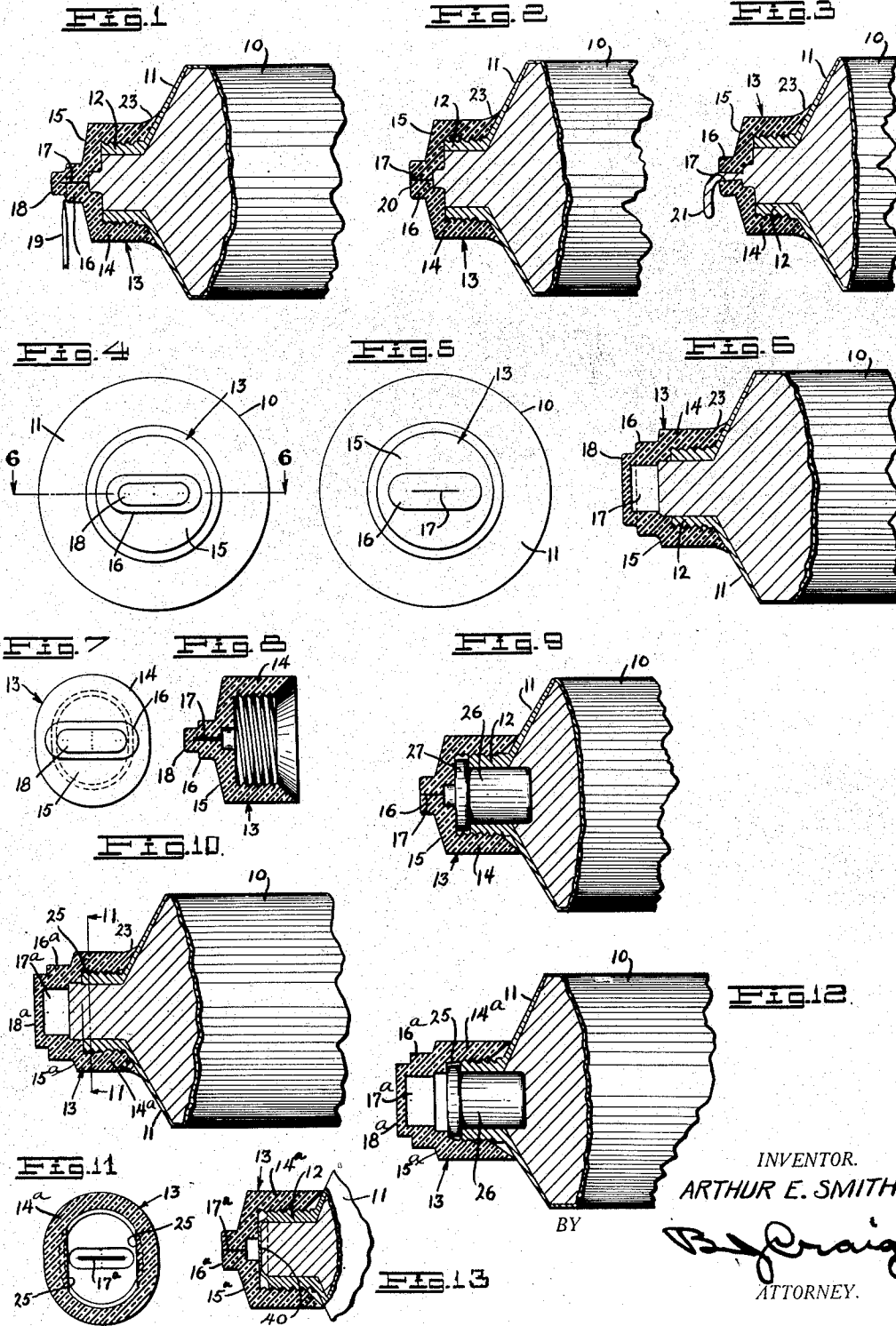


Dec. 25, 1928.

1,696,506

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CLOSURE FOR COLLAPSIBLE TUBES

Filed June 21, 1926



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# UNITED STATES PATENT OFFICE.

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## CLOSURE FOR COLLAPSIBLE TUBES.

Application filed June 21, 1926. Serial No. 117,295.

This invention relates to closures for collapsible tubes.

The general object of the invention is to provide an improved dispensing closure for collapsible tubes which is so constructed that complete closing of the discharge orifice of the closure will be effected.

