July 25, 1967 R. W. PETERS 3,332,579

CONTENT DISPENSER FOR COLLAPSIBLE TUBES

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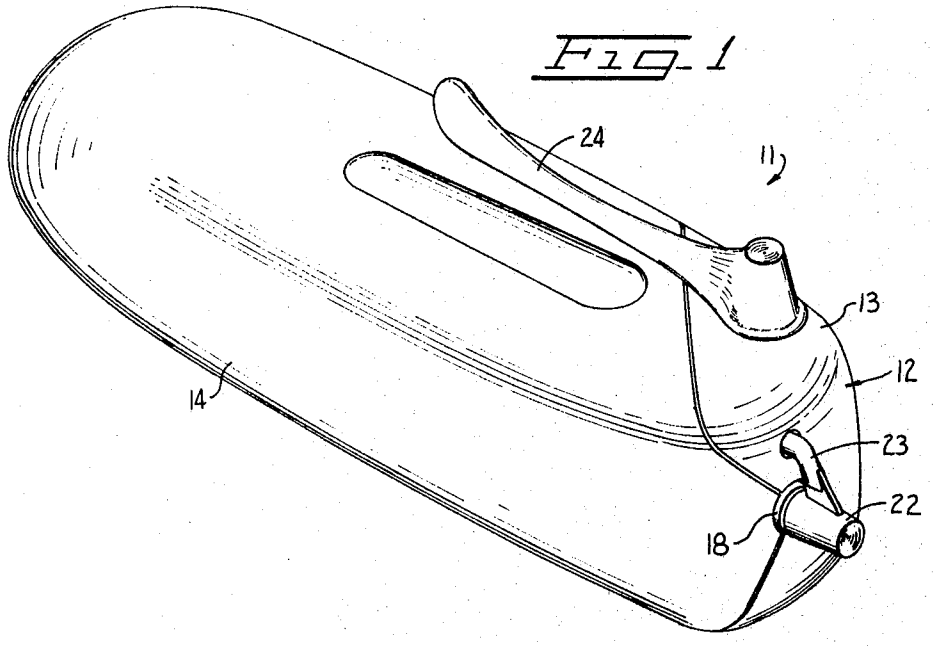
Fig. 1



