Feb. 1, 1938. J. M. CROOK 2,107,106

CLOSURE FOR CONTAINERS OF LIQUID OR SEMILIQUID SUBSTANCES

Filed April 30, 1937

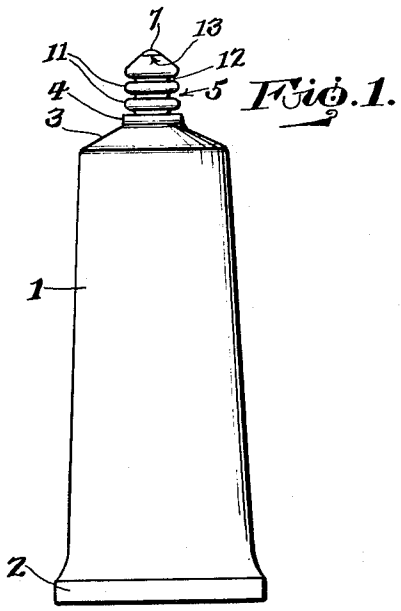


Fig. 1.

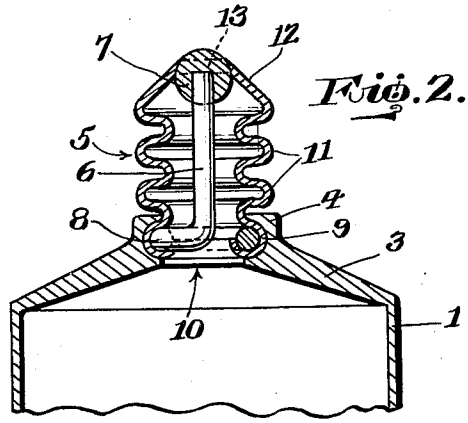


Fig. 2.

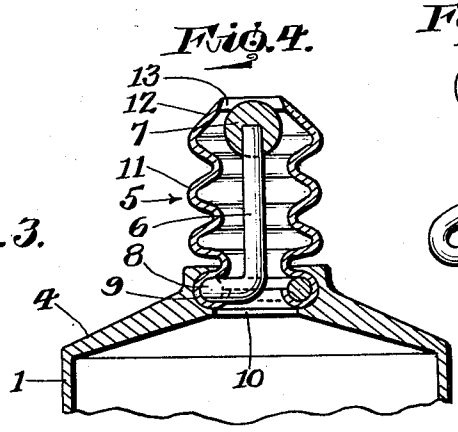


Fig. 4.

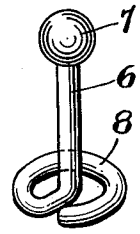


Fig. 5.

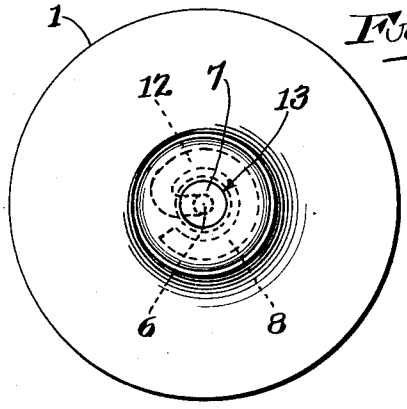


Fig. 3.

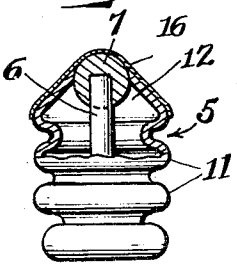


Fig. 6.

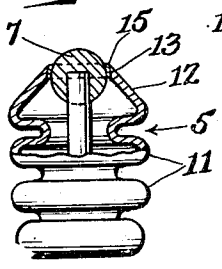


Fig. 7.

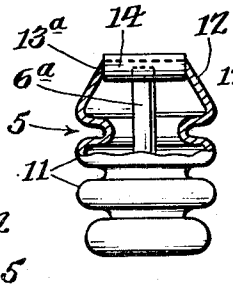


Fig. 8.

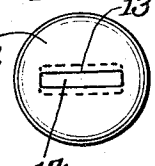


Fig. 9.

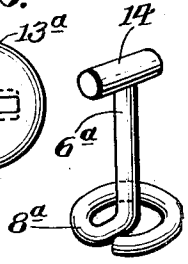


Fig. 10.

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Patented Feb. 1, 1938 2,107,106

UNITED STATES PATENT OFFICE

2,107,106

CLOSURE FOR CONTAINERS OF LIQUID OR SEMILIQUID SUBSTANCES

James M. Crook, Huntington, W. Va.

