Feb. 2, 1960 R. W. ANKNEY 2,923,446

CAN CLOSURES

Filed Oct. 29, 1956 2 Sheets-Sheet 1

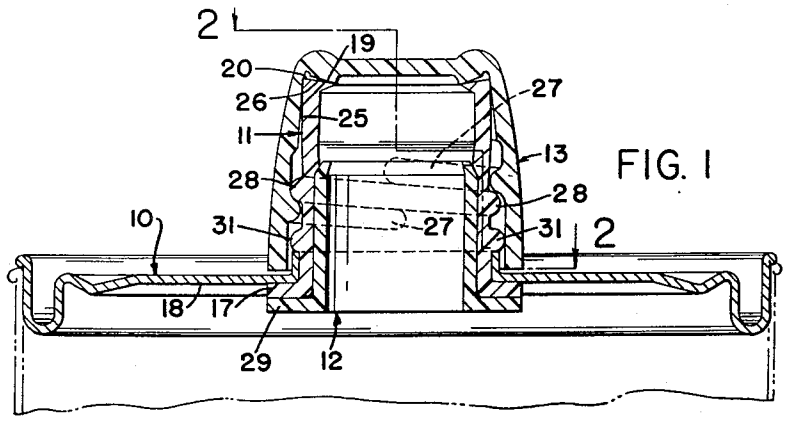


FIG. 1

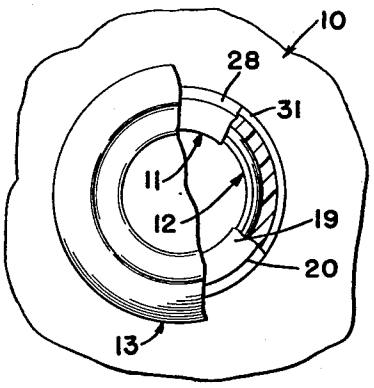
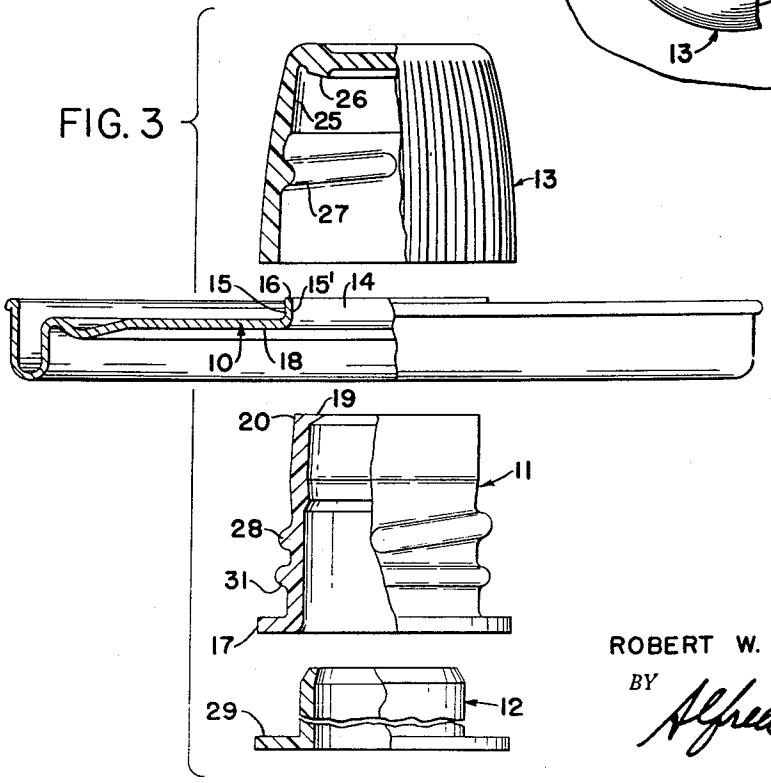