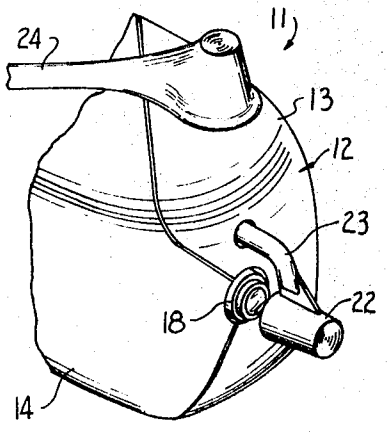


Fig. 2

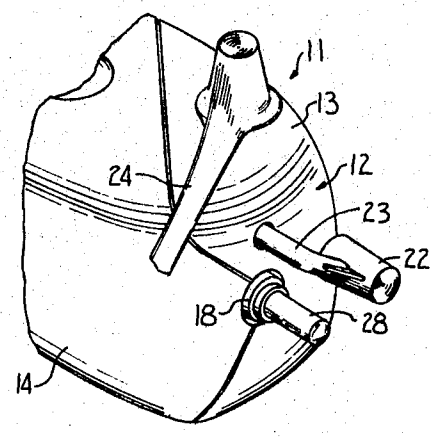


Fig. 3

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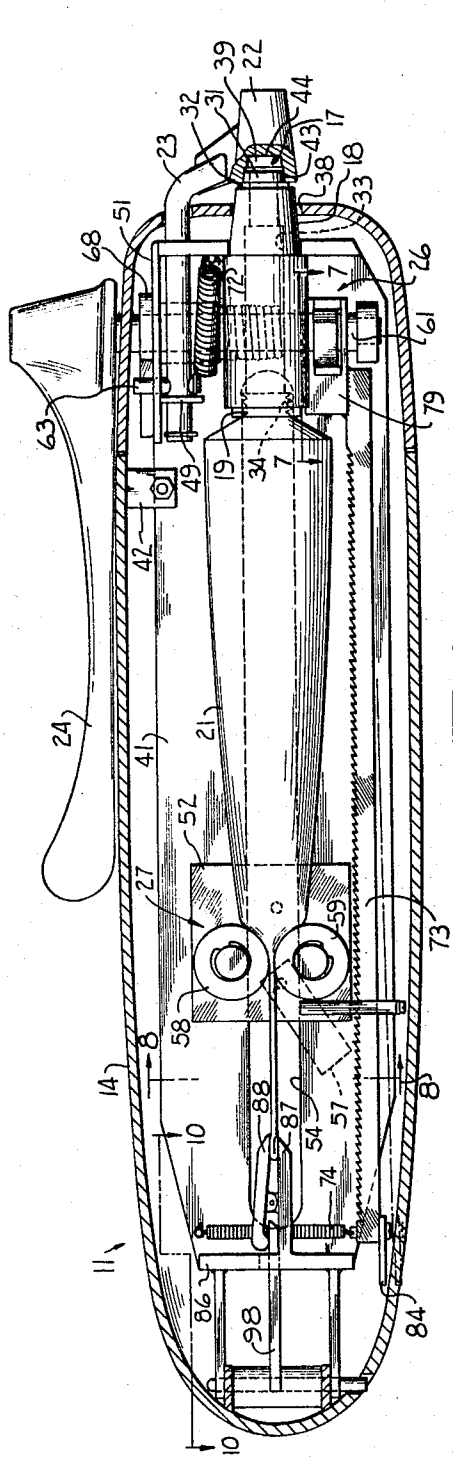

FIG-4

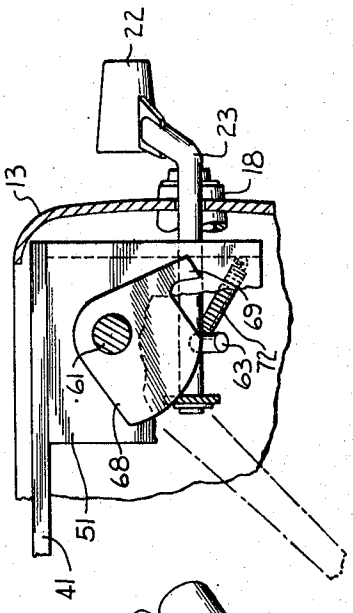

FIG-6

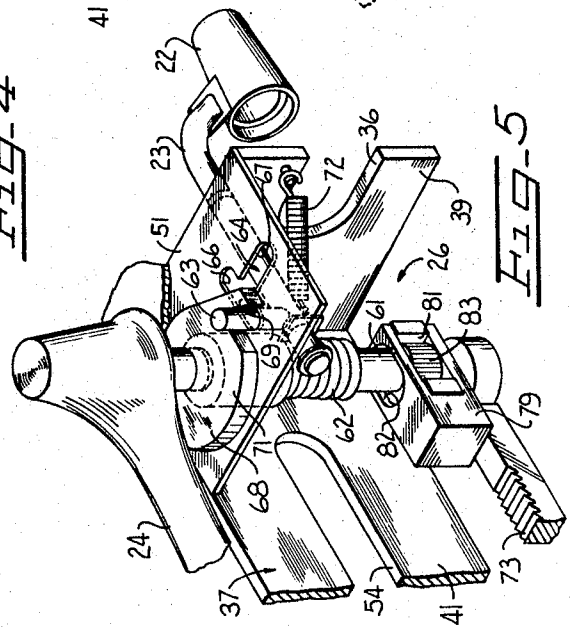

FIG-5

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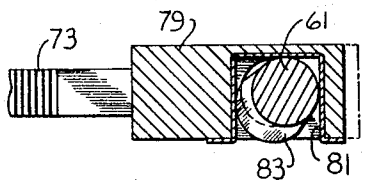

