May 24, 1932. G. R. CRUZE 1,859,382

STOPPER AND RETRACTING DEVICE FOR COLLAPSIBLE TUBES

Filed April 28, 1931

Fig. 1.

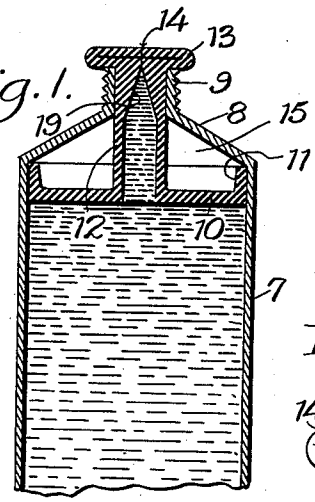


Fig. 2.

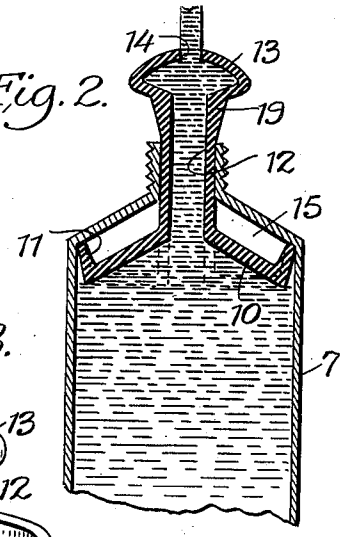


Fig. 3.

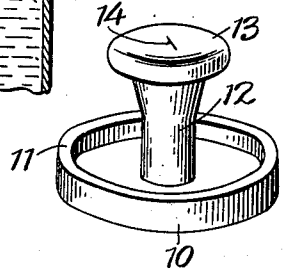


Fig. 4.

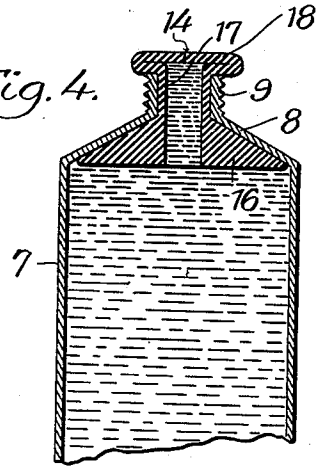


Fig. 5.

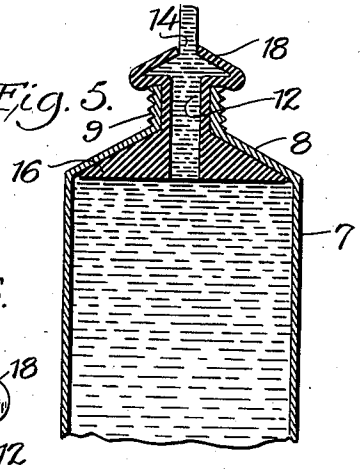
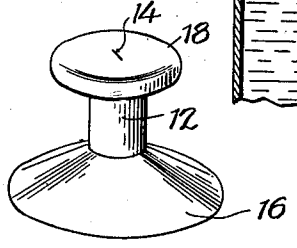


Fig. 6.



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UNITED STATES PATENT OFFICE

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STOPPER AND RETRACTING DEVICE FOR COLLAPSIBLE TUBES

Application filed April 28, 1931. Serial No. 533,524.

The present invention relates to a method of and device for stopping and regulating the flow of plastic or fluent material from dispensing containers and consists in the steps of procedure, and combinations and arrangements of elements of apparatus hereinafter described and particularly set forth in the accompanying claims.

In the present type of containers for dispensing fluent or plastic materials (e. g. toothpaste, soap, vaseline, oils, grease, paints, etc.) the substance is usually contained in collapsible tubes which are compressed for expelling the same and while this is satisfactory in a general way there is the serious defect that a considerable quantity in each tube is lost through oozing after the desired amount has been expelled from the tube. And a further result of this emission is that it serves to clog or smear the tube opening when the closure cap is applied, or if not applied—which is usually the case—the material solidifies or hardens through exposure. Due to this last condition the tube end thus sealed has greater strength than the material of the tube body with the result that when pressure is applied the tube itself breaks and the entire contents of the article must needs be discarded.

To overcome these disadvantages the present invention contemplates the use of a device insertable in the tube at the time of filling which when collapsed acts to create an appreciable vacuum at a point near the discharge opening so that when pressure is stopped the emitting fluent substance is immediately retracted or withdrawn within the tube for a distance sufficient to entirely clear the neck opening. The device further acts to keep the tube opening at all times clear and free from liability of hardening, and obviously there is no needless loss of substance due to the conditions above stated. This theory has heretofore been proposed but insofar as known is believed not to have succeeded due probably to the defect of insufficient vacuum, or leakage between the diaphragm and the tube opening. And a further probable fault is that attempt was made to alter the tube structure per se which is obviously impracticable both in function and from the cost production standpoint.

