

Oct. 15, 1968

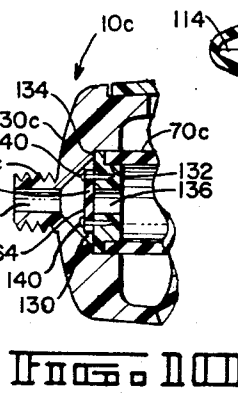
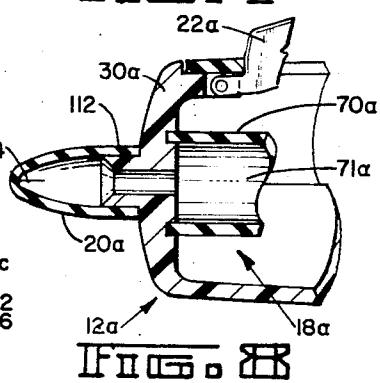
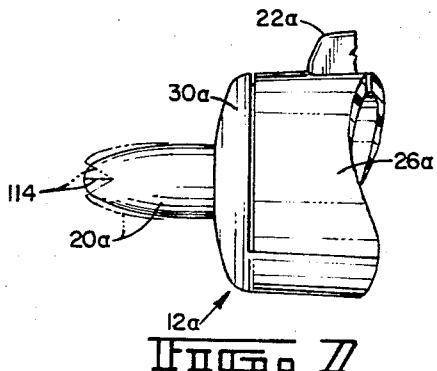
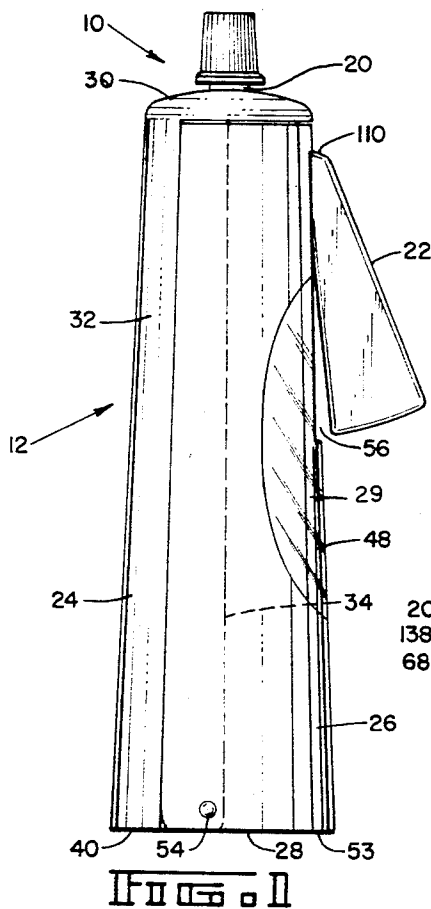
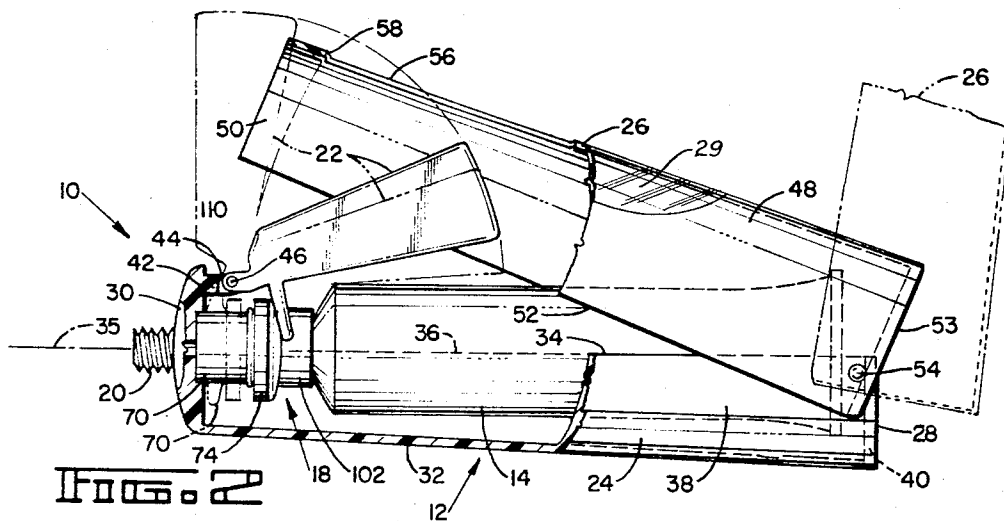
C. B. WATSON, JR

3,405,843

CONTAINER-DISPENSER FOR COLLAPSIBLE TUBES

Filed Nov. 23, 1966

3 Sheets-Sheet 1



INVENTOR.

CORNELIUS B. WATSON, JR.

BY

Mc Cormick, Paulding & Huler

ATTORNEYS.

