

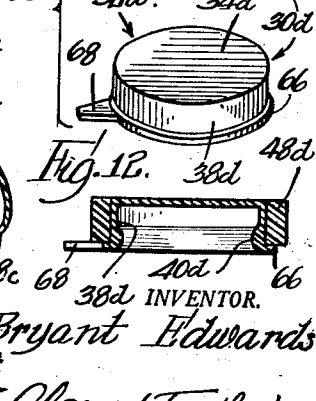
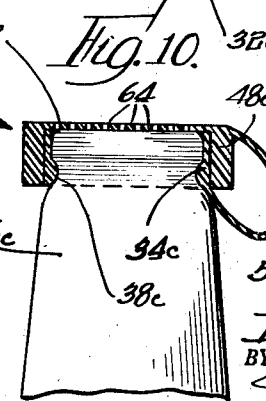
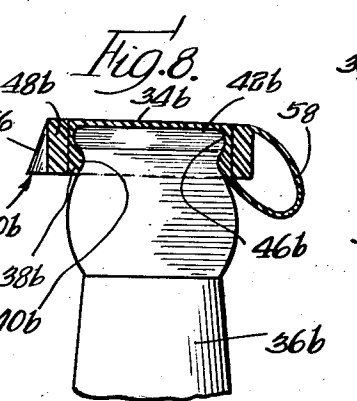
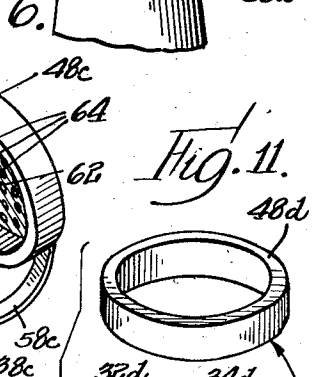
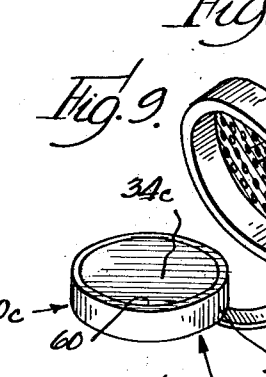
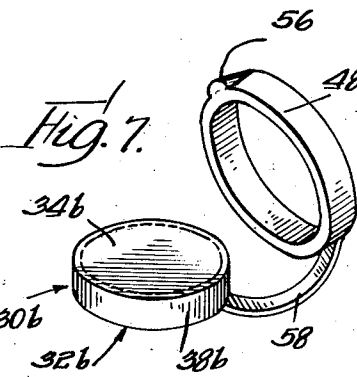
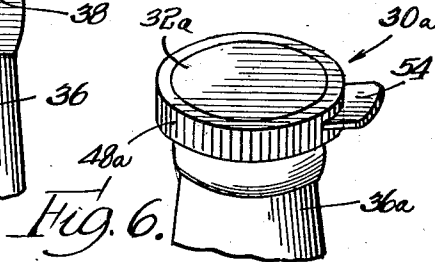
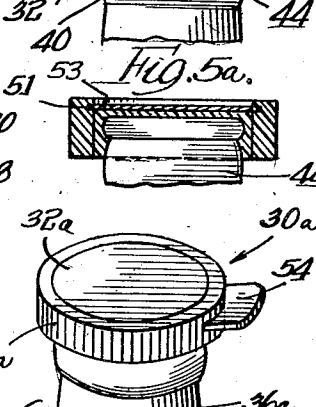
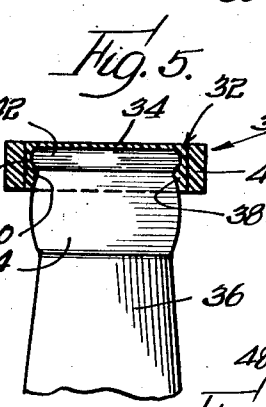
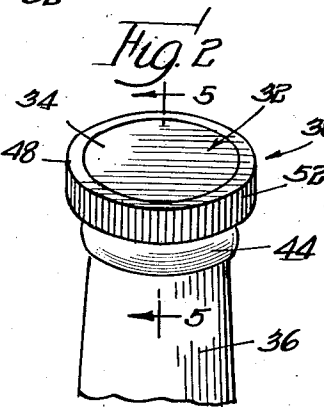
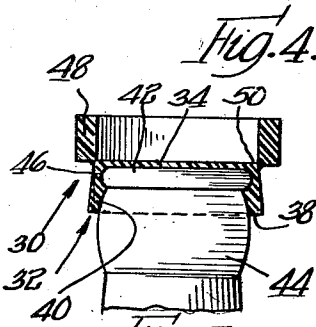
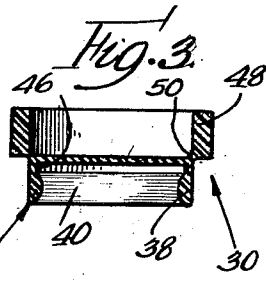
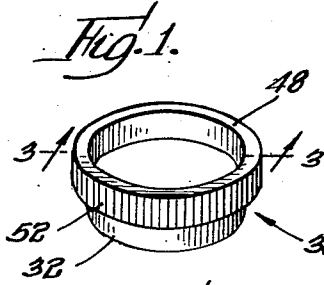
Nov. 26, 1957