FIG. 7

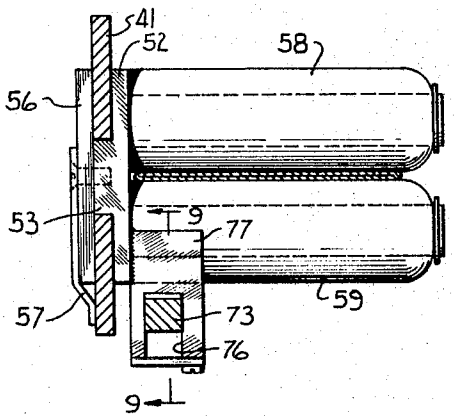

FIG. 8

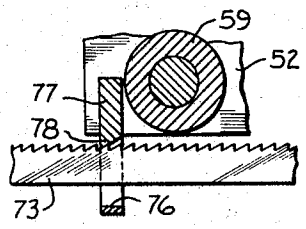

FIG. 9

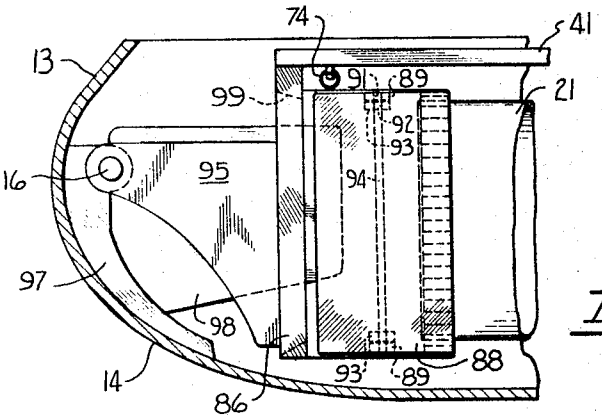

FIG. 10

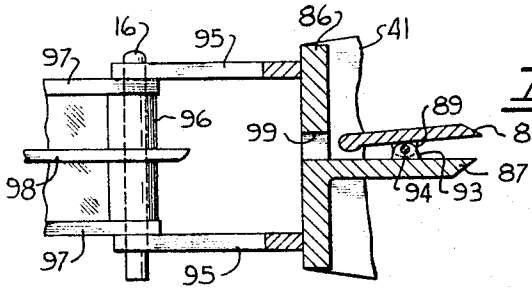

FIG. 11

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CONTENT DISPENSER FOR COLLAPSIBLE TUBES

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Filed July 6, 1966, Ser. No. 563,647
8 Claims. (Cl. 222—96)

This invention relates generally to devices for automatically dispensing predetermned quantities of the contents of collapsible tubes such as are employed to contain toothpaste, shaving cream, and the like, and is more particularly directed to a dispensing device of this type which is characterized by an improved non-leak capping arrangement and a relatively simple yet reliable dispensing and operating mechanism.

Various devices have been advanced for automatically dispensing predetermined quantities of toothpaste, shaving cream, etc., from collapsible tubes. Typically such devices include a squeezing element which is arranged to engage the collapsible tube, and means for moving the element an incremental distance longitudinally of the tube in response to each operation of an actuating member to thereby forcefully dispense a predetermined quantity of the tube contents. Heretofore, the incremental moving means for the squeezing element have been relatively complex, and yet not particularly consistent in the quantity of the contents dispensed. In addition, with many of the previous dispensing devices the existing screw cap of the tube has been utilized to close the tube when not in dispensing service. It is therefore necessary to unscrew the cap prior to initiating the dispensing operation. In still other existing devices, a cap arrangement is provided which is automatically actuated upon initiation of the dispensing operation to remove the cap from the tube and thereby permit dispensing of the contents. Upon completion of the dispensing operation the cap is automatically restored to a position of closing engagement with the tube. Heretofore, such automatic cap arrangements have not been particularly effective in sealing the tube, and residue of the dispensed contents has tended to leak from the cap thus creating a rather messy condition.

