United States Patent [19]

Leeson

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[54] **DEVICE FOR SQUEEZING TUBES OF PASTE**

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[52] **U.S. Cl.** **222/100;** 222/105

[51] **Int. Cl.** **B65d 35/34**

[58] **Field of Search** ..... 222/100, 99, 97, 98, 101, 222/391, 336, 102, 95; 192/415, 12 BA

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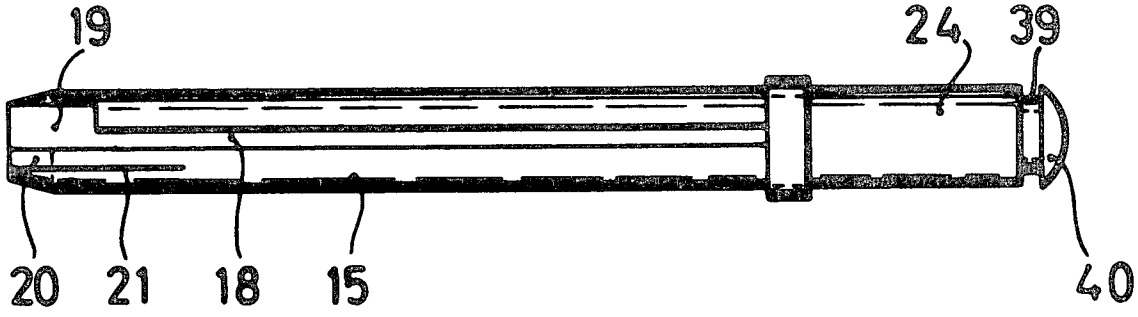
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Assistant Examiner—Charles A. Marmor
Attorney, Agent, or Firm—Cushman, Darby & Cushman

[57] **ABSTRACT**

A device for squeezing the contents from tubes of paste including a mandrel about which a tube is wound to expel the contents therefrom. A frame is provided for rotatably supporting the mandrel so that the mandrel is rotated when an actuating member is rotated via drive and clutch springs which cooperates with the mandrel and the actuating member. A pressure member is supported in a position in advance of the mandrel so that when the mandrel is rotated, the tube will be pressed against the pressure member to thereby assist in squeezing the contents from the tube. Upon release of the squeezing pressure of the pressure member on the tube, the tube casing relaxes to thereby create a suction force for forcing the paste proximate the opening of the tube back into the tube.

