Nov. 26, 1968 W. HAHN 3,412,910

CLOSURE FOR TUBES OR THE LIKE

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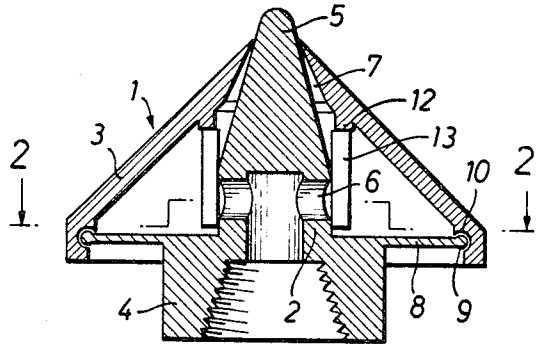

Fig. 1

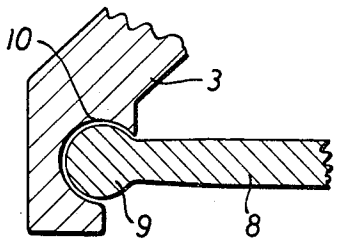

Fig. 3

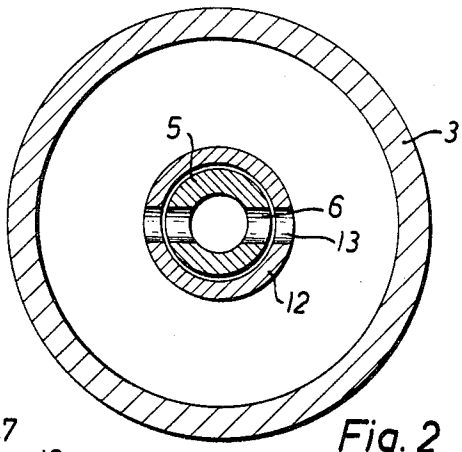

Fig. 2

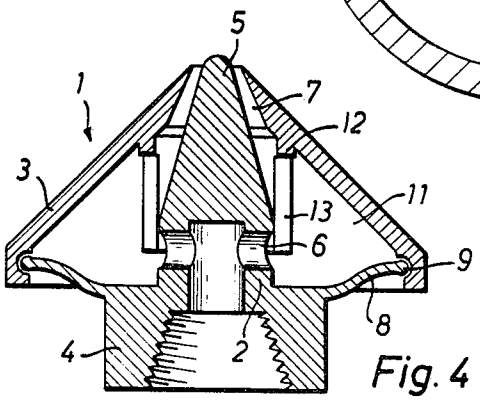

Fig. 4

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CLOSURE FOR TUBES OR THE LIKE

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ABSTRACT OF THE DISCLOSURE

The disclosure in this application relates to a closure for a collapsible tube wherein pressure on the tube unseats the closure for the discharge of the contents of the tube, while release of pressure on the tube permits seating of the closure member to seal the tube against discharge.

The invention relates to improvements in a closure for tubes which opens automatically under pressure exerted on the contents of the tube and closes automatically upon release of this pressure.

There is known to be automatically acting tube closures of the above-mentioned type which have an inner body with a sealing cone attached to the mouthpiece of the tube and a cap movable relative to the sealing cone, the cap as well as the inner body being both subjected to the action of spring means which consists of a spiral spring mounted between the closure cap and an outer sleeve. These parts are provided with radially extending flanges serving as abutments for the spiral spring. Since the spiral spring must have several windings to obtain a suitable springiness, the height of the automatically acting tube closure is relatively great. Moreover, the same consists of a plurality of parts whereof result certain costs for the material and for assembling of the parts.

It is the primary object of the invention to provide an automatically acting tube closure which is simple in its structure and less costly in the manufacture. According to the present invention, the tube closure is characterized by the fact that the inner body and the cap are connected with one another by radially extending spring elements, preferably, such spring elements being made from the same material as the inner body and/or the cap.

With the foregoing construction, there is obtained an automatically acting tube closure which has a simple structure and may consist of comparatively few parts. The height of the tube closure is relatively small. It is unnecessary to use and mount spiral springs, and the danger of corrosion of the spring is also eliminated. By a special design of the spring elements, the space between the inner body and the cap may further be kept closed at the bottom in a simple manner. No discharge of the material is possible than through the opening provided therefor. The degree of springiness of the spring elements may be easily determined and adjusted by the material thereof.

