

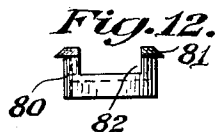
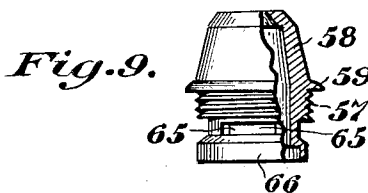
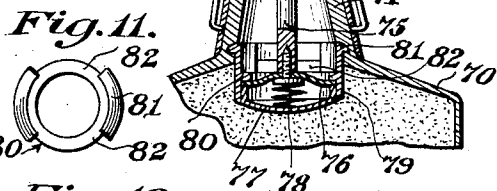
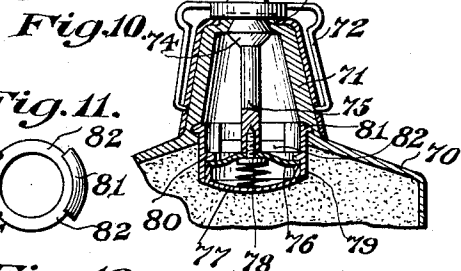
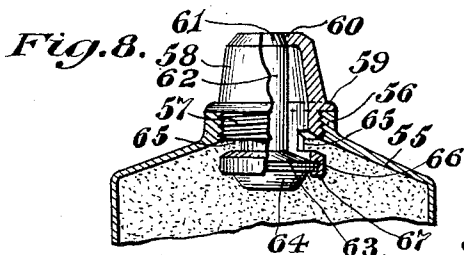
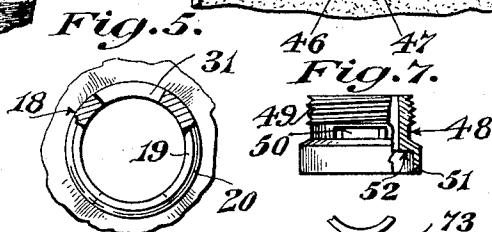
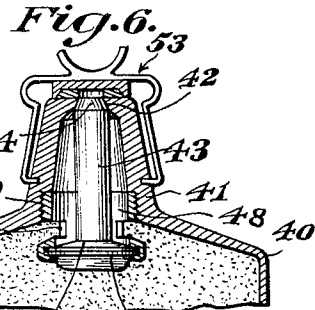
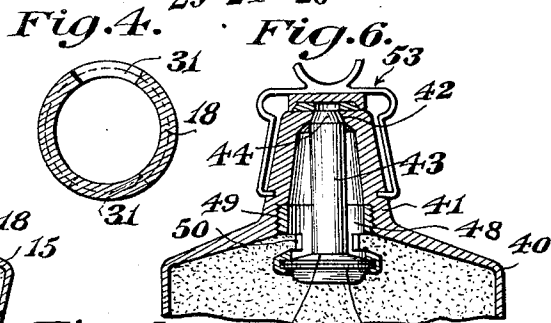
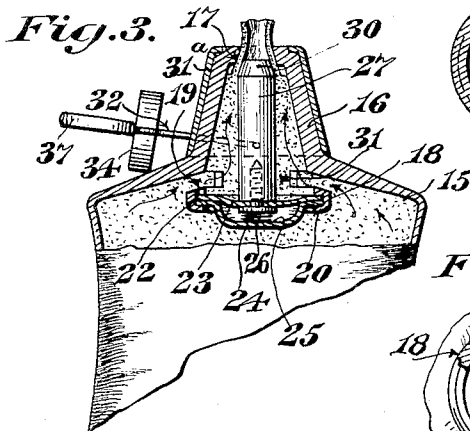
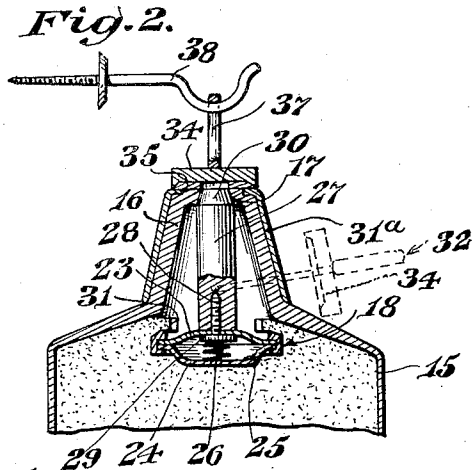
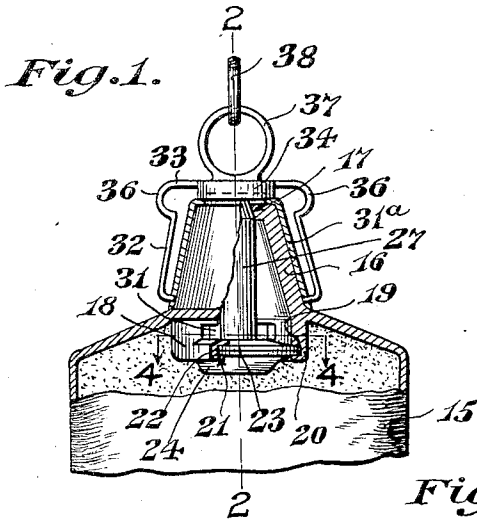
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E. A. JAEN

