Jan. 14, 1964 J. HENCHERT 3,117,703

POURING NOZZLE WITH CAPTIVE CAP

Filed April 7, 1959

FIG. 1

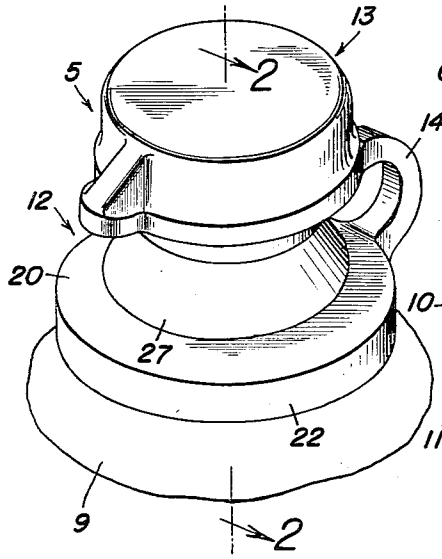
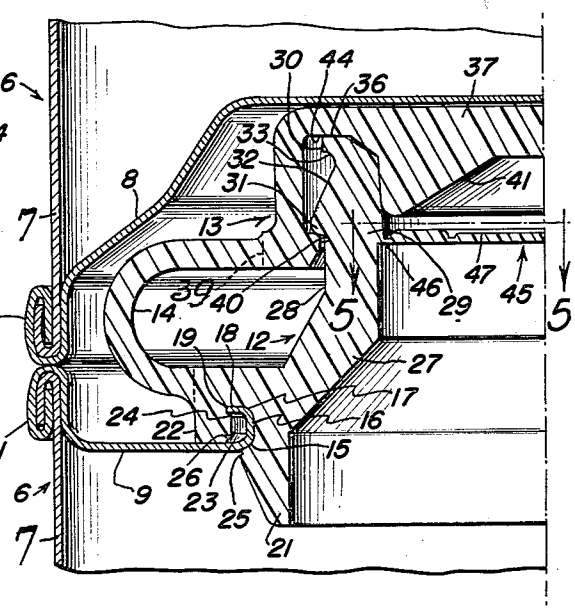


FIG. 2



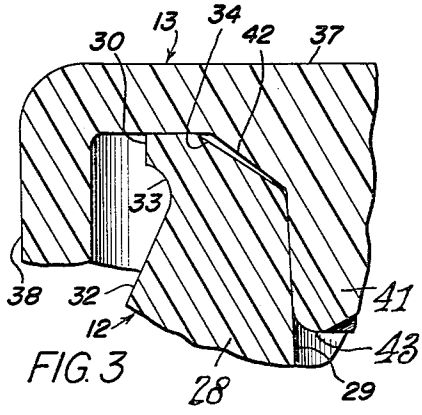


FIG. 3

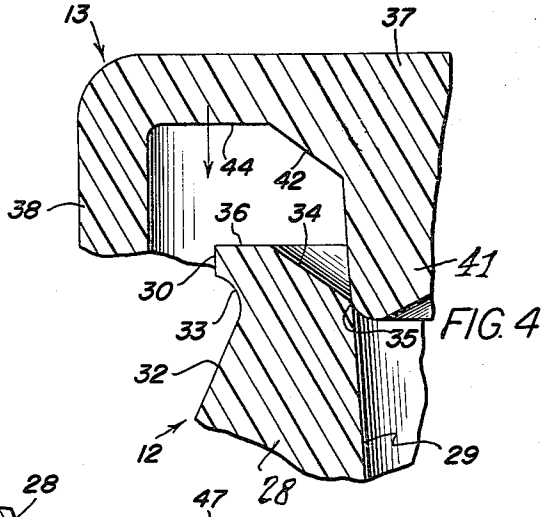


FIG. 4

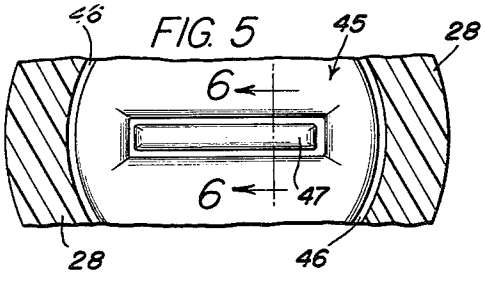


FIG. 5

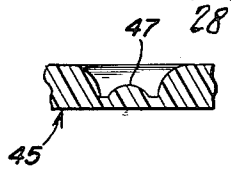


FIG. 6

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POURING NOZZLE WITH CAPTIVE CAP

