

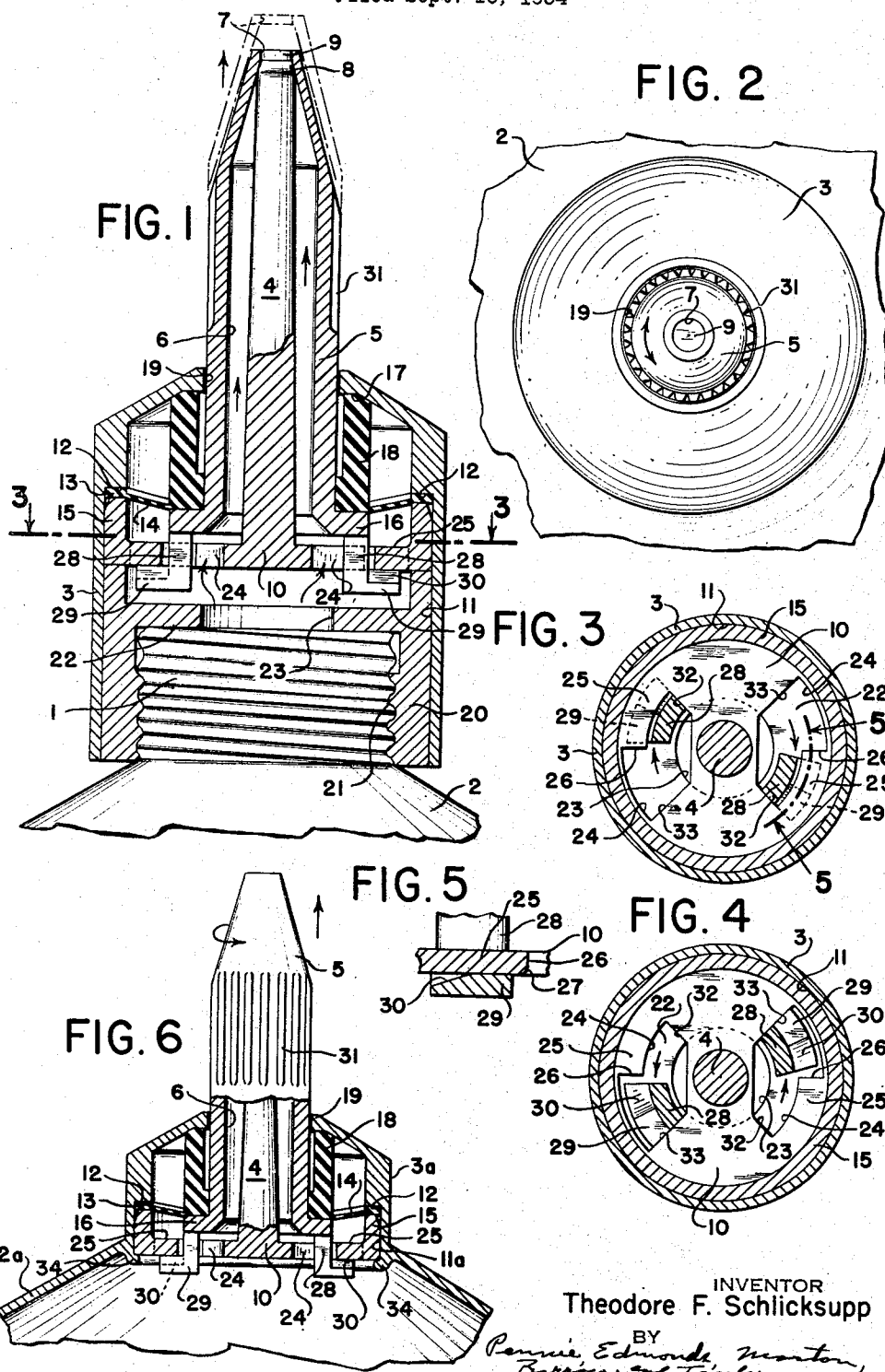
June 21, 1955

T. F. SCHLICKSUPP

2,711,271

SELF-CLOSING COLLAPSIBLE TUBE MECHANISM WITH LOCK

Filed Sept. 16, 1954



INVENTOR
Theodore F. Schlicksupp

BY
Pamela Edmonds Manton,
Barrios and Taylor
HIS ATTORNEYS

1

2

2,711,271

SELF-CLOSING COLLAPSIBLE TUBE MECHANISM WITH LOCK

Theodore F. Schlicksupp, Long Island City, N. Y.