FIG. 2

FIG. 3



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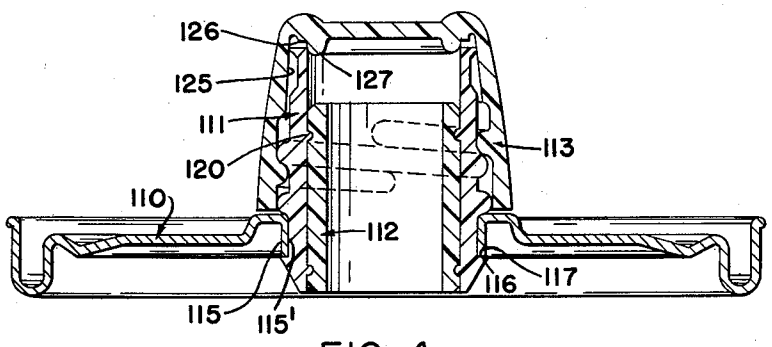


FIG. 4

FIG. 5

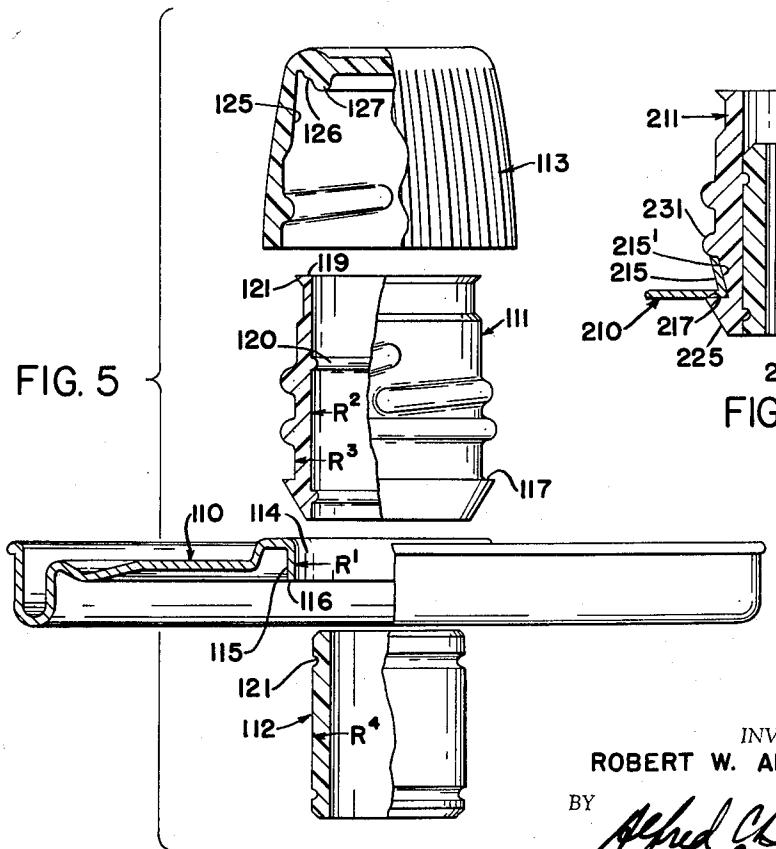


FIG. 6

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CAN CLOSURES

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Application October 29, 1956, Serial No. 618,955

6 Claims. (Cl. 222—570)

The present invention pertains to the art of can closures or more particularly to a can closure including a pouring spout.

The invention is particularly applicable to pouring spouts and closures for cans made of sheet metal materials and will be described with particular reference thereto although it will be appreciated that the can may be of any desired material.

Ordinarily cans of the type which are used for containing liquid soaps, detergents and many other liquids are generally constructed from sheet material such, for example, plastic or sheet metal including ferrous sheet metal. The sheet material used in these cans is generally very thin and, therefore, unless it is reinforced, provides a weak connection or joint between the sheet material and a pouring spout or enclosure secured thereto at a hole in the wall.

It is known to manufacture the pouring spouts out of a relatively soft, pliable material such as a polyethylene molded plastic. By pliable is meant a material which can readily be deflected or deformed by relatively light pressures such as hand pressure and which, upon the release of the pressure, will quickly regain its molded shape. These spouts were provided on the outside thereof with threads for co-acting with an internally threaded cap.

One of the problems in the past has been to mount such a plastic spout on a metal can wall in such manner that a leakproof, sealed joint is obtained and the spout will remain tight to and thus substantially nonmovable relative to the wall even though the spout and wall of the can are subjected to extreme temperature changes or destructive type bending, or other forces or pressures.