6 Claims, 8 Drawing Figures



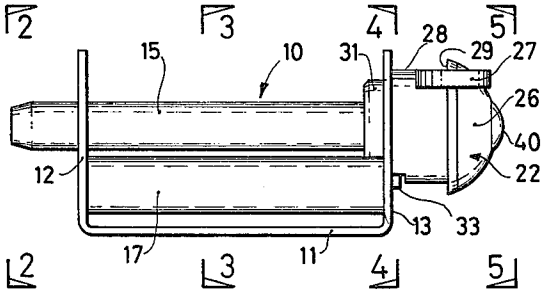


FIG. 1

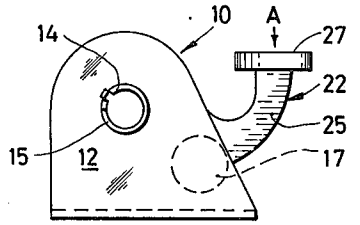


FIG. 2

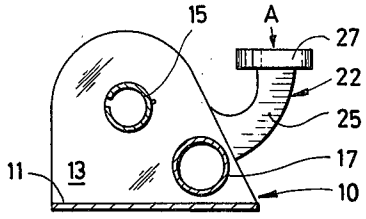


FIG. 3

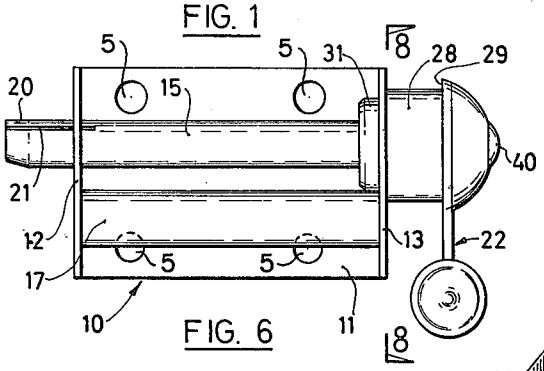


FIG. 6

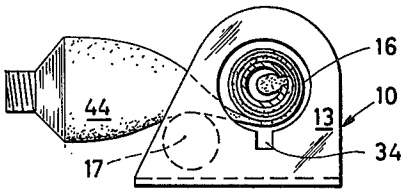


FIG. 4

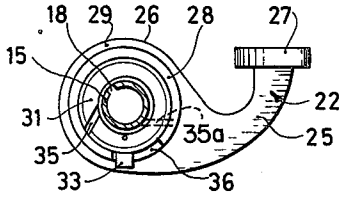


FIG. 8

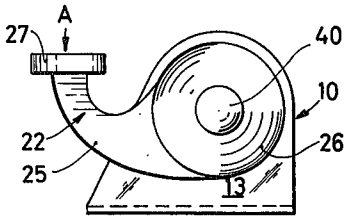


FIG. 5

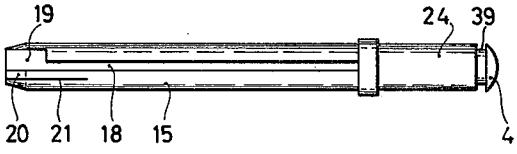
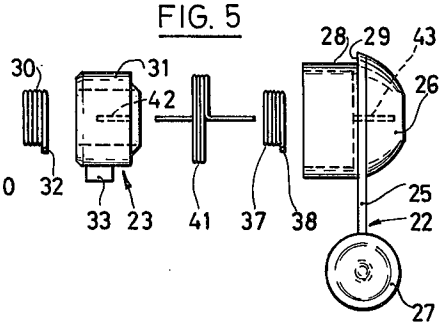


FIG. 7



DEVICE FOR SQUEEZING TUBES OF PASTE

This invention relates to a device for squeezing the contents from tubes of paste, and more particularly relates to a device which squeezes the bottom portion of the tube forcing the contents towards, and outwardly through, the outlet of the tube.

The invention is particularly applicable to squeezing toothpaste from tubes therefor.

Many devices have been produced for squeezing toothpaste from tubes, however, one disadvantage with the known devices is the tendency to squeeze too much, or too little, paste, from the tube during any particular actuation of the device, while after the squeezing pressure is released, pressure built up within the contents of the tube tends to cause a small amount of paste to exhaust through the outlet of the tube if the closure is not applied to the tube immediately after use.

It may therefore be an object of the present invention to provide a device for squeezing the contents from tubes of paste, including a control mechanism whereby at each actuation of the device a predetermined quantity of paste will be squeezed from the tube.

The invention may therefore envisage a device for squeezing the contents from tubes of paste, including a mandrel or key about which, in use, a tube is wound to expel the contents therefrom, means rotatably supporting the mandrel, actuating means for rotating said mandrel, and combined drive and clutch means cooperating with said mandrel and said actuating means to allow only a predetermined amount of rotation of said mandrel each time the device is actuated.

By limiting the amount of rotation of the mandrel to a particular value each time the device is actuated, the amount of paste expelled from the tube will be substantially constant.

Preferably the combined drive and clutch means includes a stop means cooperating with said actuating means for limiting the amount of movement thereof and thus the amount of rotation transmitted to said mandrel.

Preferably the combined drive and clutch means includes a drive coil spring looped around said end of said mandrel having one free end retained by said actuating means which when rotated in one direction causes said spring to tighten about said end of said mandrel to impart rotational movement thereto, and whereby upon reversal of said actuating means said spring releases its grip on said end of said mandrel to allow rotation of said spring and actuating means about said mandrel.

Preferably the stop means is a lug fixed with respect to said supporting means, and said actuating means includes a slot of predetermined length adapted to receive said lug.

Preferably said slot is provided in the circumferential edge of a flange provided on, and integral with, said actuating means and surrounding said mandrel.

