

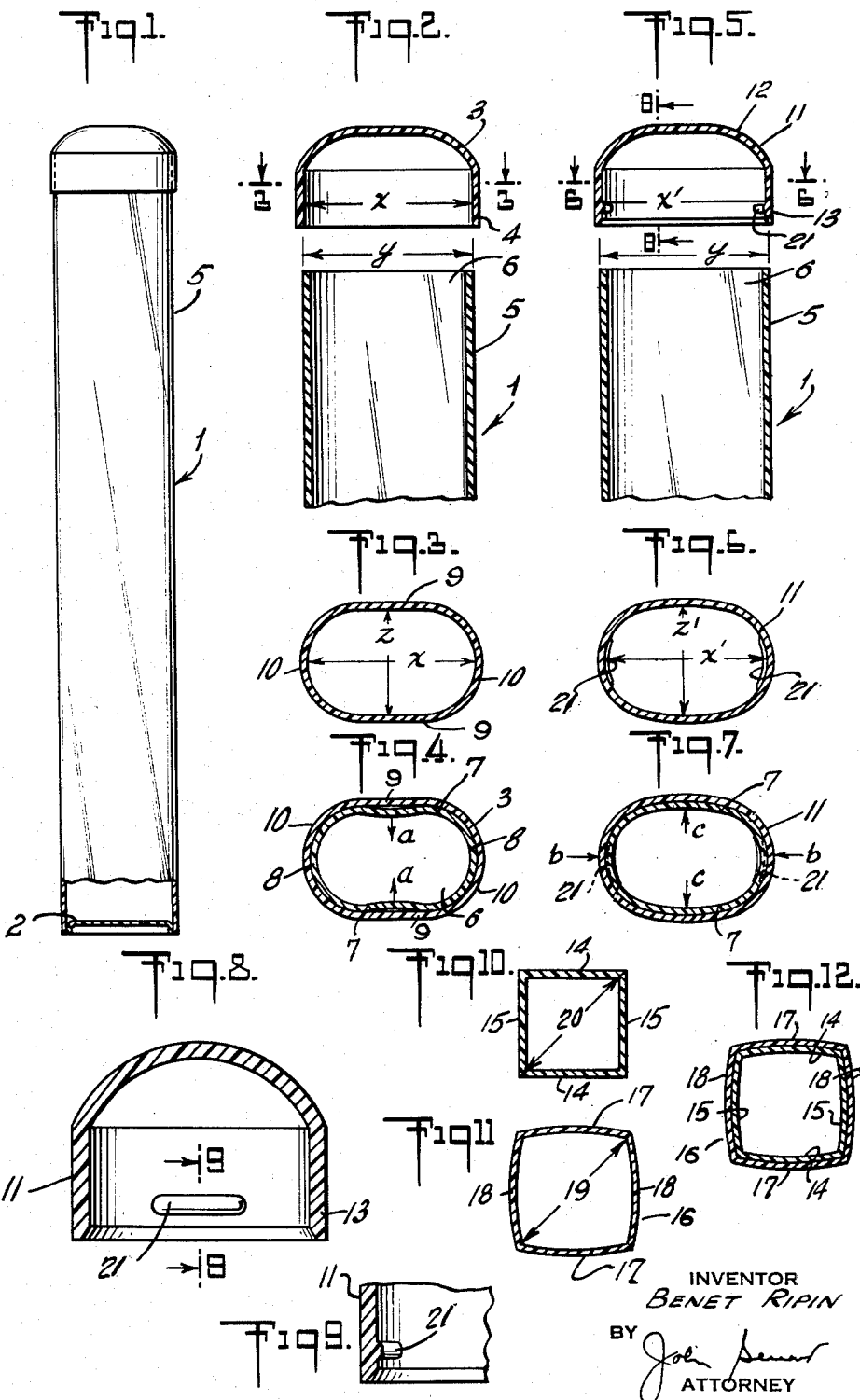
June 21, 1960

B. RIPIN

2,941,562

CONTAINER AND CLOSURE THEREFOR

Filed Sept. 28, 1955



INVENTOR
BENET RIPIN
BY *John Benet*
ATTORNEY

1

2,941,562

CONTAINER AND CLOSURE THEREFOR

Benet Ripin, Waterford, N.Y., assignor to Johnson & Johnson, a corporation of New Jersey

Filed Sept. 28, 1955, Ser. No. 537,170

8 Claims. (Cl. 150—.5)

This invention relates to container closures and more particularly to container closures of the slip-on type for capping containers having a neck portion defining an opening through which the container contents may be removed.