Another problem was to eliminate molding costs of the square-type thread by using semicircular or V-type threads or a sloping edge cam portion on the spout and cap while having a thinner wall thickness to provide a larger opening for a given external spout diameter. It is recognized that semicircular, V-type threads or sloping edge cam portions make it possible to use a single piece die for molding since the spout and cap can be stripped therefrom, whereas the square threads required a two-piece separable die for molding. Also, materials and curing time are saved when a thinner wall thickness can be used.

The problem of filling the cans was also encountered because of the small opening in the spout and the attachment of the spout to the wall prior to filling of the can. Filling the can through a larger opening in the spout or attaching the spout to the wall after filling the can is more economical and easier to do.

Furthermore, when sheet metal is used, it usually has coatings of tin or other material on the surfaces thereof to prevent corrosion, rusting, or the like, of the sheet metal. However, when a hole is punched in the sheet metal, the edge of the hole is left unprotected and sometimes was left in a position where it could easily

be contacted by the atmosphere or the corrosive materials or liquids in the can. Various attempts have been made to protect the peripheral edge of the hole against corrosion when such spouts and/or closures are secured thereto.

The present invention contemplates a new and improved pouring spout of a general type described which overcomes all of the above referred difficulties and others, and provides a cap and pouring spout which is simple in construction, economical to manufacture, is leakproof and easily assembled with a can wall either before or after attaching the wall to the can and either before or after filling the can.

The present invention further contemplates a can closure and pouring spout which is constructed from a plastic material and is secured to the periphery of the hole in a sheet metal can in such manner that it strengthens the can and spout as well as protecting the peripheral edge of the hole against corrosion.

In accordance with the present invention, a sheet material can is provided with a cylindrical flange defining a hole in the wall of the can. Extending through this hole is a pliable tube or spout held against the flange by a rigid sleeve which presses the tube against the flange. The spout may be secured in the flange or on the wall before or after the wall is fastened to the rest of the can as well as before or after the can has been filled. The tube or spout is closed by a removable cap which may engage external cam or thread portions of the tube and which sealingly seats against at least a corner on the end of the tube. Since the tube is pliable, it has been found preferable to make the rigid sleeve sufficiently long so that it forms a liner for the threaded portion of the spout or tube to stiffen it.

Further in accordance with the invention, the pouring spout is externally threaded or provided with cam portions of a shape which can be easily stripped from a mold without parting the mold.

Further in accordance with the invention and when the sheet material of the can is corrodible or sheet metal, the tube is preferably provided with a shoulder or the like which will cover and protect the edge of the flange around the hole.

Therefore, the present invention as set forth herein has for one of its objects the provision of a pouring spout for a can which is simple in design, economical to make, easy to assemble, and provides a strong construction.

A further object of the invention is to provide a combined closure and spout for a sheet material can which completely seals the can and protects the peripheral edge of the sheet material around the spout.

A further object of the invention is to provide a pouring spout for a can which is assembled to the wall of the can after the can is completed.

A further object of the invention is to provide a sheet material wall of a can with a pliable pouring spout and a cap which completely seal the hole in the can when the cap is affixed to the spout, wherein the spout is reinforced or stiffened and the cap is cammed or threaded thereon.

A still further object of the invention is to provide a mounting for a pouring spout on the sheet material wall of the can wherein a sealed joint is obtained which is mechanically strong or which strengthens the wall of the can.

A still further object of the invention is to provide complementary structures in a pouring spout and a cap therefore which completely seal the pouring spout when the cap is affixed thereto, the pouring spout being made of a pliable material.

Further objects of the invention will become apparent from the claims when taken in conjunction with the fol-

lowing description of particular embodiments of the invention in association with the drawings in which:

Figure 1 is a cross-sectional view of a section of a sheet material wall of the can and the pouring spout and cap attached thereto and in sealed engagement therewith, illustrating an embodiment of the invention.

Figure 2 is a view taken approximately along the lines 2—2 of Figure 1,

Figure 3 is an exploded view of the component parts of Figure 1 illustrating the invention with the parts thereof illustrated partly in cross-section,

Figure 4 is a cross-sectional view of another embodiment of the invention,

Figure 5 is an exploded view of the embodiment of Figure 4, and

Figure 6 illustrates another modification of the invention.