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The invention generally relates to dispensing means for containers, and primarily seeks to provide a novel pouring nozzle having a captive cap.

In many instances, plastic nozzles are formed as part of containers for liquids which include solvents, which solvents will permeate the plastic nozzle and cause swelling thereof. This is true in certain types of detergents and other liquids which are presently being distributed in containers having plastic pouring nozzles. When the solvent permeates the neck portion of the plastic nozzle, the swelling thereof in many instances is such as to prevent the removal of the plastic cap.

It is therefore another object of the invention to provide a plastic pouring nozzle and cap assembly wherein sufficient clearance is provided between telescoped portions of the plastic nozzle and cap so that in the event the plastic nozzle should be permeated by a solvent and the like and the plastic nozzle swell within the cap, there will be sufficient space within which the plastic nozzle may swell so as to prevent the wedging of the nozzle within the cap.

Molded plastic parts must be formed with a relatively high tolerance. As a result, the desired seal is not always obtained between a plastic nozzle and a plastic cap. It is therefore another object of this invention to provide a plastic nozzle and cap assembly wherein the nozzle includes a generally cylindrical neck portion and the cap includes a wedge-shaped cross-sectional plug which is movable down into the neck portion to form a seal therewith, the exterior diameter of the plug being greater than the interior diameter of the neck portion whereby when the plug is forced into place, it will frictionally engage the surface of the throat of the neck portion and form the desired seal therewith.

Still another object of the invention is to provide a novel pouring nozzle and cap assembly wherein the neck portion of the nozzle includes a generally cylindrical throat and the cap has a wedge-shaped cross-sectional annular plug which extends down into the throat to form a seal therewith, the upper part of the nozzle being flared outwardly from the throat and the plug being also flared outwardly adjacent its intersection with the top wall of the cap, the flare of the nozzle being at a greater angle to the axis of the throat than the flare of the plug, whereby full seating of the plug within the throat is assured.

In many instances, caustic materials and other liquids harmful to metal and certain types of coatings applied to metal are packaged in cans of the type including upper ends provided with pouring nozzles. Unless a complete seal between the can end and the plastic nozzle is formed, the raw edge of the can end will be attacked by the contents of the can due to the leakage of the contents through the space between the can end and the pouring nozzle. Also, often the liquid will seep through the connection between the can end and the nozzle, and will seep out onto the upper surface of the can end so as to destroy the enamel or similar coating of the can end.

In view of the foregoing, it is a further object of the invention to provide a novel connection between a can end and a plastic dispensing nozzle, the connection being of such a nature that the raw edge of the can end is sealed with respect to the lower part of the plastic nozzle, and thus the contents of the can are not free to attack either the exposed material of the raw edge of the can end or

the enamel and similar coatings on the outer surface of the can end.

A still further object of the invention is to provide a novel plastic nozzle for the dispensing of liquids from containers, the plastic nozzle being of the pouring type and being initially sealed against the dispensing of liquid from the container by a diaphragm disposed within the neck portion thereof, the diaphragm being integrally formed with the remainder of the plastic nozzle and having a peripheral tear line immediately adjacent its connection to the neck portion of the nozzle to facilitate its removal, the diaphragm being further provided with a centrally located tool receiving slot through which a tool may be readily passed to facilitate the twisting and removal of the diaphragm.

Yet another object of the invention is to provide a novel container construction which includes a pouring nozzle having a closure cap, the container being provided with a bottom end wall which is upwardly recessed so as to clear the pouring nozzle and cap of a similar container, whereby the containers may be stacked one upon the other.

