

Feb. 19, 1935.

D. M. GUNN

1,992,067

VALVED CLOSURE

Filed Dec. 14, 1933

4 Sheets-Sheet 1

Fig. 1.

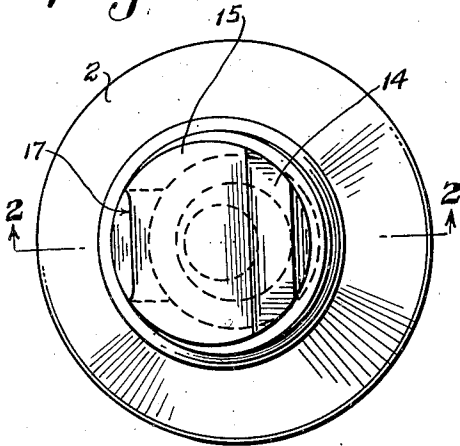


Fig. 4.

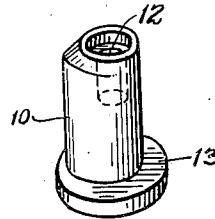


Fig. 3.

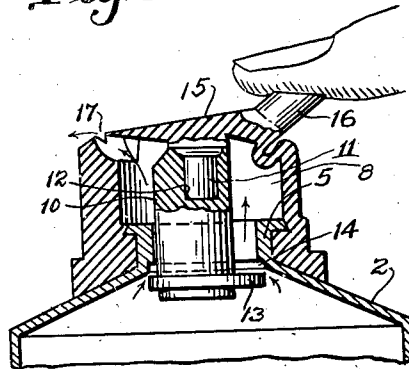


Fig. 2.

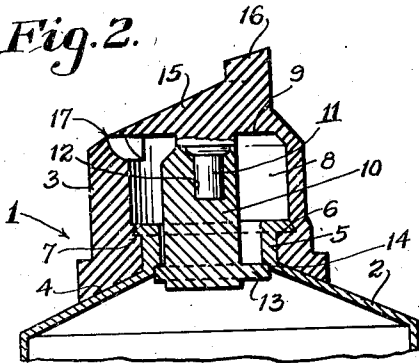


Fig. 5.

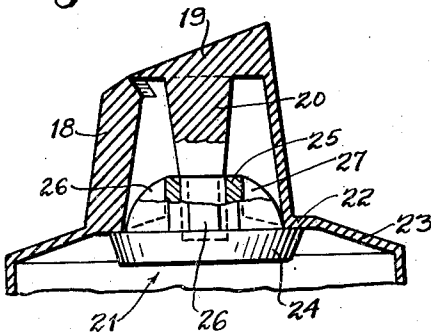
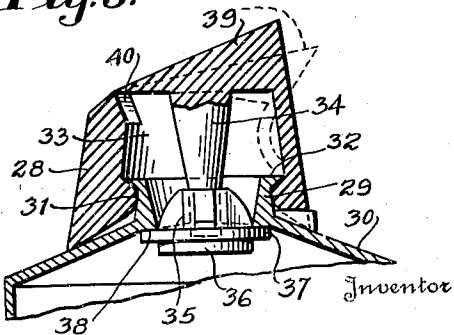


Fig. 6.



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Fig. 7.

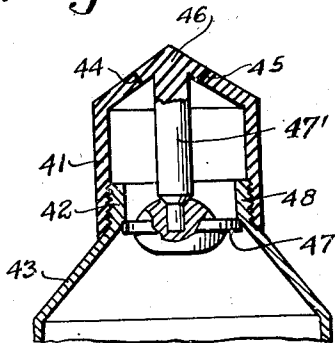


Fig. 9.

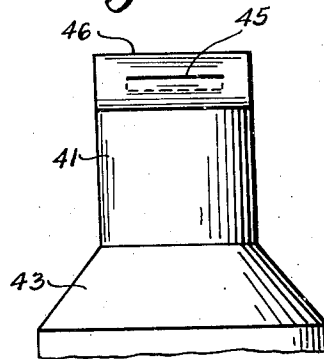


Fig. 8.