B. EDWARDS
CLOSURE DEVICE

2,814,405

Filed Dec. 31, 1954

3 Sheets-Sheet 1



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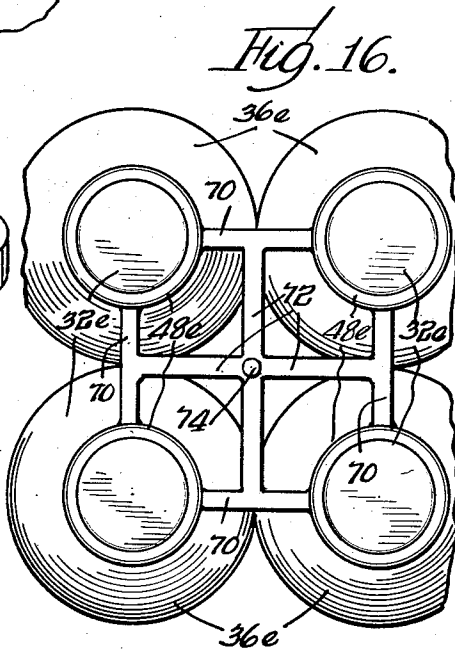
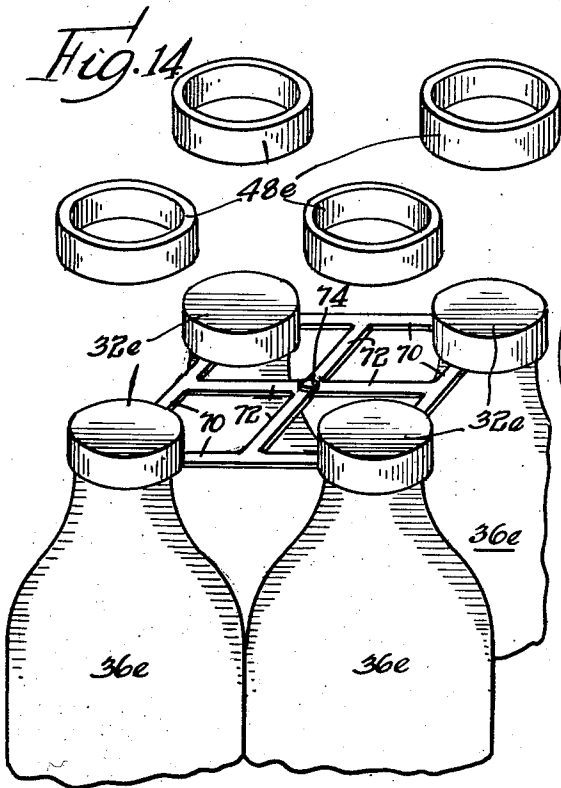
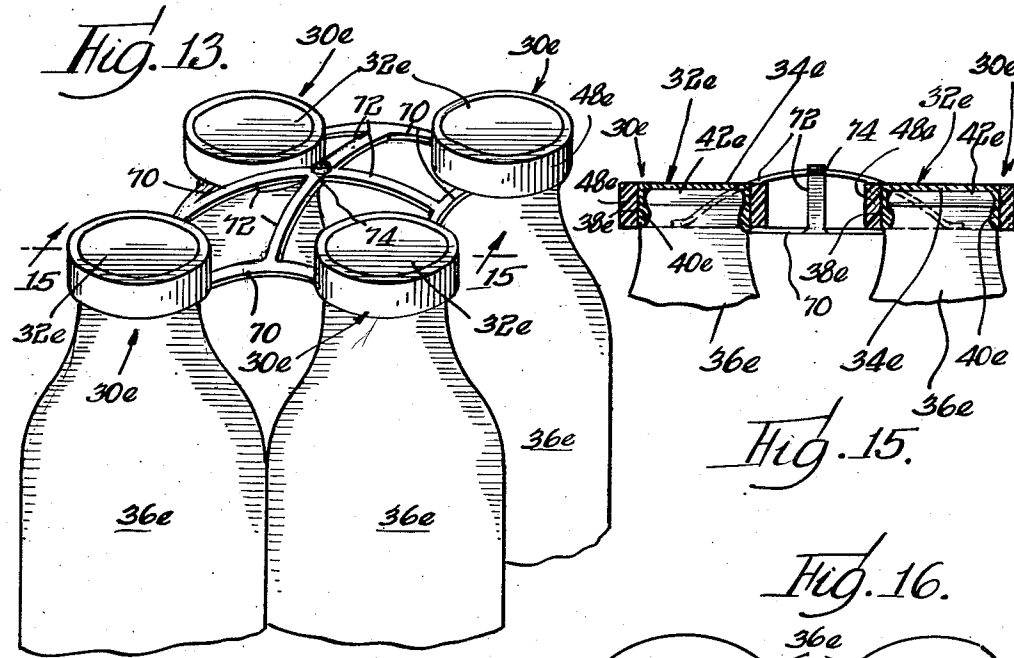
Nov. 26, 1957

