May 24, 1966 C. B. WATSON, JR 3,252,624

TUBE SQUEEZER AND NOZZLE THEREFOR

Filed Dec. 23, 1963

FIG. 1

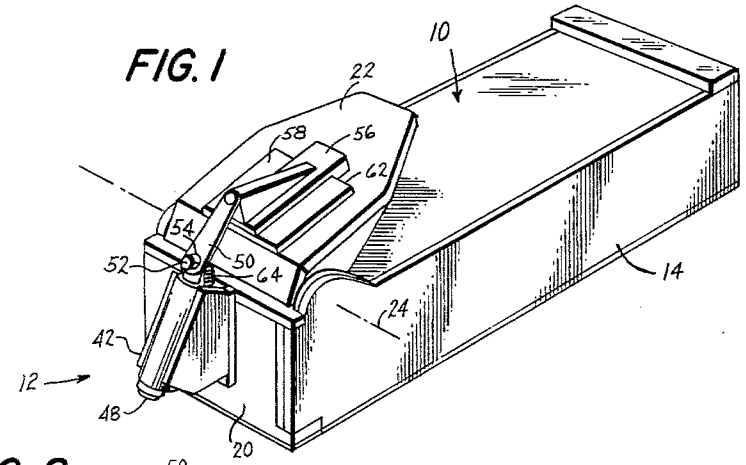


FIG. 2

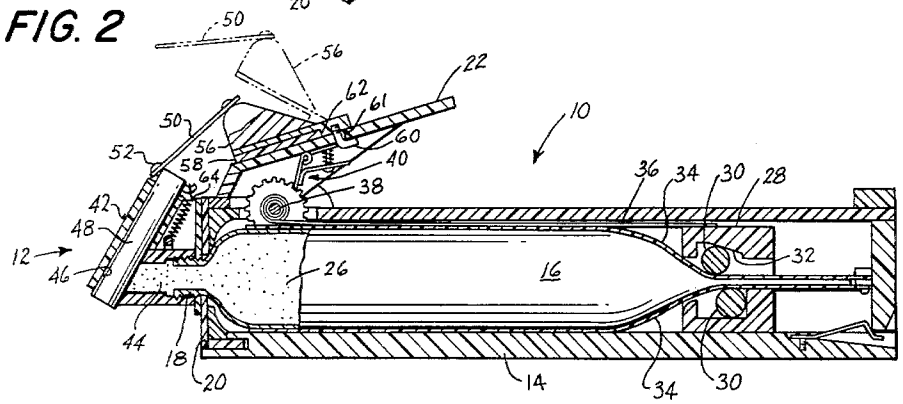


FIG. 3

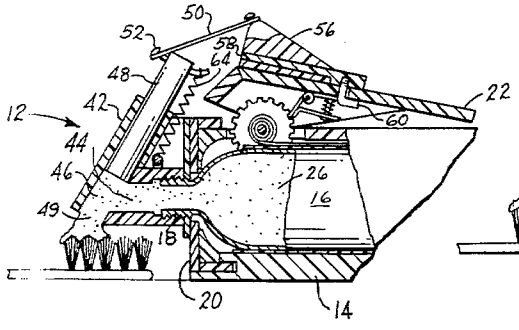
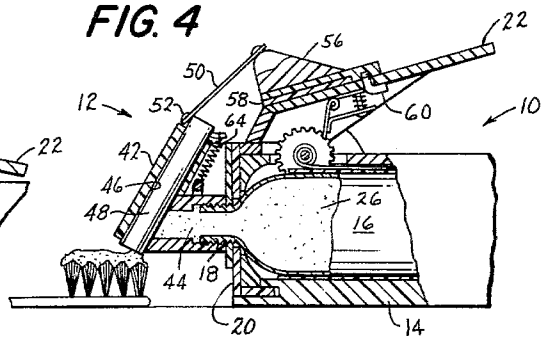


FIG. 4



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TUBE SQUEEZER AND NOZZLE THEREFOR

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This invention relates to tube squeezers for dispensing the contents of a collapsible tube, such as a conventional toothpaste tube, and deals more particularly with a tube squeezer having combined therewith a nozzle for positively controlling the discharge of material from the tube.