Oct. 15, 1968

C. B. WATSON, JR

3,405,843

CONTAINER-DISPENSER FOR COLLAPSIBLE TUBES

Filed Nov. 23, 1966

3 Sheets-Sheet 2

FIG. 3

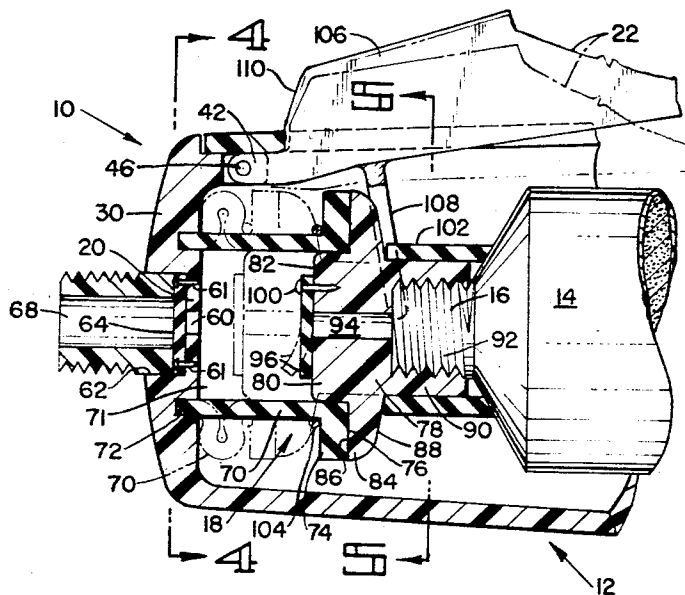


FIG. 4

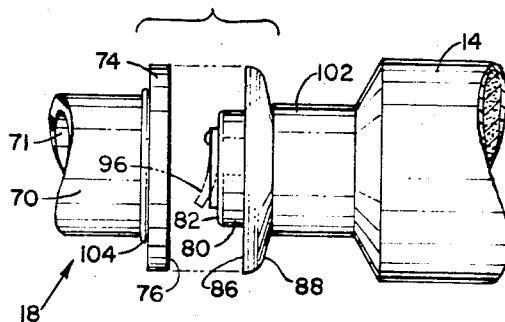
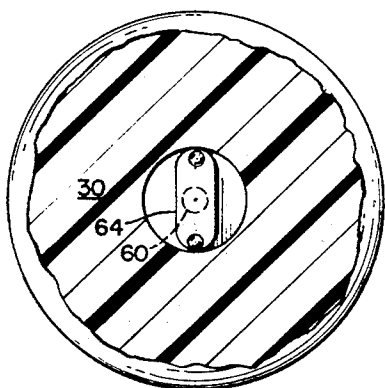


FIG. 6

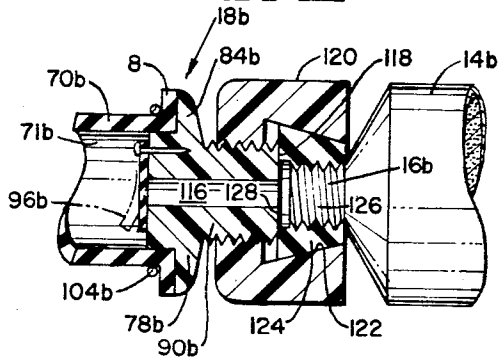


FIG. 9

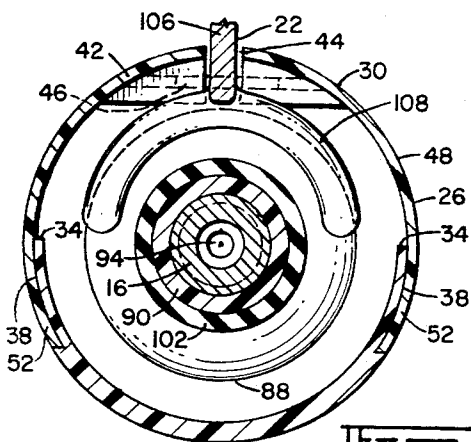


FIG. 8

Oct. 15, 1968

C. B. WATSON, JR

3,405,843

CONTAINER-DISPENSER FOR COLLAPSIBLE TUBES

Filed Nov. 23, 1966

3 Sheets-Sheet 3

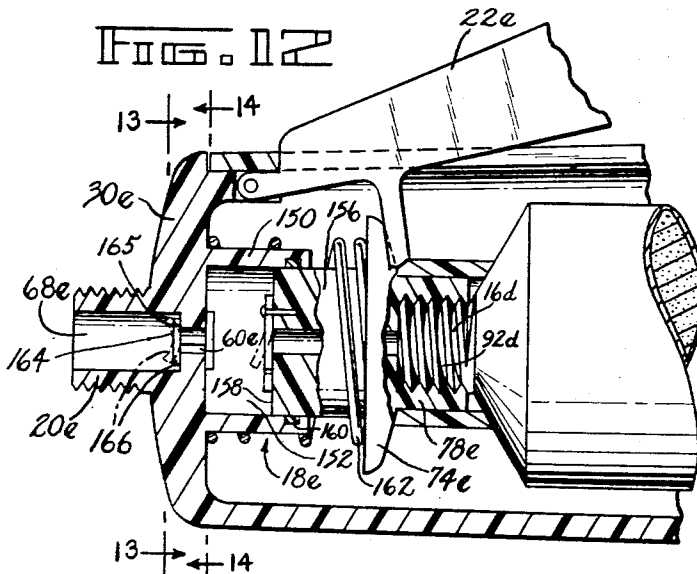
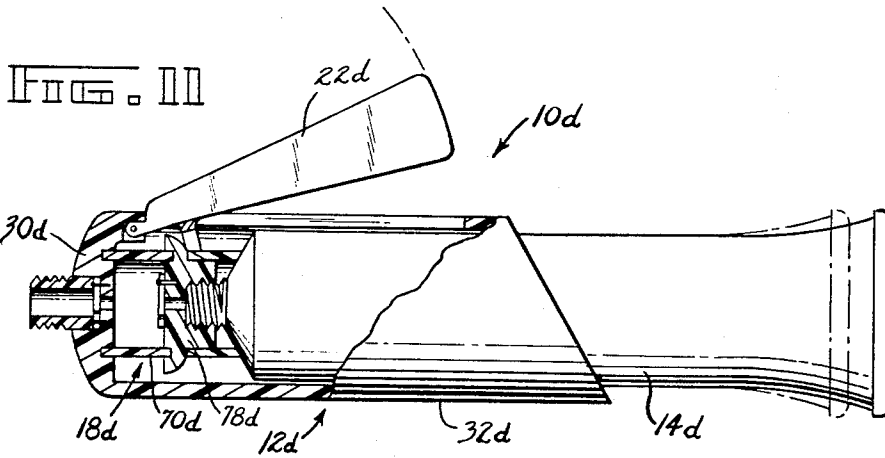


FIG. 16

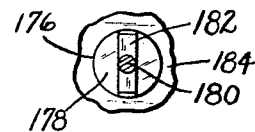


FIG. 15

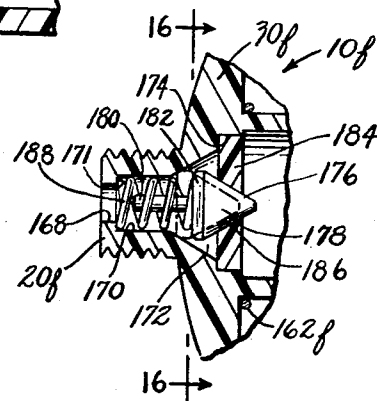


FIG. 13

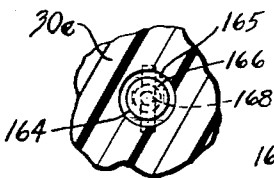
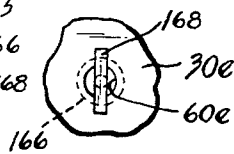