B. EDWARDS
CLOSURE DEVICE

2,814,405

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3 Sheets-Sheet 2



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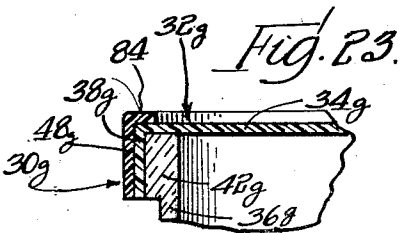
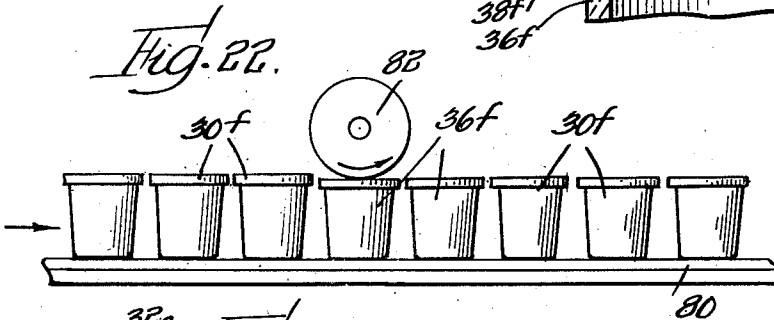
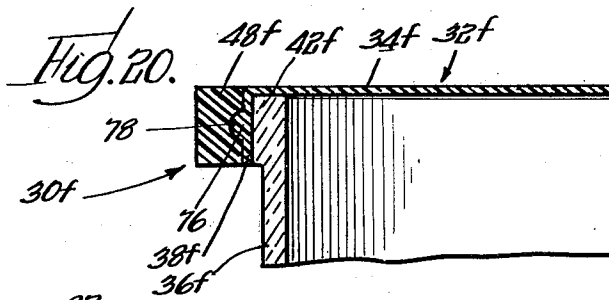
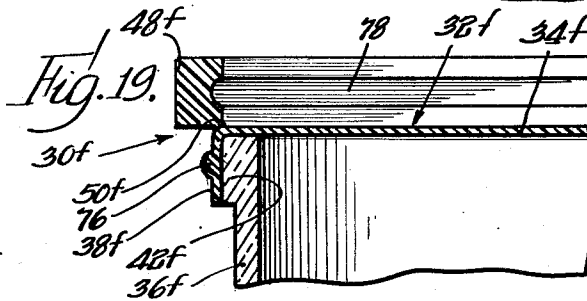
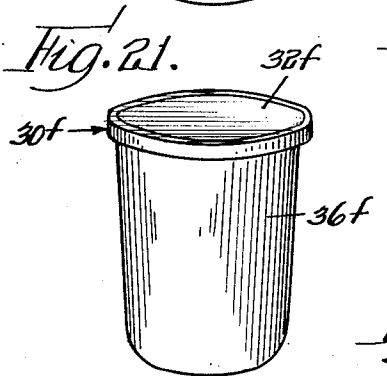
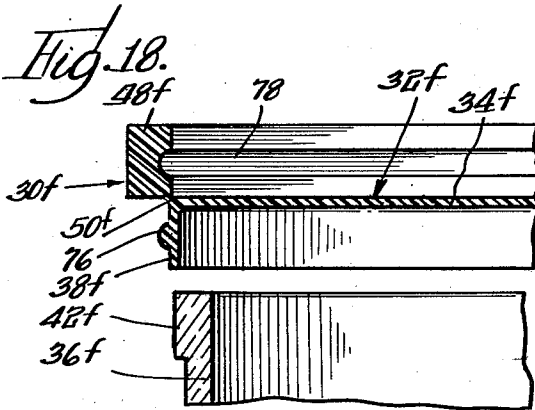
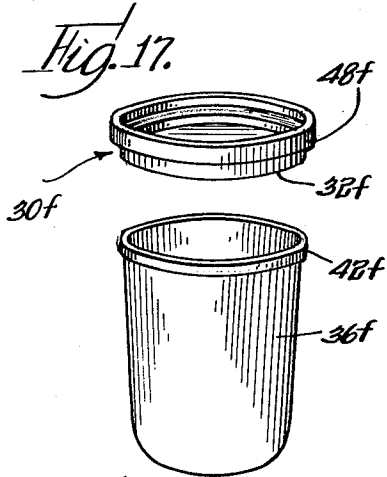
B. EDWARDS

2,814,405

CLOSURE DEVICE

Filed Dec. 31, 1954

3 Sheets-Sheet 3



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2,814,405

CLOSURE DEVICE

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Application December 31, 1954, Serial No. 479,031

5 Claims. (Cl. 215—41)

This invention is concerned generally with the art of sealing containers such as bottles and jars, and is concerned more specifically with a new and improved removable sealing cap which is capable of reuse after removal.

Most caps which seal a container such as a bottle or jar have required deformation for removal, thereby rendering the caps unsuitable for further closure of a bottle or jar, particularly when it is necessary or desirable to form a tight closure approximating a seal to prevent passage of air and other fluids into or out of such containers. It is true that screw caps generally can be reused, but screw caps often are difficult to remove, and the production of screw caps and accompanying screw topped bottles or jars is expensive. Various types of non-metallic closure members for jars or bottles have been utilized, but these closure members also have had serious defects. Many of them have been too expensive for "throw-away" use. Others have failed to seal the container with which they have been associated, and in general the non-metallic closure members have been too easily dislodged from the containers with which they have been associated. Others have required special and expensive bottle capping equipment for applying the caps.