The general object of this invention is to provide a combined tube squeezer and nozzle wherein the nozzle operates to positively prevent the escape of material from the tube during non-use of the squeezer and is operated automatically to permit the discharge of material in response to operation of the operating member of the squeezer.

Another object of this invention is to provide a combined tube squeezer and nozzle wherein the nozzle is readily removable from the tube and tube squeezer to permit cleaning thereof.

Still another object of the invention is to provide a nozzle of the foregoing character which is readily removable from and replaceable on the tube in the tube squeezer so as to facilitate its removal from an exhausted tube and its replacement on a fresh tube when a fresh tube is required by the squeezer.

A further object of the invention is to provide a nozzle and tube squeezer combination wherein the nozzle if desired may be removed from the tube and tube squeezer and the tube squeezer thereafter operated without the nozzle and without impairment to its attractive appearance.

A further object of this invention is to provide a combined tube squeezer and nozzle wherein upon operation of the squeezer the tube material, particularly in the case of toothpaste or material of similar consistency, is dispensed from the nozzle in a neat appearing ribbon.

Still another object of this invention is to provide a nozzle of the foregoing character which avoids or at least substantially reduces the possibility of clogging and of sticking of its parts as a result of the hardening of residual tube material during periods of non-use.

A still further object of the invention is to provide a nozzle of the foregoing character which operates to aid in the movement of dispensed material therethrough.

Other objects and advantages of the invention will be apparent from the following description and from the drawing forming a part thereof.

The drawing shows a preferred embodiment of the invention and such embodiment will be described, but it will be understood that various changes may be made from the construction disclosed, and that the drawing and description are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawing:

FIG. 1 is a perspective view showing a combined tube squeezer and nozzle in accordance with the present invention;

FIG. 2 is a longitudinal vertical sectional view taken through the combined tube squeezer and nozzle of FIG. 1;

FIG. 3 is a fragmentary vertical sectional view similar to the left-hand portion of FIG. 2 but showing the operating handle of the tube squeezer moved to its operated position; and

FIG. 4 is a vertical sectional view similar to FIG. 3 but showing the operating handle of the tube squeezer returned to its normal or unoperated position.

Turning to the drawing, the combination of the present invention is shown to consist in general of a tube squeezer **10** having combined therewith a nozzle **12** for controlling and aiding the discharge of material from the tube squeezer and for preventing the escape of material from the squeezer during periods of non-use.

Considering first the construction of the tube squeezer **10**, it includes an elongated body **14** which is hollow and of generally rectangular transverse cross section and adapted to receive a collapsible tube **16** having an externally threaded discharge spout **18** which extends through an opening in its forward end wall **20**. Also at the forward end of the body **14** is an operating handle **22** which is supported for pivotal oscillating movement relative to the body about an axis, as indicated at **24**, extending transversely of the body. FIGS. 1 and 2 show the handle in one limit of its movement relative to the body, and FIG. 3 shows it in the other limit of its movement. The operating handle position of FIGS. 1 and 2 is its normal or unoperated position, and the position of FIG. 5 may be referred to as its operated position. Connected with the operating handle **22** is a squeezing mechanism which operates in response to movement of the handle toward its operated position to squeeze the tube **16** to expel a portion of the material **26** contained in the tube from the spout **18**.