FIG. 14



1

3,405,843

CONTAINER-DISPENSER FOR COLLAPSIBLE TUBES

Cornelius B. Watson, Jr., P.O. Box 832,
Madison, Conn. 06443

Continuation-in-part of application Ser. No. 576,118,
Aug. 30, 1966. This application Nov. 23, 1966, Ser.
No. 611,190

18 Claims. (Cl. 222—95)

ABSTRACT OF THE DISCLOSURE

A container-dispenser for a collapsible tube containing fluent material has a case containing a manually operable suction pump at its forward end. The pump includes a resilient collapsible pump chamber which is collapsed by the manual operation of an oscillatable handle pivotally supported on the case to dispense a quantity of fluent material from the tube.

This application is a continuation-in-part of my co-pending application, Ser. No. 576,118, filed Aug. 30, 1966, bearing the title "Container-Dispenser for Collapsible Tubes" and now abandoned.

This invention relates in general to devices for dispensing fluent materials such as pastes, creams and viscous liquids from collapsible tubes, and deals more particularly with manually operated container-dispensers which utilize pumps to dispense fluent materials from collapsible tubes.

The general object of this invention is to provide a container-dispenser utilizing a pump which may be easily operated by one hand to dispense a desired quantity of material from a collapsible tube contained therein.

Another object of this invention is to provide a compact container-dispenser of the aforescribed character wherein the pump mechanism occupies and is operable in a relatively small space in front of the tube received therein, the container-dispenser therefore being capable of being made of a size only slightly larger than the tube with which it is to be used.

Another object of this invention is to provide a handle to operate the pump mechanisms, whereby the manual pressure of the operator is magnified two-fold or three-fold in pressure applied to the pump chamber, by virtue of an elongated handle incorporating a yoke of shorter radius to engage the pump chamber with proportionate ease of operation derived from such mechanical advantage.

A further object of this invention is to provide a container-dispenser of the aforescribed type wherein a tube with which it is used is easily placed into and removed from operative position by a simple manipulation.

Still another object of this invention is to provide a container-dispenser utilizing a suction pump construction which avoids or at least substantially reduces the possibility of air entering the pump chamber, thereby causing interruption in the flow of material dispensed therefrom, and which also avoids or at least substantially reduces the possibility of clogging as a result of hardening of residual material during periods of non-use.

A still further object is to provide a container-dispenser for collapsible tubes which may be constructed so as to receive only tubes having a given spout structure thereby limiting its use to tubes of a selected type or brand.

Still another object is to provide a container-dispenser wherein a tube contained therein is at least partially visible to the user thereby substantially reducing the probability that material will be erroneously dispensed therefrom.

Other objects and advantages of the invention will be

2

apparent from the following description and from the drawings forming a part thereof.

The drawings show preferred embodiments of the invention and such embodiments will be described, but it will be understood that various changes may be made from the constructions disclosed, and that the drawings 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 drawings:

FIG. 1 is a side elevational view of a container-dispenser embodying the present invention shown in an up-standing position.

FIG. 2 is a side elevational view of the container-dispenser of FIG. 1, the full lines showing the case cover in a partially opened position and the broken lines showing the case cover in a fully opened position, portions of the case cover and body being broken away to reveal details of the pump mechanism and the associated tube.

FIG. 3 is a somewhat enlarged longitudinal sectional view taken through the pump and case of FIG. 1.

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 3.

FIG. 5 is a fragmentary sectional view taken along the line 5—5 of FIG. 3.

FIG. 6 is a fragmentary side elevational view of the pump of FIGS. 2 and 3 and shows the tube and its associated pump part separated from the remainder of the pump as during removal or replacement of the tube.

FIG. 7 is a fragmentary side elevational view of a container-dispenser comprising another embodiment of the invention.

FIG. 8 is a longitudinal sectional view taken through the embodiment of FIG. 7.

FIG. 9 is a fragmentary longitudinal sectional view taken through a container-dispenser comprising another embodiment of the invention.

FIG. 10 is a fragmentary sectional view taken through a container-dispenser comprising another embodiment of the invention.

FIG. 11 is a side elevational view of another container-dispenser and an associated tube, the pump and a portion of the case being shown in longitudinal section.

FIG. 12 is a somewhat enlarged fragmentary longitudinal section view of still another container-dispenser embodying the invention.

FIG. 13 is a fragmentary sectional view taken along the line 13—13 of FIG. 12.

FIG. 14 is a fragmentary sectional view taken along the line 14—14 of FIG. 13.

FIG. 15 is a fragmentary longitudinal sectional view taken through still another container-dispenser embodying the invention.

FIG. 16 is a fragmentary sectional view taken along the line 16—16 of FIG. 15.

Turning now to the drawings, and first referring particularly to FIGS. 1 to 3, a container-dispenser embodying the present invention is indicated generally at 10 and comprises a case 12 adapted to receive and contain a collapsible tube 14 having a discharge opening or spout 16 and containing material to be dispensed. A manually operated suction pump, indicated generally at 18, is positioned forwardly of the tube 14. The pump is adapted for connection to the spout 16 and operates to dispense material from a nozzle 20 located at the forward end of the case. Operation of the pump is effected by an associated handle 22 supported on the case and operable externally thereof.