2,009,552

SELF SEALING TOOTH PASTE TUBE

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Inventor
Elpidio Ambrosio Jaen,

By *Irving A. McCathran*
Attorney

UNITED STATES PATENT OFFICE

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SELF-SEALING TOOTH PASTE TUBE

Elpidio Ambrioso Jaen, Habana, Cuba

Application January 25, 1934, Serial No. 708,281

8 Claims. (Cl. 221—60)

This invention relates to a self-sealing tooth paste tube, or a self-sealing tube of any character for containing liquid, paste, cream or other similar material, and has for one of its objects the production of a simple and efficient valve means for automatically closing the discharge opening of the tube and also permitting the automatic operation of the valve means when pressure is exerted upon the contents of the tube.

Another object of this invention is the production of a simple and efficient self-sealing tube particularly of the collapsible tube type wherein an automatically controlled valve is mounted in the neck of the tube to immediately seal the tube upon the release of pressure from the contents of the tube, and also to permit the valve to immediately open when pressure is brought to bear upon the contents of the tube through the neck thereof.

A further object of this invention is the production of a simple and efficient means in the nature of an automatically controlled valve which is mounted in the neck of a collapsible tube for automatically opening when pressure is exerted upon the contents of the tube, such for instance as the squeezing of the tube and also permitting the valve means to immediately seal the discharge opening of the tube as soon as pressure is released from the contents of the tube.

Other objects and advantages of the present invention will appear throughout the following specification and claims.

In the drawing:—

Figure 1 is a side elevation partly in section illustrating the structure of the tubular neck and valve means carried thereby;

Figure 2 is a section taken on line 2—2 of Figure 1 showing the valve in closed position;

Figure 3 is a view similar to that shown in Figure 1 with the valve illustrated in its open position;

Figure 4 is a transverse sectional view taken on line 4—4 of Figure 1, the valve structure and diaphragm being eliminated;

Figure 5 is a bottom plan view of the diaphragm-supporting skirt formed upon the neck of the tube, a portion of this skirt being shown in transverse section;

Figure 6 is a vertical sectional view through a modified form of the self-sealing neck and valve means;

Figure 7 is a side elevation partly in section of the screw threaded diaphragm supporting thimble illustrated in Figure 6;

Figure 8 is a vertical sectional view partly in

section of a further modified form of the self-sealing neck of the tube illustrating a removable valve casing threaded into the neck of the tube;

Figure 9 is a side elevation partly in section of the valve casing removed from the neck of the tube;

Figure 10 is a vertical sectional view through a further modified form of the self-sealing valve means; and

Figure 11 is a top plan view of the diaphragm-supporting thimble illustrated in the form shown in Figure 10;

Figure 12 is a side elevation of the diaphragm-supporting thimble shown in Figures 10 and 11.

By referring to the drawing, it will be seen that 15 designates the body of the tube which is preferably of a collapsible type commonly employed in connection with the sale of tooth paste, shaving cream, and other products. The body 15 is provided with a projecting neck 16 which is preferably of a conical type tapering toward its outer end, the outer extremity of the neck 16 having a discharge opening 17 the walls of which are preferably inclined toward the center of the neck to provide a beveled valve seat.

