Sept. 3, 1929. H. C. MASON 1,727,241

COLLAPSIBLE TUBE

Filed Oct. 7, 1926

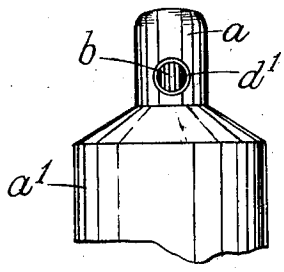


Fig. 1.

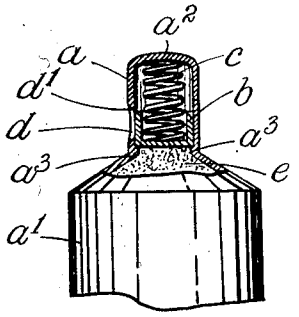


Fig. 2.

Fig. 5.

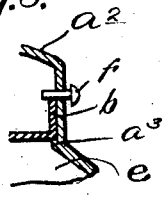




Fig. 4.

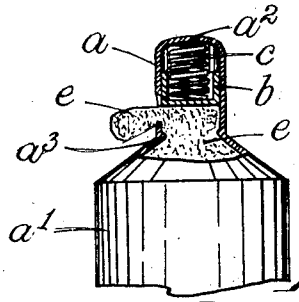


Fig. 3.

Inventor
Hubert Chase Mason
By Miller & Porter
Attorneys

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UNITED STATES PATENT OFFICE.

HUBERT CHASE MASON, OF EAST CROYDON, ENGLAND, ASSIGNOR TO ANGLO-AMERICAN PHARMACEUTICAL COMPANY LIMITED, OF CROYDON, ENGLAND, A BRITISH COMPANY.

COLLAPSIBLE TUBE.

Application filed October 7, 1926, Serial No. 140,104, and in Great Britain October 19, 1925.

This invention relates to collapsible tubes—more particularly to collapsible tubes for the purpose of containing toilet pastes, creams and ointments, polishing creams etc. The object of this invention is to construct the tube so that it opens automatically when pressure is applied to the tube to extrude the contents and closes automatically when such pressure is released. Thus, immediately the tube closes the contents thereof become sealed and, therefore, are not exposed to contamination by micro-organisms in the atmosphere, as is the case with tubes provided with the usual removable cap, this being a point of primary importance where hygienic conditions are to be observed as, for example, in preparations for human use, and also where the contents are of a volatile or of a hygroscopic nature.

According to the preferred manner of carrying out this invention, the mouth or exit orifice of the tube is arranged at the side of the exit end of the tube and the exit end is provided with a close fitting valve which opens to permit extrusion of the contents when pressure is applied to the tubes and closes upon release or relaxation of the pressure.

The valve is preferably in the form of a piston fitting snugly but slidingly within the exit end of the tube and so as to prevent the contents of the tube passing around its walls.

In the drawings,

Figure 1 is an elevation of the top part of a tube according to this invention,

Figures 2 and 3 are elevations partly in section, showing the valve in the closed and open positions respectively, and

Figure 4 is a perspective view of the valve.

Figure 5 is a fragmentary sectional view through the wall of the exit end of the tube and of a portion of the valve, longitudinally of the valve, showing a pin removably inserted through said wall and engaging the outer end of the valve to secure the valve in closed position.

Referring to the drawings, the exit end a of the tube a^1 instead of being closed at its outer end by a screw cap as is the usual practice, is blanked off as at a^2. The exit end accommodates the valve in the form of a piston b which fits closely but slidingly within the exit end a. Between the valve b and the outer end a^2 of the exit end of the tube a^1 is arranged a spring c or other resilient device which normally presses the valve b down upon a suitable stop or abutment, which latter may be in the form of an inner peripheral flange a^3 situated at the lower end of the exit end a of the tube. Such flange a^3 may be formed by flaring over the metal at the lower portion of the exit end or it may be formed by a slight contraction of the lower portion of the exit end of the tube, which contraction may be obtained by indenting the neck of the tube at this point.