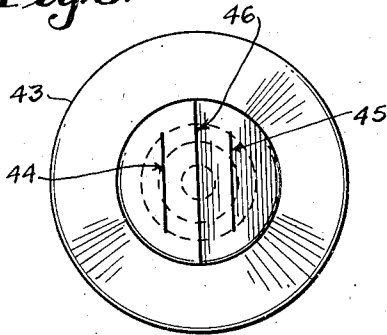


Fig. 12.

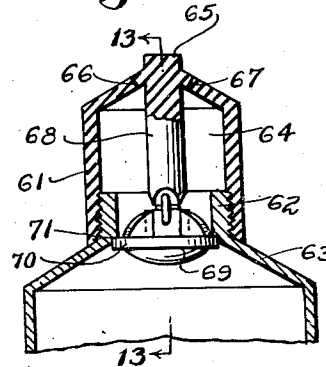


Fig. 10.

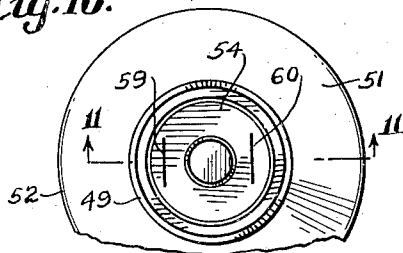


Fig. 13.

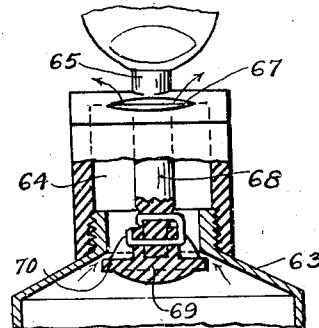
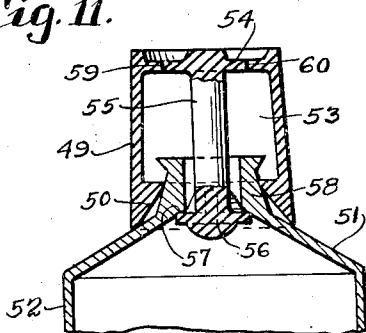


Fig. 11.



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Fig. 14.

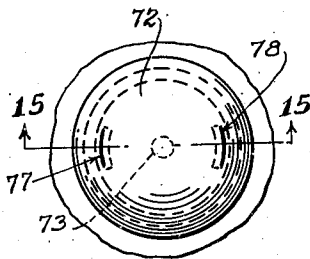


Fig. 17.

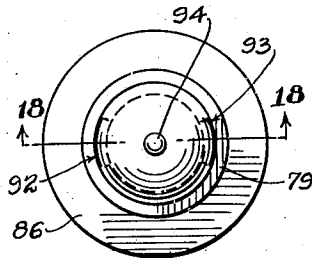


Fig. 20.

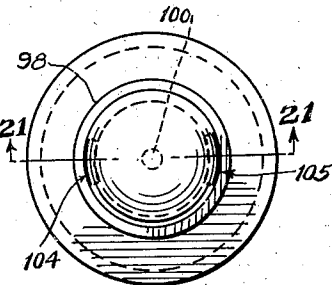


Fig. 15.

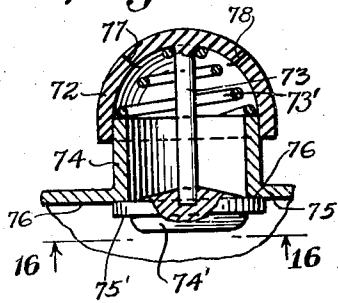


Fig. 18.