With the above, and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims, and the several views illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a perspective view of the top portion of a can employing the plastic pouring nozzle and captive cap and shows the general arrangement thereof.

FIGURE 2 is an enlarged fragmentary vertical sectional view, taken substantially upon the section line 2—2 of FIGURE 1, and shows the specific details of the pouring nozzle, the captive closure cap and the relationship of the pouring nozzle to the top end of the container, a second container being shown in a stacked position on the first container.

FIGURE 3 is an enlarged fragmentary sectional view showing the upper part of the nozzle and an associated part of the closure cap, and shows the relationship between flared portions of both the pouring nozzle and the closure cap.

FIGURE 4 is an enlarged fragmentary sectional view showing the upper part of the pouring nozzle and a lower portion of the closure cap, with the plug of the closure cap in position for entering the throat of the nozzle.

FIGURE 5 is an enlarged fragmentary horizontal sectional view, taken along the line 5—5 of FIGURE 2, and shows the general configuration of a tool receiving weakened portion of the diaphragm to facilitate the removal of the diaphragm.

FIGURE 6 is an enlarged fragmentary sectional view, taken along the section line 6—6 of FIGURE 5, and shows the general cross-section of the weakened portion of the diaphragm.

In the example of embodiment of the invention herein disclosed, the pouring nozzle and captive cap assembly is generally referred to by the numeral 5, and is mounted on a can, generally referred to by the numeral 6. The can 6 includes a can body 7, a bottom end 8, and a top end 9. The bottom end 8 is secured to the lower end of the can body 7 by a double seam 10 of the conventional type. A similar double seam 11 is utilized to secure the top end 9 to the upper end of the can body 7.

The pouring nozzle and captive cap assembly 5 is integrally formed of a suitable plastic, such as polyethylene. The pouring nozzle and captive cap assembly 5 includes a pouring nozzle, generally referred to by the numeral 12, and a captive cap, generally referred to by the numeral 13, the cap 13 being permanently connected to the pouring nozzle 12 by an integral strap 14.

As is best shown in FIGURE 2, the inner portion of the top container end 9 is upwardly curved, as at 15, and has an integral portion in the form of an upstanding circular flange 16. The upper edge of the flange 16 terminates in a curved portion 17, which, in turn, terminates in a generally horizontal outwardly directed annular flange 18 having a free or raw edge 19.

A lower portion of the pouring nozzle 12 is in the form of an annular base 20. A tubular extension 21 extends downwardly from the annular base adjacent the inner edge thereof. A circumferential flange 22 also depends from the base 20, the circumferential flange 22 being disposed radially outwardly of the tubular extension 21 and concentric to the tubular extension 21 to define, in conjunction with the tubular extension 21, an annular channel 23 which opens downwardly.

As is best shown in FIGURE 2, the flanges 16 and 18 of the top can end 9 are received in the annular channel 23. The upper part of the circumferential flange 22 has an inwardly directed annular seat 24 formed therein. The raw edge 19 is compressively engaged with the seat 24 and forms a seal therewith. Also, those portions of the flanges 16 and 18 facing the underside of the base 20 and the tubular extension 21 are in compressive engagement therewith to further form a seal between the pouring nozzle 12 and the can 6.

The tubular extension 21 has a projecting part 25 which underlies the annular channel 23 and engages the underside of the top can end 9 adjacent the curved portion 15. This engagement prevents the upward movement of the pouring nozzle 12 with respect to the can 6. It also prevents the jack-knifing of the pouring nozzle 12 out of the can top end 9.

A lower inner corner of the circumferential flange 22 is removed, as at 26, to facilitate the telescoping of the flanges 16 and 18 into the annular channel 23. Further, since the pouring nozzle 12 is formed of a resilient plastic material, such as polyethylene, it will be seen that portions of the pouring nozzle 12 may be deformed to permit the insertion of the flanges 16 and 18 into the annular channel 23.

