

July 16, 1968

H. K. BROSS
CONTAINER CLOSURE

3,392,887

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2 Sheets-Sheet 1

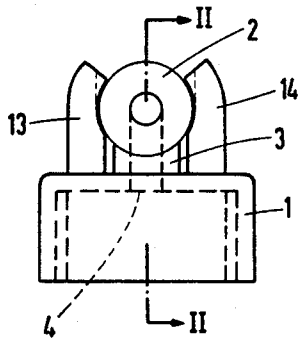


FIG. 1

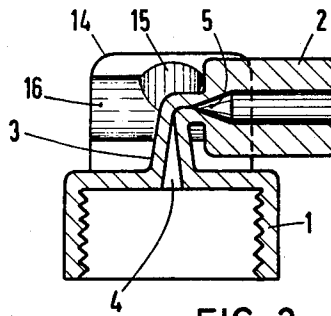


FIG. 2

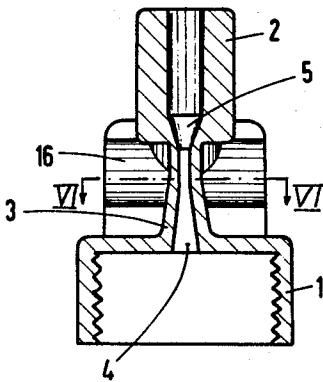


FIG. 3

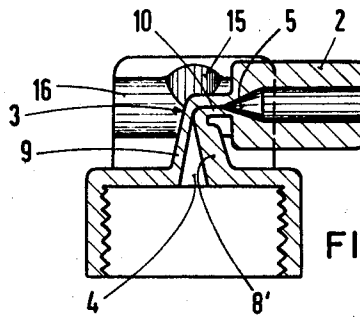


FIG. 6

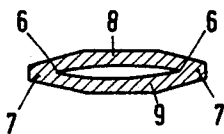


FIG. 4

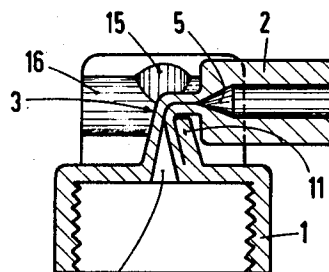


FIG. 7

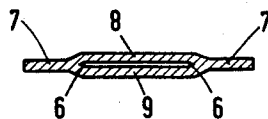


FIG. 5

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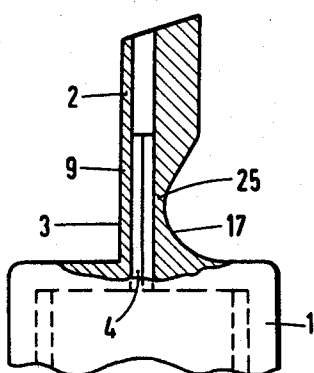


FIG. 9

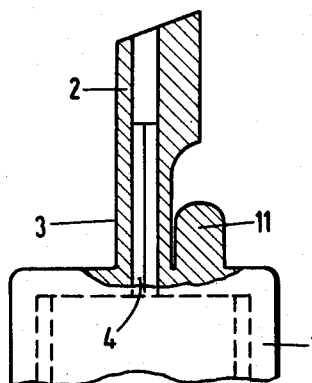


FIG. 8

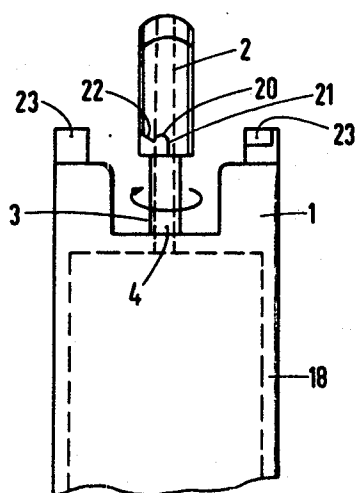


FIG. 11

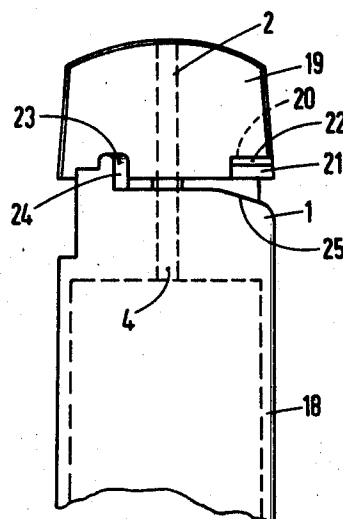


FIG. 10

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CONTAINER CLOSURE

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ABSTRACT OF THE DISCLOSURE

A closure device for a container having an outlet nozzle and container top which are substantially rigid and a flexible connecting means which terminates at one of its ends into an opening of the container top and at its other end into an opening of the outlet nozzle. The connecting means, by providing an intermediate channel having an elongated cross section with a pair of side walls each of which tapers substantially to a pair of connecting points between them, is adapted to be bent into a closed position.