Container closures of the slip-on type have been widely used to cap containers, particularly where it is not necessary to provide an absolute seal. These closures consist of a crown part having an integral depending peripheral skirt which defines a chamber for receiving the neck portion of the container to be capped. The horizontal cross sectional configuration of the closure is substantially the same as the horizontal cross sectional configuration of the neck portion of the container on which it fits. Instead of using a screw or similar engagement between the closure and the neck portion of the container to maintain the closure in position, the parts are held together by frictional engagement between the inner surface of the depending peripheral skirt of the closure and the outer surface of the walls defining the neck portion of the container. Since these closures remain in position by frictional engagement, a snug fit between the outer surface of the walls defining the neck portion of the container and the inner surface of the depending skirt is necessary.

While such closures have been widely accepted, they possess certain disadvantages when used to cap containers having a neck portion defined by walls which are flexible as, for example, when the walls defining the neck portion of the container are made from thin metal or plastics, such as cellulose acetate or cellulose butyrate. Because a snug fit between the closure and the neck portion of the container is necessary to maintain the closure in position, if the neck portion of the container has flexible walls, the snug fitting closure causes the walls to collapse thus reducing the wall area in engagement with the inner surface of the depending skirt on the closure with the result that the closure becomes loose. Collapse of the walls occurs most frequently when the neck portion of the container has at least one pair of opposed straight side walls.

I have found that secure engagement of slip-on type closures to the neck portion of such containers may be obtained by providing a closure which, when in position, does not cause the walls defining the neck portion of the container to collapse. By means of my invention, frictional engagement between the closure and the neck portion of the container can be maintained with the result that the closure does not become loose. The closure of my invention may also include an additional feature for maintaining the closure securely in position when the walls defining the neck portion of the container are made from plastic.

To more clearly understand my invention, reference is made to the attached drawings wherein various illustrative embodiments are shown and wherein like numerals refer to like parts.

In the drawings:

Fig. 1 is a side elevation, with the lower portion cut

2

away, of a tubular container having its neck portion defining an opening through which the container contents may be removed capped with the type of closure to which this invention relates;

Fig. 2 is an enlarged, exploded, fragmentary, vertical sectional view of a conventional closure and the neck portion of the container of the type shown in Fig. 1 and illustrates the respective dimensions of the parts;

Fig. 3 is a sectional view of the closure shown in Fig. 2, taken along the line 3—3;

Fig. 4 is a sectional view of the closure of Fig. 2 and the neck portion of the container of Fig. 1 with the closure positioned on the neck portion of the container and illustrates the manner in which the flexible walls defining the neck portion of the container tend to collapse;

Fig. 5 is an exploded, fragmentary, sectional view of the container of Fig. 1 and a closure embodying my invention, illustrating the respective dimensions of the parts;

Fig. 6 is a sectional view of the closure of Fig. 5, taken along line 6—6;

Fig. 7 is a sectional view of the closure illustrated in Fig. 5 and the neck portion of the container of Fig. 1 with the closure positioned on the neck portion of the container and illustrates the position assumed by the walls defining the neck portion;

Fig. 8 is an enlarged sectional view of Fig. 5, taken along line 8—8;

Fig. 9 is a fragmentary, sectional view of Fig. 8, taken along line 9—9;

Fig. 10 is a horizontal sectional view of the neck portion of another container;

Fig. 11 is a horizontal sectional view of a closure for such a neck portion; and

Fig. 12 is a sectional view of the closure of Fig. 11 and the container neck portion of Fig. 10, with the closure positioned on the neck portion and illustrates the position assumed by the walls defining the neck portion.