Referring to the drawings wherein embodiments of the invention are shown for the purposes of illustrating the invention and not for the purpose of limiting same, the figures show a can and closure therefore, comprised of a sheet material can wall **10**, a pliable tube constituting the pouring spout **11**, a non-resilient or rigid sleeve **12**, and a cap **13** which may be somewhat resilient if desired. The wall is provided with a flange **15**, defining a hole **14** through which the spout or tube extends and to which the tube is secured by the rigid sleeve tightly fitted within and radially outwardly pressing the tube. The cap is threaded, cammed or otherwise fitted on the free end of the tube to completely seal it and is removable therefrom so that contents of the can may be poured outwardly through the tube or spout. In most instances, it is preferable to have the rigid sleeve stiffen that portion of the spout which is in threaded engagement with the cap.

The term "out-turned" flange as used herein refers to the fact that the flange extends transversely to the wall around it, and regardless of whether the flange extends in a general direction into or out of a completed can.

In the structure of Figure 1, the wall **10** is formed of a sheet material such as a ferrous sheet metal having a tinned or corrosion-proof surface coating applied thereto by plating or the like, and provided with a hole **14**. The pouring spout **11**, rigid sleeve **12**, and cap **13** are, in this case, made from suitable plastic materials as will hereinafter be more fully described.

The wall **10** (see Figure 3) has an out-turned flange **15** terminating in an unprotected edge **16**, with the out-turned flange **15** defining the periphery of the hole **14** in the sheet metal wall **10**. This edge **16** is usually unprotected by the tinning, plating or other coatings which are applied to the surface of the sheet metal in the wall **10** since the hole is usually punched therein after the coatings are applied to the sheet metal forming the wall. The out-turned flange naturally strengthens the periphery of the sheet metal around the hole **14**.

The resilient, flexible or pliable tube **11** extends through the flange **15** and thus through the hole **14** and is provided with a collar **17** on one end thereof which is adapted to seat tightly against the inside surface **18** of the sheet metal wall **10** of the can. The tube or spout **11** has a longitudinal passage therethrough. In accordance with the present invention, the portion of the tube or spout **11** which is received in the opening **14** has, before its insertion in such opening, outer dimensions at least equal to the dimensions of the opening, so that the spout has a snug fit in this opening when initially inserted therein. The longitudinal passage in the tube or spout **11** after such insertion has pre-determined dimensions longitudinally uniform throughout the length of the opening **14** and for a substantial distance beyond. The tube **11** is preferably made of a somewhat resilient, flexible or pliable plastic material such as, for example, polyethylene, so that it can be resiliently or flexibly pushed into sealed surface contact with the inside surface **15'** of the out-turned flange **15** and the inside surface **18** of the wall by the non-resilient or rigid sleeve **12** which tightly fits into the inside of the sleeve **11** and within the out-turned flange **15**. The sleeve **12** is inserted in the longitudinal passage in the spout **11** after the spout has been positioned in the opening **14**. The sleeve has outer dimensions longitudinally uniform throughout the length of the opening **14** and greater than the pre-determined uniform dimensions at the portion of the spout **11** which is located in the opening **14**, but less than the dimensions of the opening **14** itself. By virtue of this novel structural arrangement, when the sleeve **12** is inserted into the spout passage after the spout has been inserted in the opening **14**, the material of the portion of the spout at the opening **14** will be compressed between the sleeve and the flange **15** which defines the opening **14**.

The tube or spout **11** extends outwardly from the wall and thus from the out-turned flange **15** and terminates in an inturned lip **19** at the free end thereof which is engageable by the cap **13**. The inturned lip **19**, and thus the free end of the resilient tube **11**, is surrounded by and peripherally encompassed by an external sharp corner or edge **20** adapted to cooperate with cap **13** to provide a seal when cap **13** is on the spout.

The cap **13** is provided with an internal wall surface **25** terminating in an internal peripheral bottom surface **26** which cooperate with the corner **20** and the lip **19** of the tube to completely seal the end of the tube when the cap is cammed or threaded thereon. In this instance, it has been found preferable to have the wall surface **25** and the bottom surface **26** aligned in such manner that the wall surface **25** is slightly conical upwardly and the bottom surface **26** slopes inwardly and downwardly toward the inturned lip **19** on the end of the tube **11**. In this way, the wall surface **25** will engage and press the sharp corner **20** radially inwardly and the bottom surface **26** will engage and press against the inturned lip **19** to completely seal the end of the tube **11** when the cap **13** is fastened thereon.

