Dec. 18, 1951 G. W. PARVIS, JR 2,579,156

CONTAINER CLOSURE

Filed Sept. 21, 1948

Fig. 1.

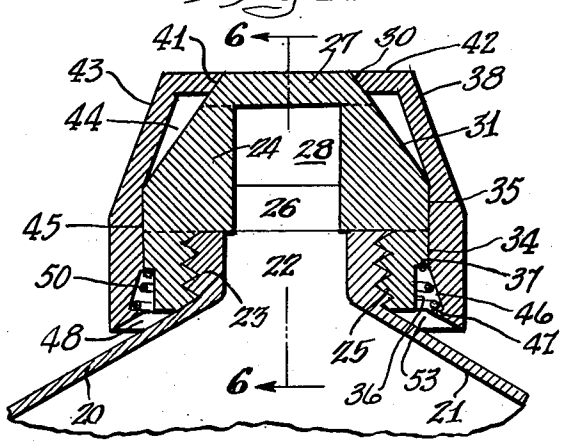



Fig. 3

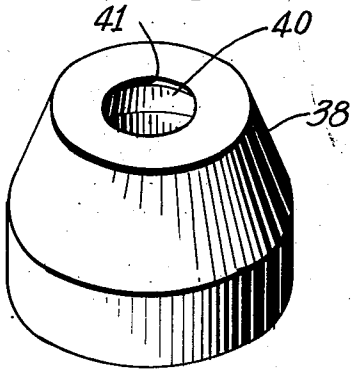



Fig. 4.

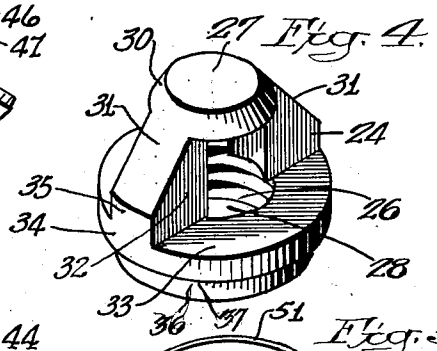



Fig. 2.

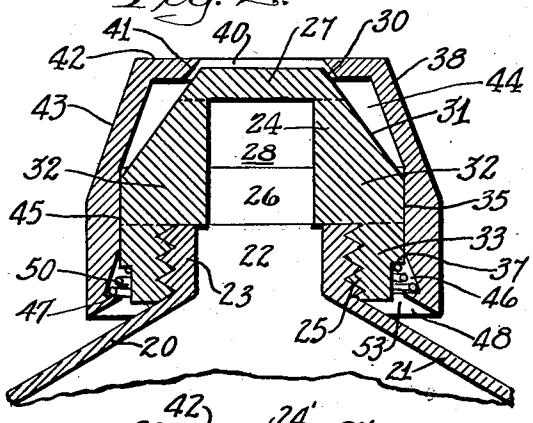



Fig. 5

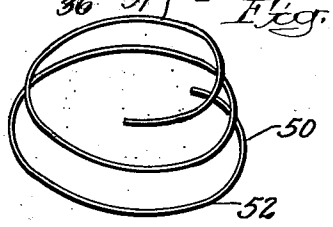



Fig. 6.

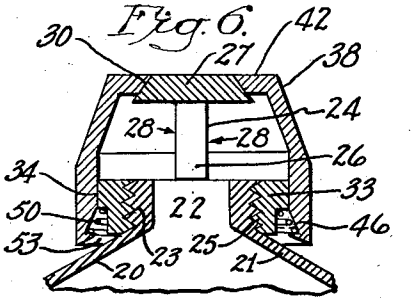
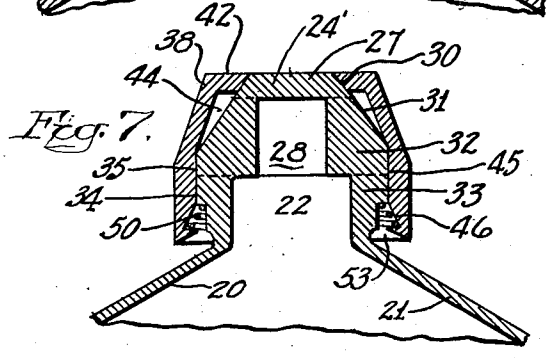



Fig. 7.