The neck 16 is preferably provided at its lower end with a depending annular skirt 18 which extends preferably into the interior of the body 15 as shown in Figure 1, and this annular skirt 18 is preferably provided with a shoulder portion 19 near its lower edge and a reduced depending wall 20, the lower extremity of the wall 20 being intumed, as shown clearly in Figure 1, to provide a supporting flange 21. This structure will provide an annular channel 22 for receiving the edges of the diaphragm 23, and the diaphragm supporting disc 24, the edges of the disc 24 and diaphragm 23 being firmly clamped in the channel 22 between the shoulder 19 and the intumed flange 21. The disc 24 is preferably provided with a depressed or sunken pocket 25 in which is seated a coil spring 26, as shown in Figure 2. The diaphragm 23 supports an elongated valve stem 27 the lower end of which abuts against the upper face of the diaphragm 23 and is firmly held in engagement with the diaphragm 23 by means of the threaded pin 28, which threaded pin 28 is provided with an enlarged head 29, the head 29 engaging the under face of the diaphragm 23 and firmly holding the diaphragm 23 in clamped engagement with the lower end of the valve stem 27. This valve stem 27 is provided with a beveled outer end 30 for snugly fitting upon the beveled valve seat 17 of the neck 16 previously described.

The depending skirt 18 is provided intermedi-

ate its lower edge and the point of junction with the neck 16, with a pair of oppositely arranged elongated slots 31, which slots are located above the diaphragm 23, as shown clearly in Figure 2.

5 The operation of the device is as follows:—

As pressure is brought to bear upon the body 15 by squeezing the same with the fingers or otherwise compressing the body, the material within the body 15 such as tooth paste, or other creamy
10 or pasty material, due to the pressure, will be forced through the slots 31 into contact with the diaphragm 23. As soon as this pressure exceeds the pressure of the spring 26, the diaphragm 23 will be collapsed or forced downwardly to the
15 position shown in Figure 3, thereby drawing the outer tapering end 30 of the valve stem 27 out of engagement with the valve seat 17 and in this way permit the contents of the tube or body 15 to pass through the discharge opening in the
20 neck 16, as shown in Figure 3. The valve stem 27 is preferably circular in cross-section. As this valve stem is drawn to a retracted position such as is shown in Figure 3, the contents of the tube 15 will be forced out through the opening or valve
25 seat 17 in a hollow tubular formation, as is indicated clearly in Figure 3. The paste or cream which is being discharged from the opening in the tube, is ejected in this hollow tubular formation due to the fact that it is of a plastic nature and
30 passes between the beveled edge 30 of the valve stem 27, and the valve seat 17. This hollow tubular formation of plastic material will immediately collapse when placed upon the tooth brush
35 or other object and will in this manner produce a ribbon-like strip, thereby placing upon the brush or other object a proper amount of paste or cream for the purpose desired. When pressure is released from the body 15 or the fingers are removed therefrom, and as soon as pressure
40 upon the contents of the tube or body 15 is reduced to an amount less than the pressure of the spring 26, the spring 26 will immediately force the valve stem 27 to a closed position upon the valve seat or side walls of the opening 17 and in this
45 way automatically seal the outer end of the neck 16.

If desired, a band 31^a may be placed around the neck 16 so as to partly overhang the outer edge, as shown in the drawing, and this band
50 may be of any suitable or desired material such as celluloid, metal, or any other material found suitable. A pivoted bail 32 may be secured to the band 31 so as to be brought to a position to overhang the outer end of the neck 16, as shown
55 in Figures 1 and 2, and this bail 32 may be provided with a transversely extending bridge portion 33 having a cap 34 which carries a sealing washer 35 upon its under face for snugly fitting over the outer end of the neck 16 and constituting an additional sealing means. The bail 32
60 is preferably of a wire type structure having loops 36 near its outer end to facilitate the placing of the cap 34 over the outer end of the neck 16 in a clamping position when desired. An eye 37 is carried by the upper end of the cap 34 through which may pass a suitable supporting
65 hook 38 to permit of the hanging of the tube upon the hook when desired. This additional sealing cap may or may not be used in connection with the automatic valve sealing means, but
70 this structure will constitute an additional sealing device for the outer end of the tube as well as an efficient support for the tube when not in use. The eye 37 will also constitute an efficient
75 means for placing the cap 34 into and out of

position. While the tube is being used, the bail 32 and cap 34 may be swung to the position shown in dotted lines in Figure 2.

