

Nov. 24, 1953

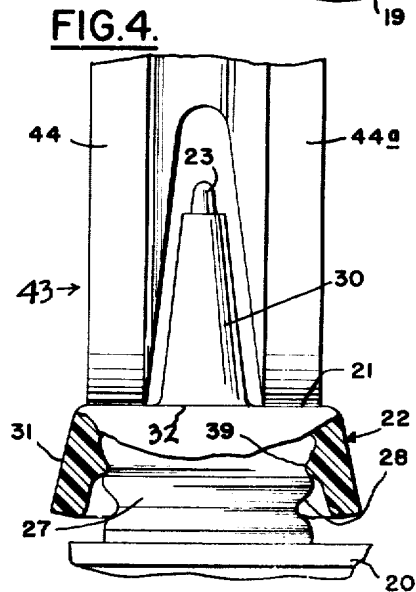
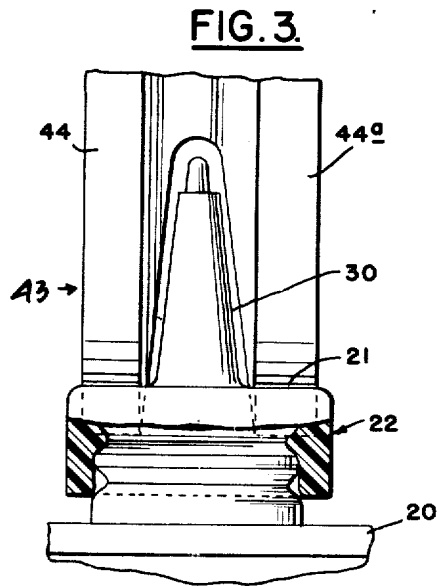
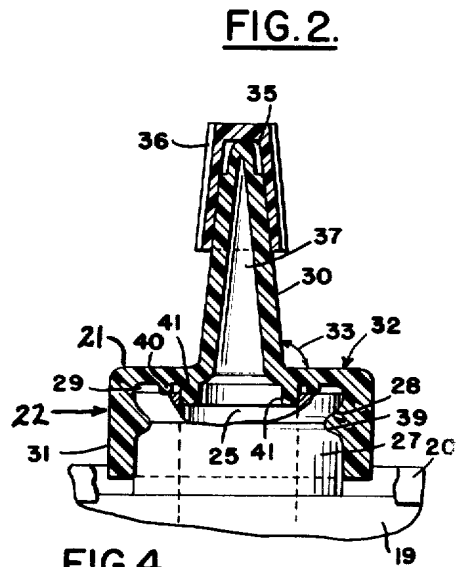
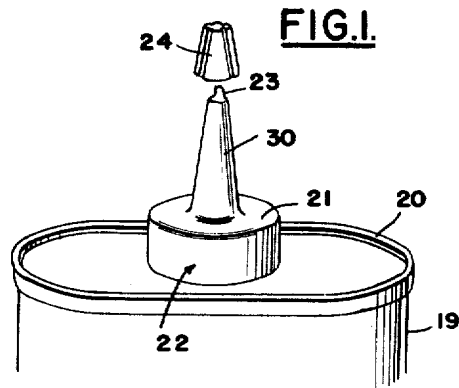
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2,660,355