A specific object of the invention is to provide a valved closure for collapsible tubes including a valve closure member which is threaded to engage threads on the collapsible tube and wherein the threads of the closure are mutilated or partially removed to give added thickness to portions of the skirt of the closure to thereby increase the tendency of the valve to close.

Another object of the invention is to provide an elastic dispensing closure cap for collapsible tubes wherein the skirt of the closure is molded or made to be normally elliptical but which assumes a cylindrical form when placed on the tube.

Another object of the invention is to provide a combined collapsible tube and removable closure member wherein a removable plug or cork is arranged upon the end of the tube to prevent the contents from being forced out while the tube is being filled.

Another object of the invention is to provide a collapsible tube having a preformed discharge orifice therein and wherein means is provided for normally preventing flow through the preformed orifice.

An additional object of the invention is to provide a collapsible tube including a cap member having a preformed orifice and having a closure integral with said cap for closing the orifice and for maintaining it closed until the consumer desires to use the contents of the tube.

Other objects of the invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a central sectional view showing a cap embodying the features of my invention;

Fig. 2 is a view similar to Fig. 1 with the seal removed;

Fig. 3 is a view similar to Fig. 2 showing the manner in which the material is extruded from the tube;

Figs. 4 and 5 are end views of the closure and tube as shown in Figs. 1 and 2 respectively;

Fig. 6 is a section on line 6—6, Fig. 4;

Fig. 7 is an end view and Fig. 8 is a central sectional view showing one of the closures before it has been placed on the tube;

Fig. 9 is a central sectional view showing the closure used in combination with a temporary sealing plug;

Fig. 10 is a central sectional view of a slight modification showing a portion of the securing threads of the closure removed;

Fig. 11 is a section on line 11—11, Fig. 10,

Fig. 12 is a central sectional view showing the closure with mutilated threads used in connection with a temporary plug closure, and

Fig. 13 is a section of a modification.

Referring to the drawing by reference characters, I have shown a portion of a collapsible tube with which my invention may be used at 10. This tube may be made of any suitable soft material and the tube, as is customary, may be provided with an end portion 11 which is relatively stiff and on which a threaded neck 12 is provided.

A closure member embodying the features of my invention is indicated generally at 13. This closure member includes a skirt 14 having an end portion 15 thereon. This end portion 15 is shown as provided with a transverse rib 16 in which a preformed slit 17 is arranged. The slit 17 is normally closed by a seal 18 which is integral with the portion 16 of the closure.

The closure 13 is preferably of rubber, celluloid, or similar material and the slit 17 is made by providing a blade on one of the mold members. This blade is wafer thin. In use, to dispense the contents of the tube, the seal 18 is removed by means of a knife, scissors, or other member 19. This leaves an end portion 20 which is intersected by the slit 17 so that the material 21 will be forced from the tube when the latter is squeezed.

Due to the inherent or elastic properties of the closure, the latter will cause the walls of the slit 17 to come together after pressure is removed from the tube. The end of the skirt which engages the portion 11 of the tube, is preferably tapered as at 23 but this forms no part of my present invention being described and claimed in my co-pending application, Serial Number 101,907, filed April 14, 1926.

The skirt 14 of the closure is preferably

made elliptical in shape when in normal position with the major axis of the ellipse arranged at right angles to the slit 17 so that when it is placed upon the cylindrical neck 12 the skirt will be distorted to a round shape thereby causing tension in the side walls defining the slit to thereby cause the walls to be forced together so that the tending of the slit to remain sealed is increased. The closure skirt 14 is preferably provided with internal screw threads (as shown) which are adapted to match with the threads on the neck 12 of the tube 10 to assure of a better grip between the closure and the neck of the tube.

I also may, if desired, remove a portion of the threads on the closure as shown at 25 in Figs. 10 and 11. These mutilated thread portions 25 are on opposite sides and are perpendicular to the slit. As a result of this construction the walls 14<sup>a</sup> will be distorted outwardly as shown in Fig. 10 when the closure is in place thereby setting up compression strains and further tending to maintain the slit 17<sup>a</sup> closed.