The case 12 may be made from various materials and may take various forms, but preferably and as shown, it is molded in two parts from a resilient plastic material. These two parts are a body 24 and a cover 26 which, in

3

the closed position of the cover, cooperatively define an axially elongated generally cylindrical hollow shell having a slightly forwardly tapering configuration. The illustrated case is further characterized by relatively thin walls along the major portion of its length, and a substantially flat rear end surface 28 which may be used to support the device on a horizontal surface in a stable upstanding position, as in FIG. 1. In addition, the case is preferably further so constructed as to enable a user to view the tube 14 when the case is closed to easily and accurately determine the type of tube loaded in the case and to thereby avoid accidents due to a mistaken belief as to type of tube involved and to the material dispensed therefrom. This may be accomplished by making one or both of the two case parts from transparent material or by cutting one or more windows or openings in one or both of the parts. In the illustrated example, as shown in FIG. 1, it is accomplished by making the cover 26 of a transparent material and by then painting the cover with an opaque paint over its entire outer surface except for a window area 29, which is left clear or free of paint, located below the handle 22. The window area 29 therefore allows the user to inspect the tube 14 by looking therethrough. A similar window area could also be provided on the body part 24, if desired.

The body 24 includes a relatively thick generally circular front wall 30, an axially elongated generally semicylindrical side wall 32, and a generally semi-circular rear wall 40 which partially defines the rear surface 28. The side wall 32 tapers slightly outwardly in going from the front wall 30 to the rear wall 40 and includes laterally spaced free edges 34, 34 which lie generally in an axial plane 35, as shown in FIGS. 2 and 5, and which partially define an axially extending side opening 36 through which the tube 14 may be moved in being placed in and in being taken out of the case body 24. The longitudinally extending marginal edge portions of the body adjacent the opening 36 are relieved, as indicated at 38 in FIGS. 2 and 5, to receive associated marginal edge portions of the cover 26.

The handle 22 is located on the opposite side of the opening 36 from the side wall 32 and is pivotally connected to the case body 24 by a pivot pin 46. More particularly, a radially inwardly spaced semi-annular wall 42 projects rearwardly from the front wall 30 on the open side of the body. An axially extending rearwardly opening slot 44 is formed in the wall 42 generally opposite the center of the opening 36 and receives the handle 22. The handle is in turn pivoted on the pin 46 which passes transversely through the wall 42 and handle, as best shown in FIG. 5.

The cover 26 normally closes the opening 36 and includes a generally parti-cylindrical slightly rearwardly tapering side wall 28 having a forward edge portion 50 and two longitudinally extending free edge portions 52, 52. It is closed at its rear end by a generally semicircular rear wall 53 which, when the case is in its closed position, defines the remainder of the flat rear surface 28. The cover 26 is connected at its rear end to the rear end of the body 24 for movement about a pivot axis between open and closed positions. The pivot axis extends generally diametrically of the body adjacent the rear wall 40 and is generally parallel to the axis of the handle 22, the actual pivotal connection being provided by a pair of rivets, one of which is shown at 54 in FIGS. 1 and 2, each of which passes through the side wall of the case body and the adjacent side wall of the cover. The closed position of the cover is best shown in FIG. 1 and its fully open position is indicated by broken lines of FIG. 2. To accommodate the handle an axially elongated slot 56 is formed in the forward part of the cover side wall 48 generally opposite the opening 36. The forward extent of the slot 56 is defined by a rearwardly facing surface 58 which is engageable with the handle 22 for a purpose hereinafter further described.

At this point it should be noted that the longitudinally extending edge portions 52, 52 of the cover are so curved, and extends slightly toward one another, so that when the

4

cover is in its closed position, the edge portions 52, 52 conform to and engage the associated relieved marginal edge portions 38, 38 of the case body, thereby releasably retaining the cover in its closed position. That is, some slight amount of resilient spreading of the cover edge portions 52, 52 is required during movement of the cover to or from its closed position. When the cover is closed its forward edge portion 50 engages and is supported by the body wall 42 to which the handle is attached.

The pump unit of the present invention may also take various different forms and may for example be made as a unit separate from the case and adapted for insertion into the case after being connected with the tube. However, in the presently preferred embodiment of the invention, at least a portion of the pump is permanently connected to the case.

In accordance with one aspect of the invention, the pump unit 18 includes a pump chamber, and two parts one of which is movable toward and away from the other along the longitudinal axis of the case and tube to vary the volume of the pump chamber. One of the parts, referred to as the rear part, is adapted for connection with the tube and provides a passageway or path for the flow of material from the tube to the chamber. The other part, referred to as the forward part, is connected to, or part of, the front wall of the case and includes a passageway or path for the flow of material from the chamber to the discharge nozzle. The movement of the rear part toward and away from the forward part is effected by oscillation of the handle, the handle having a part thereon which is engageable with the rear part and so arranged relative to the pivot point of the handle as to produce a high mechanical advantage permitting the rear part to be moved toward the forward part, to reduce the volume of the pump chamber and to discharge material from the spout, with the application of a relatively small force to the handle. The tube fits loosely in the case and as the rear part is moved relative to the forward part the tube moves with the rear part and slides relative to the case.

Further considering the pump 18 and referring particularly to FIGS. 3 and 4 for a detailed description of this part of the illustrated device, the forward part of the pump is made up of part of the front wall 30 and includes a coaxially aligned generally cylindrical passageway 60 passing therethrough and a generally cylindrical coaxially aligned forwardly opening recess 62 of somewhat larger diameter for receiving the nozzle 20 which has a generally cylindrical center bore 68 extending coaxially therethrough. The forward end of the nozzle 20 is preferably externally threaded, as shown, to receive the closure or cap customarily furnished as part of the collapsible tube 14. Seated at the bottom or rear of the recess 62 and retained therein by the nozzle 20 and two headed pins or nails 61, 61 is a check valve element 64 made of a thin strip or sheet of resilient material such as rubber. When tube material is pushed through the passageway 60 to the nozzle bore 68, it resiliently stretches the valve element and moves around the sides thereof to the nozzle bore. After such flow, however, the resiliency of the valve element returns it to sealing engagement with the passageway 60 and prevents the dispensed material or air from flowing backwards from the nozzle bore 68 to the passageway 60.

The principal chamber-defining element of the pump 18 is a generally cylindrical tubular sleeve 70, coaxial with the tube and extending between and connecting the forward and rear parts of the pump. The sleeve is made from an elastomeric material such as rubber and constitutes the side wall of the pump chamber 71. The forward end portion of the sleeve is received and retained in a rearwardly opening annular recess 72 defined by the body front wall 30. Various means may be used for holding the sleeve in place relative to the front wall 30, but preferably the sleeve is bonded in place by means of a suitable adhesive. At its other end, the sleeve is provided

with a generally radially outwardly directed flange 74 which includes a generally radially disposed rearwardly facing surface 76. The sleeve is axially collapsible to vary the volume of the chamber 71 and is biased toward to an expanded or non-collapsed condition by its inherent resiliency.