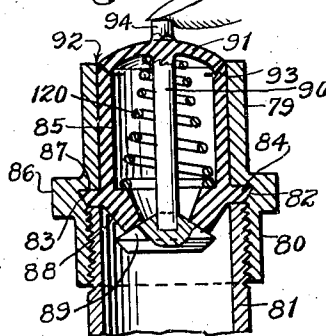


Fig. 21.

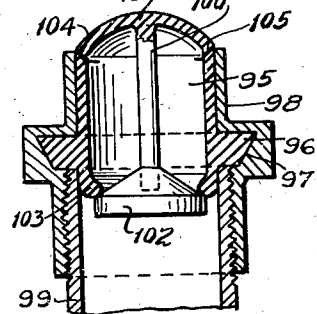


Fig. 16.

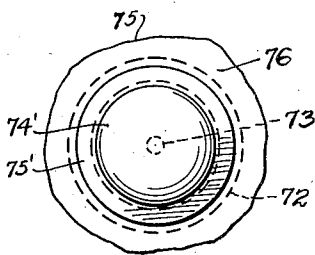


Fig. 19.

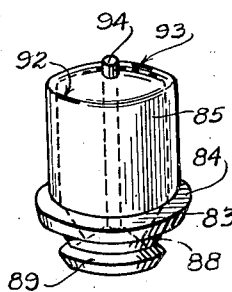
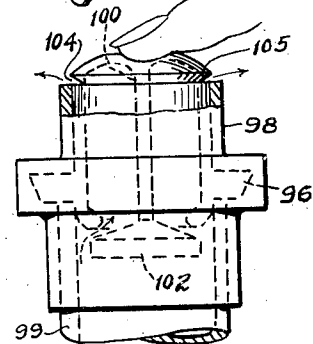


Fig. 22.



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Fig. 23.

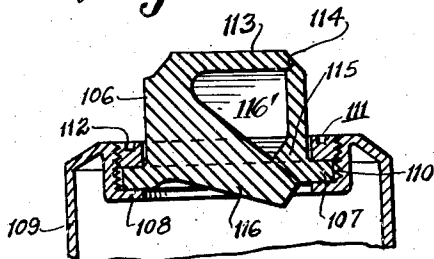


Fig. 24.

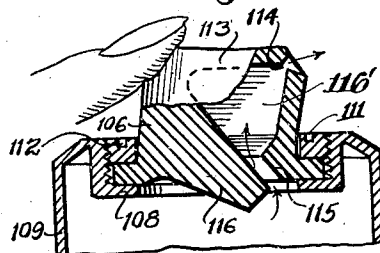


Fig. 25.

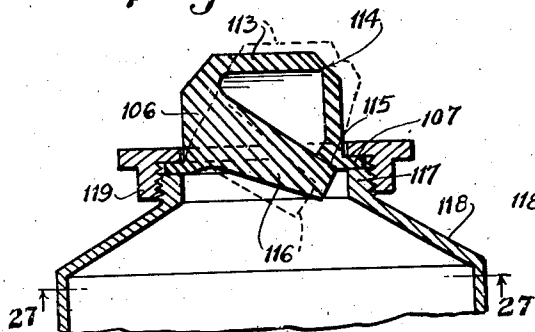


Fig. 26.

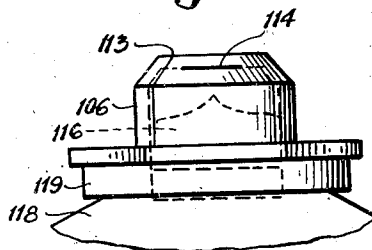
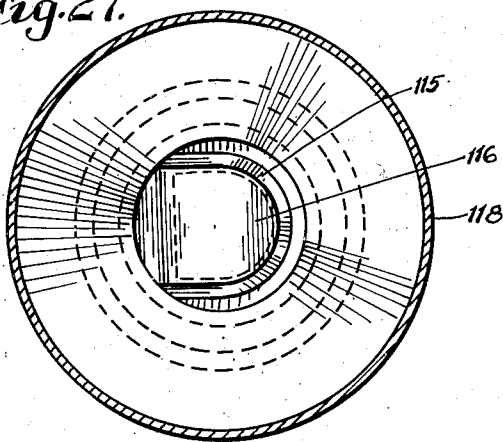


Fig. 27.