It is an object of the present invention to provide an improved dispenser of the contents of collapsible tubes which has a relatively simple yet highly reliable mechanism for automatically dispensing predetermined quantities of the tube contents with substantial consistency.

Another object of the invention is the provision of a dispenser of the class described having an automatic capping mechanism which is effective to establish a positive seal with the tube upon completion of the dispensing operation, thereby preventing leakage of the tube contents.

Still another object of the invention is to provide a dispenser for toothpaste, and the like, which is arranged for the installation of new tubes of toothpaste, etc., therein in a highly expeditious manner.

It is a further object of the invention to provide a dispenser of the class described having means for automatically clamping the tube upon installation thereof to prevent twisting and turning during the dispensing operation.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawings and description may be adopted wtihin the scope of the invention as set forth in the claims.

FIGURE 1 is a perspective view of a dispensing device in accordance with the present invention.

FIGURE 2 is a fragmentary perspective view of the front end of the device illustrating the actuating handle and cap thereof in partially actuated position.

FIGURE 3 is a view similar to FIGURE 2, but with the handle and cap in fully actuated position.

FIGURE 4 is a longitudinal vertical sectional view of the dispensing device.

FIGURE 5 is a fragmentary perspective view of the actuating mechanism of the device.

FIGURE 6 is a plan view with portions broken-away of the actuating mechanism in actuated position.

FIGURE 7 is a sectional view on an enlarged scale taken at line 7—7 of FIGURE 4.

FIGURE 8 is a sectional view on an enlarged scale taken at line 8—8 of FIGURE 4.

FIGURE 9 is a sectional view taken at line 9—9 of FIGURE 8.

FIGURE 10 is a sectional view on an enlarged scale taken at line 10—10 of FIGURE 4, illustrating particularly a tube gripping mechanism of the device as actuated by a cover thereof in closed position.

FIGURE 11 is a fragmentary elevational sectional view of the tube gripping mechanism, the cover of the dispensing device being illustrated in open position.

Referring now to FIGURE 1, there is shown a dispensing device **11**, in accordance with the invention, which will be seen to include a generally cylindrical housing **12** formed by a half cylindrical shell-like body **13** and mating half cylindrical shell-like cover **14** hinged at its rear end to the body by means of a pivot pin **16** (see FIGURE 10). Extending from the leading end of the housing at the juncture of the body and cover there is provided the sealing tip **17** of a barrel **18** which at its opposite end is adapted to threadably receive the neck **19** of a collapsible tube **21** of toothpaste, or the like (see FIGURE 4). The tip **17** is sealed by a cap **22** carried at the end of an arm **23** which extends from the leading end of the body **13**. In addition, an actuating handle **24** is pivotally mounted atop the body for rotation about a vertical axis. The handle is coupled to the arm **23** by means of an actuating mechanism **26** (see FIGURES 4 and 5), which is also coupled to a squeezing element **27** engaged with the tube. The mechanism is arranged, in a manner subsequently described, such that upon initial rotation of the handle, the arm is longitudinally extended to coaxially displace the cap from the tip **17** as shown in FIGURE 2. Upon continued rotation of the handle, the arm pivots about its axis to in turn pivot the cap away from the tip to an unobstructing position as shown in FIGURE 3. Simultaneously, the mechanism advances the squeezing element **27** a predetermined longitudinal increment to effect dispensing of a corresponding incremental quantity of toothpaste **28**, or the like, from the tip **17**. Upon release of the handle, the cap is returned to its original position in sealing engagement with the tip while the squeezing element is retained in advanced position.

