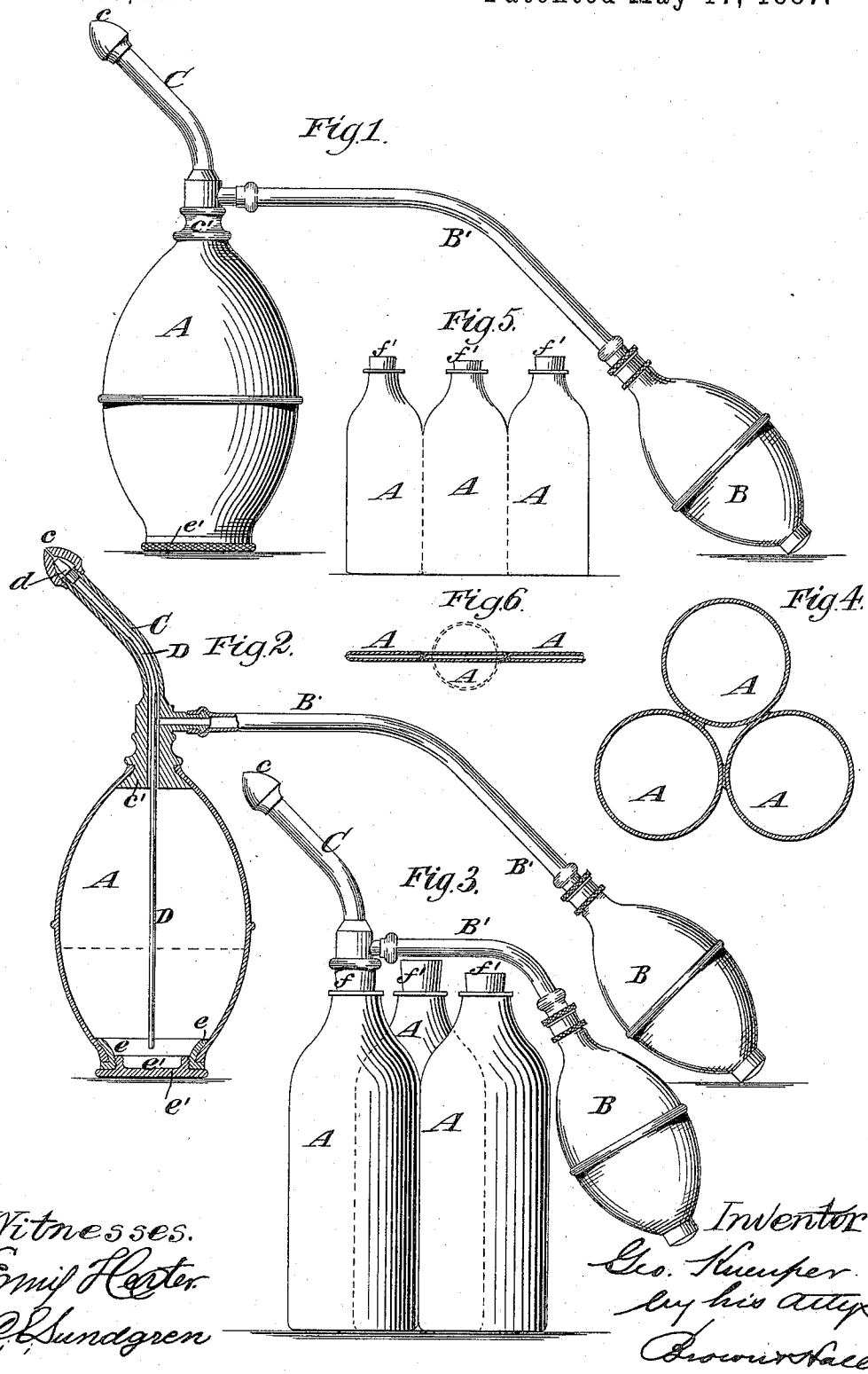
(No Model.)

G. KNEUPER.

ATOMIZER.

No. 363,247. Patented May 17, 1887.



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GEORGE KNEUPER, OF NEW YORK, N. Y.

ATOMIZER.

SPECIFICATION forming part of Letters Patent No. 363,247, dated May 17, 1887.