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UNITED STATES PATENT OFFICE

1,992,067

VALVED CLOSURE

Damon Mott Gunn, Fort Preble, Maine

Application December 14, 1933, Serial No. 702,382

10 Claims. (Cl. 221-60)

The invention forming the subject matter of this application is an improvement on the valve closure disclosed in my United States Patent No. 1,879,205, dated September 27, 1932.

As in my aforesaid patent, the present invention relates to valves shown as applied to collapsible tubes in which shaving creams and other toilet creams are ordinarily packaged and sold. However, the invention is not limited to this particular use but may be applied in any other relation or situation where its employment may be advantageous or desirable.

The main object of the invention is to provide a collapsible valve closure which includes a chamber having simultaneously opening and closing valves at its inner and outer ends, the closure being so constructed as to reduce the volume of the chamber during the opening movements of the valve and to hold it so reduced until near the end of the valve closing movement; thereby creating a partial vacuum within the chamber tending to draw in any cream, liquid, or other matter, which may have remained on the outer valve seat, permitting the valve at the outer end of the chamber to close properly.

Another object of the invention is to provide a collapsible valve closure in which the inner or inlet valve underlaps the walls surrounding the mouth of the tube when the closure is in place so that said inlet valve functions to hold the closure to the tube.

A further object of the invention is to provide the inlet valve with a flexible circumferentially extending flange, the inlet valve below said flange being of substantially the diameter of the mouth of the tube and above said flange of a diameter sufficiently less than that of the mouth of said tube to permit the valve to be forced through the mouth of said tube with the flange up-folded, said flange expanding so as to under-lap the wall surrounding the mouth of the tube and the part of the valve of larger diameter preventing subsequent removal of the valve through the downward folding of said flange.

Other objects of the invention will become apparent as the detailed description thereof proceeds.

In the drawings:

Figure 1 is a top plan view of one form of the invention;

Figure 2 is a vertical transverse section taken on the line 2-2 of Figure 1;

Figure 3 is a view similar to Figure 2, but with the parts of the closure shown in a different operative position;

Figure 4 is a perspective view of the inner valve forming a part of the closure illustrated in Figures 1, 2, and 3;

Figure 5 is a vertical transverse section through a modified form of the invention and in which the closure is formed integral with a collapsible tube;

Figure 6 is a central vertical section through another modification of the invention;

Figure 7 is a central vertical section through another form of the aforesaid invention;

Figure 8 is a top plan view of the device shown in Figure 7;

Figure 9 is a side view of the device shown in Figure 7;

Figure 10 is a top plan view of still another modification;

Figure 11 is a vertical section taken on the line 11-11 of Figure 10;

Figure 12 is a central vertical section taken through another modified form of the invention;

Figure 13 is a sectional elevation of the device shown in Figure 12;

Figure 14 is a plan of still another modification of the invention;

Figure 15 is a vertical section taken on the line 15-15 of Figure 14;

Figure 16 is a horizontal section taken on the line 16-16 of Figure 15;

Figure 17 is a top plan view of another modification;

Figure 18 is a vertical section taken on the line 18-18 of Figure 17;

Figure 19 is a perspective view of part of the valve mechanism shown in Figure 18;

Figure 20 is a top plan view of still another modification of the invention;

Figure 21 is a vertical section taken on the line 21-21 of Figure 20;

Figure 22 is a side elevation of the device shown in Figure 21, but illustrating the parts in a different operative position;

Figure 23 is a central vertical section through another form of the invention;

Figure 24 is a view similar to Figure 23 but showing the parts moved to a different position;

Figure 25 is a central vertical section through still another form of the invention;

Figure 26 is a side elevation of the device shown in Figure 25; and

Figure 27 is a horizontal section taken on the line 27-27 of Figure 25.

