Apr. 10, 1923. 1,451,461

C. G. KING

COLLAPSIBLE TUBE

Filed Mar. 14, 1921

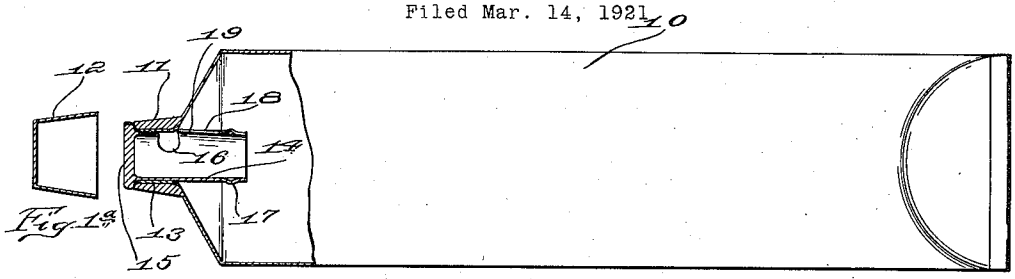


Fig. 1a.

Fig. 1.

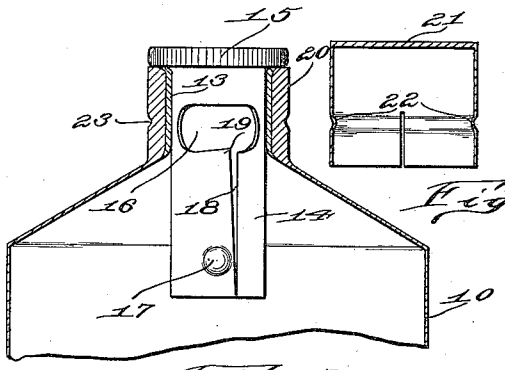


Fig. 2.

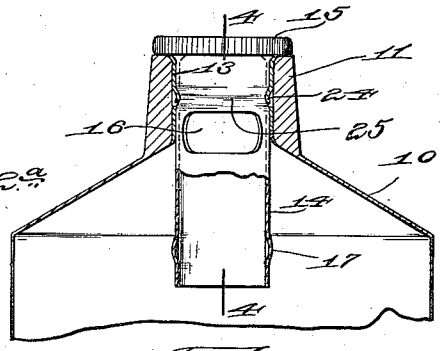


Fig. 2a.

Fig. 3.

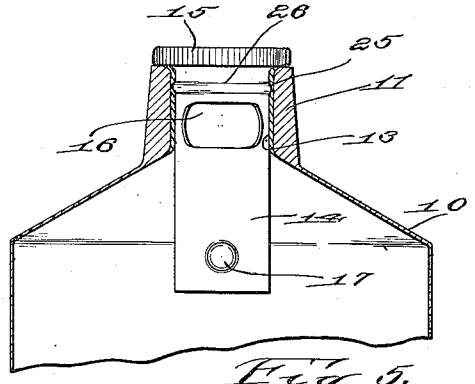


Fig. 5.

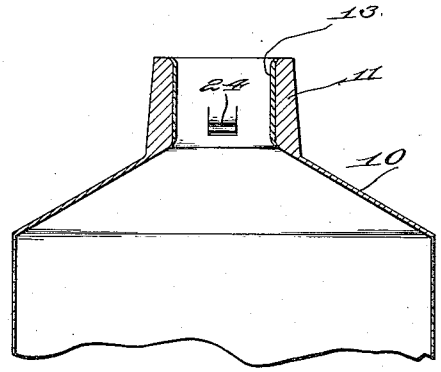


Fig. 4.

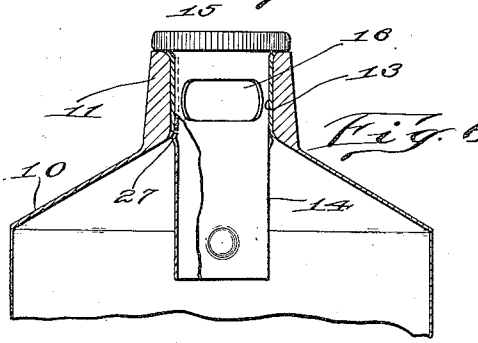


Fig. 6.

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Patented Apr. 10, 1923. 1,451,461

UNITED STATES PATENT OFFICE.

CLIFFORD G. KING, OF PROVIDENCE, RHODE ISLAND.

COLLAPSIBLE TUBE.

Application filed March 14, 1921. Serial No. 452,358.

To all whom it may concern:

Be it known that I, CLIFFORD G. KING, a citizen of the United States, and a resident of Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Collapsible Tubes, of which the following is a specification.