The rear part of the pump, indicated at 78, is preferably made from plastic and has a forwardly extending cylindrical portion or nose 80 adapted to be snugly received within the rear end opening in the sleeve 70 to form the rear end of the pump chamber 71. Spaced rearwardly of the forward surface 82 of the nose 80 is a radially outwardly projecting flange 84 having a forwardly facing surface 86 engageable with the sleeve surface 76. The flange 84 also includes a rear surface 88 which is inclined slightly forwardly and radially outwardly from the axis of the pump. A coaxially aligned cylindrical neck 90 extends rearwardly from the flange and has a central bore 92 internally threaded to receive the threaded tube spout 16. A passageway 94 extends through the remainder of the part 78 and communicates with the bore 92. At the forward end of the passageway 94 is a check valve 96 comprised of a flap of rubber or other flexible material fixed at one end to the part 78 by one or more headed pins or nails such as shown at 100. The valve 96 covers the forward end of the passageway 94 and serves to prevent retrograde flow of material therethrough as will be hereinafter evident. In FIG. 3, the solid lines show the valve 96 in its closed position and the broken lines superimposed on the solid lines show it in its open position. The other broken lines show the sleeve 70 and the pump part 78 in the positions assumed in the collapsed condition of the sleeve.

Preferably, the pump also includes a means for assuring a fluid-tight seal between the tube 14 and the movable rear part 78. In the embodiment of FIGS. 1 to 6, this seal means comprises a cylindrical collar 102, made from an elastomeric material such as rubber, surrounding the neck 90 and extending slightly rearwardly therebeyond so as to engage the forward surface of the tube 14 when the tube is fully assembled with the part 78. The collar 102 thereby serves to prevent material leakage and also aids in preventing air from entering the pump mechanism.

In order to allow easy placement of the tube 14 into, and removal from, the case, the movable pump part 78 is removable from the sleeve 70, the nose 80 of the part 78 being merely slidably inserted in the rear portion of the sleeve. FIG. 6 shows the part 78 separated from the sleeve 70, and from the relative positions shown in this figure, the part 78 may be assembled with the remainder of the pump by merely moving it and the associated tube forwardly, or to the left in FIG. 6, to move the nose 80 into the sleeve 70. Therefore, when placing a tube into the case, the part 78 is first threaded onto the tube externally of the case and then, as the tube is put into the case, the nose 80 is pushed into the sleeve 70. Preferably, a metal reinforcing ring 104 surrounds the sleeve 70 adjacent the forward face of the flange 74 to aid in maintaining a tight seal between the sleeve 70 and part 78. The part 78 is further held axially in place relative to the sleeve 70, when the case is closed, in a manner to be hereinafter described.

The handle 22 is preferably made from metal and includes a relatively thin elongated lever portion 106 received, at its forward end, in the slot 44 and apertured to receive the pivot pin 46 which extends transversely thereof. Formed on the handle in axially spaced relationship to the pin 46 is a yoke 108 which normally engages the inclined flange surface 88 of the rear pump part 78 and partially surrounds the neck 90 as best shown in FIG. 5. The lever portion of the handle is additionally provided with a generally forwardly facing surface 110 spaced rearwardly of the pin 46 and engageable with the cover surface 53 to limit movement of the handle in one

direction. When the cover 26 is in its open position, the handle 22 may be pivoted in a counterclockwise direction to a forward position, indicated by the broken lines in FIG. 2, to move the yoke out of engagement with the pump flange 84, thereby allowing adequate clearance for moving the tube 14 and the attached part 78 into and out of the case.

After a tube has been positioned in the case, the handle 22 may be rotated in a clockwise direction, from the broken line to the full line position of FIG. 2, and the case cover 26 may then be pivoted in a counterclockwise direction toward its closed position. When the cover is fully closed, the slot surface 58 bears against the handle surface 110 and prevents the handle from moving counterclockwise from the position shown by the full lines of FIG. 2. In this position of the handle, the yoke 108 engages the flange 84 and thereby retains the separable pump parts in assembled relationship. Clockwise movement of the handle from the full line position of FIG. 2 moves the pump part 78 forwardly to collapse the sleeve 70 and the chamber 71 provided thereby.

Preparatory to operating the device after the tube 14 has been inserted therein, and before closing the cover 26, the tube is manually squeezed to force a quantity of material through the spout 16 and forwardly past the valve and into the chamber 71 to substantially fill the chamber. When the chamber has been filled a quantity of material will flow forwardly through the valve 68 and into and from the nozzle 20 thereby indicating that the device has been properly primed for operation. Thereafter, the cover 26 may be moved to its closed position.

Depression of the handle 22 moves the rear pump part 78 forwardly to collapse the chamber 71 to the broken line position of FIG. 3. During this movement, the valve 96 is retained in its closed position by the pressure of the material in the chamber, thereby preventing the retrograde flow of material from the chamber toward the tube. As the volume of the chamber 71 decreases the material in the chamber exerts a forward pressure upon the valve 64 causing the latter valve to open and permitting material to flow to and through the nozzle 20.

When the handle is released from its depressed position, at the end of each stroke, the resilient sleeve 70 returns to its normal expanded or non-collapsed condition and exerts a biasing force upon the yoke 108 to return the handle 22 to its initial position, thereby preparing the pump for the next successive stroke or operation. As the sleeve 70 moves toward its initial position, the check valve 64 assumes a closed position and a partial vacuum is created in the chamber 71 as its volume increases. This reduction in pressure within the pump chamber causes material to be sucked from the tube 14 through its spout 16, the passageway 94 and the valve 96. Material continues to flow from the tube to the chamber 71 until the chamber is substantially filled. With each successive stroke of the handle 22, the aforescribed cycle is repeated and a quantity of material is dispensed from the nozzle 20.