Preferably a holding coil spring is provided between said mandrel and a sleeve also surrounding said mandrel, said holding coil spring having a free end retained by said sleeve, whereby operation of said actuating means and transmission of rotation to said mandrel, said mandrel is free to rotate within and relative to said sleeve, but upon return rotation of said actuating means in the opposite direction said holding coil spring will tighten about said mandrel to hold it fixed with respect to said supporting means via said sleeve.

Preferably a return spring is provided between said actuating means and said sleeve to allow rotation of said actuating means in the opposite direction after actuation of said device to return said actuating means to its original position.

Preferably the means supporting said mandrel includes a pair of upstanding support walls spaced apart from each other and including holes therethrough for supporting said mandrel at a pair of spaced positions adjacent opposed ends thereof.

Preferably the mandrel is adapted to be slid axially into position in said support walls to be releasably retained therein.

Preferably the mandrel is releasably retained by means of a resilient tab on the end of said mandrel remote from said actuating means which cooperates with one of said holes in said support walls.

Preferably the pressure member is a pressure bar fixedly supported by said pair of supporting walls in said position in advance of said mandrel to extend parallel therewith.

Preferably the upstanding support members are interconnected by a bridging portion formed integrally therewith which bridging portion includes provision for attaching said device to a flat surface.

The provision for attachment may be holes for receiving screws, bolts or the like. Alternatively the provision for attachment may be by means of an adhesive pad of the type where a cover strip is removed initially to reveal an adhesive surface for attachment to a horizontal or vertical surface.

One form of the invention which may be preferred will now be described with reference to the accompanying drawings in which:

FIG. **1** is a side elevation of this preferred form of the invention,

FIG. **2** is an end elevational view in the direction of arrows **2—2** of FIG. **1**,

FIG. **3** is a cross-sectional view along line **3—3** of FIG. **1**,

FIG. **4** is a cross-sectional view along line **4—4** of FIG. **1**, but also showing a tube of paste in the device,

FIG. **5** is an end elevational view in the direction of arrows **5—5** of FIG. **1**,

FIG. **6** is a plan view of the device of FIG. **1**,

FIG. **7** is an exploded longitudinal view of the mandrel, drive, clutch and actuating means of this preferred embodiment, and

FIG. **8** is a sectional view taken along line **8—8** of FIG. **6**.

Referring particularly to FIGS. **1** to **5**, the device generally indicated as **10**, includes a support body having a base portion **11** and a pair of opposed upright support walls **12** and **13**. the base portion **11** has applied to its under surface an adhesive layer (not shown) for attaching the device to a flat surface such as a wall or bench top.

The provision for attachment may alternatively be a plurality of holes **5** receiving attachment screws, bolts, or the like as illustrated in FIG. **6**.

Upstanding support wall **12** includes a hole **14** therethrough for receiving one end of a mandrel **15** to be later described. Upstanding support wall **13** also includes a hole **16** therethrough for supporting the opposite end of the mandrel **15**.

A pressure bar **17** is also provided between the side walls **12** and **13** and fixed with respect thereto. This

pressure bar as will be evident from later description assists in supporting and guiding a tube of paste while it is being wound onto the mandrel **15** and applying pressure thereto to assist in squeezing the paste therefrom and due to its cooperation with the tube of paste allows for the creation of a pressure lower than atmospheric in the tube after release of the squeezing pressure.

The mandrel **15** is hollow for a large proportion of its length and includes a longitudinally extending slot **18** communicating with the interior of the mandrel **15** and opening through one end of the mandrel. The end of the slot opening through the end of the mandrel is widened at **19** to allow the crimped end of a tube of paste to be slid axially into the slot with the crimped end portion receive in the interior of the hollow mandrel **15.** Rotation of the mandrel winds the tube about it and causes the contents of the tube to be pushed towards, and outwardly through, the outlet from the tube at the top thereof.