In Figs. 9 and 12 I show the neck 12 as provided with a plug 26 which fits in the aperture in the neck 12 and has a flange 27 thereon which engages the end of the neck. This plug is adapted to be engaged by the closure 13 having a skirt 14<sup>a</sup>, an end portion 15<sup>a</sup> and a rib 16<sup>a</sup> to prevent leakage through the slit 17<sup>a</sup> should the tube 10 be accidentally squeezed. Before using a tube provided with the plug 26 the consumer must first remove the closure 13, then withdraw the plug 26. After the plug 26 has been removed the closure 13 is replaced and is moved to position in a manner similar to that shown in Fig. 2.

I will now describe the use of my invention with the plug 26 omitted. The closure 13 is first inserted on the tube and the tube is presented to the filling machine which fills the tube after which the filling end is closed. The seal 18<sup>a</sup> prevents leakage through the slit 17 while filling and the tube is sent to the consumer. The consumer will use a knife or scissors 19 to cut off the seal 18 after which the tube contents will be available by merely squeezing the tube to cause the proper amount of material to be extruded. When the pressure is released the slit 17 closes.

When the plug 26 is used it is inserted as shown in Fig. 9 and the cap 13 is secured in place, this cap 13 has the slit 17<sup>a</sup> already formed therein so that the plug 26 prevents material from being forced through the slit 17<sup>a</sup> under the pressure caused by the filling machine. After the tube is filled it is sent to the consumer who removes the cap 13, removes the plug 26 and then replaces the cap 13 thus making the tube ready for use as previously described. When the consum-

er wishes to go on journeys or otherwise move the tube so that it might be accidentally squeezed, he can reinsert the plug 26 to prevent leakage.

In Fig. 12 the plug is shown as in use on a cap wherein a seal 18<sup>a</sup> is provided. I have found that either the seal 18<sup>a</sup> or the plug 26 will serve to prevent leakage while the tube is being filled, but since the consumer frequently desires to have the plug 26 for closing the container after the seal has been removed, I may at times use both the plug 26 and the seal 18<sup>a</sup> if desired.

From the foregoing description it will be apparent that I have provided an improved closure for a collapsible tube wherein the closure is provided with a preformed automatically closing discharge orifice and wherein means is provided for preventing flow through the orifice while the tube is being filled.

In Fig. 13 I have shown a modification wherein the neck of the tube 12 is provided with a thin frangible diaphragm 40. This diaphragm is of soft material. The closure 13 may be of the type previously described and this closure will normally take the position shown in Fig. 13 when the device is sold to the consumer. The consumer will remove the closure 13 and will cut away the frangible diaphragm 40 and then replace the closure so that the contents may be dispensed.

Having thus described my invention, I claim:

1. The combination of a collapsible tube having a discharge end, a closure for said end, said closure being made of flexible material and having a slit therein, said closure including a skirt engaging the end portion of said tube, the transverse section of said skirt being normally elliptical in shape.

2. The combination of a collapsible tube having a discharge end, a closure for said end, said closure being made of flexible rubber-like material and having a slit molded therein, said closure including an integral seal for said slit.

3. A closure for a collapsible tube, said closure being made of flexible material and having a slit therein, said closure including a skirt, said skirt forming an attaching portion for positioning said closure upon said tube, a transverse section of the attaching portion of said skirt being normally of greater diameter in one direction than in a direction perpendicular thereto.

4. The combination of a collapsible tube having a threaded end, a closure for said end, said closure being made of flexible material and having a slit therein, said closure including a skirt, said skirt having internal threads therein with portions of the innermost threads removed on diametrically opposed sides.

5. In combination with a collapsible tube having a threaded discharge orifice, a plug fitted in said orifice, said plug having a shoulder thereon engaging the end of said tube and a cap for temporarily holding said plug in place, said cap having threads thereon adapted to engage threads on said tube, said cap being of flexible material and having a slit therein, and a seal integral with said cap for normally closing said slit.
6. In combination with a collapsible tube having a discharge orifice, a plug fitted in said orifice, said plug having a shoulder thereon engaging the end of said tube and a cap for temporarily holding said plug in place, said cap having threads thereon adapted to engage threads on said tube, said cap being of flexible material and having a slit therein, a complete removal of said plug being necessary before the contents of said tube can be discharged.
7. The combination of a collapsible tube having a threaded end, a closure for said end, said closure being made of flexible material and having a preformed slit therein, said closure including a seal for said preformed slit, said seal being integral with the body of the closure, said closure including a skirt normally elliptical in shape, said skirt having internal threads therein with portions of the innermost threads removed on diametrically opposed sides.

In testimony whereof, I hereunto affix my signature.

ARTHUR E. SMITH.