From the foregoing description, it will be seen
5 that a very simple and efficient automatic valve device for the discharge end of a collapsible tube, such as a tooth paste or shaving cream, or other similar tube, has been provided which will not
10 only efficiently seal the discharge end of the tube when not in use to prevent the waste and escape of the contents of the tube, but will also
15 efficiently seal the outer end of the tube so as to prevent the entrance of air which would tend to harden the material within the tube. In this way the contents of the tube may be kept in its
20 moist condition whereby the material or contents may be immediately ejected without the danger of the material or contents forming a
25 sealing crust around the discharge end of the tube when the tube is not in use caused by the hardening of the material which becomes exposed to the air for a considerable period of
30 time. It, of course, should be understood that the body 15 must necessarily be of sufficient strength to prevent the breaking of the collapsible tube when pressure is brought to bear thereon. The tension of the spring 26 must necessarily be of such strength to permit of the proper
35 opening of the valve when pressure is brought to bear upon the body 15 for the purpose of collapsing the same without danger of breaking the body.

It should be understood that certain detail changes in the mechanical construction may be employed without departing from the spirit of
40 the invention, and I illustrated in Figures 6 to 12, inclusive, certain other mechanical refinements or changes which might fall within the scope of the present invention.

In the type shown in Figures 6 and 7, there is
45 illustrated a body 40 having a tapering neck 41 somewhat similar to the neck 16 previously described, and this neck 41 is provided with a discharge opening 42, the sides of which are inclined to provide a valve seat. A valve stem 43
50 is mounted within the neck 41 and is provided with a beveled outer extremity 44. This valve stem 43 is carried by a diaphragm 46 similar to the diaphragm 23 and this diaphragm 46 is provided with a supporting disc 47 similar to the
55 disc 24, previously described, within which is mounted a suitable spring similar to the one described in connection with Figure 2, with the exception of the structure of the supporting
60 means for the diaphragm 46, and diaphragm 46 constitutes a thimble 48 which is provided with an externally threaded upper end 49 which is adapted to thread into the inner wall of the neck
65 41, as shown in Figure 6 for the purpose of connecting the thimble 48 with the neck of the tube. Below the threaded portion 49 are arranged a plurality of slots 50 similar to the slots 31 previously described in the preferred embodiment,
70 and below these slots 50 is located a depending skirt 51 which is adapted to be bent under the edges of the supporting plate 47, as shown in Figure 6, for firmly anchoring the edges of the diaphragm 46 and the edges of the plate 47 between the shoulder portion 52 and the inturned
75 edge of the depending skirt 51. The slots 50 constitute ports for permitting the entrance of the contents of the tube 40 into the neck 41 and into contact with the diaphragm 46 in a manner as previously described. The action of the de-

vice illustrated in Figures 6 and 7 is identical with that as previously described. A suitable sealing cap supporting bail 53 may be mounted upon the neck 41 as shown in Figure 6 if desired.

5 In Figures 8 and 9, I have shown a further modified form of the invention wherein the body 55 is provided with an internally threaded neck 56 for receiving the externally threaded shank 57 of the valve supporting neck 53. This valve supporting neck 58 is provided with an annular flange 59 which overhangs the upper edge of the neck 56 and constitutes an efficient seal. The valve containing neck 58 is provided with a centrally located discharge opening 60, the side walls of which are preferably inclined to provide an efficient valve seat for receiving the beveled outer end 61 of the valve stem 62. The valve stem 62 is preferably constructed similar to that as previously described in conjunction with Figures 1 and 2, and is supported upon a suitable diaphragm 63 and plate 64 similar to the diaphragm 23 and plate 24 previously described. Below the threaded portion 57 of the valve supporting neck 58 is arranged a pair of oppositely disposed slots 65 which slots are so arranged below the neck 56 as to provide entrance ports for the contents of the tube to pass from the body 55 into the valve containing or supporting neck 58. The lower end of the valve supporting neck 58 is provided with a depending skirt 66 which is intumed as is illustrated at 67 for the purpose of gripping and supporting the diaphragm 63 and the plate 64 in a manner similar to that as described in Figures 1 and 2.

35 In Figures 10, 11 and 12, there is shown a further embodiment of the present invention wherein a body 70 is illustrated having a tapering neck 71 supporting a suitable bail 72 similar to the bail 32 previously described. This neck 71 is provided with a discharge port or valve seat 73 at its outer end which seat is normally closed by means of the valve head 74 carried by the valve stem 75. This valve stem 75 is supported upon a diaphragm 76, the diaphragm 76 being carried by a dished plate 77 in which is mounted a coil spring 78 for normally exerting an outward pressure upon the diaphragm 76. The plate 77 and the diaphragm 76 are supported by the lower depending skirt 79 of the thimble 80, and this thimble 80 is provided with laterally extending tapering flanges 81, which flanges bite into the inner faces of the lower end of the neck 71, as shown in Figure 10, to constitute an efficient support for the thimble within the lower end of the neck 71. This thimble 80 is provided with suitable notches 82 in the upper edge thereof to provide entrance ports and a communication between the interior of the body and the interior of the neck 71.

