(No Model.)

B. F. SUTTON.

SYRINGE.

No. 383,257. Patented May 22, 1888.

Fig. 1.

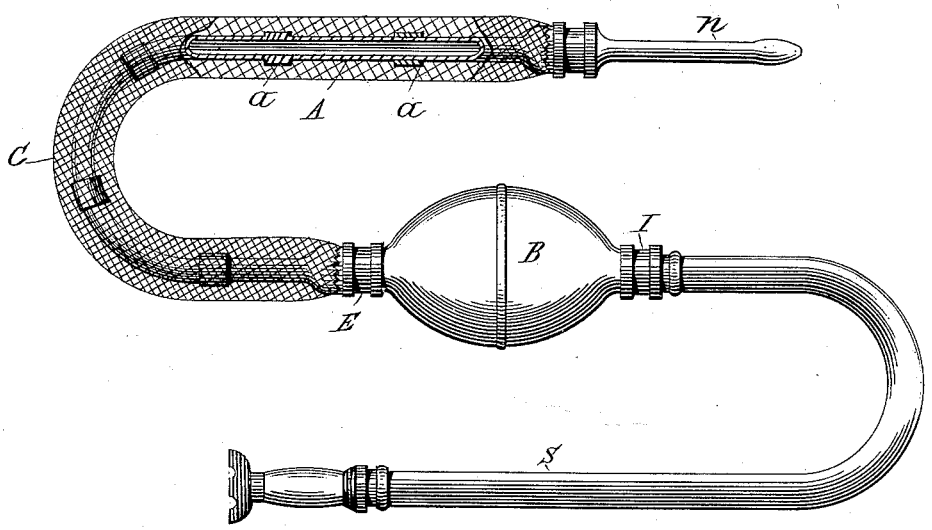
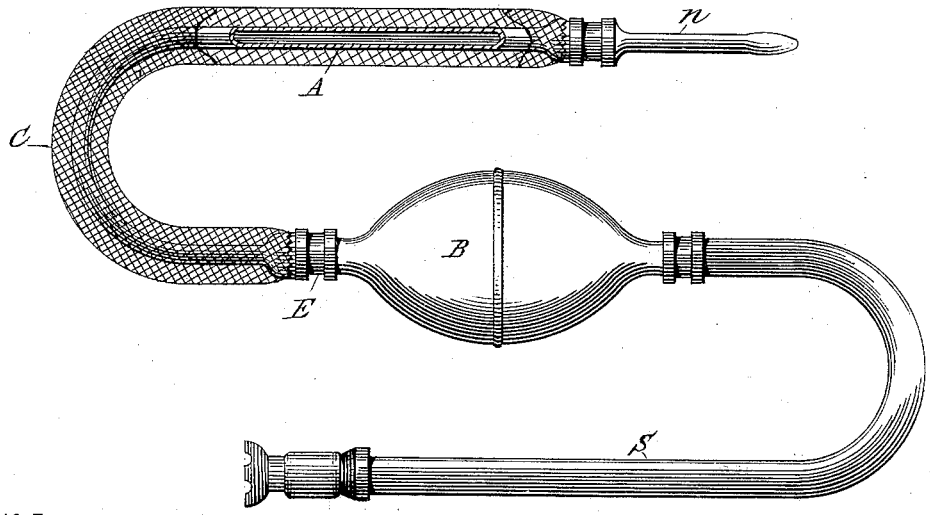


Fig. 2.



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UNITED STATES PATENT OFFICE.

BENJAMIN F. SUTTON, OF BROOKLYN, NEW YORK.

SYRINGE.

SPECIFICATION forming part of Letters Patent No. 383,257, dated May 22, 1888.

Application filed June 9, 1885. Serial No. 168,168. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. SUTTON, of the city of Brooklyn, county of Kings, State of New York, have invented a new and useful Improvement in Syringes, of which the following is a full and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to that class of syringes operated by means of an elastic bulb or hollow globe provided with inlet and outlet tubes in connection with induction and eduction valves.

In my Letters Patent No. 319,937, dated June 9, 1885, I have shown a syringe having a discharge-tube provided with a constricted outlet, and which is of complex form, or, in other words, is folded or collapsed longitudinally when in its normal condition. When operating that syringe, the discharge-tube at each compression of the bulb is enlarged in its capacity essentially by the unfolding or opening of its folds, and by reason of the contractile tendency which it has to close its folds the discharge-tube continues the flow from its outlet while the bulb is recovering, thereby keeping up a continuous stream or discharge.

The object of my present invention is to secure substantially the same result with a discharge-tube of simple form—such, for example, as a cylindric tube, and, essentially, by the stretch of the wall of the tube itself.