It will of course be understood that, during the operation of the handle, the tube 14 is moved back and forth in the case 12 with the attached movable part 78. The case 24 is therefor made of such a shape and size as to allow the tube to slide freely therealong as required while nevertheless providing some lateral support for the tube. Also, in the illustrated embodiment, the resiliency of the sleeves 70 is relied upon for biasing the sleeve to its normal expanded condition. Where the wall of the sleeve is relatively thick this inherent biasing force is usually sufficient. If desired, however, additional or other biasing means may be employed, such as a helical compression spring surrounding the sleeve and working between its flange 74 and the forward wall 30 of the case.

Further embodiments of this invention are hereinafter described. Parts of these embodiments which are similar to corresponding parts of the previously described em-

embodiment 10 have been given the same reference numerals as in FIGS. 1 to 6, except for the addition of a letter suffix, and need not be redescribed in detail.

Referring now to FIGS. 7 and 8, these figures show another embodiment of the invention wherein the forward check valve 64 and nozzle 20 of the previously described embodiment are replaced by a combination check valve and dispensing nozzle. The container-dispenser 10a further differs from the previously described embodiment in the general construction and arrangement of the front wall 30a and the nozzle 20a.

The forward wall 30a of the container-dispenser 10a includes a forwardly projecting cylindrical portion 112 which receives a generally conically shaped nozzle 20a. The nozzle 20a is made from a resilient material such as rubber and is provided with at least one slit 114 through its otherwise closed forward end. The construction of the nozzle 20a is such that the resilience of its material tends to cause the slit to normally assume a closed position as indicated by full lines in FIG. 7. During depression of the handle 22a, however, internal pressure of the material forced forwardly by the pump 18a causes the nozzle to be generally deformed to the broken line position of FIG. 7, thereby opening the slit and allowing a ribbon of material to flow therefrom.

After the handle is released, and as the chamber 71a returns to its normal expanded condition, the nozzle 20a also returns to its normal condition to close the slit 114. Thus, the slit provides a valve action forwardly of the pump chamber and performs the function of the forward check valve 64 of the previously described embodiment. It should be apparent that the slit will remain open only while material is being dispensed from the container. Thus, the nozzle 20a substantially reduces the possibility of residual material hardening in the nozzle during periods of non-use.

In FIG. 9 is shown another embodiment of the invention which is similar to that of FIGS. 1 to 6 except for including a different means for attaching the movable pump part to a tube. The pump 18b of FIG. 9 includes a movable part 78b having a coaxial bore 116 extending therethrough and having a rearwardly projecting neck portion 90b including a generally radially disposed rearwardly facing surface 118. The neck is externally threaded to receive a connecting member or collet 120. Contained within the collet in a rearwardly converging conical recess 122 is a resilient annular retaining member 124 preferably made from rubber or like material and generally conforming to the configuration of the recess. The member 124 is provided with a cylindrical bore 126 adapted to receive the spout 16b of the associated tube 14b and includes a radially disposed annular forwardly facing surface 128 which bears against the neck surface 118. It will be apparent that as the collet 120 is threaded forwardly onto the neck 90b the retaining member 124 will be urged forwardly against the surface 118 and will be deformed radially inwardly to tightly engage the spout 16b. In addition to releasably gripping the spout 16b the member 124 also provides a means for effecting a fluid tight seal between the pump and the tube.

From the foregoing description of FIG. 9 it will be obvious that the illustrated collet mechanism for joining the tube 14b to the movable part 78b is usable with tubes having various different thread configurations on the spout 16b and having slightly different spout diameters. The connection device is therefore one universally usable with almost all types of tubes presently on the market. In contrast to this, the connection means of the embodiment of FIGS. 1 to 6 is limited to use with tubes having a specific thread configuration on their spouts. This, however, may be advantageous insofar as it limits the use of the container-dispenser to certain specific tubes, such as tubes made by a given manufacturer. Therefore, a tube manufacturer may furnish a container-dispenser of

this invention for use with his tubes and be assured that it will not be used with tubes of another manufacturer.

Turning to FIG. 10, this figure shows another embodiment of the invention, generally similar to that of FIGS. 1 to 6, but wherein the nozzle of the container-dispenser is integral with the front wall. In the container-dispenser 10c of FIG. 10, the nozzle 20c is integral with the front wall 30c of the case and includes a passageway 68c which communicates with a conical chamber 130 in turn communicating with a cylindrical bore 132. Received in the annular bore 132 is an annular insert 134 having an opening 136 passing therethrough. On its outer surface, the annular insert 134 is relieved at its rear portion to receive the forward end of the pump chamber sleeve 70c. The sleeve 70c fits between the annular part 134 and the wall 30c, and the insert 134, sleeve 70c and front wall 30c are preferably bonded together by means of a suitable adhesive. On the forward face of the annular part 134, and cooperating with the opening 136, is a check valve 138. This check valve is made from a strip or sheet of resilient material, such as rubber, and is fixed to the annular part 134 by two headed pins or nails 140, 140 located on opposite sides of the opening 136. The valve 138 is therefore generally similar to the valve 64 of FIGS. 1 to 6, and during the collapsing movement of the sleeve 70c is moved to an open condition by the pressure of the dispensed material thereagainst, the material flowing around the sides of the element of the valve 138 in moving from the opening 136 to the chamber 130 and the nozzle passageway 68c. During the return or expanding movement of the sleeve 70c the valve element 138 moves to its closed position, shown by FIG. 10, to prevent the reverse flow of material or air to the pump chamber provided by the sleeve 70c.

Another container-dispenser embodying the present invention and indicated generally at 10d is shown in FIG. 11. The container-dispenser 10d differs from the previously described embodiment in the construction of the pump 18d and in the general construction and arrangement of the case 12d. More specifically, the pump 18d is attached to the case and includes a generally cylindrical resilient tubular sleeve 70d the rear end portion of which is received and retained in a forwardly opening annular recess defined by the rear part 78d. Like the rear part 78 of the part 78d is provided with a rearwardly opening central bore 92d internally threaded to receive a threaded tube spout 16d.