In Fig. 1, there is shown a container 1 which is of the type commonly employed to package toothbrushes, nails, screws, bolts and other items. Container 1 is generally tubular in form and may be made by extruding thermoplastic material such as cellulose acetate and cellulose butyrate. Its walls are thin and flexible. The lower end of the container is sealed by securing a plastic disk 2 in position with an adhesive. The upper end of the container has an opening through which the container contents can be removed.

A conventional slip-on closure 3 for such containers is shown in Fig. 2. Since the closure is of the slip-on type, it is maintained in position on the neck portion of the container by frictional engagement between the inner surface of its depending peripheral skirt 4 and the outer surface of walls defining the neck portion 5 of the container. To receive the neck portion of the container, depending peripheral skirt 4 defines a chamber which is substantially the same in cross sectional configuration as the cross sectional configuration of the neck portion of the container. In the container shown, the neck portion 5 is generally oblate in cross section and has an opening 6 through which the container contents may be removed. Container neck portion 5 is defined by two parallel spaced apart straight side walls 7, 7 and two arcuate end walls 8, 8. Accordingly, to obtain a snug fit on the neck portion, closure 3 also has two parallel spaced apart side walls 9, 9 and arcuate end walls 10, 10. The major inner axis "x" of closure 3 is made substantially the same length as major outer axis "y" of the neck portion of the container and the minor inner axis "z" of the closure substantially the same length as the minor outer axis of the neck portion of the container so that secure engage-

ment between the closure and the neck portion of the container is obtained.

When a conventional closure of the foregoing type is placed in position on the neck portion of the container, a force is exerted throughout the periphery of the walls defining the neck portion. Since these walls are thin and flexible, they tend to assume a form whereby the force which is applied to them by the snug fitting closure is diminished. Long straight side walls 7 tend to buckle inwardly, as shown in Fig. 4, in the direction indicated by arrows *a, a*. This results in a reduction in cross sectional area of the neck portion of the container and a consequent reduction of frictional engagement between the inner surface of the depending peripheral skirt 4 of the closure and the outer surface of the walls defining the neck portion of the container, with the result that the closure becomes loose.

As shown in Figs. 5, 6 and 7, a secure fit between a slip-on type closure and a container having a neck portion of the type described may be obtained by providing a closure 11 which, when in position, does not cause inward buckling of the walls defining the neck portion of the container. The closure permits the walls to assume a configuration which maintains frictional engagement between the walls and the depending skirt of the closure.

In Fig. 5, a closure 11 embodying my invention has a crown portion 12 and a depending peripheral skirt 13 which defines a chamber to receive the neck portion of the container. The closure may be molded from the same materials from which the container is made, i.e., plastic material, or may be made from other suitable materials, such as metal, as desired. Secure frictional engagement between the inner surface of depending skirt 13 and the outer surface of the walls defining neck portion 5 of the container may be obtained, in accordance with my invention, by providing a closure with side walls which are slightly arcuate outwardly, instead of straight as shown at 9 in closure 3, and which is slightly shorter along its major inner axis and slightly longer along its minor inner axis than the corresponding outer axes of the neck portion of the container on which the closure fits. Referring to Fig. 5, the major inner axis "x" of closure 11 is slightly shorter than the corresponding major outer axis "y" of the neck portion 5 of the container. The minor inner axis "z" of the closure is slightly longer than the corresponding minor outer axis of the neck portion of the container. Therefore, when the closure is positioned on the neck portion of the container, the walls defining the neck portion are placed under compression along the line defined by its major axis "y," in the direction indicated by arrows *b, b*, Fig. 7. This forces the relatively long side walls 7, 7 of the neck portion of the container outwardly in the direction indicated by the arrows *c, c*. Because the parts of peripheral skirt 13 adjacent side walls 7, 7 are not originally in intimate contact with the outer surface of the side walls, as in the case of the conventional closure 3 of the type shown in Figs. 2 and 4, the walls are not buckled inwardly, as in Fig. 4, but move outwardly instead with the result that the cross sectional area of the neck portion remains about the same.