Application September 16, 1954, Serial No. 456,559

5 Claims. (Cl. 222-493)

This invention relates to a self-closing closure and discharge mechanism for containers such as collapsible tubes for paste-like material, e. g. toothpaste, shaving and other toilet creams, and the like. More particularly, the invention relates to locking mechanism to prevent the unintentional discharge of the contents of the container.

The present invention constitutes an improvement on the self-closing discharge mechanism which is disclosed and claimed in my prior Patent No. 2,628,004, issued February 10, 1953. It has been found that tubes equipped with the mechanism of this patent when carried in traveling cases may sometimes be subjected to accidental squeezing pressure and eject some of the paste-like material. When the discharge mechanism is in the form of an attachment screwed onto the collapsible tube, this can be avoided, when traveling, by removing the attachment and replacing the tube cap. However, the tube cap may be misplaced, or even thrown away at the time the attachment is first screwed onto the tube. In any event, it is more convenient to have a manual locking mechanism provided as a part of the automatic discharge mechanism.

The object of the present invention is to provide a self-closing discharge mechanism of this kind which incorporates a locking mechanism that is effective, simple, easy to use and does not significantly increase the manufacturing cost of the closure mechanism as a whole.

Additional objects of the invention will be apparent from the following description of the mechanism of the invention taken in connection with the accompanying drawings.

In these drawings:

Fig. 1 is a view in vertical central section of the improved locking self-closing discharge mechanism, drawn to a considerably enlarged scale;

Fig. 2 is a plan view of the mechanism shown in section in Fig. 1;

Fig. 3 is a transverse sectional view taken on line 3-3 of Fig. 1 illustrating the parts of the locking mechanism in locked position;

Fig. 4 is a view similar to Fig. 3 with the parts in unlocked position;

Fig. 5 is a detail sectional view taken on line 5-5 of Fig. 3; and

Fig. 6 is a view similar to Fig. 1, but drawn to a smaller scale, showing a modification.

Referring now more specifically to Figs. 1-4, the improved locking discharge mechanism is here illustrated as embodied in an attachment device which can be screwed onto the conventional threaded neck portion 1 of a collapsible tube 2, for example, a toothpaste tube the opposite end of which, after filling, is permanently closed in the usual manner.

The discharge mechanism comprises a body member 3, and positioned within and projecting therefrom are a fixed member in the form of a slender, elongated post or stem 4, and a relatively movable nozzle or spout member 5. The latter member is generally cylindrical in form, and is somewhat larger than post 4 so as to leave an annular

passage 6 between the two members. The upper end of the tubular spout member 5 is preferably tapered and terminates in a discharge outlet or aperture 7 in the form of a short, cylindrical opening.

The upper end of fixed post 4 is provided with a conical valve surface 8 which cooperates with the inner conical surface of the end portion of spout 5. Beyond conical surface 8 post 4 has a short, cylindrical projection 9 to fit the cylindrical discharge opening 7, so as to provide a smooth cutoff of the discharged material and a smooth end surface of the discharge nozzle mechanism when the parts are in position to close the discharge opening.

The fixed post 4 is supported at its base by means of a substantially rigid transverse plate member 10 to which it is connected in any suitable way, advantageously by being made integral therewith. The peripheral surface of plate member 10 is cylindrical and is slid into a cylindrical bore 11 in body member 3. The upper end of bore 11 is provided with a lateral shoulder 12 against which is seated the rim 13 of a diaphragm member 14 for the spout member 5.

Above plate member 10 and advantageously formed integrally with it there is a spacing sleeve or collar member 15, the upper end of which bears against the lower or inner surface of the diaphragm rim 13. Such sleeve-like member serves to space the plate member 10 below the lower end of spout member 5 so as to permit the contents of the tube to flow laterally above the plate member and enter the lower end of the annular passage 6, and thence to the discharge aperture 7.

The lower end of movable nozzle 5 is flanged as shown at 16, and between the upper surface of this flange and a shoulder 17 at the top of body member 3, there is positioned a spring member which advantageously is in the form of a flexible, resilient sleeve of plastic or rubber, or similar material. Diaphragm 14 also is advantageously molded integrally with the lower end portion of this sleeve member.

Nozzle member 5 is centralized at its lower end by means of diaphragm 14 and has axial sliding movement in an aperture 19 in the upper wall of body member 3. The resiliency of sleeve member 18 holds the spout member 5 and diaphragm 14 normally in the position shown in Fig. 1, which is also the closed position of the discharge opening 7 and cooperating valve structure 8, 9. In fact it is desirable that diaphragm 14 be substantially non-resilient so as to be extremely flexible.