The invention consists, essentially, in the combination, in a syringe, of a compression-bulb and suction-tube, a self-acting eduction or discharge valve at the outlet-opening from the bulb, and a discharge-tube having a constricted outlet, the wall of which tube is of a thickness and elasticity to freely stretch in its circumference under the ordinary pressure produced in working the bulb while the discharge-tube is open.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 represents a side view, in part section, of a syringe, with the usual valves, flexible bulb, and inlet-tube, and having my improved dilatable outlet-tube. Fig. 2 is a similar view illustrating certain modifications of construction hereinafter explained.

In the said drawings, A designates the outlet-tube of the syringe, which is of rubber or other analogous substance, constructed with thin and highly-elastic cylindrical walls, which easily and freely stretch in circumference by the ordinary pressure produced in working the bulb, and while the constricted outlet or nozzle of the tube A is open, so that the tube will be dilated and enlarged in capacity by each pressure of the bulb. Surrounding this dilatable outlet-tube I prefer to construct a sheath or restricting-net, C, of greater circumference. This sheath C is designed to allow the dilatable tube A to expand sufficiently to accomplish the purpose of the tube and prevent rupture by restricting a further dilation.

As shown in Fig. 1, I surround the dilatable tube A with one or more rings, *a*, of any preferred material, or thicken the walls integrally at intervals, for the purpose hereinafter explained.

If the walls of the dilatable outlet-tube C are made of even or uniform elasticity, the dilation from inward pressure will be sufficiently uniform to prevent rupture and obviate the use of the sheath or restricting-net without departing from the essential feature of my invention.

With the exception of the heretofore-described dilatable outlet-tube, my syringe is constructed in the usual manner with the bulb B, inlet-tube S, induction-valve I, and eduction-valve E, using care to have the openings leading into and from the bulb made larger than the bore of the discharge-orifice, for the purpose hereinafter described.

The action of a syringe having my improved dilatable outlet-tube is as follows: When the syringe is operated in the usual manner, each pressure upon the bulb B closes the induction-valve I and forces the liquid into the dilatable tube A. The flow or escape through the discharge-orifice *n* being restricted by the size of the bore, the accumulating liquid within the tube A dilates it into a temporary reservoir. The pressure upon the bulb being relaxed, the eduction-valve closes, and the elastic contraction of the dilatable tube A creates an automatic pressure upon the accumulated liquid, which continues to flow through the discharge-orifice *n* while the bulb is expanding and refilling.

The rings or thickened portions *a a*, as shown

in Fig. 1, serve to strengthen the thin elastic walls of the dilatable tube A, and also serve to restrict the dilation of the tube when it is preferred to use the syringe without the sheath C.

With the exception of certain improvements in syringes for which Letters Patent of the United States were granted to me, bearing date the 9th day of June, 1885, the outlet-tubes of syringes have heretofore been constructed with thick flexible walls, serving only as conduits to convey the liquid from the bulb to the discharge-nozzle.

It will be seen that in the construction of my improved syringe the cylindrical outlet-tube, being formed with thin or highly-elastic walls, acting in combination with the eduction-valve and a restricted discharge-orifice, performs a double function—that of a tubular conduit and an elastic dilatable reservoir—thereby assisting in the expulsion of the liquid, a syringe so constructed requiring less exertion to operate than one producing an intermittent flow.

My syringe is distinguished from those of the same class now used, because under the ordinary pressure produced in working the bulb and while the outlet is open the capacity of the discharge-tube is enlarged by the stretching of its wall, while in the ordinary syringe its discharge-tube is not appreciably enlarged under such circumstances and a continuous stream cannot be produced with it.

I am also aware of English Patent No. 2,160 of 1883, which shows a syringe having between the compression-bulb and discharge-tube an expansible chamber having a cock at its communication with the discharge-tube. When said cock is closed, the repeated operation of the compression-bulb will expand said chamber, and on opening the cock the contractile tendency of said chamber will cause a flow for a moment through the discharge-tube without any operation of the compression-bulb. With the English device no stream is discharged while operating the compression-bulb, and I do not desire to include it in my invention. Neither do I desire to claim herein anything shown in my former patent above referred to. In my former patent the discharge-tube is enlarged in capacity at each compression of the bulb, essentially by the unfolding or spreading of its folds, while in my present invention such enlargement is produced essentially by the stretching of the wall of the tube.

Having thus described my invention, what I claim is—

1. The combination, in a syringe, of a compression-bulb and suction-tube, a self-acting eduction or discharge valve at the outlet-opening from the bulb, and a discharge-tube having a constricted outlet, the wall of which tube is of a thickness and elasticity to freely stretch in its circumference under the ordinary pressure produced in working the bulb while the discharge-tube is open, substantially as herein described.

2. A cylindrical dilatable elastic tube for syringes or like purposes formed integrally with one or more restricting-rings, for the purpose set forth.

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