(No Model.)

S. W. BEALL.

COMBINED ATOMIZER AND SYRINGE.

No. 369,767. Patented Sept. 13, 1887.

Fig. 1.

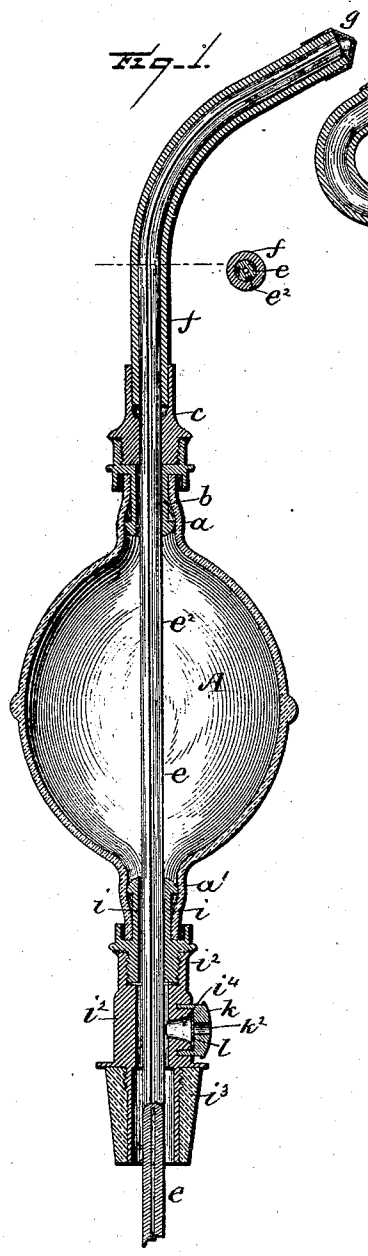

Fig. 2.

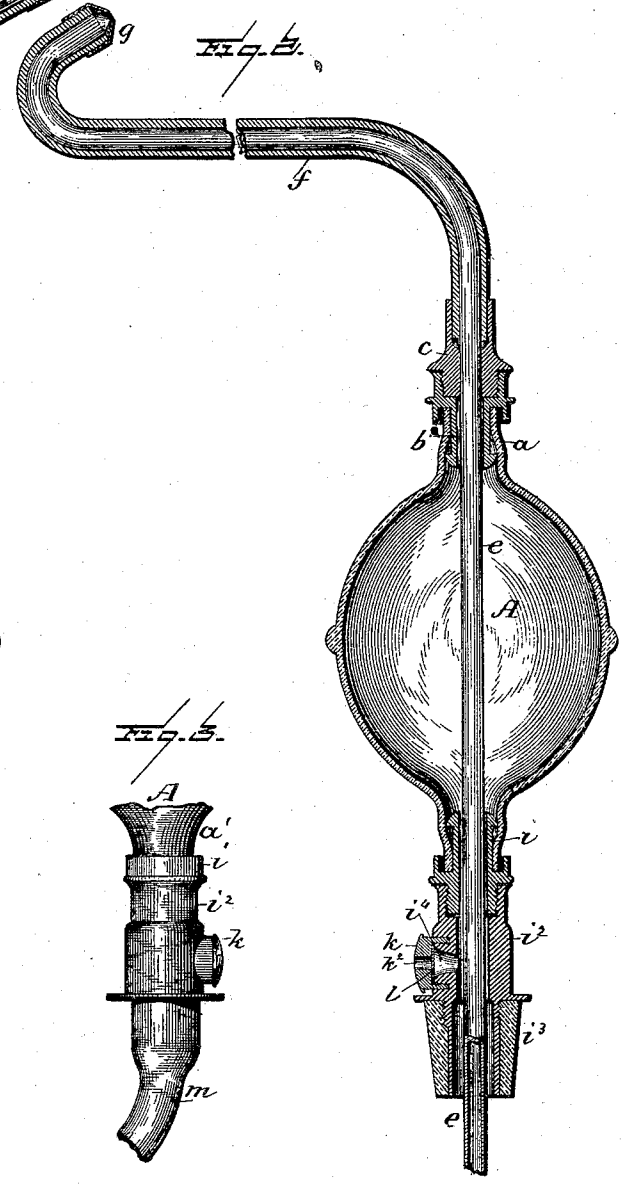

Fig. 3.

Witnesses:
E. Murdeman.
I. J. Masson

Inventor:
Sylvester W. Beall,
by E. E. Masson
atty.

UNITED STATES PATENT OFFICE.

SYLVESTER W. BEALL, OF COLUMBUS, OHIO.

COMBINED ATOMIZER AND SYRINGE.

SPECIFICATION forming part of Letters Patent No. 369,767, dated September 13, 1887.

Application filed November 13, 1885. Serial No. 182,705. (No model.)

To all whom it may concern:

Be it known that I, SYLVESTER W. BEALL, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a certain new and useful Improvement in Atomizers, of which the following is a specification.