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2,579,156

## CONTAINER CLOSURE

George W. Parvis, Jr., Philadelphia, Pa.

Application September 21, 1948, Serial No. 50,254

2 Claims. (Cl. 222—493)

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The present invention relates to closures for containers such as collapsible tubes.

A purpose of the invention is to produce a valve type closure for a container which can be manufactured and assembled, using mass production methods, and with a minimum of manufacturing operations.

A further purpose is to produce a container closure which will not clog or otherwise block by providing a spring which is so designed and situated that it can always be rinsed with water at the bottom of the closure on the outside without removal from the device. This procedure keeps the spring clean and clear at all times, assuring uninterrupted action.

A further purpose is to obtain more positive discharge of the contents over 360 degrees of angle of the valve.

A further purpose is to provide for easy insertion of the spring without the necessity of permanently deforming parts of the container to hold the spring in place.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen to illustrate a few only of the embodiments in which my invention may appear, choosing the forms shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figure 1 is a central longitudinal section of the closure of the present invention, showing a fragment of the container. In Figure 1 the closure is in closed position.

Figure 2 is a section similar to Figure 1, but showing the closure in open position.

Figure 3 is a perspective of the cap.

Figure 4 is a perspective of the valve.

Figure 5 is a perspective of the spring.

Figure 6 is a section of Figure 1 on the line 6—6 with the container partially broken away.

Figure 7 is a fragmentary central longitudinal section of a valve, showing the valve element integral with the container.

In the drawings like numerals refer to like parts throughout.

In the prior art, valve-type closures have been developed for containers for fluids, primarily on extruded collapsible tubes which are commonly employed for shaving cream, tooth paste and the like. One such construction is shown in my U. S. Patent No. 2,155,202, granted April 18, 1939 for Closures for Collapsible Tubes.

Difficulty has been encountered in these prior art devices for a number of reasons. In the first

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place, mass production has often been difficult due to the complex machining or other forming required, and due to special problems of assembly, which have in some instances necessitated rolling or forming of flanges or the like in order to position the spring or otherwise assemble the parts. One device which employs this feature is shown in Donnelly U. S. Patent 1,971,371, issued August 28, 1934 for Dispenser Closure.

A certain amount of leakage of the fluid contents, such as shaving cream, tooth paste or the like, is likely to occur into the spring recess during dispensing, and in the prior art this has frequently resulted in surrounding the spring with material which finally dries hard when the container is laid aside. Since the spring has commonly been placed in a closed compartment, there has been little opportunity for escape of such fluid contents surrounding the spring, and the tendency has been for such material to remain, clog the spring, become dry and hard, and render the device inoperative. In many of the prior art devices washing or otherwise removing the contents from the vicinity of the spring has not been possible.

Many of the prior art devices have also been objectionable because the contents discharged by the valve have been permitted to flow over a portion only of the circumference of the valve, producing an irregular flow which is directed to one side instead of axially, and which is difficult to apply to a tooth brush, shaving brush, or other point of application.

In accordance with the present invention, the design has been greatly simplified and improved to eliminate machining and other forming operations and simplify assembly.

The cap is of simple tapered form, having straight lines internally and externally, capable of forming readily in metal or plastic. The valve likewise is of simple construction and contour and can be made either of metal or plastic. Suitable metals for the cap and valve are lead base collapsible tube alloy, tin base collapsible tube alloy, aluminum, brass, bronze or stainless steel. Suitable plastics are phenol-formaldehyde plastic, urea formaldehyde plastic and acrylic plastic. The spring may be of any suitable spring material, such as brass, bronze, beryllium copper or spring steel, as it is not in contact with the contents of the tube in normal dispensing.