METHOD OF APPLYING SEALING SPOUTS FOR LIGHTER FLUID CANS

Original Filed Feb. 9, 1950

3 Sheets-Sheet 1



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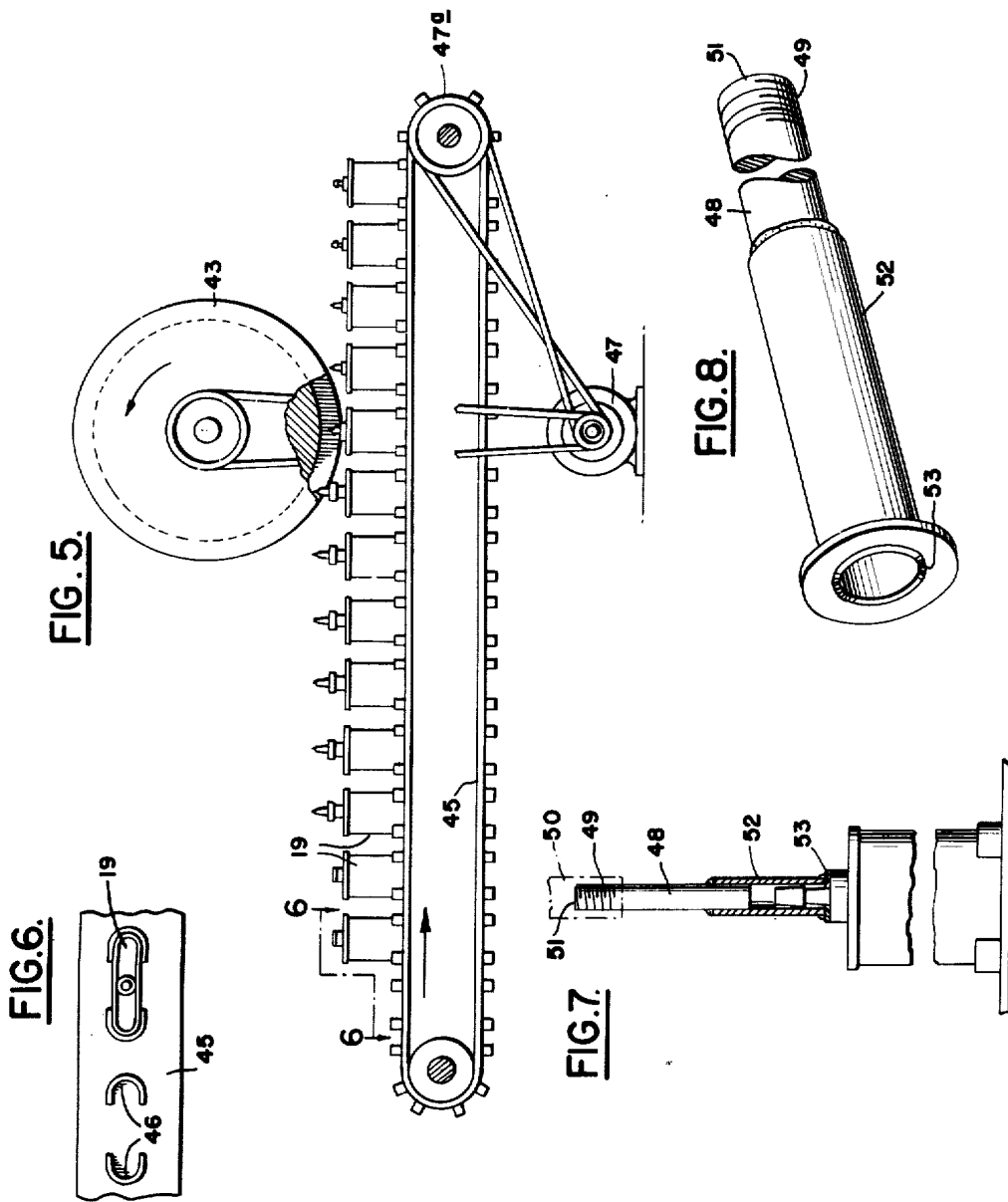
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METHOD OF APPLYING SEALING SPOUTS FOR LIGHTER FLUID CANS

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3 Sheets-Sheet 2



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METHOD OF APPLYING SEALING SPOUTS FOR LIGHTER FLUID CANS

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3 Sheets-Sheet 3

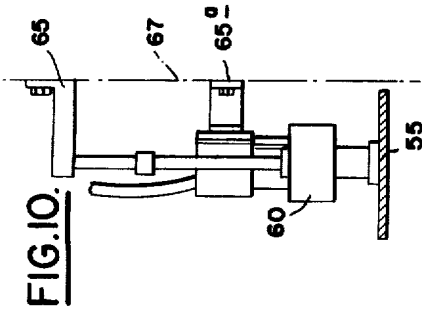


FIG. 10.