The present invention relates to a closure device for a container such as a bottle, tube, can, or the like, which may be either secured to or integral with the container and comprises an outlet nozzle which may be moved to one position to open its channel and to another position to close the channel.

There are container closures of this type known in which the closure device which forms, for example, the top of a tube, consists of a flexible material and is provided with outwardly and inwardly extending corrugations which increase the flexibility of the closure device and permit the outlet nozzle to be pivoted back and forth. For closing the container, the outlet nozzle is bent from a substantially vertical position to a substantially horizontal position in which a resilient tongue which is secured to the edge of the container engages the outlet opening of the nozzle and closes the same. This device does not, however, form a safe and reliable closure and its manipulation is rather difficult. Attempts have also been made to improve this closure by providing the outlet nozzle with inwardly projecting beads or lips which are applied upon each other when the nozzle is bent and thereby close the latter. This closure device is, however, likewise not reliable and in addition it is rather complicated and therefore expensive.

It is an object of the present invention to provide a container closure of the general type as described above which may be operated in an extremely simple manner, reliably closes the container to which it is secured, and is of a very simple construction and therefore especially adapted for being mass-produced at a low cost.

According to the invention, this object is attained by making the outlet nozzle and the container top or container cap substantially rigid and by connecting these parts to each other by means of an intermediate channel part which may be bent or twisted and terminates at one end into an opening of the container top or cap and at its other end into an opening of the outlet nozzle. This channel part then serves either as a bending or twisting joint which forms a flexible connection between the rigid outlet nozzle and the likewise rigid container top or cap. When according to one embodiment of the invention the outlet nozzle is pivoted from its vertical opening position to its horizontal closing position or when according to another embodiment of the invention the outlet nozzle is twisted about its axis, the smooth inner walls of the intermediate section are pressed firmly against each other. Since the channel within the channel part is in addition made of an elongated or oval cross section which tapers to a point at both sides, this chan-

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nel when bent or twisted will be securely closed without danger that any part of the elastic material of which the entire device is made will be subjected to any excessive strain. This cross-sectional shape of the channel in the channel part permits the closure device to be made of a relatively stiff plastic material as conventionally employed for container caps.

The different parts of the closure device including the outlet nozzle and the channel part are preferably made integrally with each other of a single piece of plastic, preferably polyethylene and especially high-pressure polyethylene.

The features and advantages of the present invention will become more clearly apparent from the following detailed description thereof which is to be read with reference to the accompanying drawings, in which—

FIGURE 1 shows a side view of a pivotable nozzle closure according to the invention in the closed position;

FIGURE 2 shows a cross section which is taken along the line II—II of FIGURE 1;

FIGURE 3 shows a cross section of the closure device according to FIGURE 2, but in the open position;

FIGURE 4 shows a cross section of the channel part which is taken along the line VI—VI of FIGURE 3;

FIGURE 5 shows a cross section of the channel part according to a modified design;

FIGURES 6 and 7 show cross sections similar to FIGURE 2 of two modifications of the pivotable nozzle closure in the closed position;

FIGURES 8 and 9 show, partly in cross section, two further modifications of the nozzle closure according to the invention in the open position;

FIGURE 10 shows a side view of a twistable nozzle closure according to the invention in the open position; while

FIGURE 11 shows a side view of the twistable nozzle closure as seen from one side of FIGURE 10.

The pivotable nozzle closure according to the invention, as illustrated in FIGURES 1 to 7, essentially consists of a rigid part 1 which may either form a screw cap or plug cap or be an integral part of the container, of a rigid tubular nozzle 2, and an intermediate elastically deformable channel part 3 which connects the two rigid parts 1 and 2 to each other. The caplike part or container top 1 and the nozzle 2 have relatively thick walls and are therefore substantially rigid, whereas the walls of the channel part 3 have a lower thickness and a flattened elongated cross section and may therefore be elastically bent in one direction. This channel part 3 extends from an opening 4 in the caplike part 1 to an opening 5 in the bottom of the nozzle part 2.