Considering now the dispensing device in greater detail as to the preferred structure thereof, it will be noted that the barrel is of elongated cylindrical configuration tapered at one end to terminate in the tip **17**. The tip includes a reduced end portion **29** outwardly stepped to an enlarged intermediate portion **31** terminating at a stop shoulder **32**. A bore **33** extends coaxially through the barrel, and the opposite end of the bore from the tip **17** is internally threaded, as shown at **34**, for securance to the neck **19** of the tube **21**. The barrel is supported by engagement in a slot **36** of a bracket **37** and extension through an aperture **38** provided in the body **13**. More particularly, the bracket includes a transverse portion **39** containing the slot **36** and a longitudinal portion **41** at right angles to the transverse portion. The bracket is mounted within the body as by means of a

support tab 42 in such position that the transverse portion 39 is slightly longitudinally spaced from the aperture 38 in the end wall of the body. In this manner, two point removable support of the barrel is obtained.

The cap 22 is provided with an enlarged recess 43 inwardly stepped to a relatively reduced recess 44 respectively adapted to engage the portions 31, 29 of the tip 17 in positive sealing engagement. The cap supporting arm 23 is mounted for slidable translation and rotation in apertures provided in the bracket portion 29 and end of the body 13, and in an aperture provided in a depending ear 49 of a horizontal shelf portion 51 of the bracket 37 secured atop the longitudinal and transverse portions thereof.

The squeezing element 27 is preferably provided as a plate 52 having a central rectangular ridge 53 on one face thereof extending through a slot 54 provided longitudinally of the bracket portion 41 (see FIGURE 8). A retaining plate 56 is secured to the ridge 53 on the opposite side of the bracket portion 41 from the plate 52. A spring foot 57 is secured to the retaining plate to resiliently bear against the bracket portion. The assembly of the plate 52, retaining plate 56, and spring foot 57 is thus slidable longitudinally of the bracket portion 41. Mounted upon the plate 52 are a pair of parallel closely vertically spaced transverse rollers 58, 59 which are adapted to engage opposite sides of the tube 21 and thereby squeeze same. As the plate and roller assembly is translated longitudinally, the contents are squeezed from the tube in quantities determined by the amount of such translation.

In accordance with the particularly salient aspects of the invention, the actuating mechanism 26 includes a vertical shaft 61 secured to the actuating handle 24 and journalled for rotation in apertures provided in the body 13 and horizontal shelf portion 51 of the bracket 37. A coil spring 62 concentrically secured to the shaft serves to load same to a normal position wherein the handle 24 is substantially longitudinally of the housing 12, as shown in FIGURE 1. The previously noted movements of the arm 23 and cap 22 carried thereby are effected by means of a pin 63 which projects radially from the arm 23 through a slot 64 provided in bracket portion 51 having right angularly intersecting longitudinal and transverse portions 66, 67. The pin is engaged by a cam 68 secured to shaft 61 at a position closely overlying the bracket portion 51. The cam has a substantially tangential hook portion 69 which merges with an eccentric portion 71 (see FIGURE 6). A spring 72 is secured between the arm and the bracket portion 39 to normally urge the arm outwardly from the housing 12. However, in the normal position of the handle 24, the shaft 61 is positioned such that the hook portion 69 of the cam retains the pin at the end of longitudinal slot portion 66 in opposition to the loading of spring 72. In this position the arm retains the cap in sealed engagement with the tip 17. During initial turning of the handle 24 the hook portion 69 is rotated away from the pin. The pin is thus released such that under the loading of spring 72, the pin moves forward in the longitudinal slot portion 66 and the arm consequently moves longitudinally forward to withdraw the cap coaxially away from the tip. Upon further turning of the handle the eccentric portion 71 of the cam engages the pin to urge same into the transverse slot portion 67. This effects rotation of the arm about its axis to thus pivot the cap to an unobstructing position to the side of the tip. Upon release of the handle, the shaft 61 and handle are returned to normal position by the spring 62. The cam 68 is rotated to disengage the eccentric portion 71 from the pin 63 whereby the latter is freed for movement through transverse slot portion 67 to the longitudinal slot portion 66. The hook portion 69 of the cam at this time engages the pin to move same in the longitudinal slot portion against the loading of spring 72. The net result is that the arm 23 rotates the cap 22 back into coaxial alignment with the tip 17 and then translates the cap into sealed engagement therewith.