In accordance with the invention the assembly is simplified and can be accomplished with the fingers or simple hand tools without requiring forming operations at assembly.

In the new valve closure, leakage during dispensing is reduced to a minimum, so that there is very little tendency to discharge any of the contents into the spring recesses. Furthermore, the spring recesses are accessible without removal of the cap to permit any accumulation to flow out, and also to permit washing out of the spring recesses. Thus there is no liklihood of clogging of the spring by any accumulation of material, since any such accumulation would either clear itself by drainage or by flushing with water.

In the new valve closure the discharge is around an angle of 360 degrees at the valve, so that there is no tendency for the contents to squirt off to one side. The discharge is axial.

Referring to the drawings, a container **20** is shown, suitably a collapsible tube, having a shoulder **21**, a dispensing opening **22** and, for the preferred form, a threaded neck **23** around the dispensing opening.

In the form of Figures 1 to 6 inclusive a valve **24** is secured to the neck by internal threads **25**. This threading can, however, be eliminated, and, as in Figure 7, a valve **24** may be employed which is integral with the container. The form of Figures 1 to 6 has the advantage that, if desired, a cork or other insert can be applied fully across the dispensing opening **22** during shipment, to be removed before use.

In any case the valve has an internal passage **26** which extends from the dispensing opening of the container to the valve element **27** which closes the end of the passage remote from the container. The passage **26** is connected with the space outside the valve by passages **28** on either side behind the valve element. The valve element **27** has an outer circular conical valve surface **30** which is engaged in order to close the valve.

The conical shape of the surface **30** is continued at **31** along the outer edges of two supporting columns **32** which support the valve element from a collar **33** which carries the threads engaging the container in the form of Figures 1 to 6, and which is integrally joined to the container in the form of Figure 7.

The outer surface of the column **33** at the end toward the valve element provides a straight cylindrical elongated sealing barrel surface **34** which can be engaged closely by a cooperating sealing surface to prevent leakage of the contents downwardly. The same surface is carried toward the valve element at **35** along the outsides of the columns **32** until the conical surface **31** is intersected at each side.

A spring recess **36** is formed at the outside of the collar **33** at the end toward the container, producing a first spring shoulder **37** facing toward the container at that end of the recess which is nearest the valve element. The opposite end of the recess from the shoulder **37** is open.

The valve is surrounded by a cap **38** which is hollow and has an outer discharge opening **40** surrounded by a conical internal valve seat **41** which engages the valve element to close the valve when the cap is in its closed position. The outer end of the cap is suitably blunt at **42** and then tapers at **43** at an angle more gradual than the corresponding taper at **31** on the valve columns, thus providing an internal hollow space **44**, which connects clear around the valve and permits adjustment of pressures on the two sides. Toward the container end of the tapered portion **43**, the cap on the inside has a mating straight cylindrical surface **45** which engages and seals with the



outer sealing barrel surface on the valve and the extension of such surface on the columns which support the valve element.

At a position near the end of the cap adjoining the container, a second spring recess **46** is formed on the inside of the cap, producing a second spring shoulder **47** which faces the first spring shoulder **37**. The cylindrical outer wall of this second recess is conical with the larger diameter toward the spring shoulder **47**. The end of the socket portion of the cap is desirably dished at **48** to aid in spring insertion.

The spring **50** is of conical or tapered spiral variety, having an end **51** with a small internal diameter and an end **52** with a large internal diameter. When assembled the spring occupies the spring recesses with end **51** having the small internal diameter engaging the first shoulder **37** and the end **47** having the large internal diameter engaging the second shoulder **47**.

In order to assemble the device, the assembly can be completed before or after the valve is applied to the container in the form of Figure 6, although it is most convenient to assemble before applying the valve to the container. For the purpose of assembly the cap is slipped over the valve until the parts reach the position of Figure 1, after which the spring is positioned into the spring recesses. This is aided by the dishing of the bottom end of the cap, since the dished surface **48** tends to guide the small diameter end of the spring and the subsequent turns of the spring into the spring recesses. It will be noted that a clear open space **53** is provided at the end adjoining the container between the valve and the cap. When the large diameter end of the spring has entered the spring recesses it will spring out into and occupy the portion of the outer recess engaging the second shoulder **47**. If it is necessary to disassemble the device this can be accomplished by applying a sharp instrument such as a knife in the spring recesses and prying out the large diameter end of the spring.