In the form of the invention illustrated in Figures 1 to 4, a closure designated generally by the reference numeral 1 is shown as detach-

ably connected to a collapsible tube 2. The closure, preferably formed of rubber or similar flexible material, has a body 3 generally cylindrical in cross section. The lower end of the body 3 is inwardly beveled to form an inclined annular wall 4 adapted to fit snugly on the upper inclined end of the tube 2.

The tube 2 is provided with a neck 5 having an outwardly extended flange 6 adapted to seat over a shoulder 7 formed in the interior of the body 3. Above the shoulder 7 the body 3 is shaped to form a chamber 8 having a top wall 9 from which depends a valve stem 10 which is suitably secured to the aforesaid top wall by means of a depending pin 11 cemented, or otherwise secured, in a bore 12 (see Figure 4). The lower end of the stem 10 is enlarged to form an outwardly extending flange 13 adapted to seat snugly in an annular valve seat 14 formed at the lower end of the neck 5 of the collapsible tube 2.

The upper end of the body 3 where it extends from the wall 9 is generally triangular in cross section. This upper end 15 has a projecting lug 16 formed at one side thereof. The body 3 is provided with a slot 17 which is normally closed by the natural resilience of the material from which the body 3 is made. The body 3 and the valve mechanism connected thereto are so arranged and constructed that when the flange 13 is seated in the annular seat 14 the slot 17 is closed.

In order to move the valve 13 from its seat and to open the slot 17, it is only necessary for the operator to press downwardly on the projection 16. This pressure not only moves the valve 13 away from its seat, but also causes the slot 17 to gape and thereby permit the discharge of fluent material from the collapsible tube 2. The form of the invention just described is adapted to be forced onto the neck of a tube of standard construction; the naturally resilient parts yielding sufficiently to permit them to be properly assembled on the neck.

In the modification shown in Figure 5, the closure body 18 is formed integral with a collapsible tube, which, of course, will be made of the same elastic material. The body 18 is provided with a top 19 somewhat similar to the top 15 of the modified form described above. A stem 20 depends from the top 19 and has suitably secured to its lower end a valve closure 21 adapted to seat snugly against a flat face 22 formed at the upper end of the tube 23.

The valve 21 comprises a comparatively heavy body 24 from the center of which extends a cylindrical projection 25 adapted to receive the lower cylindrical end 26 of the stem 20. The end 26 may be suitably secured in the cylindrical projection 25 by cementing these parts together or by any other suitable means. The cylindrical projection 25 may be reinforced by any desired number of radial ribs 27 which extend adjacent to the outer periphery of the body 24 and serve as guide means for properly positioning the body 24 on the seat 22.

In the modification shown in Figure 6, the body 28 of flexible material is detachably connected to the neck 29 of a collapsible tube 30. The lower end of the body 28 is beveled or countersunk at a greater inclination than the inclination of the upper end of the tube 30; and is shaped to form an annular bead 31 which seats under the flange 32 which extends outwardly from the upper end of the neck 29. The body 28 is shaped to form a chamber 33, from the upper

wall of which a valve stem 34 depends to be connected suitably at its lower end to a valve member 35. The valve member 35 comprises a comparatively heavy body 36 having an outwardly directed flange 37 adapted to seat against an annular flat valve seat 38 formed at the lower end of the neck 39.

The upper end of the body 28 is inclined to form a triangular member 39 which may be depressed, as indicated by the dotted line, to open the valve 35 and the slot 40 formed at the junction of the member 39 with the main part of the body 28.