To allow the mandrel **15** to be withdrawn, so as to allow a tube to be inserted or removed, the mandrel is capable of being axially withdrawn from the supporting body. In order to allow the mandrel **15** to be retained in position in the supporting body against normal axial forces during operation, a small tab **20** is formed by providing an axially extending slit **21** in the end of the mandrel **15** adjacent the widened entrance **19** to the slot **18.** The tab is normally bent slightly radially outwardly from the line of the surface of the mandrel **15** to prevent the mandrel from being withdrawn unintentionally. The axial force applied to insert or withdraw the mandrel forces the tab **20** into line with the surface of the mandrel as it bears against the edge of the hole **14** in the support wall **12.**

The mandrel **15** is caused to rotate about its axis by means of an actuating member **22** connected via a combined drive and clutch mechanism **23** (see FIG. **7**) to a solid end portion **24** of the mandrel **15** (see FIG. **7**). The actuating member **22** includes an outwardly extending lever portion **25** and actuating button **27,** with an inner portion **26** cooperating with the combined drive and clutch mechanism **23** and a flange portion **28** housing the combined drive and clutch mechanism with an intervening step **29** to enable gripping when the assembly is withdrawn from the device.

Referring particularly to FIG. **7,** the combined drive and clutch mechanism **23** comprises a holding coil spring **30** adapted to be received around the solid portion **24** of the mandrel **15,** a holding sleeve **31** having a longitudinal slot **35** therein for receiving a free end **32** of the holding spring **30.** The slot extends generally tangential to the inner surface of the sleeve **31** and the free end **32** of the spring **30** is doubled back to effectively cause the bulk of any forces applied to the spring to be tensional forces rather than shear forces. The holding sleeve **31** also includes a lug **33** adjacent one end for receipt within a notch **34** in the hole **16** in the end wall **13** of the support body to hold the sleeve fixed with respect to the support body.

The flange portion **28** of the actuating member **22** includes a notch **36** (see FIG. **8**) extending a short distance circumferentially around the flange **28** which in the assembled condition receives the lug **33** on the holding sleeve **31.** The combined drive and clutch mechanism **23** also includes a drive spring **37** also adapted to be received around the solid portion **24** of the mandrel **15.** The drive spring **37** is received within the flange **28** of the actuating member **22,** with the free end **38** of the spring **37** received within a slot **35a** in the inner wall of the inner portion **26** of the actuating member **22** similar to the slot **35** in the holding sleeve **31** with both the slot and free end being angled to apply tensional rather than shear forces to the drive spring **37.** When the unit is assembled, the lug **33** is received within the slot **36** in the flange **28** as previously mentioned and moves from one end thereof to the other, to thereby confine movement of the actuating member **22** to within the limits of the length of the slot **36** thus confining the rotation of the mandrel to being within those limits.

Within the inner portion **26** of the actuating member **22** adjacent the outer end thereof there is provided a circumferentially extending deformable rib which engages in a corresponding notch **39** around the end **24** of the mandrel **15** to hold the mandrel **15,** actuating member **22** and drive and clutch assembly **23,** in the assembled condition and closing the end of inner portion of the actuating member **22** by the integral button **40** on the end of the mandrel.

A return spring **41** is provided surrounding the drive spring **37** between the holding sleeve **31** and the actuating member **22,** and in the assembled condition is within the flange portion **28** of the actuating member **22.** The ends of the spring **41** are received in holes **42** and **43** in the holding sleeve and member **22.** The effect of the return spring **41** is that it will become tensional during actuating of the actuating member **22** when rotating the mandrel **15,** and upon release of the actuating member **22** will serve to return the member to its normal position.

The operation of the device is as follows. With the lever of the actuating member **22** in the position shown in FIGS. **1** to **5,** downward movement in the direction of arrow A causes the drive spring **37** to be drawn tightly about the end portion **24** of the mandrel **15** to transmit drive thereto. The slot **36** on the flange **28** of the actuating member **22** is at the position shown in FIG. **8** with one end of the slot **36** adjacent the lug **33** on the holding sleeve **31,** and the actuating member **22** will continue imparting rotation to the mandrel until the other end of the slot contacts the lug **33** at which point, since the sleeve **31** is held fixed with respect to the support body due to the receipt of the lug in the notch **34,** further rotation of the actuating member **22,** and thus the mandrel **15,** is prevented.