The actuating mechanism 26 further includes means for incrementally translating the squeezing element 27 in response to each actuating turning of the handle 24. Such means preferably includes a rack 73 supported at one end by the lower end of the shaft 61, in a manner subsequently described, and at the other end by means of a spring 74. The rack extends through the window 76 of a rectangular tab 77 that depends from the plate 52 of the squeezing element 27. The upper surface of the window is inclined to define a tooth 78 which is engageable with the teeth of the rack when the latter is urged resiliently upward by the spring 74. With regard to the manner in which the rack is supported by the shaft, it is to be noted that the adjacent end of the rack is provided with a rectangular coupling element 79 having a rectangular recess 81 extending into a side thereof. The top and bottom of the coupling element are provided with elongated apertures 82 which intersect the recess. The shaft 61 traverses the apertures and an eccentric cam 83 secured to the shaft is disposed in the recess (see FIGURE 7). The upper surface of the recess rests upon the cam to thereby support the rack. In the normal position of the handle 24, the cam 83 is positioned, as shown in FIGURE 7, in engagement with the trailing end of the recess. When the handle is turned, the cam is rotated to an opposed position wherein it engages the leading end of the recess. By virtue of the eccentricity of the cam the coupling element and rack are slightly advanced to the phantom line position depicted in FIGURE 7. Since the tooth 78 is engaged with the teeth of the rack 73, the squeezing element 27 is correspondingly incrementally advanced to dispense a predetermined amount of the contents of tube 21 from the tip 17. When the handle is released, the cam is returned to its original position of engagement with the trailing edge of the recess to return the coupling element and rack to their original position. By virtue of the resilient support of the rack afforded by spring 74, the rack overrides the tooth 78 during the return stroke such that the advanced position of the squeezing element is retained. In this manner, the squeezing element is incrementally advanced each time the handle 24 is turned until the entire contents of the tube 21 are depleted. The squeezing element may be then returned to a start position at the far left of the rack, as viewed in FIGURE 4, preparatory to the installation of a fresh tube 21 in the dispenser by depressing the rack against the loading of spring 74 and sliding the squeezing element to the left. To assist with this operation, a finger tab 84 is preferably secured to the rack adjacent the spring.

As a further important feature of the dispenser 11, means are provided to grip the trailing end of the tube 21, i.e., the end opposite the neck 19, to hold the tube taut and prevent rolling and twisting during the dispensing operation. In this regard, the bracket 37 is provided with a second transverse portion 86 projecting from the opposite end of longitudinal portion 41, to transverse portion 39. Transverse portion 86 includes a longitudinally projecting shelf 87 substantially centrally thereof. A gripping jaw 88 is secured to the shelf in a suitable manner to effect gripping of the trailing end of the tube 21 therebetween. More particularly, the jaw is provided adjacent its longitudinal edges with two depending hinge flanges 89 having apertures 91 which register with corresponding apertures 92 in flanges 93 upstanding from shelf 87. A pin 94 extends transversely of the jaw and shelf through the aligned apertures 91, 92 to thereby pivotally mount jaw 88 in spaced relationship to shelf 87 about a transverse axis. Normally, the jaw is spaced from the shelf as shown in FIGURE 11, to permit insertion of the trailing end of the tube 21. Clamping of the end of the tube between the jaw and shelf is uniquely accomplished in

response to closure of the cover **14** of the housing **12**. More particularly, a pair of parallel spaced ears **95** project longitudinally from transverse bracket portion **86** to support the pivot pin **16** in vertical position. A collar **96** is rotatably disposed on the pin, and arms **97** secured to the collar and to the cover **14** render the cover pivotal relative to the body **13**. A tongue **98** is also secured to the collar so as to be pivotal with the cover, and such tongue is positioned to enter a transverse slot **99** in the bracket portion **86** when the cover is closed. The tongue upon entering the slot also traverses the gap between the shelf and adjacent end of the jaw to wedge same apart, as shown in FIGURE 4. The opposite end of the jaw is in turn urged toward the shelf to grip the trailing end of the tube therebetween. When the cover is opened, the tongue is withdrawn from between the jaw and shelf to free the tube. The old tube may be removed and a new tube positioned in the dispenser with its trailing end between the jaw and shelf. When the cover **14** is closed, the tongue engages the jaw to thereby automatically effect gripping of the trailing end of the tube.