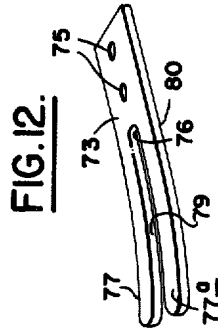


FIG. 12.

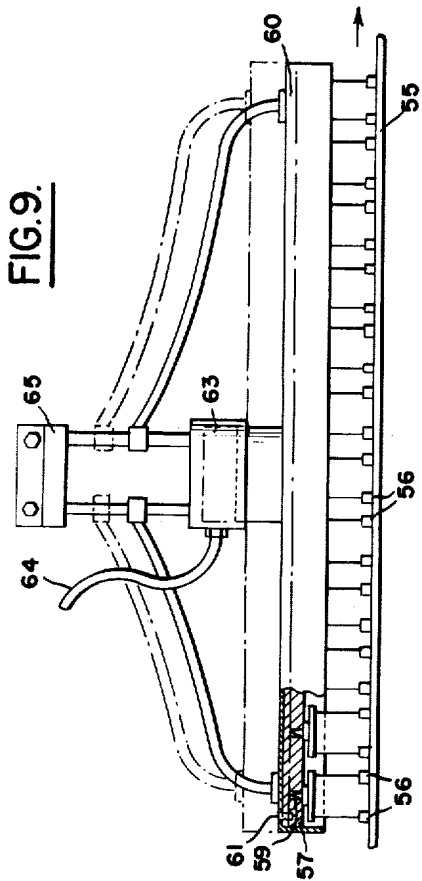


FIG. 9.

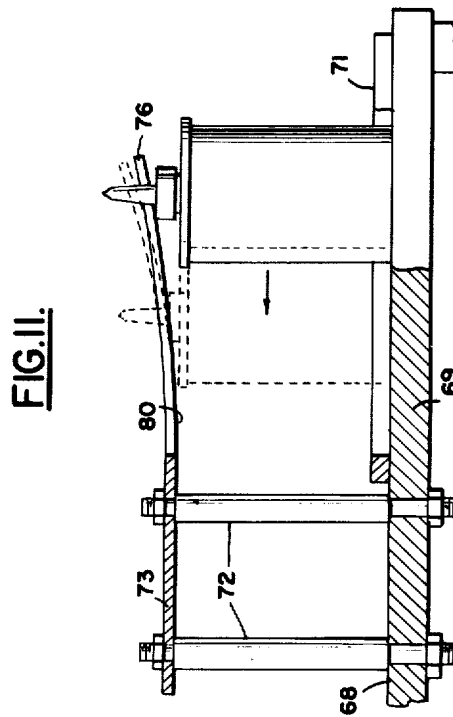


FIG. 11.

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# UNITED STATES PATENT OFFICE

2,660,355

## METHOD OF APPLYING SEALING SPOUTS FOR LIGHTER FLUID CANS

Chester S. Allen, Warren, Pa.

Original application February 9, 1950, Serial No.  
143,230. Divided and this application January  
6, 1953, Serial No. 329,860

7 Claims. (Cl. 226—81)

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This invention relates broadly to closures and in particular to a method and apparatus for applying closures to containers of volatile fluid such as lighter liquid and spot remover.

This application is a division of my application filed February 9, 1950, Serial No. 143,230, for Closure Elements and Methods.

It has been the practice heretofore to supply such volatile fluids in a type of small metal container containing 4 fluid ounces having an apertured flat top and an upstanding metal neck with an external circumferential groove. The groove is designed to receive the metal depending skirt of a spout type metal closure element, the closure applying operation being accomplished, for example, by a so-called Callahan capping machine, which squeezed the closure skirt circumferentially and caused the metal of the skirt to press or flow into and fill the external groove of the can neck. This operation would frequently produce a satisfactory hermetical seal between the spout skirt and the can neck, but due to the rigidity and inherent lack of resilience in the parts constituting this metal-to-metal seal, subsequent vibration or jolting in normal shipping or handling too frequently disrupted the sealing connection and thus permitted the inflammable fluid contents of the can to volatilize and escape. The hazards of this conventional closure became well known and the resulting damage became sufficiently important as to create serious insurance, safety and indemnity problems.