When the walls of the collapsible tube are squeezed for the purpose of dispensing a portion of the contents of the tube, the paste-like material will exert pressure against the diaphragm 14 and the lower end of the nozzle member 5. This causes the nozzle 5 to shift outwardly to the dotted position of Fig. 1 compressing the resilient sleeve 18. In such outward position the desired amount of the paste-like material can be discharged from the outlet 7.

The several parts of the mechanism are assembled by inserting them within the bore 11 of the body member 3, as shown in Fig. 1, and then inserting a sleeve-like member 20 which occupies the lower portion of bore 11. The outer cylindrical surface of this member 20 fits bore 11 with a force fit and thus frictionally holds the plate member 10 and the diaphragm 14 clamped against one another and against the shoulder 12. The lower portion of member 20 has an internally threaded central opening 21 to receive the neck portion 1 of the collapsible tube.

The upper end of the neck portion 1 is screwed home against an internal flange 22 which is spaced a predetermined distance from the upper end of sleeve-like member 20 to allow room for the operation of the locking mechanism, which is about to be described. Flange

3

22 forms a central opening 23 for the passage of the paste-like material which moves upwardly in the direction of the arrows through a pair of similar apertures 24 in plate 10, and thence moves above this plate and into the annular discharge passage 6 of the spout member 5.

Apertures 24 are also part of the locking mechanism. The outline of these apertures is shown in Figs. 3 and 4, from which it will be seen that the apertures are similar in shape and each has a wide and a narrow portion. Each of the narrow portions is formed by the presence of an arcuate shelf or ledge 25 (Fig. 4) having a radial edge 26 extending inwardly from the outer boundary of the wide portion. The lower corners of the edges 26 are rounded, as indicated at 27 in Fig. 5.

These two apertures 24 are diametrically opposite each other, and correspondingly positioned on the lower edge of flange 16 of the spout member 5 there are two downwardly projecting leg members 28 which advantageously are formed integrally with the spout member. These leg members project downwardly through the apertures 24 and terminate in outwardly or radially projecting feet 29. Each of these feet has a sloping or cam-shaped toe portion 30.

With the parts in the unlocked position shown in Fig. 4, the leg and foot members 28-30 are free to move vertically and provide no interference with the automatic operation of diaphragm 14 and spout member 5 to discharge the paste-like material from the end of the spout through discharge aperture 7 when the tube 2 is squeezed. Also, they do not interfere with the return of the parts to their normal or closed position shown in Fig. 1 by the resilience of the plastic or rubber sleeve 18 when the squeezing pressure on the tube is removed.

The parts are moved to the locked position shown in Fig. 3 by manually turning, that is, partially rotating spout member 5, and for this purpose the upper portion of the exterior surface is knurled as indicated at 31. When the spout member is turned in the clockwise direction the feet 29 are moved into a position beneath the shelves or ledges 25. The rounded corners 27 of the ends of these ledges and the sloping toe portions 30 facilitate this movement. The short radial edges 32 of apertures 24 serve as stops for the leg members 28 to limit such rotation of spout 5. Also when the spout member is turned in the opposite direction to the unlocked position, the longer radial edges 33 of the apertures serve to limit the movement of the leg portions 28 after the tips of the toe portions 30 are free of the locking edges 26.

It will be understood that when the feet and toe portions 29 and 30 are rotated to the locked position shown in Fig. 3, the engagement with the lower surface of plate 10, that is, with the ledge or shelf portions 25 of this plate, effectively prevents axial upward or outward movement of the spout member 5. Thus the inner conical valve surface is held against the conical valve surface 8 on fixed post 4 so that the discharge aperture is sealed against the accidental discharge of the contents of the tube.

Referring now to Fig. 6, the discharge mechanism and the parts which serve to lock it in closed position are identical with those described above, the modified form of Fig. 6, however, being built into, that is to say, being manufactured as a part of the collapsible tube 2a. For this purpose the body portion 3a of the discharge mechanism is formed as a part of the head of the collapsible tube, and as shown in Fig. 6, these two parts are made integral.

In order to hold the plate 10 and its associated spacing collar 15 in clamped position against the lower surface of rim 13 of the diaphragm, a bead 34 is formed on the interior of the head of tube 2a around the periphery of the lower end of bore 11a. In Fig. 6 this bead

4

is shown as having been crimped over the lower circumferential edge of plate 10 to hold the parts in place. It will be understood that before such crimping operation, the form and position of bead 34 permits the insertion of the various parts within bore 11a.

It will be understood that changes may be made in the construction and arrangement of the various parts of the discharge locking mechanism without departing from the invention, the scope of which is set forth in the appended claims.