The difference in dimensions between the cross section of the closure and the cross section of the neck portion of the container may be small. For example, with a container having a neck portion with a major outer axis "y" one inch long, the corresponding major inner axis "x" of the closure may be 0.975 inch long. The length of the minor inner axis "z" of the closure is then made slightly longer than the corresponding minor outer axis of the neck portion of the container so that the length of the inner periphery of the depending skirt of the closure is slightly less than the length of the adjacent outer periphery of the neck portion of the container to provide a snug fit when the closure is in position. In addition, the side walls of the closure are made slightly arcuate

outwardly to permit the straight side walls of the neck portion to bow outwardly when the closure is placed on the neck portion.

In Fig. 10, there is shown in cross section the neck portion of a container which neck portion is defined by two pairs of opposed, parallel straight walls 14, 14 and 15, 15 respectively. The neck portion may be square, as shown, or rectangular in cross section. A closure 16 for a container having such a neck portion is illustrated in Fig. 11. Instead of having straight sides which are the same shape and length as walls 14 and 15 defining the neck portion illustrated in Fig. 10, closure 16 has two pairs of opposed walls 17, 17 and 18, 18 which are slightly arcuate outwardly, in the manner shown, to permit walls 14 and 15 defining the neck portion of the container to move outwardly, as illustrated in Fig. 12, when the closure is positioned on the neck portion. The diagonals 19 of closure 16 are slightly shorter than the corresponding diagonals 20 of the neck portion of the container shown in Fig. 10, thereby placing the four corners of the neck portion under compression, causing walls 14 and 15 to move outwardly against adjacent walls 17 and 18 of closure 16.

When the walls defining the neck portion of the container are made from plastic materials, further provision for secure engagement of the closure of this invention to the neck portion of the container may be obtained. Plastic materials possess an inherent property known as cold flow which occurs when plastic is subjected to pressure or a similar force. When subjected to such force, the plastic material moves in an attempt to offset the stresses imposed upon it. This cold flow characteristic of plastic may be effectively utilized in connection with the present invention by providing closure 11 with a small raised portion, such as a rib 21, on the inner surface of depending peripheral skirt 13 adjacent that portion of the walls defining the neck portion of the container which are subjected to compression when the closure is placed on the neck portion. The inner surface of the depending peripheral skirt 13 of the closure may be provided with a small raised rib 21, which may be about 0.005 inch high, adjacent and substantially in alignment with the lower edge of the skirt. The stress imposed upon the walls defining the neck portion of the container by the snug fitting closure causes the plastic adjacent the rib to cold flow around the rib, thus further providing for a more secure engagement between the closure and the neck portion of the container.

It will be apparent that variations, modifications and substitutions may be made from the foregoing illustrative embodiments without departing from the scope of the invention. For example, while the closure of this invention has been illustrated in connection with a tubular container, it is apparent that the body of the container may be of other constructions.

What is claimed is:

1. In combination with a container having a semi-rigid neck portion defined by flexible end walls and side walls, the side walls being normally straight, the end walls being normally non-inwardly extending, a closure capping said neck portion in a snug fit comprising a crown part having a depending peripheral skirt forming a chamber with end walls and side walls receiving said neck portion, the end walls of said chamber conforming substantially to the end walls of said neck portion, the side walls of said chamber being slightly arcuate outwardly, said closure, due to its snug fit, urging the end walls of said neck portion inwardly and the side walls of said neck portion outwardly into contact with the arcuate side walls of said closure.

2. In combination with a container having a semi-rigid neck portion defined by flexible end walls and side walls, the cross section of said neck portion being substantially oblate, a closure capping said neck portion in a snug fit comprising a crown part having a depending peripheral

5

skirt forming a chamber with end walls and side walls receiving said neck portion, the end walls of said chamber conforming substantially to the end walls of said neck portion, the side walls of said chamber being slightly arcuate outwardly, said closure, due to its snug fit, urging the end walls of said neck portion inwardly and the side walls of said neck portion outwardly into contact with the arcuate side walls of said closure.