The device can likewise be assembled when the valve is in place on the container as by screwing it on the container in the forms of 1 to 6 or forming it integral in Figure 7. For this purpose the spring is preferably forced over the valve before the cap is applied, and then the cap is pulled down fully on the valve, after which the spring is pushed up in the spring recesses as by a fingernail or a tool such as a knife or screw driver. The dished surface at **48** aids in guiding the spring into proper position.

The interior and outer diameters of the opposite ends of the spring are chosen to make the spring hug the respective inside and outside portions of the spring recesses so that it will properly stay in place.

With the valve fully assembled, the device will operate simply by squeezing the collapsible tube, which will force the cap into open position and discharge the contents all around the valve element with a positive action which is very desirable.

It may be desirable to coat the end portion of the container in Figure 7 with nitrocellulose or other material to seal it in shipment. Any such coating will be removed before use of the device.

The mating between the cap and the valve along the elongated barrel surface **34** and the extensions **35** is desirable for several reasons. In the first place it prevents leakage of the contents down into the spring recesses. In the second place it guides the cap against rocking so as to assure that the cap will not jam, and that

the cap will always reach the same seating position as shown in Figure 1. Thus in most cases there will be no serious accumulation of the contents in the space surrounding the spring. However, should any leakage occur into the spring recesses, it is free to discharge through the space **53** between the valve and the cap, and it can also be washed out by introducing water or the like through the space **53**.

It will be seen, therefore, that the device of the invention produces a very simple and reliable closure valve at a very low cost.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a closure for a container for fluids, a valve adapted to be secured on the container, having a valve element at the end remote from the container, having an internal passage through the valve, having ports at each side from the passage to the outside of the valve at the valve element, having an axially elongated sealing barrel surface around the outside near the middle and having an external spring recess on the end toward the container forming a first spring shoulder at the point where it meets the barrel surface, a cap surrounding the valve, having a discharge opening at the end remote from the container, having a valve seat around and cooperating with the valve, having a portion spaced from the valve all around adjoining the valve seat, having a straight longitudinal elongated sealing surface which actually mates with the barrel to form a seal and having a spring recess on the inside at the end adjoining the container providing a second spring shoulder adjoining the



container, the end of the cap adjoining the container being spaced from the valve to provide an opening around the cap into the spring recesses, and a conical spiral spring in the spring recesses having its smaller diameter engaging the first shoulder on the valve and its larger diameter engaging the second shoulder on the cap.

2. In a closure for a container for fluids, a valve adapted to be secured on the container, having the valve element at the end remote from the container, having an internal passage through the valve, having a port from the passage to the outside of the valve at the valve element, and having an external spring recess on the end toward the container forming a first spring shoulder facing the container, a cap surrounding the valve, having a discharge opening at the end remote from the container, having a valve seat around and cooperating with the valve, having a spring recess on the inside at the end adjoining the container, providing a second spring shoulder facing oppositely from the first spring shoulder and having an end on the cap which is annularly internally dished to aid in insertion of the spring, the end of the cap adjoining the container being spaced from the valve to provide an opening around the container into the spring recesses, and a tapered spiral spring in the spring recesses engaging the first shoulder with a small diameter end and engaging the second shoulder with a larger diameter end.

GEORGE W. PARVIS, JR.


REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,256,075 | Tainter | Feb. 12, 1918 |
| 1,913,274 | Itayden | June 6, 1933 |
| 1,948,070 | Hasse et al. | Feb. 20, 1934 |
| 1,971,371 | Donnelly | Aug. 28, 1934 |
| 2,253,738 | Totschnig | Aug. 26, 1941 |