The squeezing mechanism associated with the operating handle **22** may take various different forms without departing from the present invention. The illustrated tube squeezer **10** however is or may be similar to the tube squeezer shown and described in detail in my copending application entitled, "Collapsible Tube Squeezer," Serial No. 294,905, filed July 15, 1963, to which application reference is made for a more detailed description of the squeezing mechanism and other parts of the squeezer. For the present purposes it is sufficient to note (see FIG. 2) that the squeezing mechanism includes a squeezer block **28** housed within the body **14** and adapted to receive two transversely disposed rollers **30, 30** located on opposite sides of the tube **16** and urged by an inclined wall **32** of the squeezer block into squeezing relationship with the tube, there being a flexible slab **34** interposed between each of the rollers **30, 30** and the tube. The squeezer block **28** is moved a short distance toward the front or forward end of the tube with each stroke of the operating handle **22** by means of a tape **36** fixed at one end to the block **28** and at its other end wound on a shaft **38**. The latter shaft provides the pivotal support for the handle **22** and is rotated in response to movement of the handle **22** by a suitable ratchet mechanism indicated generally at **40**.

Considering next the construction of the nozzzle **12**, this unit consists of a nozzle block **42** which may be formed of plastic or other suitable material. This block may consist of a single integral piece of material or, as shown, may consist of a number of initially separate parts glued or otherwise fabricated into a unitary structure. Provided in the block **42** is a first opening or bore **44** which along its outer or right-hand portion is threaded to conform with and to threadably receive the spout **18** of the tube **16** contained in the squeezer **10**. The nozzle block is separate from the squeezer body and may be readily removed from or attached to the spout **18** by threading the same thereon.

Also provided in the block **42** is a second bore **46** which is arranged at an angle to and intersects the bore **44** so that the bore **44** at its inner end communicates with and terminates in the second bore **46**. As will be seen from FIGS. 2, 3 and 4, the bore **46** includes a first or lower portion which extends a slight distance beyond the point at which the bore **44** communicates with the bore **46** and also includes a second portion

which extends a substantially greater distance upwardly beyond the point at which the bore **44** communicates with the bore **46**.

The bore **46** is preferably cylindrical in cross section and extends completely through the nozzle block **42**. Received in this bore is a cylindrical plunger **48** which is slidably movable relative to the nozzle block and which has a diameter substantially equal to that of the bore. Referring to FIGS. 2 and 3, the plunger **48** is movable between a first or closed position (the FIG. 2 position) at which it blocks the first bore **44** from communication with the bore **46** so as to prevent the leakage of tube material from the nozzle and a second or open position (the FIG. 3 position) at which the two bores are in communication to allow the dispensing of tube material to the point of discharge from the nozzle, which point is indicated at **49** in FIG. 3.

In accordance with the invention, means are provided for moving the plunger **48** in response to movement of the operating handle **22** and in such a manner that the plunger is moved to its open position in response to movement of the operating handle to its operated position and is returned to its closed position in response to the return of the operating handle to its normal position. This means for coordinating the movement of the plunger with the movement of the operating handle may take various different forms but, in the illustrated case, it comprises a link **50** which connects the upper end of the plunger **48** with the operating handle **22**. When the plunger is in its closed position, its upper end portion extends slightly beyond the nozzle block **42**. Extending transversely through this exposed portion of the plunger is a pin **52** having a headed portion which extends from one side of the plunger and an upwardly curved portion which extends from the other side of the plunger. The headed portion of the pin **52** serves to provide a connection for the link **50** which is provided, as shown in FIG. 1, with an oversized opening **54** to permit the link to be moved over the head of the pin to connect and disconnect the link to and from the pin.

At its other end, the link **50** is permanently fixed to a part **56** which is removably attached to the operating handle **22** by means of a pad **58** fixed to the outer surface of the operating handle and by an L-shaped pin **60** which is fixed to the part **56** and which extends loosely through an opening **61** in the operating handle. The pad **58** includes a rear straight edge **62** which is engaged by a corresponding edge of the part **56**. As will be observed from the figures, the resulting arrangement is such that when the link **50** is connected with the plunger **48** the part **56** will be held in its desired position relative to the operating handle by the force exerted thereon by the link **50**. Sufficient looseness exists between the pin **60** and the opening **61** that when the link **50** is removed from the plunger **48**, the the part **56** may be swung upwardly relative to the operating handle **22**, as shown by the broken lines of FIG. 2, and removed completely from the operating handle. Accordingly, if it is desired to use the squeezer **10** without the nozzle **12**, both the nozzle **12** and the part **56** may be completely removed from the squeezer to leave the latter with a clean and attractive appearance.