Application filed February 7, 1887. Serial No. 226,852. (No model.)

To all whom it may concern:

Be it known that I, GEORGE KNEUPER, of the city and county of New York, in the State of New York, have invented a new and useful Improvement in Atomizers, of which the following is a specification.

My invention relates to atomizers which comprise a tube for air and a tube for liquid terminating in suitable operative relation to each other, and a compression-bulb connected with a liquid-receptacle for compressing air therein above the liquid.

My invention consists, essentially, in the combination, with the liquid and air tubes of an atomizer, of an expansible liquid-receptacle formed in one integral structure of elastic material and a bulb communicating with the upper part of the receptacle for forcing air thereinto. By this combination I secure the utmost simplicity of construction, and at the same time provide a receptacle which is capable of expansion when the air is compressed therein, so as to afford a large volume of compressed air which will eject a spray with approximately uniform force for a considerable length of time.

I preferably connect the air-tube permanently with the top of the liquid-receptacle and provide a filling-hole independent of the opening which receives the tubes, and this filling-hole is usually in the bottom of the receptacle, and the plug which closes it may have a broad base for supporting the receptacle in an upright position. I also combine with the flexible liquid-receptacle a flexible liquid-tube which extends through the air-tube and downward into the receptacle, and thus provide for readily distorting or changing the form of the receptacle, as may be necessary in packing, without any danger of breakage.

The invention also consists in the combination, with a number of liquid-receptacles formed in one integral collapsible and expansible structure of soft india-rubber, of a stopper interchangeably fitted to the several receptacles, and having connected with it concentric tubes for liquid and air and a compression-bulb. By this combination I provide an apparatus which a physician may easily carry in his pocket, and which he may use for spraying a number of liquids, as is often necessary in preparing bandages, and for other purposes.

The structure in the above combination being made of collapsible and expansible india-rubber, can be collapsed and rolled up, and each of the liquid-receptacles will be capable of individual expansion.

In the accompanying drawings, Figure 1 is an elevation of an atomizer embodying my invention. Fig. 2 is a partly sectional view, the compression-bulb and its tube only being shown in full view. Fig. 3 is an elevation of an atomizer embodying my invention and comprising three liquid-receptacles formed in one integral structure. Fig. 4 is a transverse section of the atomizer shown in Fig. 3; and Figs. 5 and 6 are respectively a side view and a horizontal section of three liquid-receptacles formed integral of india-rubber, and which when not in use may be laid out flat and rolled up.

Similar letters of reference designate corresponding parts in all the figures.

In the drawings, A designates a liquid-receptacle embodying my invention, and B designates a compression-bulb or air-pump of the ordinary construction, which is used to force air into the receptacle A through the air-pipe B′. From the top of the liquid-receptacle A rises an air-tube, C, terminating in a nozzle, *c*, and within the air-tube is a liquid-tube, D, which extends nearly to the bottom of the receptacle. The construction and arrangement of these tubes I do not herein claim, and in carrying out my invention I may employ any construction and arrangement of air and liquid tubes which is well known in atomizers. The liquid-tube D terminates at the upper end in a liquid nozzle or jet, *d*, which is inserted into the end of the air-tube C, and is flattened at the sides, so as to permit the escape of air around it. This construction is desirable, because by unscrewing the cap in which is the nozzle *c* the liquid-tube D may be entirely withdrawn upward out of the air-tube C, for cleaning or any other purpose, the liquid-tube

being pliable or of india-rubber, to enable it to be thus withdrawn.

As is usual in atomizers, air is compressed within the liquid-receptacle A by the action of the bulb B, and, making its escape around the tip *d* of the liquid-tube and through the nozzle *c*, it induces the flow of liquid upward through the tube D and takes up such liquid, discharging it in the form of spray.

An essential feature of novelty in this atomizer consists in making the liquid-receptacle A within one integral structure, or wholly of soft india-rubber or analogous elastic and flexible material, and it may be made similar in form to the bulb B, but preferably much larger. As here represented, the air-tube C has a hub or projection, *c'*, which is inserted within the hole in the top of the liquid-receptacle A and firmly cemented therein, so as to permanently connect the air-tube with the liquid-receptacle; and I provide a filling-opening independent of the opening which receives the air-tube.