As illustrated in FIGURES 4 and 5, the channel in the channel part 3 has an oval or elongated cross section and is tapered at both sides to a point 6. The narrow outer edge portions 7 of the channel part 3 may, if desired, be laterally extended so as to increase the width of this part and thus to insure that the nozzle part 2 may be pivoted back and forth relative to the caplike part 1 only in one direction about a substantially horizontal axis.

When the closure device according to FIGURES 1 and 2 is in the open position, as shown in FIGURE 3, the lateral walls 8 and 9 of the channel part 3 extend substantially parallel to each other and are then spaced from each other to form the open outlet channel, while in the closed position as shown in FIGURE 2 the lateral walls 8 and 9 are pressed against each other and thus tightly close the outlet channel.

FIGURE 6 illustrates a modification of the closure device according to FIGURES 1 to 3 in which the lower section 8' of the side wall of the channel part 3 which faces in the direction toward which the nozzle part 2 may be bent, that is, the wall section underneath that section which

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forms the actual joint about which the nozzle part 2 may be pivoted relative to the caplike part 1, is made of a greater thickness and therefore more rigid than the upper section 10 of this wall and the opposite wall 9, the ends of which are connected to the bottom of the nozzle part 2. The thicker wall section 8' thus forms a substantially rigid abutment over which the thinner section 10 and the other wall 9 together with the nozzle part 2 may be pivoted, whereby the smooth inner walls of this section 10 and of the corresponding section of the other wall 9 will be firmly pressed against each other so that the outlet channel will be tightly closed.

Instead of making the side wall 8' of a greater thickness than the opposite wall 9, it is also possible, as shown in FIGURES 7 and 8, to provide the upper wall of the caplike part 1 at the side thereof toward which the nozzle part 2 is to be bent with a separate upwardly projecting web 11 which is rounded at its upper end over which the side walls of the channel part 3 may be bent so as to close the channel and thus the container to which this closure device is secured.

In order to maintain the nozzle part 2 in the opening and closing positions, two clamping jaws 13 and 14 are provided on the caplike part 1 at both sides of the channel part 3 and the nozzle part 2. Each of these jaws is provided with a vertical groove 15 and a horizontal groove 16 of an arcuate shape into which the nozzle part 2 engages so as to be resiliently gripped when it is pivoted either to its vertical opening position or to its closing position in one or the opposite direction from this opening position. If the closure device is to be designed in a similar manner as shown in FIGURES 6 to 8 and the channel in the part 3 is to be tightly closed when the nozzle part 2 is pivoted to a substantially horizontal position either toward the right or left from its vertical opening position, the lower parts of both side walls of the channel part 3 may be made of a greater thickness than the upper parts so as to be as rigid as the lower part of 8', the side wall 8 in FIGURE 6 or the lower parts of both side walls 8 and 9 may be supported at the outer sides thereof by a pair of separate webs similar to the web 11 as shown in FIGURES 7 and 8.

A secure closure may, however, also be attained if the lower parts of the channel walls 8 and 9 underneath the points at which they are to be bent for opening and closing the upper part of the channel are either tapered upwardly and thus reduced in thickness toward these points or if, as shown in FIGURES 2 and 3, the two channel walls 8 and 9 are inclined to each other so that the cross-sectional size of the channel between them decreases toward the points at which they are to be bent.

FIGURE 9 illustrates another very practical modification of the pivotable nozzle closure according to the invention. One side wall to the nozzle 2 which faces in the direction toward which the nozzle is to be bent is made of a greater thickness than the other side wall 2, and the lower part of this thicker side wall is provided in its outer side with a groove, preferably of an arcuate shape. When the nozzle 2 is bent over in the clockwise direction to its closing position, it will bend easily at and over the thinnest part 25 which is formed by groove 17. This part 25 is supported at both sides by thicker wall portions in which bracing forces are produced which extend at an angle to each other.