The pouring nozzle 12 also includes a generally frusto-conical intermediate portion 27 which is formed integral with the base 20, and which extends upwardly from the base 20. The intermediate portion 27 terminates at its upper end in a generally cylindrical neck portion 28. An inner upper surface of the neck portion 28 defines a generally cylindrical throat 29. A non-drip pouring lip 30 projects outwardly from the upper end of the neck portion 28. A locking rib 31 projects outwardly from the exterior surface of the neck portion 28 intermediate the ends thereof. The locking rib 31 is annular and is curved in cross-section. It is to be noted that the exterior of the neck portion 28 slopes upwardly and inwardly in a straight line from the locking rib 31 to a point inwardly of the outer edge of the pouring lip 30. This outer surface of the neck portion 28 is generally frusto-conical, and is referred to by the numeral 32. The outer surface 32 is connected to a circumferential surface of the pouring lip 30 by a curved portion 33.

The throat 29 terminates at its upper end in an outwardly flared surface 34. The outwardly flared surface 34 extends to the upper end of the pouring nozzle 12, and is connected to the surface defining the throat 29 by a curved part 35. The extreme upper end of the pouring nozzle 12 is in the form of an annular seat 36 which surrounds the outwardly flared surface 34 and forms an upper part of the pouring lip 30.

The captive or closure cap 13 includes a generally circular end wall 37 and a cylindrical body wall 38. The lower end of the body wall 38 is thickened, both inwardly and outwardly, to define an outwardly projecting annular part 39 and an inwardly projecting annular locking rib 40. The connecting strap 14 is integrally connected to the part 39 at one end and to portions of the base 20

and the circumferential flange 22 at the other end. When the closure cap 13 is in place, the locking rib 40 underlies the locking rib 31 to retain the closure cap 13 in place on the pouring nozzle 12.

An annular wedge-shaped plug 41 is formed on the underside of the end wall 37. The upper and outer part of the plug 41 is outwardly flared, as at 42, immediately adjacent its intersection with the underside of the end wall 37. The extreme lower end of the plug 41 is rounded, as at 43, to facilitate the passage of the plug 41 down into the throat 29. A downwardly directed annular seat 44 is formed on the underside of the end wall 37 surrounding the flared portion 42 of the plug 41.

At this time, it is pointed out that the diameter of the external surface of the plug 41 is of a greater dimension than the diameter of the internal surface of the throat 29. This is best illustrated in FIGURE 4. However, since both the pouring nozzle 12 and the closure cap 13 are formed of deformable plastic, the plug 41 may be forced down into the throat 29 so that there will be an intimate frictional contact between the plug 41 and the throat 29 of the neck portion 28.

It is also pointed out that the angle of the flared portion 42 of the plug 41 with respect to the axis of the throat 29 is less than the angle of the flared portion 34. Further, there is a sharp corner between the flared portion 42 and the exterior surface of the plug 41. In actual practice, the angle of the flared portion 34 to the horizontal or an axis transverse of the longitudinal axis of the throat 29 is 30°, whereas the angle of the flared portion 42 is 35°. In view of the relationship between the flared portions 34 and 42, there is no interference that will prevent the plug 41 from being disposed in its full in position in relation to the neck portion 28. Further, this relationship permits the sealing surface or seat 44 to come into sealing contact with the annular seat 36 of the pouring nozzle 12.

The pouring nozzle 12 may also be provided with a sealing diaphragm, generally referred to by the numeral 45. The diaphragm 45, when incorporated in the pouring nozzle structure, will be disposed immediately below the throat 29 and will seal the contents of the can 6. It is intended that the diaphragm 45 be removed by the ultimate user of the contents of the can 6. Accordingly, the diaphragm 45 is connected to the interior surface of the neck portion 28 by a very thin annular portion 46. This annular portion 46 may be readily ruptured to facilitate the removal of the diaphragm 45.