60 As previously stated, the bail structure carrying the additional sealing cap may or may not be used as occasion may demand, with any of the forms of the device illustrated without departing from the spirit of the invention.

65 Having described the invention, what is claimed as new is:—

1. A device of the class described comprising a body having a projecting neck, said neck having a discharge opening provided with inclined walls for constituting a valve seat, a valve stem having a beveled outer end adapted to snugly fit upon said seat for closing said opening, a diaphragm carried by the inner end of said valve stem, a supporting plate engaging said diaphragm, a spring interposed between the supporting plate

and diaphragm for normally urging the valve stem to a closed position, means for anchoring the edges of said diaphragm and supporting plate in position, and said neck having communicating means to permit of the passage of material under pressure from the interior of the body to the interior of the neck and in contact with the diaphragm for controlling the movement of said valve stem to and from an open position.

2. A device of the class described comprising a body having a projecting neck, said neck having a discharge opening provided with inclined walls for constituting a valve seat, a valve stem having a beveled outer end adapted to snugly fit upon said seat for closing said opening, a diaphragm carried by the inner end of said valve stem, a supporting plate engaging said diaphragm, a spring interposed between the supporting plate and diaphragm for normally urging the valve stem to a closed position, means for anchoring the edges of said diaphragm and supporting plate in position, and said neck having communicating means to permit of the passage of material under pressure from the interior of the body to the interior of the neck and in contact with the diaphragm for controlling the movement of said valve stem to and from an open position, and said neck having a depending skirt within which said communicating ports are formed.

3. A device of the class described comprising a body having a projecting neck, said neck having a discharge opening provided with inclined walls for constituting a valve seat, a valve stem having a beveled outer end adapted to snugly fit upon said seat for closing said opening, a diaphragm carried by the inner end of said valve stem, a supporting plate engaging said diaphragm, a spring interposed between the supporting plate and diaphragm for normally urging the valve stem to a closed position, means for anchoring the edges of said diaphragm and supporting plate in position, said neck having communicating means to permit of the passage of material under pressure from the interior of the body to the interior of the neck and in contact with the diaphragm for controlling the movement of said valve stem to and from an open position, and said neck having a depending skirt within which said communicating ports are formed, the lower edges of said skirt being intumed to constitute a supporting flange for said plate and diaphragm.

4. A device of the class described comprising a body having a discharge opening formed therein, a valve stem adapted to normally close said discharge opening, means for controlling the opening and closing of said valve stem, and means for supporting said last mentioned means and comprising a thimble externally threaded at its upper end and threaded into contacting engagement with said body for supporting said valve stem in an operative position.

5. A device of the class described comprising a body having a discharge opening formed therein, a valve stem adapted to normally close said discharge opening, means for controlling the opening and closing of said valve stem, and means for supporting said last mentioned means and comprising a thimble having laterally extending tapering flanges adapted to bite into engagement with the inner walls of said body for supporting said thimble in position.

6. A device of the class described comprising a body having a discharge opening formed therein, a valve stem adapted to normally close said discharge opening, means for controlling the open-

ing and closing of said valve stem, and means for supporting said last mentioned means and comprising a thimble having means for gripping engagement with the inner walls of said body for supporting said thimble in position.

7. A device of the class described comprising a body having a discharge opening formed therein, a valve stem adapted to normally close said discharge opening, means for controlling the opening and closing of said valve stem, and means for supporting said last mentioned means and comprising a thimble having means for detachably engaging the inner walls of said body for supporting said thimble in position.

8. A device of the class described comprising a

body having a discharge opening formed therein, a valve stem adapted to normally close said discharge opening, a diaphragm supporting said valve stem and adapted to control the opening and closing thereof, means for supporting the diaphragm, a bottom fitted within said last mentioned means and clamping the edges of the diaphragm against said last mentioned means for anchoring the diaphragm in position, yieldable means for normally urging said valve stem to a closed position, and said diaphragm supporting means having entrance openings to permit the passing of the contents of said body into engagement with said diaphragm.

ELPIDIO AMBRIOSIO JAEN.