Application April 30, 1937, Serial No. 140,035

6 Claims. (Cl. 221—60)

This invention relates to improvements in closures for the containers of liquid or semi-liquid substances, more especially containers of the collapsible tube type, and its objects are as follows:

First, to provide a closure for collapsible tubes such as are used for tooth paste and a wide variety of similar semi-liquids, or liquids, which closure is made so as to seal automatically upon the cessation of the extruding pressure.

Second, to provide a closure of the foregoing character, in which the stiff, perforated cap has flexible sides so as to allow expansion and contraction in respect to a rigid stopper on which the aperture is adapted to seat.

Third, to provide a closure as stated, in which the cap is part of an axially expansible and contractible bellows.

Fourth, to provide a collapsible tube which has a stopper fixed in position in the vicinity of its outlet opening, and a stretchable and retractible encasing neck in continuation of said opening, terminating in a cap end that has a perforation, the rim of which is seatable upon the stopper.

Other objects and advantages will appear in the following specification, reference being had to the accompanying drawing, in which:

Figure 1 is a side elevation of a collapsible tube with the improved closure applied.

Figure 2 is a vertical section of the closure and a portion of the tube showing the former in the sealing position.

Figure 3 is a plan view of the structure shown in Fig. 2.

Figure 4 is sectional view similar to Fig. 2, showing the closure in the open or discharging position.

Figure 5 is a perspective view of the stopper and its supporting element.

Figure 6 is a partially sectional and elevational view of the closure alone, illustrating the application of a sealing covering.

Fig. 7 is a view similar to Fig. 6 illustrating a cork or similar seat in the outlet perforation.

Figure 8 is a sectional view similar to Fig. 6 illustrating a modified form of stopper.

Figure 9 is a detail plan view of the structure shown in Fig. 8.

Figure 10 is a perspective view of the modified stopper and its supporting element.

As already indicated in the foregoing statements of the objects of the invention, the main purpose of the latter is to provide a self-sealing closure which is best adapted to collapsible tubes such as those in which tooth paste, shaving cream and the like is sold. It is the experience of persons using these commodities to find that long before the contents of the tube have been used up, portions of the substances will exude from the outlet opening, making the appearance of the tube most unsightly and preventing an effectual replacement of the customary screw cap.

In addition to the unsightly appearance just spoken of, the fact that the screw cap cannot be readily replaced makes the container substance subject to some contamination. The present invention is intended to, and does prevent contamination of the tube contents and does away with the annoyance of having to struggle with a screw cap that either fits the threaded nozzle very poorly or not at all.

In devising the herein disclosed improvement sight has not been lost of the fact that efforts have been made before to automatically displace and replace a closure structure at the mouth of a collapsible tube by the application and cessation of pressure upon the tube sides. But in such structures an inordinate amount of pressure is required, making the intended remedy worse than the original defects which it is supposed to overcome.

Reference is made to the drawing. The container 1 comprises a familiar type of collapsible tube. This, as is commonly known, is crimped or otherwise closed at 2 at one end, the other and usually frusto-conical end 3 converging to a shoulder 4 which is herein used as a common anchorage both for the flexible neck 5 and for the element 6 which supports the stopper 7.

It is not so material to the carrying out of the invention how the flexible neck 5 and supporting element 6 are affixed to the container 1. The present showing is mainly for the purpose of providing one illustration and according to this showing the ring base 8 on the element 6 is tightly crimped in the last annular corrugation 9 of the flexible neck, this corrugation being seated either in or upon the shoulder 4. The advantage of seating the corrugation in the shoulder arises out of being able to mold the substance of the shoulder 4 around the corrugation and thus producing an anchorage which will endure for the life of the container.

The neck 5 is composed of flexible material. By preference it consists of very thin metal, but it may be made of such other substance as rubber or Celluloid. An outstanding characteristic of this neck is its ability to expand and contract in the axial direction of the outlet opening 10 of the container 1, upon the application and cessa-

tion of pressure upon the contents of the container. For this purpose the neck is made in the form of a tiny bellows. It is somewhat on the order of an accordion bellows although the ridges here are not shown sharp.

As seen in the drawing it comprises a plurality of annular corrugations 11, of which the previously mentioned corrugation 9 is the last of the series. The exposed end of the neck 5 terminates in a stiff cap 12. Ordinarily this cap is made continuous with the flexible neck 5, and reliance for the requisite stiffness is put upon the shape of the cap, which, as shown, is sharply upwardly tapering. The tip of this cap has a central perforation 13, the rim of which seats upon the stopper 7 when the flexible neck 5 is collapsed (Fig. 2).