In the overall operation of the dispenser **11**, the cover **14** is first opened to provide access to the interior of the housing **12**. The barrel **18** removed and threadably secured to the neck **19** of the collapsible tube **21** of toothpaste, or the like. The rack **73** is depressed by pushing tab **84** and the squeezing element **27** is moved to its starting position. The barrel is placed in position by inserting same through slot **36** and aperture **38**. The trailing end of the tube is placed between the rollers **58**, **59** and between the jaw **88** and shelf **87**. The cover is closed and the tube is thus gripped in the manner previously described. Predetermined quantities of the tube contents may be now dispensed by turning the handle **24**. When the handle is turned the cap **22** is withdrawn from the tip **17** and rotated to an unobstructing position and a predetermined quantity of the tube contents is dispensed from the tip **17**. When the handle is released the cap is returned into sealing engagement with the tip.

What is claimed is:

1. A device for dispensing the contents of a collapsible tube comprising a housing for containing said tube, a barrel adapted at a first end thereof for securance to a dispensing neck of said tube and having a dispensing tip at a second end thereof, said tip extending longitudinally through the leading end of said housing, a cap sealably engageably with said tip, an arm having one end carrying said cap and extending longitudinally through the leading end of said housing in slidable and rotatable relation thereto, an actuating handle journalled for rotation on said housing, gripping means mounted within said housing for releasably gripping the opposite end of said tube from said dispensing neck, a squeezing element mounted within said housing for translation longitudinally thereof between said gripping means and said barrel, said squeezing element engageable with said tube to squeeze the contents therefrom upon translation, and actuating mechanism coupled between said handle and said arm and squeezing element, said mechanism including means for sequentially translating said arm longitudinally forward relative to said housing and rotating said arm about its axis in response to turning of said handle from a normal position to an actuated position and means for simultaneously incrementally translating said squeezing element longitudinally towards said leading end of said housing.

2. A device according to claim **1**, further defined by said housing being defined by a shell-like body and a shell-like cover pivotally connected to the trailing end of said body for pivotal movement between open and closed positions relative thereto, and said gripping means comprising a horizontal shelf secured transversely to said body adjacent the trailing end thereof, a jaw mounted on said shelf in parallel spaced relation thereto for pivotal movement about a transverse axis parallel to said shelf and centrally of said jaw, means maintaining said jaw in a normal position of spaced relation to said shelf with gaps therebetween at the forward and trailing ends thereof, said gap at the forward end adapted to receive the trailing end of said tube, and a tongue secured to said cover for movement therewith, said tongue engageable in said gap between the trailing end of said jaw and shelf with a wedge fit when said cover is in said closed position to pivot the forward end of said jaw from said normal position thereof towards said shelf into tight gripping engagement with the trailing end of said tube.

3. A device according to claim **1**, further defined by a bracket mounted within said housing including a longitudinal portion having a longitudinal slot therethrough, and said squeezing element comprising a plate having a central rectangular ridge extending through said slot in slideable relation thereto, and a pair of closely vertically spaced parallel rollers journalled on said plate and projecting transversely therefrom.