I claim:

1. A self-closing discharge mechanism for a collapsible tube comprising a body portion, a fixed member and a relatively movable member positioned within and projecting from the body portion, one of said members having a discharge outlet controlled by the movement of the movable member and through which the contents of the tube may be discharged, a flexible diaphragm located in the body portion and connected to the movable member, means clamping the outer periphery of the diaphragm in fixed sealing relation to said body portion, said diaphragm being subjected at one side to pressure of the contents of the tube when the tube is squeezed and serving to then move the movable member to a position in which said discharge outlet is open, resilient means normally biasing the diaphragm to a position in which the movable member is in a position in which said discharge outlet is closed, a locking member projecting axially inward from the inner end of said movable member, said locking member having a radially outwardly projecting foot portion, and a lug fixed to the inner wall of said body member, said movable member being rotatable to engage said foot portion with said lug to lock said movable member in closed position.

2. A self-closing discharge mechanism for a collapsible tube comprising a body portion, a fixed member and a relatively movable member positioned within and projecting from the body portion, one of said members having a discharge outlet controlled by the movement of the movable member and through which the contents of the tube may be discharged, a flexible diaphragm located in the body portion and connected to the movable member, means clamping the outer periphery of the diaphragm in fixed sealing relation to said body portion, said diaphragm being subjected at one side to pressure of the contents of the tube when the tube is squeezed and serving to then move the movable member to a position in which said discharge outlet is open, resilient means normally biasing the diaphragm to a position in which the movable member is in a position in which said discharge outlet is closed, an apertured transverse plate member disposed inwardly of said movable member within said body member, and a locking means projecting from the inner end of said movable member and projecting through said apertured plate to engage the lower surface thereof and lock said movable member in said closed position, said movable member being rotatable to disengage said locking means from said plate to permit the movable member to move to open position.

3. A self-closing discharge mechanism for a collapsible tube comprising a body portion, a fixed member and a relatively movable member positioned within and projecting from the body portion, one of said members having a discharge outlet controlled by the movement of the movable member and through which the contents of the tube may be discharged, a flexible diaphragm located in the body portion and connected to the movable member, means clamping the outer periphery of the diaphragm in fixed sealing relation to said body portion, said diaphragm being subjected at one side to pressure of the contents of the tube when the tube is squeezed and serving to then move the movable member to a position in which said discharge outlet is open, resilient means normally biasing the diaphragm to a position in

5

which the movable member is in a position in which said discharge outlet is closed, a fixed transverse plate member disposed inwardly of said movable member within said body member, said plate having a pair of apertures diametrically opposite one another, each of said apertures having a wide portion and a narrow portion including a ledge, said movable member having a pair of locking members disposed diametrically and projecting axially inward through said apertures, each of said locking members having a foot portion projecting outwardly, said locking members being movable by rotation of said movable member from the wide portions of said apertures to the narrow portions thereof, and vice versa, said movable member being free to shift axially to open said discharge outlet when said locking members are in said wide aperture portions, and, when said locking members are moved to said narrow aperture portions, the foot portions thereof engaging beneath said ledges and locking the movable member in closed position.

4. A self-closing discharge mechanism for a collapsible tube comprising a body portion, a fixed member and a relatively movable member positioned within and projecting from the body portion, one of said members having a discharge outlet controlled by the movement of the movable member and through which the contents of the tube may be discharged, a flexible diaphragm located in the body portion and connected to the movable member, means clamping the outer periphery of the diaphragm in fixed sealing relation to said body portion, said diaphragm being subjected at one side to pres-

6

sure of the contents of the tube when the tube is squeezed and serving to then move the movable member to a position in which said discharge outlet is open, resilient means normally biasing the diaphragm to a position in which the movable member is in a position in which said discharge outlet is closed, and locking means in part on the inner end of said movable member and in part attached to the inner wall of said body member and serving to retain the movable member in said closed position, said locking means being engageable and disengageable by partial rotation of said movable member.

5. A self-closing discharge mechanism for a collapsible tube comprising a body portion including a fixed member and a relatively movable member, one of said members having a discharge outlet controlled by the movement of the movable member and through which the contents of the tube may be discharged, actuating means for said movable member, said actuating means being subjected to pressure of the contents of the tube when the tube is squeezed and serving to then move the movable member to a position in which said discharge outlet is open, resilient means normally biasing the movable member to a position in which said discharge outlet is closed, and locking means in part attached to said movable member and in part attached to said fixed member and serving to retain the movable member in said closed position, said locking means being engageable and disengageable by partial rotation of said movable member.

No references cited.