In the present example of my invention the filling-opening is in the bottom, and the liquid-receptacle has cemented within it a bushing or thimble, *e*, which receives a screw-threaded stopper, *e'*. This stopper preferably is of such size as to form a sufficiently broad base to support the liquid-receptacle. If the finger be placed over the nozzle of an ordinary atomizer and the compression-bulb operated repeatedly, air of a high pressure will accumulate in the receptacle; but the volume of air will not be increased, and consequently when the air is released the spray will be ejected with great and unnecessary force at first, and the force of ejection will quickly diminish. On the contrary, when the receptacle is made of thin india-rubber or otherwise rendered expansible, the repeated action of the compression-bulb B will greatly increase the volume of air within the receptacle when the finger is placed over the nozzle, and when the finger is removed the spray will be ejected for a considerable time and with a comparatively uniform force, which is not unnecessarily great at the beginning and continues sufficient until the pressure of air within the receptacle decreases to the atmospheric pressure. It is furthermore advantageous to make the liquid-receptacle of flexible material—such as soft india-rubber—because the atomizer can then be sent through the mail without any special and expensive packing. The liquid-receptacle, being of india-rubber, may be distorted or changed in form to facilitate packing, and the liquid-tube D, being also flexible, does not interfere with the distortion or changing the shape of the receptacle. Furthermore, the atomizer is made wholly of material which is not fragile like glass, and in case of its falling will not be broken in any part.

Physicians and surgeons often find it necessary to use, in preparing bandages and for other purposes, several different liquids, and in Figs. 3 and 4 I have shown an apparatus which may be conveniently carried in the pocket and which also embodies my invention. This apparatus has a number of liquid-receptacles, A, three being here represented, which are formed and incorporated in one integral structure, and the air-tube C, the liquid-tube D, and the air-pipe B', leading from the compression-bulb, are all secured in a stopper, *f*, which is interchangeably fitted to the receptacles. This stopper may be inserted in any one of the receptacles, the remaining ones being corked tightly and liquid ejected therefrom; and by changing the stopper *f* from one receptacle to another a change of liquid is secured.

The structure in which the liquid-receptacles A are comprised is made of soft and elastic material, such as soft india-rubber, and consequently in this apparatus also the benefits arising from the use of an expansible liquid-reservoir may be secured.

The apparatus as a whole is of small size, and may be of such soft and flexible material as to be compacted into very small compass when it is to be carried in the pocket.

In Figs. 5 and 6 I have represented three liquid-receptacles as comprised in a soft india-rubber structure, which, when the receptacles contain no liquid, assumes the flat form shown in Fig. 6, and after a proper quantity of liquid has been introduced into the receptacles the structure containing them may be rolled up or compacted into very small compass and carried in the pocket. The compression-bulb and the tubes for air and liquid, which are shown in Fig. 3, may be used with this receptacle-structure, the several receptacles being closed by corks or stoppers *f'* until it be desired to introduce the stopper *f*, with which the tubes are connected into any one of them.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the liquid and air tubes of an atomizer, of an expansible liquid-receptacle formed in one integral structure of elastic material, and a compression-bulb communicating with the upper part of the receptacle for forcing air thereinto, substantially as herein described.

2. The combination, with the liquid tube D and the air-tube C, having a hub or enlarged portion, *c'*, at the lower end of the expansible liquid-receptacle A, formed in one integral structure of elastic material, and secured at the upper end upon the hub or projection *c'*, of a compression-bulb communicating directly with the air-tube C above the expansible liquid-receptacle, substantially as herein described.

3. The combination, with the liquid and air tubes of an atomizer, of an expansible liquid-receptacle, with the top of which the air-tube is permanently connected, and which has a filling-hole independent of the opening which receives the tubes, substantially as herein described.

4. The combination, with the liquid and air

tubes of an atomizer, of an expansible liquid-receptacle, with the top of which the air-tube is permanently connected, and which has a filling-hole in the bottom and a plug closing the filling-hole, and having a broad base for supporting the receptacle in an upright position, substantially as herein described.

5. The combination, with a number of liquid-receptacles formed in one integral collapsible and expansible structure of india-rubber, of a stopper interchangeably fitted to the several receptacles, and having connected with it concentric liquid and air tubes and a compression-bulb, substantially as herein described.

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