In the form of the invention shown in Figures 7, 8, and 9, the closure comprises a cylindrical part 41 internally screwthreaded at its lower end to engage the external screwthread on the neck 42 of a collapsible tube 43. The part of the body 41 adjacent the neck 42 preferably is formed of vulcanized rubber, while the upper part is necessarily formed of flexible material. The upper end of the body 41 is of conical shape and is provided with two slots 44 and 45 which may be caused to gape by a lateral and downward pressure on the apex 46 of the closure.

A valve stem 47 depends centrally from the conical end of the closure; and at its lower end is suitably secured to a valve member 47 adapted to seat against the valve seat 48 when pressure is removed from the upper end of the closure. Obviously, when the valve 47 is in closed position the slots 44 and 45 must also be closed.

In the modification shown in Figures 10 and 11, the body 49 of flexible material is substantially cylindrical throughout its length. The lower end 50 of said body 49 is sharply countersunk so as to make a close fit with the upper inclined end 51 of the collapsible tube 52. The interior of the body 49 is shaped to form a chamber 53 closed at its upper end by a wall 54 from which depends a valve stem 55 having a valve 56 suitably secured to its lower end to move toward and from a valve seat 57 formed at the lower end of the neck 58 of the said tube. The top wall of the chamber 53 is provided with slots 59 and 60 which are normally closed by the resilience of the material, but which may be caused to gape by lateral and downward pressure on the upper end of the body 49. Obviously, such pressure will also cause the valve 56 to be moved from its seat.

The modification shown in Figures 12 and 13 is somewhat similar to that shown in Figures 7, 8 and 9. The body 61 of this closure is internally screwthreaded at its lower end to engage the external screwthreads on the neck 62 at the upper end of a collapsible tube 63. The body 61 is shaped to form a cylindrical chamber 64; and the top wall of this chamber is inverted V-shaped in cross section. A ridge 65 extends lengthwise of the aforesaid top and provides the means whereby the top may be moved in opposite direction to cause the slot 66 or the slot 67 to gape for the purpose of discharging material from the closure.

A valve stem 68 depends from the center of the top, and at its lower end is suitably secured to a valve 69 having an annular flange 70 extending outwardly therefrom to seat in an annular groove 71 formed at the lower end of the neck 62. As shown in Figures 12 and 13, the valve 69 is secured by a staple to the lower end of the stem 68.

In the modification shown in Figures 14, 15 and 16, the closure comprises a hemispherical body 72 of flexible material having a stem 73 depending

from the center thereof with a spring 73' surrounding the stem. The lower end of the body 72 fits snugly over the upper end of the neck 74 extending upwardly from the upper end of a container 75. The stem 73 is connected at its lower end to a valve 74' which includes a flange 75' adapted to seat against the flat face 76 formed at the lower end of the neck 74. Slots 77 and 78 are formed in the body 72 on opposite sides of the stem 73 and are closed by the normal resilience of the material and by the pressure of spring 73' when the valve 74 is in closing position against the seat 76. The operation of this form of the invention is quite similar to that of the previously described form.

In this form of the invention the valve 74' is provided with a circumferential flange 75' which it will be observed under-laps the neck 74 preventing removal of the closure. The closure was applied by forcing the valve 74' down through the neck 74 with the flexible flange 75' up-folded with respect to the upper part of the valve, which upper part it will be observed is cut away or smaller in diameter so as to make room for the flange when the latter is upfolded. After the flange 75' has expanded as in the position shown in Figure 15, the closure cannot be subsequently removed, for the bottom portion of the valve 74' is made of a diameter approximately that of the neck 74 leaving no room for the down-folding of the flange 75'.

In the form of the invention shown in Figures 17, 18 and 19 a substantially cylindrical body 79 has a skirt 80 at its lower end internally screw-threaded to receive the externally screwthreaded upper end of a collapsible tube 81. The body 79 is provided with an intermediate recess 82 having its inner wall beveled to correspond with the slope 83 of a flange 84 formed between the ends of the valve member 85. A flange 86 is formed between the ends of the body 79 to facilitate the assembly of the body on the upper end of the tube 81.