The object of the present invention which is an improvement on the collapsible tube described in my Letters Patent No. 1,346,897, dated July 20, 1920, is to provide a sanitary closure for collapsible tubes that will eliminate the use of the threaded cap now commonly employed for this purpose. With this object in view my invention comprises a longitudinally slidable cap arranged in the nozzle of the tube, said cap being constructed and arranged to co-operate with the nozzle in such manner that it will be held in frictional engagement therewith, both in closed and delivery positions, against the pressure exerted thereon by the contents of the tube, the head of said cap being closely adjacent to or abutting, the outer end of said nozzle and the side delivery opening thereof being inward of the outer end of said nozzle when said cap is frictionally held in closed position, and said delivery opening projecting beyond the outer end of said nozzle when the cap is frictionally held in delivery position. My invention comprises also a cap arranged to fit over the nozzle and the head of the longitudinally slidable cap and to be held in frictional engagement with the nozzle, said cap being designed to protect the closure of the tube during transportation of the same and until it reaches the user and to be discarded after the tube reaches the user.

Several embodiments of my invention are shown in the accompanying drawings in which—

Figure 1 is a side view of a collapsible tube embodying my improvement, the nozzle and closure being shown in central longitudinal section;

Fig. 1ª is a central section of one form of protecting cap that may be employed;

Fig. 2 is a central section of a modification showing a nozzle having straight walls;

Fig. 2ª is a section of a protecting cap arranged to be used with the nozzle shown in Fig. 2;

Fig. 3 is a section of a modified form of closure;

Fig. 4 is a section taken on the line 4—4 of Fig. 3;

Fig. 5 is a section of another form of closure embodying my invention;

Fig. 6 is a section of a further modification.

In the particular drawings selected for more fully disclosing my invention 10 represents a collapsible tube provided with a nozzle 11 having a tapering outer surface with which the protecting cap 12 is arranged to co-operate and to be held in frictional engagement therewith. A bushing 13 of relatively hard non-corrosive metal is arranged in the nozzle and its ends swaged over the inner and outer ends of the nozzle. Arranged within said bushing is a longitudinally-slidable cap 14 having a flanged head 15 and a side delivery opening 16, the head of said cap as shown abutting the outer end of the nozzle, although of course it may be closely adjacent to said outer end without actually touching the same, and the delivery opening being inward of said outer end, and preferably between the two ends of the nozzle, when the cap is in closed position, and said delivery opening projecting beyond the outer end of the nozzle when the cap is in delivery position. It will be understood of course that while the delivery opening is within the nozzle in the forms of my invention shown in Figs. 1 and 2, it may be located farther away from the head in the modifications shown in Figs. 3 to 6 inclusive, in which case it will be inward of the inner end of the nozzle and within the tube itself when the cap is in closed position. Means must be provided for limiting the outward movement of the cap and for arresting such movement when it is in delivery position with the opening 16 projecting beyond the outer end of the nozzle. While various means may be employed for this purpose, I prefer to arrange the cap so that it will be in frictional engagement with the nozzle when the cap is in delivery position, and a simple way of accomplishing this result is to form one or more beads 17 at or near the inner end of the cap which, engaging with the nozzle, serve to arrest or limit the outward movement of the same. The user will grasp the flanged head 15 of the slidable cap and draw the same outwardly to delivery position, the beads 17 preventing further outward movement unless considerable force is applied,

and then by squeezing the end of the tube a portion of the contents is delivered through the opening 16 in the usual way. A slight pressure on the tube in the opposite direction will cause a portion of the contents to recede from the cap, and thereupon the tube is closed by pushing the head against the outer end of the nozzle. The restoration of the cap to its original position will create a slight pressure at the inner end of said cap which will tend to project the head thereof slightly beyond the nozzle. It is therefore necessary to provide means for maintaining the cap in closed position against such pressure so created by closing the tube, and against pressure caused by accidentally pressing the body of the tube, as for instance when it is packed in a suitcase. While I have shown several means for maintaining or frictionally locking the cap in closed position, it will be understood of course that various other means may be devised for this purpose and that I do not limit myself to the particular arrangements disclosed.

In Figs. 1 and 2 the tubular cap is slotted longitudinally from the delivery opening to its inner end, although as will be obvious said slot 18 may stop short of said end, and a portion of the surface thereof at the juncture 19 of the delivery opening and the slot projects slightly laterally to engage the inner end of the nozzle when the cap is in closed position and to hold it in such position. The elasticity of the metal of which the cap is formed will permit the same to be readily drawn outwardly to delivery position, but the frictional engagement between the surface 19 of the cap and the inner end of the nozzle is sufficient to prevent any pressure that may be created by squeezing the tube from projecting the cap outwardly. In fact I have ascertained that the tube may be subjected to bursting pressure without moving the cap.

In Fig. 2 the outer surface of the nozzle 20 is cylindrical and the cap 21 is arranged to fit over the same and to be held in frictional engagement therewith. In the present instance I have shown the cap provided with inwardly projecting beads 22 arranged to snap into the groove 23 in the outer surface of the nozzle, although it will be understood that the arrangement might be reversed and that various other means may be employed to secure the cap in position. The protecting caps 12 and 21 are placed over and secured to their respective nozzles before shipment, and a paraffin shell is usually placed around the inner end of the cap. The user will discard the protecting caps inasmuch as the closure 14 will serve the purpose of the detachable closures, usually threaded caps, now employed on collapsible tubes and which, not being permanently attachable to the tubes, are often lost. In the modification shown in Fig. 3 the frictional engagement between the cap 14 and the nozzle is effected by one or more lips 24 struck up from the bushing 13 and arranged to snap into the groove 25 formed in the body of said cap.