The cap **13** is fastened to the tube **11** with the surface **25** in sealing engagement with sharp corner **20** and with surface **26** in sealing engagement with lip **19** by providing the cap **13** with an internal cam portion such as threads **27** and the outside of the tube **11**, between the ends thereof, with a complementary cam portion such as threads **28**. In the present instance, these cooperative cam portions or threads **27** and **28** may be molded into the tube and the cap during the manufacture thereof.

The threads or the cam portions are of a semicircular V-shape, or the like which will permit stripping the spout or cap from a mold. In view of this, a mold may be constructed of a single piece of material instead of separable pieces which are necessary when the spout or cap cannot be stripped from the mold. Also, the spout or tube **11** is of thinner wall section than prior designs so that a larger opening is attained for a given outside diameter spout.

The tube **11**, being of a flexible or pliable material, is made rigid in the threaded portion by means of the rigid sleeve **12** so that good thread or cam engagement is obtained between tube **11** and cap **13**. Rigid sleeve **12** has a length sufficient to line the inside of and thereby strengthen or stiffen the threads of tube **11** as well as hold tube **11** in sealed engagement with the out-turned flange **15**. Thus, rigid sleeve **12** extends from a point between the inturned lip **19** and the threads **28**, through the flange **15** and terminates in a flange **29** which covers and seats against collar **17** on the inside of the can.

Rigid sleeve **12** is made of a material which will not be corroded by the contents of the can, such, for example and preferably, rigid non-corrosive plastic materials. It is understood that if non-corrosive materials are contained in the can, this sleeve **12** may be made of metal.

With this construction and the sealing engagements herein provided, the hole in the wall of the can is com-

pletely sealed when the cap **13** is placed tightly on the tube **11** to press edge or corner **20** into cap surface **25** and lip **19** into cap surface **26**, and sleeve **12** presses spout or tube **11** against the out-turned flange **15**.

The seal is not broken by attempting to push the spout sideways or axially relative to the wall of the can or when the can is subjected to extreme temperatures. Even though the spout and metal wall of the can have different co-efficients of expansion, the present design assures a strong, leakproof joint at various temperatures so that movement of the spout relative to the wall is not obtained when the cap is placed thereon or when other moving forces are applied thereto.

It is noted that this construction completely isolates the edge **16** of the outturned flange **15** from the contents of the can. The edge is completely on the outside of the tube or spout **11** and on the outside of the can. Corrosion of this edge **16** is further prevented by providing the tube **11** with an external resilient shoulder **31** which seats against the edge **16** to cover it. When the cap is removed from the spout during pouring of liquids therefrom, the shoulder **31** covers the edge **16** to keep contents being poured from the can from coming in contact with the edge **16**.

The modification of the invention, illustrated in Figures 4 and 5, has a sheet material can wall **110**, a pouring spout **111**, a rigid sleeve **112**, and a cap **113** which are in many respects similar to those of Figures 1 to 3 and which provide a spout and seal for the can.

In this modification, the wall **110** has an out-turned flange **115** defining hole **114**. It is understood the flange **115** may extend in either direction from the wall and is illustrated as extending from the wall towards the inside of the can whereas in the modification of Figure 1, the out-turned flange **15** extends outwardly from the can. The flange **115** terminates in an unprotected edge **116**.

The pliable tube or spout **111** has one end thereof chamfered and provided with an external shoulder **117** seatable against the edge **116** with the spout extending through the hole **114** and flange **115**. Since the end is chamfered, the spout may be pushed through the flange, shoulder end first, for assembly purposes and the shoulder **117** will snap out over the edge **116**. The spout **111** is pressed radially outwardly against the inside wall **115'** of the flange **115** and held in engagement therewith by the rigid sleeve **112**.

The rigid sleeve **112**, in this instance, is a straight hollow cylindrical sleeve with at least one end, and preferably both ends, externally chamfered to permit pressing the sleeve **112** into the spout **111** and within the flange **115**. When both ends of the rigid sleeve are chamfered, either end may be inserted first into the spout. The sleeve and spout may also be provided with suitable interlocking portions, such as bead **120** and groove **121**, to prevent easy removal of the sleeve after the spout has been assembled to the flange.