Preferably, the inner body is provided with a plate constituting the spring element, the edge of the plate being connected with the cap. The edge of the plate may therefor engage the cap or it may also be provided a joint connection of the spring plate with the cap and/or with the inner body. By selection of the thickness of the plate, the desired degree of springiness may be obtained.

The joint connection may be formed in such a manner that one edge or both edges of the spring plate engage by means of an annular reinforcement a recess of the other part, namely of the cap and/or the inner body. Such design has the advantage that the parts by mere engagement or snapping in may be connected to a unit and may be held together. The parts may also be disengaged from one another at any time so that they may be cleaned.

Preferably, the engagement of cap and sealing cone is formed in such a manner that the cap is provided with a jacket which in a certain position of cap and sealing cone and also upon pressure on the cap surrounds the sealing cone. The jacket is provided with passages for the material. If the cap is rotated relative to the sealing cone, the tube may be kept closed also if pressure is applied upon its contents.

One embodiment of the invention is illustrated by way of example in the drawing.

FIG. 1 is a longitudinal section of the automatically acting tube closure according to the invention,

FIG. 2 is a cross-section on the line 2—2 of FIG. 1 and shows the inner body of the tube closure with the cap removed,

FIG. 3 is a fragmentary sectional view on an enlarged scale of the joint connection between the spring element of the inner body and the cap, and

FIG. 4 is a sectional view of the parts of the tube closure in an automatically opened position when pressure is applied on the contents of the tube.

The automatically acting tube closure designated in general by the reference character **1** consists of a so-called inner body **2** and a cap **3** surrounding the same. The inner body **2** has a downwardly extending sleeve-like part **4** provided with an inner screw-thread which is screwed onto the threaded nipple of the tube. The inner body **2** carries an outwardly extending conically shaped part or sealing cone **5** which is provided with lateral bores **6** for the passage of the material from a tube and serves as a sealing cone. The sealing cone **5** engages a conical opening **7** of cap **3** in such a manner that this opening is closed by the engagement of sealing cone **5** therein. The cone angle of the sealing cone **5** and of the conical opening **7** may deviate from one another for more effective closing of the opening.

The inner body **2** is provided with radially extending spring means of any preferred design, but which preferably comprises a spring plate **8** which forms a radial elongation of part **4** of the inner body **2**. The spring plate **8** engages cap **3** in a suitable manner. For this purpose, the outer edge of spring plate **8** is provided with an annular reinforcement or bead **9** which engages a corresponding undercut recess **10** of cap **3**.

The parts can be formed in such a manner that the inserted spring plate **8** snaps into the recess **10**. The automatically acting tube closure consists therefor only of two parts which preferably are made from plastics and may be readily and easily assembled.

If the tube closure is screwed onto a tube and the contents thereof is discharged from the tube by pressure, the pressure of the material within the space **11** between cap **3** and inner body **2** will cause removal of the cap **3** from the sealing cone **5** as shown in FIG. 4 so that the material may discharge through opening **7** in the cap. Thereby spring plate **8** is brought from the flat position shown in FIG. 1 into the curved position shown in FIG. 4. By the inherent springiness of the plate **8** consisting of more or less elastic material, the inner body **2** is again moved in outward direction as soon as the pressure of the contents of the tube ceases or is released. The inner body returns then into its initial position and thereby closes automatically the discharge opening **7**.

To obtain an effective closure of the tube, the cap **3** is provided with an annular sleeve **12** surrounding the sealing cone **5**. The sleeve **12** is provided with passages **13** which are aligned with the bores **6** of sealing cone **5** as shown in FIG. 2. By rotation of cap **3** with sleeve **12** relative to the sealing cone **5**, the bores **6** may be kept closed so that the material cannot discharge from the tube also if pressure is applied thereon.

While there is herein shown and described the pre-

ferred embodiment of the invention, it is nevertheless to be understood that minor changes may be made therein without departing from the spirit and scope of the invention as claimed.