This art of closures for fluid containers is characterized by large volume and small unit value, hence solution of the fundamental problem, that is, how to effect and maintain the durable and effective seal between the spout skirt and can neck, must necessarily be accomplished within narrow cost limits for material, labor and equipment.

One of the objects of my invention is to provide a method and apparatus for applying closures to containers of volatile fluid which may be carried out economically on a mass-production scale with the assurance that a reliable, permanent closure will be effected and volatilization of the fluid contents of the containers reduced to a minimum.

Another object of my invention is to provide an improved method for applying closures to fluid containers wherein close tolerances between the internal diameter of the closure and the external diameter of the neck of the container are so selected that the closure, when subjected to pressure stress and stretched over the neck of the

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container, will snap in position thereover and be permanently retained thereon for closing the container.

Still another object of my invention is to provide a structure of capping machine for fluid containers in which a pressure-applying anvil roller of bifurcated section may be progressively rolled over an assembly line of fluid containers with caps positioned over the necks thereof and the caps forced into secured position on the necks of the containers with the bifurcated roller clearing the spouts of the containers as the roller moves progressively along the assembly line of containers.

Still another object of my invention is to provide a method of applying polyethylene caps to the necks of containers by stretching the caps over the container necks and snapping the caps in permanent position thereon under pressure.

Still another object of my invention is to provide a method of capping fluid containers with a cap and spout of plastic material as distinguished from the tin container, where the plastic material may have contrasting and attractive colors applied thereto for facilitating the merchandising of the fluid contents of the containers.

Other and further objects of my invention reside in the improved method and apparatus for applying sealing spouts to containers as set forth more fully in the specification hereinafter following, by reference to the accompanying drawings, in which:

Fig. 1 is a fragmentary exploded view showing the can and completed closure, with the plastic spout cap attached;

Fig. 2 shows an enlarged vertical section of the can spout and spout cap after assembly and before opening;

Fig. 3 shows the spout approaching the capping machine, according to one method of carrying out my invention;

Fig. 4 shows the action of the capping machine on the spout, according to the method of Fig. 3;

Fig. 5 shows schematically in elevation one form of mechanism for carrying out the closure method illustrated in Figs. 3 and 4;

Fig. 6 is a fragmentary section taken on the line 6—6 of Fig. 5;

Fig. 7 is a schematic view showing adaptation of the present method to an arrangement similar to the conventional Callahan capper;

Fig. 8 is an enlarged view of the adapting tool shown in Fig. 7;

Fig. 9 is a schematic view in elevation show-

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ing a method for attaching the plastic spout to a plurality of cans simultaneously;

Fig. 10 is an end elevation of the mechanism shown in Fig. 9;

Fig. 11 is an enlarged detail showing another method and mechanism for applying the plastic spout to the can, this being designed primarily for individual manual operation; and

Fig. 12 is a perspective view of the pressure plate used in the method shown in Fig. 11.

In order to explain the improved method and apparatus of my invention, it is necessary to first describe the product produced by the application of the method and apparatus of my invention, that is, a sales package for volatile fluid comprising, as shown in Figs. 1 and 2, a metal can 19 for lighter fluid or spot remover having a metal top 20 surmounted by a plastic spout or cap 21 constituting an important aspect of the invention. Spout 21 has a base 22 and a spout 30 extending upwardly therefrom and terminating in a finish lobe 23 formed in the molding process. It will be understood that the finish lobe 23 is readily separable by a knife or with the fingernail when it is desired to open the container sealed in accordance with the process of my invention. A plastic cap 24 surmounts the spout 30 and protects lobe 23 before opening and seals the spout against accidental spillage or leaking after opening.

The details of construction of the present cap are particularly shown in Fig. 2 wherein top 20 of can 19 has the usual aperture 25 communicating with upstanding neck 27, the latter having a circumferential groove forming an upper annulus 29. Spout 30 is preferably made of colored plastic of such a composition that it is flexible, proof against deterioration or dissolution by volatile or corrosive liquids and possessed of a greasy surface feel, the latter being of particular interest in that it facilitates the placing of the spout on the neck to seal the can as hereinafter described.