The sleeve **112** may have a length sufficient to hold the spout **111** against the flange **115** or, preferably and as illustrated, may have a length sufficient to line and thereby stiffen the threaded portion of the spout. When the sleeve **112** lines the threaded portion of the spout, the cap may be threaded down tight without collapsing the pliable spout.

Such structure, whether used in the modifications of Figure 1 or 4, also permits molding the spout of a pliable material whereby the threads can be formed in a rounded corner manner and still be stripped from a cavity type mold. It is well known that if the threads were square threads and the spout were made of a non-pliable or non-flexible material, an integrated separable mold would be needed.

It is noted that in both modifications, the flange **15** or **115** has an internal diameter R^1, the spout **11** or **111** has a pre-assembled internal diameter R^2, and a pre-assembled external diameter R^3, and the rigid sleeve **12** or **112** has an external diameter R^4. These diameters are measured before assembly of the parts and at those portions which will be aligned within the flange after assembly. A strong, rigid supporting structure which is sealed and does not leak is obtained when the pre-assembled dimensions are in one of the following relationships:

(*a*) When R^3 is equal to R^1, R^2 is less than R^4.

(*b*) When R^3 is greater than R^1, R^2 is equal to or less than R^4.

With these pre-assembly dimensions, the rigid sleeve **12** or **112** will radially outwardly press the pliable or flexible spout **11** or **111** into or against the inside **15'** or **115'** of the flange **15** or **115**, thus forming a sealed, tight and strong mounting of the spout on the wall **10** or **110**.

In assembling the device of Figure 4, the sleeve **112** may be pressed into tube **111** either before or after the tube is inserted in flange **115** and from either end of the tube. For example, and in the preferred method, the rigid sleeve **112** may first be placed in the free end, the end opposite shoulder **117**, of the spout **111** and then the spout **111** pressed into the flange **115**. After this, the sleeve **112** is pressed on into the spout **111** and within the flange **115**, the bead **120** and groove **121** interlocking to prevent the parts from separating.

This preferred method of assembly permits manufacture of the can complete with the wall and flange, the flange extending outwardly from the wall but in a direction into the completed can. The can may then be filled with liquid or other contents prior to the insertion of the spout. After the can is thus filled, the spout may be secured in the flange and the cap cammed or screwed thereon to completely seal the can. It is understood that the spout may be inserted before the wall is secured to the remainder of the can or just before the can is filled with liquid or other contents if desired.

Figure 4 also shows a modification of the sealing arrangement between the end of the spout **111** and the cap **113**. In this modification, an internal corner **119** and an external lip **121** are provided on the spout, the external peripheral lip **121** forming one shoulder of a peripheral groove in the outside of the spout **111**. Such structure permits use of a cap having an inwardly tapering wall **125** next adjacent a bottom surface **126**, and an annular bead **127** on the bottom surface. The wall **125** engages the lip **121** and the bead **127** engages the corner **119** to seal the cap and spout.

It is also understood that the spout and sleeve arrangement of Figure 4 may be used with the flange and wall of Figure 1, or the spout and sleeve arrangement of Figure 1 may be used with the flange and wall of Figure 4. However, in such cases slight alterations in the shoulder and collar will be necessary to cover the edge of the flange.

A further modification of the invention is illustrated in Figure 6. In this modification, can wall **210** supports pliable tube or spout **211** which is held in tight and sealed engagement therewith by means of non-resilient or stiff sleeve **212**. As in the other preferred embodiments, the can wall **210** is provided with a flange **215** engaged by the tube **211**. The flange **215** may be extended at an angle of other than 90° to the wall **210**, or as illustrated, the flange extends outwardly and somewhat back over the wall to provide a tapered opening or hole therethrough. The tube **211** is provided with a tapered surface adapted to engage the tapered inside surface **215'** of the flange **215** and is provided with a shoulder **231** to engage the edge of the flange to cover that edge. The tube **211** is also provided with a shoulder **217** to engage the inside surface of the wall **210** around the flange **215**. This shoulder or surface **217** is formed by chamfering or tapering the end of the tube **211**, thus providing the tube **211** with a chamfered surface **225**.