4. A device according to claim **1**, further defined by said means for sequentially translating said arm comprising a horizontal shelf mounted transversely within said housing adjacent said leading end thereof, said shelf having a slot including intersecting longitudinal and transverse portions, a pin projecting radially from said arm through said slot, means normally spring loading said arm in longitudinal and transverse directions respectively toward the leading end of said longitudinal slot portion and toward said longitudinal slot portion, and a cam coupled to said handle for rotation therewith, said cam having a hook portion merging with an eccentric portion, said hook portion engaging said pin to retain same at the trailing end of said longitudinal slot portion when said handle is in its normal position, said eccentric portion engaging said pin to urge same into said transverse slot portion when said handle is turned to its actuated position.

5. A device according to claim **1**, further defined by said means for incrementally translating said squeezing element comprising an elongated longitudinally extending rack mounted in said housing for resilient upward movement, a tab depending from said squeezing element having a window traversed by said rack, said window formed at the upper surface thereof with a tooth engageable with the teeth of said rack, a coupling element secured to said rack, said coupling element having a rectangular recess in a side thereof, and an eccentric cam coupled to said handle for rotation therewith disposed in said recess, said cam having its eccentric portion engaging the trailing end of said recess when said handle is in its normal position and engaging the leading end of said recess when said handle is in its actuated position to thereby urge said rack longitudinally forward.

6. A device according to claim **1**, further defined by said actuating mechanism comprising a shaft secured to said handle and journalled for rotation about a vertical axis adjacent the leading end of said housing, a horizontal shelf mounted transversely in said housing adjacent the leading end thereof and traversed by said shaft, said shelf having a slot including intersecting longitudinal and transverse portions, a pin projecting radially from said arm through said slot, a coil spring concentrically disposed on said shaft and loading same to a position wherein said handle is in said normal position and may be rotated to said actuated position, means normally spring loading said arm in longitudinal and transverse directions respectively toward the leading end of said longitudinal slot portion and toward said longitudinal slot portion, a cam secured to said shaft in close overlying relation to said shelf, said cam having a substantially tangential hook portion merging with an eccentric portion, said hook portion engaging said pin to retain same at the trailing end of said longitudinal slot portion when said handle is in its normal position, said eccentric portion engaging said pin to urge same into said transverse slot portion when said handle is turned to its actuated position, an

elongated longitudinally extending rack mounted in said housing for resilient upward movement, a tab depending from said squeezing element traversed by said rack, said window formed at the upper surface thereof with a tooth engageable with the teeth of said rack, a rectangular coupling element secured to said rack, said coupling element having a rectangular recess in a side thereof, said coupling element having longitudinally elongated apertures in the top and bottom thereof intersecting said recess, said shaft traversing said apertures, a second eccentric cam secured to said shaft and disposed in said recess, said second cam having its eccentric portion engaging the trailing end of said recess when said handle is in its normal position and engaging the leading end of said recess when said handle is in its actuated position to thereby urge said rack longitudinally forward.

7. A device according to claim 6, further defined by said housing being formed by a shell-like body and a mating shell-like cover pivotally secured to the trailing end of said body for pivotal movement between open and closed positions relative thereto, and said gripping means comprising a second horizontal shelf secured transversely to said body adjacent the trailing end thereof, a jaw mounted on said second shelf for pivotal movement about a transverse axis parallel to said second shelf and centrally of said jaw, means maintaining said jaw in a normal position of spaced relation to said second shelf with gaps therebetween at the forward and trailing ends of said jaw, said gap at the forward end of said jaw adapted to receive the trailing end of said tube, and a

tongue secured to said cover for movement therewith, said tongue engageable in said gap between the trailing end of said jaw and second shelf with a wedge fit when said cover is in said closed position to pivot the forward end of said jaw from said normal position thereof towards said second shelf into tight gripping engagement with the trailing end of said tube.

8. A device according to claim 7, further defined by a longitudinal bracket mounted within said housing including a longitudinal portion having a longitudinal slot therethrough, and said squeezing element comprising a plate having a central rectangular ridge extending through said slot of said longitudinal bracket in slidable relation thereto, a pair of closely vertically spaced parallel rollers journalled on said plate and projecting transversely therefrom, and a second retaining plate secured to said ridge on the opposite side of said longitudinal bracket from said first plate.

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