Spout 30 has a skirt 31 depending from base 32, such skirt, it being important to note, is at least one-sixteenth of an inch longer than conventional spouts, the purpose of this additional length being to aid in uniting the cap and the neck. The skirt provides additional material so that the operator may place the spout on the neck of the can prior to subjecting it to the capping machine and the spout-mounted can may then move along the assembly line or link belt with the spout in position ready for sealing without being accidentally dislodged.

Referring again to Fig. 2, spout 30 has a flat top or upper surface 32 against which pressure is applied in fixing the cap to the neck during the closure operation.

Angle 33 between tapering spout 30 and flat top 32 may be arbitrarily chosen within limits of the art but its relation to the angle of the inner wall 35 of cap 24 to the vertical axis thereof determines the inclination of the sides of cap 24 which must be such that the inner wall of cap 24 when inserted firmly on the spout 30 will tend to bind thereto and thus prevent leakage after the spout has been opened as in use. For example, angle 33 may be 100° and the angle of the inner wall angle 35 of the cap 24 with respect to the central axis thereof may be 95°.

Externally the plastic cap 24 has vertical grooves which strengthen the structure, impart a pleasing ornamental appearance thereto and aid in the molding process and the means of plastic

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injection which may be used in manufacture of cap 24.

The spout 30 is provided with a continuous recess 37 extending axially thereof. At the bottom, the spout skirt 31 is preformed to have an internal integral annular sealing ring or bead 39 for snugly establishing connection with the annular groove 28 in neck 27. In this assembly inherent possibility of dislocation or breaking of the seal by vibration or accident is very slight due to the resilient nature of the plastic material employed in forming of spout 30 and due to the particular construction of the cooperating parts as illustrated. Top 32 of the spout is provided on its under surface with a supplementary sealing shoulder 40 which closely engages the top of the neck 27 and concentrically with an inner and longer supplementary sealing shoulder 41 which extends into the neck aperture to provide a third sealing agent.

It will be apparent from the above that the space relation between preformed sealing ring 39 and the concentric and cooperating supplementary rings 40 and 41 must be such that the fitting of sealing ring 39 into annular groove 28 of the neck pulls the supplementary sealing rings under tension to bear closely upon the respective adjacent portions of the neck structure. From the foregoing it will be apparent that spilling is prevented by ring 41 which prevents the fluid from emerging from the neck. Any slight amount to escape is prevented from flowing over the top of the neck by ring 40, and a final hermetical seal is provided externally of the neck by the intimate placement of plastic sealing ring 39 in metal groove 28.

The invention described not only provides a perfect seal to protect against subsequent leakage, damage and indemnity problems but the structure is so designed as to be economical and conveniently attachable by conventional mechanisms, or manually.

One of the methods of carrying out my invention for applying the spout to cans is shown in Fig. 5 which utilizes the split wheel shown in Fig. 3. As indicated at the left in Fig. 5, the cans are subjected to a split or bifurcated anvil press or corking wheel 43 comprising opposed rims 44 and 44a which, by engaging the upper surface of base 22 of the spout, press the latter downwardly in intimate sealing contact with the neck of the can. The cans are carried upon a link belt conveyor 45 having clamps 46 thereon for holding the cans in spaced relation. When electric motor 47 is actuated to drive the wheel 43 in a counter-clockwise direction and the link belt conveyor in a clockwise direction capping and sealing proceeds rapidly, it being only necessary that the operator repeatedly place cans in the clamps 46 at the left of corking or anvil wheel 43 and then place the plastic cap with the lengthened skirt upon the top of the neck of each can before it is advanced rightward to the corking or anvil wheel. As will be apparent in Figs. 3 and 4, the split or bifurcated anvil, or corking wheel 43, does the rest. In Fig. 3 the spout rests upon the neck before receiving the pressure of the wheel. In Fig. 4 the spout is subject to the wheel which presses downwardly on the spout to cause sealing ring 39 to press outwardly over neck annulus 29, thereafter snapping into sealing position in groove 28 as shown in Fig. 2.