The valve member 85 has its flange 84 clamped between the shoulder 87 of the body 79 and the upper edge of the flexible tube 81. The valve member 85 also has downwardly directed a frusto-conical valve seat 88 adapted to receive the conical face of a valve 89 suitably secured at the lower end of a stem 90 which depends from the center of the top 91 of the valve member 85 and is surrounded by a spring 120. The lower part of the valve member 85 may be rigid; but it is necessary that the upper part be flexible in order that the slots 92 and 93 may be opened whenever pressure is applied to the central button 94. It will be obvious from an inspection of the drawings, that when the center of the top 91 is depressed, the slots 92 and 93 will be caused to gape, and thereby permit the egress of material from the interior of the valve member 85.

The form of the invention illustrated in Figures 20, 21, and 22 is somewhat similar to that illustrated in Figures 17 to 19. In this form, however, the valve member 95 is made throughout of flexible material in order to permit its intermediate flange 96 to be sprung into the intermediate recess 97 formed in the body 98, which is internally screwthreaded at its lower end to receive the externally screwthreaded upper end of the flexible tube 99.

A valve stem 100 depends centrally from the flexible top 101 of the valve member 95. At its lower end the valve stem 100 is suitably secured to a valve 102 adapted to be moved by pressure

applied to the top 101, from its seat 103 formed at the lower end of the valve member 95. The top of the valve 95 is provided with slots 104 and 105 which are normally closed by the resilience of the material whenever the valve 102 is in closed position on its seat 103. It will be evident that pressure applied to the top 101 will cause the slots 104 and 105 to gape at the same time as the valve 102 is moved from its seat 103.

In the form of the invention shown in Figures 23 and 24, the valve member 106 is made of resilient material; and at its lower end is provided with a flange 107 adapted to be clamped against the inwardly directed annular flange 108 formed at the upper end of a collapsible tube 109. As shown in Figures 23 and 24, the flange 108 is formed at the lower end of a cylindrical recess 110 which is internally screwthreaded to receive the screw threads of a clamping nut 111 which is provided with recesses 112 adapted to receive correspondingly shaped pins of a spanner commonly used to rotate nuts of this character. The valve member 106 is shaped to provide a flat top 113 which terminates in a slot 114 where the top wall 115 of the member 106 is shaped to form a seat for a valve portion 116 formed integrally with the member 106. The operation of this form of the invention will be apparent from inspection of Figure 24 of the drawings which shows the valve member 106 distorted to move the valve 116 away from its seat 115 and to cause the slot 114 to gape for the purpose of permitting material to be expelled through the slot 114.

The parts are so constructed and designed that when distorting pressure is released the valve 116 closes before the chamber 116' becomes fully expanded. The restoration of the chamber to its normal expanded position creates a vacuum in the chamber 116' and causes a drawing of excess material through the slot 114 into the chamber.

In the form of the invention illustrated in Figures 25, 26, and 27, the valve member 106 is identical with that shown in Figures 23 and 24. In this case, however, the flange 107 is clamped to the upper end 117 of a collapsible tube 118 by means of a flanged nut 119. The construction and mode of operation of this form of the invention will be obvious from an inspection of the drawings.

Numerous variations may doubtless be devised by persons skilled in the art without departing from the principles of my invention. I, therefore, desire no limitations to be imposed on my invention, except such as are indicated in the appended claims.

What I claim is:

1. A collapsible container having a discharge outlet, a closure secured to said outlet and comprising a body of resilient material shaped to form a chamber extending from said outlet; said body being provided at its outer end with a slot communicating with said chamber, said slot being normally closed by the resilience of said material and adapted to be opened by distorting pressure applied to said body, and a valve fixed to said body at the lower end of said chamber, said valve normally forming a closed bottom wall for said chamber and adapted to open only when said slot is caused to gape by distorting pressure applied to said body.