The plunger **48** is biased toward its closed position by a helical tension spring **64** which is received in a recess located behind the bore **46**. At its lower end, the spring is connected to a pin which extends transversely of the nozzle block and at its upper end is fixed to the curved portion of the pin **52**. The spring therefore serves to draw the plunger **48** downwardly to the closed position of FIG. 2 and to exert a force on the link **50** which retains the part **56** in place on the operating handle **22**.

From FIGS. 2 and 4, it will further be observed that the relative lengths of the plunger **48** and the bore **46** is such that when the plunger is in its closed position the plunger extends a very short distance beyond the nozzle block at the point of discharge **49**. Accordingly, when the plunger is moved to its fully closed position its serves to push all of the tube material **26** contained in the bore **46** from the nozzle block so as to leave in the nozzle no residual tube material exposed to the atmosphere and capable of hardening to clog the nozzle or cause sticking of its parts. Also, it will be noted that as the plunger moves from its open toward its closed position it will serve to push the tube material from the bore **46** so as to aid the squeezing mechanism in moving the tube material through the nozzle. The fact that the bore **46** extends beyond the intersection of the two bores to the point of discharge causes the tube material to be discharged from the nozzle in a neat round ribbon similar to the ribbon which would be formed were the tube squeezed without the squeezing mechanism. The arrangement of the parts is further such that after the plunger **48** is moved from its fully closed position the operating handle **22** may be oscillated within the remaining range of its movement to effect the dispensing of any desired amount of material without the plunger being returned to its fully closed or blocking position, thereby obtaining a substantially continuous flow from the nozzle.

The invention claimed is:

1. The combination of a tube squeezer comprising a body for holding a tube to be squeezed and having a forward end from which end the spout of such a tube projects, said tube squeezer also comprising a squeezing mechanism including an operating handle oscillatable in predetermined opposite directions relative to said body and by which squeezing mechanism is operable to squeeze such tube to eject a portion of its contents from said spout in response to movement of said operating handle in one of said opposite directions, a nozzle block having first and second bores arranged at an angle to each other, said first bore at one end being adapted to receive the spout of said tube and at its other end communicating with said second bore, and said second bore having first and second portions extending in opposite directions from the point at which said first bore communicates therewith, the first of said portions being in communication with a point of discharge, a plunger slidably received in said second bore and movable between a closed position at which it blocks said first bore from communication with said second bore and an open position at which it is moved out of said first bore portion and sufficiently far into said second bore portion to provide communication between said first and second bores, and means connecting said plunger with said operating handle for moving said plunger from its closed toward its open position as said operating handle is moved in said one direction and for returning said plunger toward its closed position as said handle is moved in the opposite direction.

2. The combination defined in claim **1** further characterized by said plunger being of such length as to extend to said point of discharge when in its closed position.

3. The combination defined in claim **1** further characterized by a spring working between said plunger and said nozzle block for biasing said plunger toward its closed position.

4. The combination defined in claim **1** further characterized by said operating handle being located adjacent said forward end of said body and being oscillatable about an axis extending transversely of said body, said plunger having an end portion which extends beyond said nozzle block, and said means for connecting said plunger with said operating handle including a link connected at one end to said plunger and at its other end to said handle.

5. The combination defined in claim **4** further characterized by said link at its said other end being connected to said operating handle by an intermediate part, and means removably connecting said intermediate part to said operating handle.

6. The combination defined in claim 1 further characterized by said handle being oscillatable between first and second limits relative to said body and the arrangement of said operating handle, plunger and connecting means being such that said plunger is moved out of blocking relation with respect to said first bore during the initial portion of the range of movement of said handle away from said first limit and in said one direction and said squeezing mechanism being such as to be operable to effect squeezing of said tube in response to repeated oscillation of said operating handle within the remaining portion of its range of movement so that any desired amount

of squeezing may be effected before said plunger is returned to its closed position.

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