FIGURES 10 and 11 show two side views of a further modification of the nozzle closure according to the invention as seen at right angles to each other. The closure element is in this case integrally connected to the container 18 which is filled through its open lower end which is thereafter tightly sealed, for example, by welding. The lower channel part 3 of nozzle 2 is adapted to be twisted about its axis and the upper part of nozzle 2 is for this purpose provided with a flat grip 19 which projects toward both sides. The outlet channel extends centrally through the entire nozzle from the container opening 4 to

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the nozzle end. When the grip 19 is turned from the position as shown in FIGURES 10 and 11 and the channel part 3 is thereby twisted about its axis, the outer wall portions of this channel part are elastically stretched in a similar manner as when this part is bent as described with reference to FIGURES 1 to 8, while the inner wall surfaces of the channel part 3 are firmly pressed against each other so that the channel is tightly closed. For maintaining the grip 19 in the twisted or closed position, its lower side is provided with a locking groove 20 which has an inclined sliding surface 22 and an end or stop surface 21. This locking groove 20 is operatively associated with a locking projection 23 on the container 18 which is likewise provided with an inclined sliding surface 25 and an end or stop surface 24. When the grip 19 is turned to its closed position, the locking groove 20 fits over the locking projection 23, and the stop surfaces 21 and 24 then prevent the channel part 3 from being twisted excessively and from thus being damaged.

Although my invention has been illustrated and described with reference to the preferred embodiment thereof, I wish to have it understood that it is no way limited to the details of such embodiments but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. A container closure comprising a substantially rigid base having a bore, a substantially rigid outlet nozzle having a bore, and a tubular member having a smooth inner wall connecting said nozzle to said base, at least a part of the length of said tubular member being elastically deformable, said tubular member enclosing an open channel connecting said bores to each other when said tubular member is in a normal, substantially straight, undeformed, position, at least said part of said tubular member being adapted to be deformed when said nozzle is turned relative to said base, whereby at least parts of the smooth inner wall of said tubular member are firmly pressed against each other and thus tightly close said channel, locking means for releasably holding said nozzle at least in its turned position, at least said part of said tubular member being elastically deformable by having a wall of a lesser thickness than said nozzle, said nozzle comprising a grip projecting laterally to the opposite sides of said nozzle bore for twisting said tubular member about its axis, said locking means comprising associated means on said grip and on the upper side of said base adapted to interengage with each other when said grip is turned so as to twist the tubular member to a position in which said channel is closed.

2. A container closure as defined in claim 1, wherein said associated locking means comprise a locking projection on said base, a first inclined sliding surface on the upper side of said base adjacent to said locking projection and substantially at the level of the lower surface of said grip, said grip having a locking groove in the lower side thereof and a second inclined sliding surface in front of said locking groove and adapted to slide along said first sliding surface when said nozzle is turned, and stop surfaces on said locking projection and said locking groove adapted to engage with each other for limiting the extent of the twisting movement of said tubular member.

3. A container closure comprising a substantially rigid base having a bore, a substantially rigid outlet nozzle having a bore, and a tubular member having a smooth inner wall connecting said nozzle to said base, at least a part of the length of said tubular member being elastically deformable, said tubular member enclosing an open channel connecting said bores to each other when said tubular member is in a normal, substantially undeformed open position, at least said part of said tubular member being adapted to be deformed when said nozzle is turned

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relative to said base for pressing at least parts of the smooth inner wall of said tubular member firmly against each other and thus tightly closing said channel, said tubular member having an elongated cross section and comprising a pair of side walls enclosing said channel which are connected at both sides to each other so that said channel, in cross section, is tapered substantially to a point at each side thereof, said tubular member being adapted to be turned by said nozzle from said normal, undeformed position in which it is open to a closed position, and locking means for releasably holding said nozzle at least in its turned position.

4. A container closure as defined in claim 3, in which said tubular member, in its undeformed, open position is substantially straight and is adapted to be turned by said nozzle in at least one direction from its undeformed, open position to its closed position substantially at a right angle thereto about a transverse axis extending substantially through said points to which said pair of side walls, respectively, of said elongated cross section are tapered.

5. A container closure as defined in claim 4, further comprising at least one bracing web projecting upwardly from said base adjacent to the lower part of at least one of said side walls of said tubular member and serving as an abutment about which the upper part of said tubu-

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lar member may be turned about said transverse axis to close said channel.

6. A container closure as defined in claim 4 wherein said tubular member has a thinner side wall and, opposite thereto, a thicker side wall at the side toward which said nozzle is adapted to be turned to said closed position, said thicker side wall having in its outer side near its lower end a substantially arcuate groove, said nozzle being adapted to be bent about said transverse axis at and over the thinnest part of said thicker wall formed by said groove, said thinnest part being supported at both sides by the adjacent thicker groove parts of said thicker wall.

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