What is claimed is:

1. A closure for a collapsible tube, wherein pressure on the tube unseats the closure for discharge of the contents of the tube and wherein the release of pressure on the tube permits seating of the closure, said closure having an inner member adapted for attachment to a collapsible tube and an outer member having a discharge opening therein, means on the inner member for normally closing the discharge opening in the outer member and spring means connecting the two members and normally holding the means on the inner member in closed relation to the discharge opening in the outer member, the means on the inner member for normally closing the discharge opening in the outer member being of conical formation and having radial openings therein to permit flow of the tube contents into the outer member and a sleeve carried interiorly of the outer member and overlying the radial openings in the closure means for the outer member, the outer member being rotatable on the inner member and there being openings in said sleeve adapted to cooperate with said radial openings for controlling flow of the tube contents to the outer member and to the outlet.

2. A closure for a collapsible tube, wherein pressure on the tube unseats the closure for discharge of the contents of the tube and wherein the release of pressure on the tube permits seating of the closure, said closure having an inner member adapted for attachment to a collapsible tube and an outer member having a discharge opening therein, means on the inner member for normally closing the discharge opening in the outer member and spring means connecting the two members and normally holding the means on the inner member in closed relation to the discharge opening in the outer member, said spring means being carried by the inner member and extending radially for attachment to the outer member, the means on the inner member for normally closing the discharge opening in the outer member being of conical formation and having radial openings therein to permit flow of the tube contents into the outer member and a sleeve carried interiorly of the outer member and overlying the radial openings in the closure means for the outer member, the outer member being rotatable on the inner member and there being openings in said sleeve adapted to cooperate with said radial openings for controlling flow of the tube contents to the outer member and to the outlet.

3. A closure for a collapsible tube, wherein pressure on the tube unseats the closure for discharge of the contents to the tube and wherein the release of pressure on the tube permits seating of the closure, said closure having an inner member adapted for attachment to a collapsible tube and an outer member having a discharge opening therein, means on the inner member for normally closing the discharge opening in the outer member and spring means connecting the two members and normally holding the means on the inner member in closed relation to the discharge opening in the outer member, said spring means being of plate-like formation and formed integral with one of said members releasably engaged with the other member, the means on the inner member for normally closing the discharge opening in the outer member being of conical formation and having radial openings therein to permit flow of the tube contents into the outer member and a sleeve carried interiorly of the outer member and overlying the radial openings in the closure means for the outer member, the outer member being rotatable on the inner member and there being openings in said sleeve adapted to cooperate with said radial openings for controlling flow of the tube contents to the outer member and to the outlet.

4. A closure for a collapsible tube, wherein pressure on the tube unseats the closure for discharge of the contents of the tube and wherein the release of pressure on the tube permits seating of the closure, said closure having an inner member adapted for attachment to a collapsible tube and an outer member having a discharge opening therein, means on the inner member for normally closing the discharge opening in the outer member and spring means connecting the two members and normally holding the means on the inner member in closed relation to the discharge opening in the outer member, said spring means being carried by the inner member and extending radially for attachment to the outer member, said spring means being of plate-like formation and formed integral with one of said members releasably engaged with the other member, the means on the inner member for normally closing the discharge opening in the outer member being of conical formation and having radial openings therein to permit flow of the tube contents into the outer member and a sleeve carried interiorly of the outer member and overlying the radial openings in the closure means for the outer member, the outer member being rotatable on the inner member and there being openings in said sleeve adapted to cooperate with said radial openings for controlling flow of the tube contents to the outer member and to the outlet.

5. A tube closure which automatically opens under the pressure of the contents of the tube and which automatically closes upon release of this pressure, a tube having an externally threaded nozzle, said closure consisting of an inner member provided with an inner thread and adapted to the thread on the tube nozzle, radially extending spring means on the inner member, a sealing cone extending in an axial direction from said inner member, a cap which in the normal position forms a closed space with the inner member and is urged under the action of the spring means in the direction towards the tube, the cap having an opening cooperating with the sealing cone, the inner member being provided with an axially extending bore joining the inner thread and being of substantially the inside width of the opening of the tube as well as that of the bore, there being lateral discharge openings arranged adjacent the bottom of the sealing cone in communication with said bore, a sleeve internally of the cap surrounding the sealing cone, the sleeve having passages which are arranged in accordance with the discharge openings in the sealing cone and the sleeve, cap and sealing cone being rotatable relative to each other.

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