or any other suitable material. When the two rings are screwed together, in the manner illustrated in the several figures of the drawings, the two half-sections c and c' form a separable reservoir or bulb, with the two flanges c^6 and c^9 forming a serviceable packing to prevent leakage.

Owing to the reinforced portions of the two half-sections and the adjacent and more flexible parts of the half-sections, when the complete bulb has been filled with liquid and is expanded, as indicated in Figs. 3 and 5, the tendency of said reinforced parts or sleeves is to return to their normal and inoperative positions, illustrated in Fig. 4, thereby automatically forcing the liquid from the bulb into the discharge nozzle. By the action of the compression bulb A, the liquid is intermittently forced into the reservoir or bulb C and expands the half-sections c and c'. By the contraction of said half-sections part of the liquid is expelled through the syringe nozzle, while part of the liquid remains accumulated in the bulb C with the pressure from the half-sections acting upon it, thus maintaining a continuous discharge of the liquid from the bulb into the nozzle, while the bulb C is being refilled, and thereby giving a non-intermittent discharge from the nozzle of the syringe.

After the syringe has been used, the two rings, f and f^2 can be unscrewed and the half-sections c and c' separated to enable the thorough cleansing and drying of these parts, which from a sanitary stand-point, is of the greatest benefit, since any poisonous matter which might accidentally be retained in the expansion bulb can be readily and thoroughly removed.

In Figs. 7, 8 and 9, the half-section c' instead of being flexible is made rigid, being preferably made of hard rubber, having an annular and screw-threaded off-set c^{10}, against which the flange c^6 of the lower and flexible half-section c fits and is screwed fast by the ring f, precisely in the manner as has been described herein above. The construction and working of these parts is similar to that described in the above and therefore will not be further described here.

Of course it will be understood that various modifications may be made in the arrangement and combinations of parts of the expansion bulb or "pump" without departing from the scope of this invention, and I therefore do not wish to be understood as limiting myself to the exact form of such bulb herein shown.

One of the essential features of this invention is to provide an expansion bulb, as C, having a flexible end or ends; which acts, when expanded, to normally force itself inward and thereby exert a constant pressure on the liquid in the bulb. Owing to the resiliency of the end portions of the pump or compression bulb C, the tendency of said parts is to spring back, whereby a constant inward pressure is exerted upon the liquid in the bulb. Another feature is the separable sections of the bulb, thereby producing a perfectly sanitary bulb for syringes.

My novel form of expansion bulb or "pump" C is equally well adapted for use in connection with atomizers or vaporizers. All that is necessary in such case, is to use in place of the expansion bulb A and its inlet tubing a, any well-known form of atomizer bulb, and the various accessories used in connection therewith, as will be clearly evident.

Having thus described my invention, what I claim is—

1. The combination, in a syringe, atomizer or the like, of the compression bulb and its discharge tubing, and an expansion bulb or pump connected with said tubing, comprising therein two separable half-sections, flexible and expansible and with a normal tendency to force themselves inwardly to exert pressure, said half-sections having annular flanges adapted to be placed upon each other, and means for securing said half-sections together, substantially as and for the purposes set forth.

2. A syringe, atomizer or the like, comprising therein, a compression bulb, discharge tube, and an expansion bulb or pump in said tube, consisting of two flexible half-sections, c and c', having the curved portions c^3 and c^2 respectively, and each section having a re-inforced portion forming a sleeve, said sections being adapted to be expanded and exert an inward pressure, substantially as and for the purposes set forth.

3. A syringe, atomizer or the like, comprising therein, a compression bulb, discharge tube, and an expansion bulb or pump in said tube, consisting of two flexible half-sections c and c', having the curved portions c^3 and c^2 respectively, and each section having a re-inforced portion forming a sleeve, said sections being adapted to be expanded and exert an inward pressure, annular flanges c^6 and c^9 on said half-sections c and c' respectively, and screw-threaded rings f and f^2 for securing said sections together, substantially as and for the purposes set forth.

4. An expansion bulb or pump for a continuous flow syringe, or the like, comprising therein two flexible half-sections c and c', having inwardly extending re-inforced portions c^4 and c^7 respectively, adapted to exert inward pressure, said re-inforced portions forming sleeves, a discharge nozzle in one of said re-inforced portions, and means for securing said half-sections together, substantially as and for the purposes set forth.

5. A syringe, atomizer, or the like, comprising therein, a bulb, discharge tube, and an expansion bulb or pump in said tube, consisting of two flexible half-sections, and an enlarged or re-inforced portion on one or both of said half-sections, forming a sleeve for a valve fitting, and the surrounding portion of the bulb being curved, substantially as set forth, to cause said re-inforced portion to exert a normal inward pressure, 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 30th day of October, 1894.

HENRY D. SMITH.

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