Said stopper 7 can be made of some soft metal, hard rubber or cork. It is fixed upon the upper end of the element 6, which, in practice, comprises a stiff wire. The stem portion of this element is centrally located with respect to the neck, the latter encasing the entire supporting element, as shown.

Instead of making the stopper 7 in the form of a ball, (Fig. 5) it can be made in the form of a short rod 14 (Fig. 10). According to the form in Figs. 1 to 5, the material extruded from the closure will be in the shape of a hollow cylindrical ribbon. In the form of the invention in Figs. 8, 9 and 10 the extruded hollow ribbon will be flat. The latter is due to the slot shape of the perforation 13*a* (Fig. 9), the latter being adapted to fit the short rod 14. Said rod is supported by an element 6*a* which terminates in a ring base 8*a* on the identical plan of Fig. 5.

In some instances it may be found that the stopper 7 may not provide an adequate seal. In such a case the rim of the perforation 13 is supplemented with a cork insert 15 (Fig. 7). This is merely a washer which is glued or cemented to the surface of the rim. It seems perfectly obvious that a material other than cork can be used for this insert just as it is permissible to vary the material of which the stopper itself is made.

Figure 6 illustrates the use of a sealing cover 16 to insure against an inadvertent extrusion of the contents of the container before it has reached the hands of the purchaser. This cover is applied by simply dipping the end of the closure into some liquid collodion. When this dries it provides a stiff and durable membrane. In practice it can be carried as far down the sides of the closure as desired. It is removed either by slitting it with a knife or tearing it off with the finger nails.

The operation is readily understood. Figure 2 illustrates the normal or sealing position of the closure. The resiliency of the flexible neck 5 is contractible; in other words, when left to itself it contracts and in doing so the rim of the perforation 13 becomes tightly engaged with the fixedly situated stopper 7.

When a person squeezes the sides of the container 1, the pressure upon its contents is directed to the stiff cap 12. The flexible neck 5 yields readily, letting the cap 12 rise and enabling the extrusion of the substance. When the extruding pressure ceases the tension of the neck 5 will predominate, causing it to again contract and reseat the rim of the perforation 13 upon the stopper 7.

From the foregoing explanation it will be understood that the principle of the invention comprises the use of the flexible neck 5 ended with the non-flexible cap 12. The shape of the perforation 13 is immaterial; it may be round (Fig. 3) oblong (Fig. 9) or square. The sides of the neck are annularly ribbed to give it the accordion bellows form. The main advantages of this construction of closure are simplicity of construction, the requirement of only a light extruding pressure to cause an opening, and the insurance of a perfectly tight seal whenever the extruding pressure is let up.

I claim:

1. A self-sealing closure for the opening of a container from which a substance is to be extruded by a pressure upon the substance, comprising a stopper in fixed relationship to the opening, a cap with an outlet perforation, and a flexible neck connecting the cap to the container, said neck being contractible to seat the rim of the perforation upon the stopper and axially stretchable upon the occurrence of said pressure to unseat the rim from the stopper.

2. A self-sealing closure for the opening of a container from which a substance is to be extruded by a pressure upon the substance, comprising a stopper in fixed relationship to the opening, a cap with an outlet perforation, and an accordion neck of flexible material connecting the cap to the container, being axially stretchable and contractible according to the application and cessation of said pressure.

3. A self-sealing closure for the opening of a container from which a substance is to be extruded by a pressure upon the substance, comprising a stopper, a rigid element which fixedly supports the stopper at a distance from said opening, a perforated cap over the stopper, and a flexible accordion neck encasing the rigid element and connecting the cap to the container.

4. A self-sealing closure comprising a stopper, a rigid perforated cap to fit upon the stopper at the rim of the perforation, a flexible neck which is an extension of the cap, an element situated inside of the neck and to which the stopper is attached, and means by which both said element and the flexible neck are rigidly anchored around the outlet opening of a container.

5. A self-sealing closure for the opening of a container from which a substance is to be extruded by a pressure upon the substance, said container including a shoulder in which said opening is formed, a stopper which has a supporting element that terminates in a base, a cap with an outlet perforation, the rim of which is adapted to seat upon the stopper, a flexible neck of bellows form of which the cap is a part, and a crimp in said flexible neck embodied in the shoulder and having the ring base crimped therein to make a firm anchorage, both for the supporting element and for the neck.

6. A self-sealing closure comprising a stopper, a supporting element by which the stopper is held in fixed relationship to an opening in a container, a flexible neck attached to said container encasing the supporting element and terminating in a rigid cap which has a perforation to receive a part of the stopper, and a washer attached to the rim of the perforation to make a seal-off against the stopper.

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