In another mechanism for carrying out the method of my invention, there is shown in Fig. 7 a convenient adaptor 48 which is provided for

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use in the Callahan capper. By removing the conventional clincher head on the Callahan capper, it is possible to use a piece of steel rod 48 threaded at 49 on its upper end 51 with corresponding SAE thread that will fit the Callahan capper fragmentarily shown at 50 in Fig. 7. A short piece of one-half inch inside diameter pipe 52 welded to this steel rod and then either flanged out slightly as shown at 53 or built up slightly with weld may be used, the flanging out being described to prevent cutting action when the capper head is depressed on the spout. When the spout is set lightly on the can and placed under the capper head, depressing the latter completes the seating action of the plastic spout which cooperates with the can neck as shown in Figs. 4 and 2.

Another mechanism by which the invention may be practiced is shown in Fig. 9 for filling multiple cans simultaneously, twelve being illustrated. The cans may be placed on a tray 55 having suitable frames 56 and the press provided with a two-inch square steel 57 drilled large enough to accept one spout in each hole. The steel is provided with holes 59 and attached to head 60 by screws 61. The press 63 has hose 64 connecting to control mechanism (not shown). As shown in Fig. 10, suitable brackets 65 and 65a may be used to fix the press to any sturdy upright support or body 67.

A manual capper of simple design is shown in Figs. 11 and 12. This may be used for individual capping in sequence and is utilized manually. The manual capper comprises a base plate 69 having guide track 71 at one end and spaced support bolts 72--72 at the other end and spring plate 73. Plate 73 has at one end holes 75 for the spaced bolts and at the other end is bifurcated to provide parallel fingers 77 and 77a having space 79 therebetween through which the spout may be advanced. Fingers 77 and 77a are curved upwardly at 80, as shown in Fig. 11, so that when the can with mounted spout is moved to the left with the spout between the fingers 77 and 77a, the curvature of the spring will depress the spout to cause its inner rings to engage the neck of the can in useful hermetical seal.

A preferred type of material for the plastic is polyethylene, commonly known in the trade as polythene and the spout is molded under a pressure of the order of 13,000 lbs. per square inch (gauge press of 600-700 lbs.) at a temperature of 100° F. The injection and gating may be done from the small end of the spout.

The polyethylene from which the cap is formed is yieldable, resilient or stretchable within limits under pressure, and by selecting the tolerances with respect to the inside diameter of the sealing ring 39 and the outside diameter of the metal groove 28 in the neck of the container, a condition is produced wherein the cap may be positioned over the neck of the container, as represented in Fig. 3, preparatory for the approach of the bifurcated anvil wheel 43, whereupon the cap is forced downwardly over the neck of the container and the skirt 31 spread, as represented in Fig. 4, sufficiently to allow the cap to move downwardly over the neck of the container. As soon as the pressure established by the rims 44 and 44a of the anvil wheel 43 is removed, the skirt 31 of the cap springs back into a position hugging the neck of the container, as represented in Fig. 2, thereby completing a reliable and permanent seal. The same type of

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operation is effected in carrying out my invention by any of the other methods which I have explained herein, the important consideration being the selection of the characteristics of the cap for resilient deformation under pressure wherein the material of the cap is restored to a position gripping the neck of the receptacle after the applying pressure is removed. It is to be understood that the thickness dimension for the material of the cap shown in the drawings is very greatly exaggerated for the purpose of setting forth the principles of my invention. Actually the plastic material forming the cap is quite thin and is possessed of the yieldable, resilient and stretchable characteristics as heretofore explained so that the material of the cap is restored after each sudden application of pressure. This quality in the material of the cap insures the flexing of the skirt of the cap so that after being stretched over the external neck of the container, the skirt springs into snug, intimate relationship with the surface of the neck of the container. In effecting this type of seal, the bifurcated anvil roller moves progressively over the sides of the top of the cap which forms part of the spout while the ring 40 forming part of the under surface of the cap rests upon and is supported by the annular rim of the neck of the container. The plastic sealing ring 39 which is forced into the annular groove 28 in the neck 27 establishes an interlock between the cap and the container which prevents dislodgement of the cap from the container.