2. A collapsible container having a rigid discharge outlet provided with an outwardly directed flange, a valved closure formed of resil-

- ient material adapted to snap over the flange of said outlet, said closure being shaped to form a chamber extending from said outlet and provided at its outer end with a slot communicating with said chamber, said slot being normally closed by the resilience of said material and adapted to be opened by distorting pressure applied to said body, a valve stem depending from the upper wall of said chamber, and a valve secured to said stem within said container, and adapted to close said outlet only when the slot is closed.
3. A collapsible container having a discharge outlet provided with a valved closure formed of resilient material and shaped to form a chamber extending from said outlet and provided at its outer end with a slot, said slot being normally closed by the resilience of said material and adapted to be opened by distorting pressure applied to said body, a valve stem depending from the upper wall of said chamber, and a valve secured to said stem within said container and adapted to close said outlet only when the slot is closed.
4. A collapsible container having an externally screwthreaded discharge neck, a valved closure having one end thereof internally screwthreaded to be detachably connected to said neck, said closure comprising a body shaped to form a chamber extending from said neck and having the outer wall thereof formed of flexible material, said wall being provided with a slot communicating with said chamber and normally closed by the resilience of said material, a valve stem depending from said wall, a valve secured to said stem within said container and adapted to close the inner end of said neck only when the slot in the wall of said chamber is closed.
5. A collapsible container having a rigid discharge neck extending therefrom, a valved closure having one end thereof fixedly secured to said neck, said closure comprising a body of resilient material and forming a chamber within said neck, said body being provided at its outer end with a slot normally closed by the resilience of said material and adapted to be opened by distorting pressure applied to said body, a valve stem depending from said wall, a valve secured within said container to the lower end of said stem and adapted to close said discharge neck only when the slot in said body is closed.
6. A collapsible container having a rigid discharge outlet extending within the container and provided with an inwardly directed flange, a valved closure comprising a body of resilient material shaped to form a chamber extending from said outlet, a flange extending outwardly from the lower end of said body and seated in the recess formed by said inwardly directed flange, means for clamping the second named flange in said recess, said body being provided at its outer end with a slot communicating with said chamber and normally closed by the resilience of said material and adapted to be opened by distorting pressure applied to said body.
7. A collapsible container having a rigid discharge outlet extending within the container and provided with an inwardly directed flange, a valved closure comprising a body of resilient material shaped to form a chamber extending from said outlet, a flange extending outwardly from the lower end of said body and seated in the recess formed by said inwardly directed flange, means for clamping the second named flange in said recess, said body being provided at its outer end with a slot communicating with said chamber and normally closed by the resilience of said material and adapted to be opened by distorting pressure applied to said body, and a valve extending from said body at the lower end of said chamber and normally forming a closed bottom wall for said chamber and adapted to be opened only when said slot is caused to gape by distorting pressure applied to said body.
8. A mouthpiece for containers of liquid or fluent plastic substances comprising a body of resilient material shaped to form a chamber being adapted to be applied to the mouth of the container and having inlet and discharge valves at opposite sides of said chamber simultaneously openable by deformation of the walls of said chamber, the inlet valve under-lapping the walls of said mouth for holding the mouthpiece on the container.
9. A mouthpiece as claimed in claim 8, the inlet valve being constructed to close before the walls of said chamber have recovered their original position, creating a vacuum in said chamber prior to the closing of the discharge valve.
10. A mouthpiece for containers comprising a deformable body formed with a chamber and having a discharge slot in one wall of said chamber, a valve fixed to the opposite wall, said slot and said valve being normally closed, and said chamber being of maximum volume when said body is in normal undeformed state, and said slot and valve opening when said body is deformed, and said valve closing before said slot closes when the deforming pressure is removed, whereby the expanded chamber acquires a partial vacuum, drawing fluid inwardly through said slot.

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