Upon the release of pressure on the lever of the actuating member **22** it returns under the action of the return spring **41** to its initial position as shown, while the drive spring **37** releases its grip about the end portion **24** of the mandrel **15,** allowing the drive spring **37** and the actuating member **22** to rotate relative to the mandrel **15.** During this return movement the mandrel is fixed with respect to the support body by means of the holding spring **30** which cooperates with the fixed holding sleeve **31** and tightens around the end portion **24** of the mandrel **15** as it tends to move back with the actuating member **22,** to thereby hold the mandrel fixed relative to the support body during the return motion.

With particular reference to FIG. **4** which shows a tube of paste **44** within the device for descriptive purposes, during each increment of rotation of the mandrel the tube is wound about the mandrel **15.** The combined action of winding onto the mandrel and the reac-

tion pressure of the pressure bar **17** forces the contents from the tube **44.** Upon release of the squeezing pressure a slight backlash in the mechanism of the device allows a release of some of the bearing pressure imposed by the pressure bar **17** thus relaxing the tube and producing some back pressure in the contents of the tube causing the portion of paste at the opening of the tube to be drawn back into the tube. This is of some advantage in preventing direct exposure of the contents and eliminate the necessity to position the cap on the tube between uses. One particular alternative to the use of a holding spring **30** may be the substitution of a racket and pawl arrangement.

The components of the device may be produced from any suitable metal or plastics materials, except for the driving spring **37,** the holding spring **30,** and the return spring **41,** which are of normal metal coil spring materials.

I claim:

1. A device for squeezing the contents from tubes of paste, including a mandrel about which, in use, a tube is wound to expel contents therefrom, means for rotatably supporting the mandrel, actuating means for rotating said mandrel, a drive spring positioned about said mandrel and having a free end fixed with respect to said actuating means, said drive spring gripping and rotating said mandrel a predetermined amount each time said actuating means is actuated, means for resetting said actuating means by returning said actuating means and said drive spring to their original positions after said actuating means is released, a holding spring also positioned about said mandrel and having a free end fixed with respect to said means for rotatably supporting said mandrel, said holding spring gripping said mandrel to restrain the mandrel against movement while said actuating means and said drive spring are being returned to their original positions, and a pressure member having a curved surface at the point of engagement with the tube being supported at a position in advance of the mandrel wherein upon rotation of said mandrel to wind said tube thereabout the tube will be brought into pressure engagement with said pressure member but upon cessation of said rotation of said mandrel the tube is free to tend to move away from pressure engagement with the pressure member and the tube casing is free to relax to allow creation of a pressure lower than atmospheric pressure in said tube wherein a portion of the paste at the opening of said tube is forced back into said tube under the action of the higher atmospheric pressure externally of said tube.

2. The device of claim **1** wherein said resetting means includes a return spring having one end secured to said actuating means and having a second end fixed with respect to said means for rotatably supporting said mandrel.

3. The device of claim **2** further comprising stop means cooperating with said actuating means for limiting the amount of movement of said actuating means and thus the amount of rotation transmitted to said mandrel.

4. The device of claim **3** wherein said stop means is a lug fixed with respect to said supporting means and wherein said actuating means includes a slot of predetermined length adapted to receive said lug, the movement of said actuating means being limited by the walls of said slot impinging upon said lug.

5. A device as claimed in claim **1,** wherein the means supporting said mandrel includes a pair of upstanding support walls spaced apart from each other interconnected by a bridging portion which bridging portion includes provision for attaching the device to a flat surface, and wherein said support walls include holes therethrough for supporting said mandrel at a pair of spaced positions adjacent opposed ends thereof, and wherein said mandrel is adapted to be slid axially into position in said support walls to be releasably retained therein.

6. A device as claimed in claim **5,** wherein the mandrel is releasably retained by means of a resilient tab on the end of said mandrel remote from said actuating means which cooperates with one of said holes in said support walls.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,880,328

DATED : April 29, 1975

INVENTOR(S) : George Joseph William LEESON

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

[30] Foreign Application Priority Data

August 11, 1972 Australia ..... PB 0042

Signed and Sealed this

Thirtieth Day of *January 1979*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

DONALD W. BANNER
Commissioner of Patents and Trademarks