The case 12d is preferably molded in one part from a resilient plastic material and includes a generally cylindrical side wall 32d extending axially rearwardly for some distance beyond the extent of the handle 22d to form a partial enclosure for a tube, such as 14d, and to provide a body portion capable of being conveniently grasped by the user when the operating handle is manipulated.

The case 12d opens axially rearwardly to receive the tube 14d and is of such size as to provide some degree of lateral support for a tube while nevertheless permitting the tube to slide freely therein, as necessary, to permit operation of the pump. It will be further noted that the tube is freely rotatable relative to the case to facilitate threadable connection with the part 78d. When a tube of material is connected to the container-dispenser 10d a portion of the tube extends rearwardly therefrom. The exposed portion of the tube which normally bears a label or other marking identifying the contents thereof is therefore visible to the user. If desired, however, the case could be made to extend for more than the full length of the tube and be provided with a squared off, although open bottom permitting it to be stored on end.

In all of the previously described embodiments of the invention the pump has been made up in part of a resilient sleeve which is collapsible to vary the volume of the pump chamber. This construction is not, however, necessary to the broader aspects of the invention and, if desired, the pump may be made to include a pump chamber made up

of a rigid cylinder and piston moveable therein. Such a pump is shown in FIG. 12 and could be substituted for any of the previously described pumps. Referring to FIG. 12, the pump is indicated generally at 18e and includes a front part 150 extending rearwardly from the front wall 30e and having a rearwardly opening generally cylindrical recess or cylinder 152. The pump further includes a rear part 78e which is in some respects similar to the rear parts of the other previously described embodiments, but which differs therefrom in that it has an axially forwardly projecting piston 156 received in the cylinder 152. The piston includes a forwardly facing surface 153 which defines the rear wall of the pump chamber. To prevent leakage of material from the pump chamber a resilient annular seal or O-ring 160 is received within a recess in the wall of the cylinder 152 and surrounds the piston 156. The rear part 78e is biased rearwardly or away from the front part by a helical compression spring 162 which acts between the front wall 30e and the flange 74e on the rear part of the pump.

The check valves in the pump 18e may be generally similar to those of the aforesaid embodiments. However, for the purpose of illustration and not by way of limitation, a modified valve indicated at 164 is shown associated with the forward passageway of the pump 18e. The valve 164 may serve as a check valve for either part of the pump, but for the purpose of illustration is shown associated with the forward passageway 60e. The nozzle 20e is integral with the front wall 30e of the case and includes a generally cylindrical center bore 68e extending coaxially rearwardly and terminating in a forwardly facing surface or face 165. The generally cylindrical passageway 60e is coaxially aligned with the bore and opens through the face 165. The check valve element 164 is preferably molded from resilient material such as rubber and includes a thin disc 166 seated on the face 165 and forming a closure for the forward end of the passageway 60e. A slender generally T-shaped stem 168 integrally connected with the disc 166 extends coaxially through the passageway 60e and engages the front wall 30e at the rear end of the passageway to retain the central portion of the disc against axial movement. When the material is forced through the passageway 60e and into the nozzle bore 68e the marginal edge portion of the disc 166 moves away from the face 165 to a position generally indicated in broken lines in FIG. 12. After the material flow ceases, the inherent resiliency of the valve element causes it to return to its seated position on the face 165 to prevent dispensed material or air from flowing from the nozzle bore to the passageway 60e.

FIGS. 15 and 16 show a container-dispenser 10f having still another form of check valve for the pump. Due to its cross-sectional configuration which varies axially of the orifice in which it is received, the valve member of the illustrated check valve has both self-centering and tight-sealing qualities. In the device 10f the nozzle 20f is integral with the front wall 30f of the case and has a central bore therethrough which includes adjacent cylindrical portions 168 and 170 at its forward end and an annular shoulder 171 located therebetween. The cylindrical portion 170 opens into a conical chamber 172 which in turn communicates with a rearwardly opening cylindrical portion 174. Received within the nozzle bore is a check valve member 176 which includes a rearwardly diverging conical body portion 178 disposed within the conical chamber 172. To maintain the valve in general coaxial alignment with the nozzle bore, the valve member 176 also includes a central stem 180 which projects into the cylindrical portion 170 of the nozzle bore. Intermediate the stem and body portions the valve member 176 has a stop bar 182 which extends diametrically of its body portion. The valve member 176 is held in assembly with the case by an annular insert 184 received within the cylindrical portion and having a conical orifice 186 extending therethrough which provides a seating surface for the valve body portion 178. A helical spring 188 encompasses the stem 180 and acts

between the shoulder 171 and the stop bar 182 to urge the valve into the orifice 186.

Pressure exerted by the material in the pump chamber causes the valve member 176 to open or move to its broken line position of FIG. 15. In the open position the stop bar 182 engages the wall of the conical chamber 172 to limit the forward travel of the valve member. The bar is further of a generally rectangular shape, as viewed in FIG. 16, so that when the valve member is in the forward limit of its movement passageways are provided between the chamber wall and the valve body portion for flow of material therethrough. The spring 188 biases the valve member 176 into a tight-sealing engagement with the wall of the orifice 186 when the flow of material ceases, thereby preventing air or material from entering the pump chamber from the nozzle bore.

The invention claimed is:

1. In a device for dispensing fluent material from a collapsible tube having a discharge spout, the combination comprising: a case adapted to receive and contain at least a portion of such a tube, a suction pump located at the forward end of said case forwardly of a spout of a tube such as aforesaid contained therein, said pump including means defining a pump chamber, a discharge nozzle located forwardly of said pump chamber and communicating therewith, means for connecting a spout of a tube such as aforesaid to said pump to provide a path of flow from such a tube to and through said pump chamber and said discharge nozzle, and means for moving said connecting means and any tube such as aforesaid connecting therewith toward and away from said discharge nozzle to vary the volume of said pump chamber.

2. The combination defined in claim 1 wherein said pump includes a first part secured to said case and a second part separable from said first part, said connecting means being carried by said second part.

3. The combination defined in claim 2 wherein said second part defines a rear wall of said pump chamber, and said means for moving said connecting means comprises a handle operable externally of said case to move said second part longitudinally of said case.