While I have described my invention in certain of its preferred embodiments, I realize that modifications may be made, and I desire that it be understood that no limitations upon my invention are intended other than may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. The method of applying plastic spouts to fluid containers of the type having upwardly extending generally circular external necks which consists in applying annular skirt portions of plastic spouts over the external surfaces of the necks of an aligned row of containers in positions in which the skirt portions are aligned with the sides of the external necks with an intermediate section of the spouts resting on the tops of the necks of the containers, and applying rolling pressure progressively over the sides of the tops of the intermediate sections of the spouts for springing the skirt portions of the spouts into binding relation with the external surfaces of the necks of the containers.

2. Apparatus for applying plastic spouts to fluid containers of the type having an upwardly extending generally circular neck comprising an anvil roller having a pair of spaced flat rim portions interconnected by a groove portion, a liquid container having an upwardly extending generally circular neck, a plastic spout having an elongated skirt adapted to be engaged over the external portion of the circular neck with the elongated skirt of the spout encircling the neck but spaced therefrom and an intermediate portion of the spout resting on the top of the annular neck of the container, the groove portion of said anvil roller having a depth sufficient to clear the tip of said plastic spout and the rim portions of said roller engaging the intermediate portion of the top of the sides of said spout for forcing said elongated skirt laterally into inti-

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mate engagement with the sides of said circular neck of said container.

3. The method of applying plastic spouts to fluid containers of the type having an upwardly extending generally circular external neck which consists in applying an annular skirt portion of a plastic spout over the external surface of the neck of the fluid container, subjecting the material of the plastic spout immediately adjacent the annular skirt to pressure for stretching the annular skirt outwardly from the sides of the external neck of the container while an annular interior portion of the spout abuts against the top of the neck of the container, distributing the applied pressure progressively over an external portion of the top of the spout for forcing the skirt portion of the spout over the neck of the container and springing the skirt portion of the spout into binding relation with the external surface of the neck of the container.

4. The method of applying plastic spouts to the cylindrical neck of fluid containers which consists in centering an internally beaded plastic spout and integral skirt over the cylindrical annularly grooved neck of a container with the skirt of the spout depending over the exterior of the annularly grooved neck, applying rolling flexing pressure along the sides of the top of the spout for forcing the skirt of the spout outwardly and establishing an abutment between the interior of the top of the spout and the periphery of the top of the neck of the container while moving the interior of the beaded skirt into transverse alignment with the annularly grooved neck of the container, removing the applied pressure for springing the skirt of the spout inwardly and effecting an interlock between the bead in the spout and the groove in the neck of the container.

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5. The method of applying plastic spouts to the cylindrical necks of fluid containers, as set forth in claim 4, in which the flexing pressure is applied over sectors of the top surface of the spout.

6. The method of applying plastic spouts to the cylindrical necks of fluid containers, as set forth in claim 4, in which the applied rolling flexing pressure is increased from a minimum to a maximum and from said maximum to a minimum as the rolling pressure is applied and removed.

7. Apparatus for applying plastic spouts to fluid containers of the type having upwardly extending generally circular necks and in which the spout comprises an elongated discharge member and a downwardly depending skirt with a flat pressure applying top surface therebetween, a bifurcated strip member beneath which the pressure applying surface of the spout is adapted to be moved while in assembled position on the neck of the container, means for supporting one end of said strip as a lever in a position for application of pressure to the free end thereof for engaging the pressure applying top surface of the spout and forcing the skirt into engagement with the neck of the container by pressure applied downwardly on the bifurcated end of said strip.

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**Dedication**

2,660,355.—*Chester S. Allen, Warren, Pa. METHOD OF APPLYING SEALING SPOUTS FOR LIGHTER FLUID CANS. Patent dated Nov. 24, 1953. Dedication filed Apr. 30, 1963, by the assignee, Owens-Illinois Glass Company.*

Hereby dedicates to the public the entire terminal portion of the term of said patent.

[*Official Gazette June 18, 1963.*]