The invention as disclosed herein is especially designed for tubes of the collapsible type though it will be understood is equally as well applicable to fluent material containers of the non-collapsible type. It is proposed as an improvement over the construction of article shown in co-pending application for United States patent on "Method and device for stopping and regulating flow from collapsible tubes", Serial No. 518,872, filed February 27, 1931, and in which I am joint inventor.

The invention is shown by way of illustration in the accompanying drawings, wherein:

Figure 1 is a central sectional view of the collapsible tube showing the devce in applied position;

Figure 2 is a similar view showing the same in position for dispensing the material;

Figure 3 is a perspective view of the device per se;

Figure 4 is a central sectional view of a modified construction of article;

Figure 5 is a similar view showing the device at the time of dispensing, and;

Figure 6 is a perspective view of the modified construction of the article.

Referring to the construction in further detail and wherein like reference characters indicate corresponding parts in the different views shown, 7 designates a collapsible tube with the usual type of reduced end portion 8 having neck 9 ordinarily closed by a screw cap, herein dispensed with. Said tube is of the conventional type employed for dispensing toothpaste, shaving soap, vaseline, paints, and other substances and is no wise altered in its construction or changed in function by the application of this invention. That is to say, the device may be applied to tubes of this character generally.

The article per se consists of a disc or diaphragm 10 having an appreciably broad rim or marginal edge 11 that lies in intimate contact with the inner surface of the tube 7 at its juncture with the reduced end portion 8. Said disc or diaphragm 10 is constructed

preferably of rubber and is formed with an integral and tubular neck portion 12 that extends through the neck 9 of the tube, and its outer end is provided with a cap or closure 13, as shown.

The cap or closure portion 13 is of double thickness as indicated in Figure 2 and is centrally orificed or slitted as 14, providing an opening through which the plastic material may be dispensed when the tube 7 is collapsed. And when pressure on the tube is released the created vacuum and pressure in the chamber 15 operate to suck or draw in that oozing portion of the paste which otherwise would protrude beyond or lodge in the neck of the tube.

In the arrangement shown in Figures 4, 5 and 6 the disc portion 16 is formed in substantial thickness, or cone like, and shaped to closely fit against the inner surface of the tube portion 8 as distinguished from leaving the annular space 15 which characterizes the construction above. In this instance the device operates wholly through the vacuum created within the stopper.

The neck portion 17 of the disc 16 is formed with an apertured cap 18 as in Figures 1 and 2 and functions the same as in that design. In this instance the inner diameter of the neck portion 12 is of uniform thickness while in the form shown in Figures 1 and 2 said neck is of increasing thickness as at 19 to form the tapering end or chamber immediately adjacent the orifice 14, when closed, as shown in Figure 1.

It is to be understood the invention as herein disclosed is not limited to the details of construction shown and described, as these may be varied widely without departing from the spirit of the invention as defined by the claims.

What is claimed as new is:

1. The combination with a tube for a fluent substance, of a stopper and diaphragm of pliable material closely fitting in the tube at the discharge end, said stopper end being folded and apertured, and said diaphragm and stopper adapted to open and move with the material when the tube is collapsed and to close and retract the emitting substance when pressure is released, as and for the purpose set forth.

2. The combination with a tube for a fluent substance, of a combined stopper and diaphragm of soft pliable material fitting against the tube adjacent the discharge end, said stopper end being folded and apertured and adapted to open and move with the material when the tube is collapsed, said diaphragm providing a vacuum adapted to close the stopper and retract the emitting substance when pressure on the tube is released, as and for the purpose set forth.

3. The combination with a tube for a fluent substance having a reduced discharging end portion, of a combined stopper and diaphragm of resilient material provided with an orifice, said stopper and diaphragm closely fitting against the tube end adjacent the discharge portion and operable to open and move with the material when the tube is collapsed and providing a vacuum to close the stopper and retract the emitting portion of the fluent substance when pressure on the tube is released, substantially as set forth.

4. In combination with a collapsible tube for fluent substances having a terminating and apertured neck portion, of a closure member of elastic material comprising a hollow elongated neck fitting closely within the bore of said tube neck, and a diaphragm having its marginal edge in continuous contact with the wall of said tube thereby forming a seal between the tube end and the tube contents, the outer end of said elastic tube neck being folded upon itself and slitted, and operable to open and dispense the tube contents when collapsed and to close and retract the emitting portion of the contents when pressure is released, substantially as set forth.

5. The combination with a tube for a fluent substance having a reduced discharging end portion, of a combined stopper and diaphragm therefor, said stopper closely passing through the end of the tube and having its outer end folded and orificed, the marginal edge of the diaphragm being enlarged and fitting against the reduced end portion of the tube, said diaphragm and stopper adapted to move with the fluent substance when the tube is collapsed and to withdraw the emitting fluent substance when pressure on the tube is released, substantially as set forth.

6. The combination with a tube for a fluent substance having a reduced discharging end portion, of a closure device therefor comprising a cone shaped body portion fitting closely against the reduced end of the tube and having a tubular stopper passing through the end of the tube, said stopper having a folded and orificed discharge end and adapted to produce a vacuum and withdraw the emitting fluent substance when pressure on the tube is released, substantially as set forth.

In testimony whereof I affix my signature.

GEORGE R. CRUZE.