4. The combination defined in claim 3 wherein said case includes a body and a cover pivotally connected with said body for movement between open and closed positions relative thereto, said cover having a slot therein for receiving said handle when said cover is in its closed position, said handle being engageable with said cover at the forward end of said slot to limit movement thereof in one direction relative to said case, said handle having a part thereon engageable with said second part for moving said second part relative to said case in response to movement of said handle and for holding said first and second parts in assembled relation, said handle when said cover is in its open position being movable to a position at which said handle part is moved out of engagement with said second part to permit separation of said second part from said first part.

5. The combination defined in claim 1 wherein said means for moving said connecting means includes an oscillatable handle supported upon said case for pivotal movement about an axis fixed relative thereto and having a part thereon engageable with said connecting means.

6. The combination defined in claim 1 wherein said case includes a rearwardly opening tubular body portion adapted to receive said tube coaxially therein, said case being further adapted to extend axially of said tube through a portion of the length thereof.

7. A device for dispensing fluent material as defined in claim 6 particularly adapted for use with a tube having an externally threaded spout and further characterized by said pump being attached to said case and said connecting means including a coaxially aligned and rearwardly opening internally threaded spout receiving aperture defined by a rear portion of said pump, said case being adapted to permit said tube to be rotated therein to effect connection with said pump.

11

8. The combination defined in claim 1 wherein said pump includes a forward part secured to said case and having a rearwardly opening recess partially defining said pump chamber and a rear part including a piston portion slidably received in said recess and defining a rear wall of said pump chamber, said connecting means being carried by said second part.

9. The combination defined in claim 1 wherein said means defining a chamber includes a resilient cylindrical sleeve generally axially aligned with the spout of a tube such as aforesaid when such a tube is connected with said connecting means, said sleeve being adapted to collapse generally axially forwardly in response to the movement of said connecting means toward said discharge nozzle.

10. The combination defined in claim 1 wherein said discharge nozzle includes a resilient closure having a slit therethrough normally biased to a closed condition and adapted to open in response to the pressure of material flow from said pump.

11. The combination defined in claim 1 further characterized by said discharge nozzle having external threads thereon.

12. The combination defined in claim 1 further characterized by said connecting means including a collet mechanism for gripping the spout of a tube such as aforesaid, said collet mechanism including first and second threadably connected parts and an apertured resilient member located between said latter two parts, said latter two parts and said apertured resilient member being so constructed and arranged that said apertured member is deformed to decrease the size of its aperture as said two parts are threaded together in one direction.

13. The combination defined in claim 1 wherein at least a portion of said case is transparent.

14. The combination defined in claim 1 wherein said pump includes a front part and a rear part, said rear part carrying said connecting means and having a rearwardly facing surface and wherein said means for moving said connecting means comprises a handle pivotally connected to said case near the forward end thereof, said handle including a depending portion rearwardly spaced from said handle pivot axis for engaging said rearwardly facing surface to move said rear part longitudinally of said case in response to the operation of said handle.

15. The combination defined in claim 1 wherein said means for moving said connecting means comprises an oscillatable handle pivotally affixed to said case and operable externally thereof, said handle having a forward portion which engages said pump chamber defining means to vary the volume of said chamber upon operation of said handle and an operating portion engageable by the user to operate said handle, said handle being pivotally affixed to said case in such a manner that said forward portion thereof moves through a relatively smaller radius than said operating portion for a given movement of said operating portion so as to obtain a mechanical advantage in compressing said pump chamber and thereby reducing the force required to operate said pump.

16. A device for dispensing fluent material from a collapsible tube having a discharge opening comprising a case adapted to receive and contain at least a portion of the body of such a tube and including a forward wall having a first passageway passing therethrough to a discharge point forwardly of said case, a suction pump located in said case at the forward end thereof forward-

12

ly of a discharge opening of a tube such as aforesaid contained in said case, said pump having a forward part integral with said forward wall and fixed relative to the remaining portion of said case and including a pump chamber partially defined by said forward wall and communicating with said first passageway, said pump having a rear part located rearwardly of said forward part partially defining said pump chamber and including a second passageway passing therethrough and communicating with said pump chamber, means for connecting a discharge opening of a tube such as aforesaid to said rear part to provide a path of flow from the discharge opening to and through said second passageway to said pump chamber, a rear check valve associated with said second passageway for permitting material to flow therethrough from the tube discharge opening to said pump chamber and for preventing material from flowing therethrough in the opposite direction, a forward check valve associated with said first passageway for permitting material to flow therethrough to said discharge point and for preventing material from flowing therethrough in the opposite direction, and means for moving said rear part toward and away from said forward part to vary the volume of said pump chamber.

17. The combination defined in claim 16 wherein said pump includes a resilient tubular sleeve connecting said forward and rear parts and partially defining said pump chamber, said sleeve being normally biased to an expanded condition and being adapted to be collapsed by the movement of said rear part toward said forward part.

18. The combination defined in claim 16 wherein said means for moving said rear part comprises an oscillatable handle pivotally affixed to said case and operable externally thereof, said handle having a forward portion which engages said rear part to vary the volume of said chamber upon operation of said handle and an operating portion engageable by the user to operate said handle, said handle being pivotally affixed to said case in such a manner that said forward portion thereof moves through a relatively smaller radius than said operating portion for a given movement of said operating portion so as to obtain a mechanical advantage in compressing said pump chamber and thereby reducing the force required to operate said pump.

References Cited

UNITED STATES PATENTS

352,343	11/1886	Warren	222—383 X
1,408,356	2/1922	Jones	137—525 X
1,537,010	5/1925	Herschmann	222—107 X
1,581,412	4/1926	Wishart	222—105 X
2,620,943	12/1952	Critelli et al.	222—95
3,061,202	10/1962	Tyler	222—383 X
3,158,176	11/1964	Toland	137—525
3,160,329	12/1964	Radic et al.	222—212 X
3,220,611	11/1965	Zander et al.	222—95
3,310,830	3/1967	Gattone	222—183 X

FOREIGN PATENTS

162,090	1/1949	Austria.
1,098,204	3/1955	France.
213,337	3/1924	Great Britain.
67,227	1/1951	Netherlands.

ROBERT B. REEVES, *Primary Examiner*.
K. N. LEIMER, *Assistant Examiner*.