In Fig. 5 a groove 25 is formed in the bushing 13 which is arranged to receive a bead 26, annular or otherwise, formed in the cap 14 for frictionally locking said cap in closed position.

In Fig. 6 one or more lips 27 struck up from the surface of the cap 14 are arranged to co-operate with the lower end of the bushing 13 for the purpose of maintaining the said cap in closed position. In every form of my invention the frictional engagement created by the several means set forth between the cap and the nozzle is sufficient to maintain said cap in closed position against any pressure that may be created by squeezing the tube, but is not sufficient to prevent the user from readily placing the cap in delivery position, very little effort being required to draw the cap out to such delivery position on account of the elasticity of the material from which it is formed. Having thus described various illustrative embodiments of my invention without, however, limiting myself thereto, what I claim and desire to secure by Letters Patent is:

1. A collapsible tube, comprising a nozzle, and a longitudinally-slidable cap located in said nozzle, said cap having a side delivery-opening and a flanged head, said head being closely adjacent to, or abutting, the outer end of said nozzle when said cap is in closed position, said cap being provided with means for maintaining itself in closed position and with means for limiting its outward movement.

2. A collapsible tube, comprising a nozzle, and a longitudinally-slidable cap located in said nozzle, said cap having a side delivery-opening and a flanged head, said head being closely adjacent to, or abutting, the outer end of said nozzle, and said delivery opening being inward of the outer end of said nozzle when said cap is in closed position, said cap being provided with means for maintaining itself in closed position and with means for arresting its outward movement when in delivery position with said delivery opening projecting beyond the outer end of said nozzle.

3. A collapsible tube, comprising a nozzle, and a longitudinally-slidable cap located in said nozzle, said cap having a side delivery-opening and a flanged head, said head being closely adjacent to, or abutting, the outer end of said nozzle when said cap is in closed position, said cap being provided with means for frictionally locking itself in closed posi-

tion and with means for limiting its outward movement.

4. A collapsible tube, comprising a nozzle, and a longitudinally-slidable cap located in said nozzle, said cap having a side delivery-opening and a flanged head, said head being closely adjacent to, or abutting, the outer end of said nozle when said cap is in closed position, said cap when in closed position being in frictional engagement with said nozzle and being provided with means for maintaining itself in closed position and with means for limiting its outward movement.

5. A collapsible tube, comprising a nozzle, and a longitudinally-slidable cap located in said nozzle, said cap having a side delivery-opening and a flanged head, said head being closely adjacent to, or abutting, the outer end of said nozzle when said cap is in closed position, said cap being provided with a longitudinal slot extending from said delivery-opening toward its inner end, a portion of the surface thereof at the juncture of said slot and delivery-opening projecting slightly laterally to engage the inner end of said nozzle when said cap is in closed position, and with means for limiting its outward movement.

6. A collapsible tube, comprising a nozzle, and a longitudinally-slidable cap located in said nozzle, said cap having a side delivery-opening and a flanged head, said head being closely to, or abutting, the outer end of said nozzle when said cap is in closed position, said cap being provided with means for maintaining itself in closed position and with means for limiting its outward movement, and a cap in frictional engagement with the outer surface of said nozzle.

7. A collapsible tube, comprising a nozzle having a tapering outer surface, a longitudinally-slidable cap located in said nozzle, said cap having a side delivery-opening and a flanged head, said head being closely adjacent to, or abutting, the outer end of said nozzle when said cap is in closed position, said cap being provided with means for maintaining itself in said closed position and with means for limiting its outward movement and a cap having a tapering inner surface in frictional engagement with the outer surface of said nozzle.

8. A collapsible tube, comprising a nozzle and a longitudinally slidable closure located in said nozzle, said closure having a side delivery-opening and being in such frictional engagement with said nozzle as to be held, both in closed and delivery positions, against the pressure exerted thereon by the contents of the tube.

9. A collapsible tube, comprising a nozzle, a longitudinally slidable closure located in said nozzle, said closure having a side delivery-opening and being in such frictional engagement with said nozzle as to be held, both in closed and delivery positions, against the pressure exerted thereon by the contents of the tube, and a cap in frictional engagement with said nozzle.

10. A collapsible tube, comprising a nozzle, the interior surface of which is of relatively-hard non-corrosive metal and a longitudinally slidable closure located in said nozzle, said closure having a side delivery-opening and being in such frictional engagement with said nozzle as to be held, both in closed and delivery positions, against the pressure exerted thereon by the contents of the tube.

11. A collapsible tube, comprising a nozzle, a bushing of relatively-hard, non-corrosive metal in said nozzle and a longitudinally-slidable closure located in said nozzle, said closure having a side delivery-opening and being in such frictional engagement with said nozzle as to be held, both in closed and delivery positions, against the pressure exerted thereon by the contents of the tube.

In testimony whereof, I have hereunto subscribed my name this 9th day of March, 1921.

CLIFFORD G. KING.