The valve b may be cup-shaped to receive the lower end of the spring c, the upper end of the latter bearing against the outer closed end a^2 of the exit end of the tube.

The orifice d through which the material e in the tube is extracted, is situated near the lower end of the walls of the exit end a so that it is closed by the valve b when the latter rests upon its seating a^3 (see Figure 2). Upon pressure being applied to the walls of the tube a^1, however, the valve b is forced upwardly against the pressure of the spring c, and opens the exit orifice d, thereby permitting of extrusion of the contents e, see Figure 3. Upon release of the pressure the valve b immediately returns and seals the exit orifice d. As the valve fits closely within the exit end a of the tube the contents are unable to pass around its walls to its upper side, and, consequently, the action of the spring c is not interfered with and the valve b always works smoothly. Also, the contents of the tube do not come into contact with the spring and are therefore not contaminated thereby.

The walls of the exit end a of the tube, together with its closed outer end, may be formed integrally with the body of the tube a^1, or they may be constructed separately, and subsequently secured to the body. In some cases, the said outer end a^2 may be applied separately. Also, in some cases, the seating a^3 for the valve b may be formed by means of a ring sprung tightly inside the exit of the tube.

Although it is preferable for the top a^2 of the tube to be completely closed, it is not necessarily so constructed. Also, although the valve is preferably close fitting it need not in all cases be so.

The edges of the said exit orifice d are con-

veniently thinned down to a sharp edge as at d^1 so that the action of passing a brush across the orifice leaves the latter quite clean.

According to a modification, the spring device may be arranged on the lower side of the valve, in which case it may consist of a tension spring secured at one end to the valve and at the other end to the tube, say, by means of a bar extending across the latter.

In some cases, the mouth portion of the tube may be sunk partially within the body of the tube, whereby the length of the tube is enabled to be reduced.

It will be appreciated that the collapsible tube according to this invention has many advantages among which may be mentioned that, as it is capless it is very convenient to use, and time is saved because there is no cap to be screwed off and on every time the tube is used.

I provide means for preventing the exit orifice *d* being opened due to accidental pressure on the tube. Such means is shown as consisting of a pin *f* removably inserted through a hole in the exit end *a* of the tube on the opposite side of the exit orifice *d* from the tube and engaging the outer end of the piston so as to prevent lifting of the valve.

Again, in some cases the valve may take the form of a sleeve or cap arranged externally of the exit end of the tube and so that upon pressure being applied to the tube the valve moves to permit of extrusion of the contents, means being provided to return the valve to the closed position when the pressure is released. Such means may comprise a spring arranged between the sleeve or cap or an abutment thereon connected to or bearing upon the tube or an abutment thereon.

I claim:—

1. A collapsible tube having a closed exit end with a side exit orifice, said exit end being provided with an inwardly projecting shoulder at its inner end, a piston closely fitting in and longitudinally movable of the said exit end of the tube between the said inwardly projecting shoulder and said closed end to cover and uncover said exit orifice, resilient means normally holding said piston against said shoulder and in position to cover said exit orifice, said valve being movable in opposition to said resilient means to uncover said exit orifice and permit extrusion of the contents of the tube when pressure is applied to the tube, and means insertible through the wall of the exit end of the tube and engaging said piston to hold said piston against said shoulder.

2. A collapsible tube having a closed exit end with a side exit orifice, said exit end being provided with an inwardly projecting shoulder at its inner end, a valve in the said exit end of the tube between the said inwardly projecting shoulder and said closed end and having means to cover said exit orifice, resilient means normally holding said valve against said shoulder with said means covering said exit orifice, said valve being movable in opposition to said resilient means to uncover said exit orifice and permit extrusion of the contents of the tube when pressure is applied to the tube, said resilient means serving upon release of the pressure to move the valve toward and hold it against the said inwardly projecting shoulder, and a removable pin carried by the exit end of the tube and engaging and holding the valve in closed position and against accidental displacement due to the compressing of the tube.

In testimony whereof I have signed my name to this specification.

H. CHASE MASON.