In this modification of Figure 6, the tube or spout may be inserted easily from the outside of the can **210** even though the flange extends outwardly since the chamfered

surface 225 will easily slide on the surface 215' when the tube is shoved through the flange. After the tube and the shoulder 217 thereof have been shoved through the flange, the shoulder 217 snaps outwardly so that the flange 215 is between the shoulder 217 and the shoulder 231. The rigid sleeve 212 is easily inserted in the tube 211 after the tube 211 has been shoved through the flange to lock the tube 211 in the flange. With this modification, a leakproof seal is provided between the tube and the flange and the wall 210, the same as in the other modifications of the invention as illustrated and described herein. The tube 211 may be provided with a cam portion or threads and seal portions, the same as the other modifications, to co-operate with a cap, not illustrated in Figure 6.

It is noted in all of the embodiment that the pliable tube forming the spout is held in leakproof engagement with the flange on the can wall by a non-resilient or rigid tube so that a leakproof construction is obtained regardless of the variations in temperatures or pressures to which the structure may be subjected. In each embodiment of the present invention the pouring spout has a snug fit in the can opening by virtue of the fact that, before insertion of the spout, the outer dimensions of the portion of the spout which is located in the opening are at least equal to the dimensions of the opening itself. At this portion of the spout the spout passage has predetermined dimensions longitudinally uniform throughout the length of the can opening, at least. The rigid sleeve has outer dimensions longitudinally uniform at least throughout the length of the can opening and greater than said pre-determined dimensions of that portion of the spout passage, but less than the dimensions of the can opening itself. In this way the material of this portion of the spout is compressed between the sleeve and the can surface which defines the opening. It is also noted in all of the embodiments that a relatively thin walled tube, or pliable spout, is provided which has thread or cam portions adapted to be stripped from a mold and that these portions are prevented from collapsing by means of the rigid liner sleeve. In this way, a cap may be fixed on the tube or spout without collapsing the tube or spout and with a leakproof seal between the can and the spout.

It will be appreciated that preferred forms only which the invention may take have been illustrated and described in this specification. Obviously, modifications and alterations differing radically in appearance from those herein described will occur to others on a reading and understanding of this specification. It is my intention to include all such modifications and alterations insofar as they come within the scope of the appended claims.

Having thus described my invention, I claim:

1. In the combination of a thin walled can having an opening therethrough defined by a surface, and a pouring spout of a pliant plastic material having a portion positioned within said opening and sealingly engaging said surface, said portion having a longitudinal passage therethrough, the improvement which comprises: said portion before insertion in said opening having outer dimensions generally at least equal to the dimensions of said opening, said passage after said portion is inserted in said opening having predetermined dimensions longitudinally uniform at least for the length of said opening, and a rigid sleeve inserted in said passage after said portion is inserted in said opening, said sleeve having outer dimensions longitudinally uniform at least for the length of said opening and greater than said passage predetermined dimensions, but less than said opening dimensions, whereby when said sleeve is inserted into said passage after said portion is inserted in said opening, the material of said portion will be compressed between said sleeve and said opening surface.

2. The improvement of claim 1 wherein said spout has external threads, the passage inwardly of said threads has predetermined dimensions and said sleeve has a length such as to extend through said passage inwardly of said threads and having outer dimensions at least equal to the internal dimensions of said passage inwardly of said threads.

3. The improvement of claim 1 wherein said spout has outwardly extending beads, one on each longitudinal end of said portion spaced a longitudinal distance generally equal to the longitudinal length of said opening surface whereby said beads will engage the longitudinal ends of said surface when said spout is assembled in said opening.

4. The improvement of claim 1 wherein said passage has at least one inwardly extending bead spaced from said portion and said sleeve has at least one groove corresponding to said bead whereby when said sleeve is inserted in said passage, said groove and bead will match and asssist in retaining said sleeve in said passage.

5. The improvement of claim 1 wherein said surface is on a flange extending longitudinally toward the outside of said can and said spout has a flange bearing against the inner side of said can and an outwardly extending bead engaging the outer end of said flange.

6. The improvement of claim 1 wherein said surface is on a flange extending longitudinally inwardly of said can and said spout has a pair of outwardly extending beads spaced longitudinally the length of said flange, the inner surface of said bead on the inner end of said spout converging inwardly whereby said spout may be inserted in said opening from the outside of said can.

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