My invention relates to atomizers or insufflators such as are used for the introduction of medicines or other substances into the human system, either in the form of liquid, powder, or vapor or spray; and the objects of my invention are, first, to produce a combined atomizer and injector neat in form and simple in construction; second, to so construct said atomizer as to convey both the substance to be introduced and air through a tube passing diametrically through the bulb into the tip or nozzle of the device and facilitate its use by the operator with only one hand, if desired. I accomplish these objects by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of an atomizer constructed in accordance with my invention. Fig. 2 is a vertical section showing the instrument converted into an injector or insufflator, having a nozzle suitably bent to reach the post-nasal cavities. Fig. 3 is a side view of the lower end of the device connected to a flexible tube.

Similar letters refer to similar parts throughout the several views.

A represents the bulb or bellows of my device, which is composed of soft rubber or other suitable material, and is provided at its top and bottom with short open necks *a a'*. Within the lower neck, *a'*, of the bulb is tightly inserted the upper end of a short metal tube, *i*, the lower end of which is outwardly screw-threaded to receive upon its thread a larger tube, i^2, the lower end of which is of reduced diameter and is covered with cork, i^3, to permit it to be securely fastened within the neck of the bottle. The parts $i\,i^2$ may also be made in one piece, if desired.

On one side of the tube i^2 there is an opening, i^4, that is closed by a flap-valve, *l*, that is retained in position by a cap, *k*, screwed to the side of said tube i^2, and said cap has a perforation, k^2, to admit air to the opening i^4 (after passing beyond the flap-valve) and thence into the device. Within the upper neck of the bulb is tightly inserted the lower end of a short metal tube, *b*, and within the upper end of said tube is screwed the lower end of another short metal tube, *c*, that carries the eduction tube and nozzle.

The atomizing attachment consists of a tube, *e*, of small diameter, either of metal or, preferably, of hard rubber, that extends downward from the upper tubular connections, *c b*, diametrically across the bulb A, and loosely through the tubular connections $i\,i^2$ into the bottle or other vessel retained upon the cork i^3. The upper end of the tube *e* extends to a suitable distance above the tubular connection *c*, and is inclosed in a tubular shield, *f*, that may be of metal or of soft rubber, but is preferably of hard rubber. After the tube *e* has been inclosed in its shield *f*, they are slightly heated and given any suitable bend, according to the purpose intended, and the upper ends of the tubes *e f* are inclosed in a thin metal tip, *g*, having a conical upper end centrally perforated for the issue of medicinal liquids or powder mixed with air, the latter being forced from the bulb to the tip through passages between the tube *e* and its shield *f*, these passages being produced preferably by forming longitudinal grooves e^2 in the sides of the tube *e*. These grooves may extend from the tip *g* to a short distance only within the upper end of the bulb, or they may extend to the lower end of said tube *e* to increase the size of the passage between said tube and the tubular connections $i\,i^2$ adjacent to the induction-opening i^3.

To operate the atomizer, the lower end of the cork-covered tubular connection i^2 having been firmly inserted into the neck of a bottle or vessel containing the fluid or powder to be used, and the lower end of the tube *e* extending beneath the surface of said fluid or powder, the operator squeezes the bulb A. The greater portion of the air contained therein is forced downward between the tube *e* and the tubular connections $i\,i^2$ upon the liquid (or powder) and causes the latter to pass upward through the central opening of the tube *e*. The same pressure upon the bulb forces small currents of air upward through

the grooves e^2 to and within the metal tip g, where they meet the fluid and spray it out of said tip. The bulb, being allowed to expand to its normal size, opens the valve l within the cap k and allows the air to pass in from the outside into said bulb. The compression of the bulb and its results can then be repeated.

When it is desired to inject a liquid or insufflate a powder without spraying it so minutely, the attachment shown in Fig. 2 may be used. In said figure the tube e is not provided with longitudinal grooves and there is no passage between it and the shield f, but said tube passes diametrically through the bulb, as described in relation to Fig. 1. In either case, if a long-continued current is to be produced, the lower end of the tubular connection i^2 may be provided with a flexible rubber tube, m, as shown in Fig. 3, and the lower end of said tube be provided with a retaining-valve as commonly used with bulb-syringes.

Having now fully described my invention, I claim—

1. In combination with an elastic bulb, its upper and lower tubular metal connections, and a valve on the side of said lower connection, a straight tube passing diametrically through said bulb and through said tubular connections, substantially as and for the purpose described.

2. The combination of an elastic bulb, its upper and lower tubular connections, and a valve on the side of said lower connection, with a tube passing diametrically through said bulb, a shield upon said tube, a perforated tip upon the end, and longitudinal passages between said tubes and shield, substantially as and for the purpose described.

SYLVESTER W. BEALL.

Witnesses:
A. C. STALLMAN,
A. C. WILLIAMS,