3. In combination with a tubular plastic container having a semi-rigid neck portion defined by flexible normally straight side walls and outwardly arcuate end walls, a closure capping said neck portion in a snug fit comprising a crown part having a depending peripheral skirt forming a chamber with end walls and side walls receiving said neck portion, the end walls of said chamber conforming substantially to the end walls of said neck portion, the side walls of said chamber being slightly arcuate outwardly, said closure, due to its snug fit, urging the end walls of said neck portion inwardly and the side walls of said neck portion outwardly into contact with the arcuate side walls of said closure.

4. In combination with a container having a semi-rigid neck portion defined by flexible plastic end walls and side walls, the cross section of said neck portion being substantially oblate, a closure capping said neck portion in a snug fit comprising a crown part having a depending peripheral skirt forming a chamber with end walls and side walls receiving said neck portion, the end walls of said chamber conforming substantially to the end walls of said neck portion, the side walls of said chamber being slightly arcuate outwardly, said closure, due to its snug fit, urging the end walls of said neck portion inwardly and the side walls of said neck portion outwardly into contact with the arcuate side walls of said closure, the inner surface of said peripheral skirt having a raised portion on the end walls thereof around which the plastic in the end walls of said neck portion adjacent the raised surface conforms.

5. For capping a container having a semi-rigid neck portion to be capped defined by flexible end walls and side walls, the side walls being normally straight, the end walls being normally non-inwardly extending, a closure adapted to cap said neck portion in a snug fit comprising a crown part having a depending peripheral skirt forming a chamber with outwardly arcuate end walls and side walls, at least one end wall of said chamber having a raised portion on the inner surface thereof.

6. In combination, a container having a semi-rigid neck portion defined by flexible end walls and side walls, the side walls being normally straight, the end walls being normally non-inwardly extending, a closure capping said neck portion in a snug fit comprising a crown part having a depending peripheral skirt forming a chamber with end walls and side walls receiving said neck portion, the

6

end walls of said chamber conforming substantially to the end walls of said neck portion, the side walls of said chamber being slightly arcuate outwardly, said closure being slightly shorter along the inner axis through its end walls than the outer axis of the neck portion of said container along the same line whereby the end walls defining the neck portion are urged inwardly and the side walls of said neck portion are urged outwardly towards the adjacent side walls of said closure.

7. In combination, a container having a semi-rigid neck portion normally rectangular in cross section defined by flexible walls, a closure capping said neck portion in a snug fit comprising a crown part having a depending peripheral skirt forming a chamber with end walls and side walls receiving said neck portion, said end walls and side walls of said closure being slightly arcuate outwardly, the inner diagonals of said chamber being slightly shorter than the outer diagonals of said neck portion whereby the walls defining said neck portion of said container are urged outwardly towards the adjacent walls of said closure.

8. In combination, a container having a semi-rigid neck portion defined by flexible plastic arcuate end walls and normally straight side walls, a closure capping said neck portion in a snug fit comprising a crown part having a depending peripheral skirt forming a chamber with end walls and side walls receiving said neck portion, the end walls of said chamber conforming substantially to the end walls of said neck portion, the side walls of said chamber being slightly arcuate outwardly, said closure being slightly shorter along the inner axis through its end walls than the outer axis of the neck portion of said container along the same line whereby the end walls defining said neck portion are urged inwardly and the side walls of said neck portion are urged outwardly toward the adjacent side walls of said closure, at least one end wall of said chamber having a raised portion on the inner surface thereof in contact with the adjacent portion of the neck portion of said container.

References Cited in the file of this patent

UNITED STATES PATENTS

1,380,908	Hothersall	June 7, 1921
1,685,765	Mangan	Sept. 25, 1928
1,842,309	Borro	Jan. 19, 1932
2,212,340	Davis	Aug. 20, 1940
2,727,547	Moon	Dec. 20, 1955
2,802,593	Slaughter	Aug. 13, 1957
2,815,057	Tupper	Dec. 3, 1957

FOREIGN PATENTS

254,518	Switzerland	Dec. 16, 1948
661,005	Great Britain	Nov. 14, 1951