The central part of the diaphragm 45 is provided with a narrow elongated readily pentratable portion 47. The general outline of the penetratable portion 47 is illustrated in FIGURE 5, and the cross-section thereof is illustrated in FIGURE 6. It is intended that a suitable tool, such as a screwdriver or the like, be used to penetrate the diaphrgam 45 through the penetratable portion 47. Once the blade of the screwdriver or similar tool has penetrated the diaphragm 45, the blade may be twisted so as to twist the diaphragm 45 and break the diaphragm 45 away from the neck portion 28 along the reduced annular portion 46. The diaphragm 45 may then be removed from the pouring nozzle 12 and the pouring nozzle 12 is ready for the dispensing of the contents of the can 6.

At this time, it is pointed out that the diaphragm 45 has no effect whatsoever on the relationship between the pouring nozzle 12 and the closure cap 13. The diaphragm 45 is disposed below the farthest in position of the plug 41 and does not prevent the outward deflection of the neck portion 28 required for the reception of the plug 41. Further, when the diaphragm 45 has been removed from the pouring nozzle 12, it does not interfere with the flow of liquid through the pouring nozzle 12.

While one form of the invention has been shown for the purposes of illustration, it is to be clearly understood that various changes in the details of construction, arrangement and proportion of parts may be made without

departing from the spirit and scope of the invention, as defined in the appended claims.

I claim:

1. In a container of the type having a pouring nozzle, a nozzel-to-container connection comprising a container end formed of thin sheet material and having an upstanding circular flange defining an opening, said upstanding circular flange terminating in a generally horizontal outwardly directed annular flange having a free edge, said nozzle including an integral annular base, a tubular extension extending down from said base, an integral circumferential flange depending from said base located radially outwardly of said tubular extension and concentric thereto to define a downwardly opening annular channel of a width greater than the thickness of said sheet material, and an inwardly directed annular seat formed in the upper part of said circumferential flange in the inner surface thereof, said upstanding circular flange and said outwardly directed annular flange being seated in said annular channel and said free edge being seated on said seat in sealed engagement therewith, whereby said free edge is protected, said tubular extension having an outwardly directed projection underlying said annular channel and retaining said container end flanges within said annular channel.

2. The container of claim 1 wherein the lower inner edge of said circumferential flange is relieved to facilitate the entry of said container end flanges into said annular channel.

3. For use with a container for a material including a solvent which will permeate plastic materials, a plastic nozzle and closure cap assembly, said nozzle including a neck portion, an outwardly directed pouring lip at the upper end of said neck portion, an outwardly directed locking rib on said neck portion spaced below said pouring lip having a center lying in a plane, said closure cap including a cylindrical wall portion telescoped over said neck portion, an inwardly directed continuous locking rib on said wall portion underlying said neck portion locking rib and retaining said closure cap in place on said nozzle, said wall portion being spaced radially outwardly of said pouring lip and said neck portion locking rib to provide clearance for the swelling of said neck portion.

4. The assembly of claim 3 wherein said neck portion has a part disposed radially adjacent said closure cap locking rib and said closure cap locking rib is spaced axially outwardly of a radially adjacent part of said neck portion.

5. A resiliently deformable plastic nozzle and closure cap assembly, said nozzle having a neck portion, an outwardly directed annular pouring lip at the upper end of said neck portion, an outwardly directed locking rib on said neck portion and spaced below said pouring lip and having a center lying in a plane, said neck portion including a cylindrical throat, said closure cap including a top wall and a depending cylindrical wall portion, said wall portion being telescoped over said neck portion, an inwardly directed locking rib on said wall portion underlying said nozzle locking rib and retaining said closure cap on said nozzle, an annular wedge-shaped cross-sectional plug depending from the underside of said top wall, said plug having an exterior diameter greater than the diameter of said throat, whereby a resilient compressed intimate frictional contact between said plug and said throat is assured, said assembly being adapted to be used as part of a container in which there is disposed a solvent which will permeate the plastic of said nozzle and cause the swelling thereof, and said closure cap wall portion being spaced radially outwardly of said pouring lip and said nozzle locking rib to provide clearance for the swelling of said neck portion.

6. The assembly of claim 5 wherein said closure cap locking rib is spaced axially outwardly of a radially adjacent part of said neck portion.

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