Accordingly, it is an object of this invention to provide an improved closure member of plastic or other elastic or deformable material which is capable of sealing a jar or bottle, which readily may be removed and reinstalled for subsequent use, and which readily is installed initially by existing bottle capping equipment with only minor modification of such equipment being required.

Yet another object of this invention is to provide a bottle or jar cap of elastic material comprising a cap element and a retaining member integral therewith and telescopically associated with the cap element for holding the same tightly in place.

More specifically, it is an object of this invention to provide an elastic cap for jars and bottles comprising a cap element and a retaining ring connected thereto by an integral connection which readily is sheared whereby to allow telescoping of said ring with said cap element to hold said cap element tightly in place.

Yet another object of this invention is to provide a bottle or jar cap of the character contemplated by the foregoing objects, wherein the retaining ring is provided with a tab facilitating removal thereof.

It is another object of this invention to provide a removable and replaceable cap structure for jars or bottles which is adapted for use in sprinkling material, such as salt or the like, from a bottle or jar.

A further object of this invention is to provide a plurality of interconnected bottle or jar caps of elastic material adapted to serve as a carrier of such jars or bottles.

It is a still further object of this invention to provide a cap structure of elastic material for jars, bottles, or the like, comprising a cap element and a retaining ring therefor, said cap element and retaining ring having inter-

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locking means thereon preventing accidental removal of the retaining ring.

Other and further objects and advantages of the present invention will be apparent from the following description, when taken in connection with the accompanying drawings, wherein:

Fig. 1 is a perspective view of a cap structure constructed in accordance with the principles of my invention;

Fig. 2 is a similar view showing the structure placed on top of a bottle;

Fig. 3 is a longitudinal sectional view through the cap structure taken substantially along the line 3—3 in Fig. 1;

Fig. 4 is a cross sectional view of the cap structure mounted on top of a bottle and before telescoping of the parts of the cap structure;

Fig. 5 is a view similar to Fig. 4 after telescoping of the parts and taken substantially along the line 5—5 of Fig. 2;

Fig. 5a is a view similar to Fig. 5 illustrating a minor modification;

Fig. 6 is a perspective view generally similar to Fig. 2 showing the cap structure in telescoped position on top of a bottle, the retaining ring in this instance being provided with a tab for removing the ring;

Fig. 7 is a perspective view showing a modified form of the invention;

Fig. 8 is a longitudinal sectional view showing the modification of Fig. 7 as applied to the top of a bottle with the parts of the cap structure in telescoped relation;

Fig. 9 is a view similar to Fig. 7 showing a further modification of the cap structure adapted for use as a salt shaker cover or the like;

Fig. 10 is a longitudinal sectional view showing a bottle adapted for use as a salt shaker or the like by means of the cap structure of Fig. 9;

Fig. 11 is a further modified form of the invention wherein the cap element and retaining ring are made of different materials;

Fig. 12 is a longitudinal view of the form of the invention shown in Fig. 11;

Fig. 13 is a perspective view showing a plurality of cap structures in accordance with the principles of my invention interconnected for use in carrying a plurality of bottles;

Fig. 14 is a perspective view of the form of the invention shown in Fig. 13 before telescoping of the cap elements and retaining rings;

Fig. 15 is a longitudinal sectional view of the form of the invention shown in Fig. 13 and taken substantially along the line 15—15 of Fig. 13;

Fig. 16 is a plan view of the form of the invention shown in Fig. 13;

Fig. 17 is a perspective view of a further form of the invention as applied to a jar;

Fig. 18 is a longitudinal sectional view through the form of the invention shown in Fig. 17;

Fig. 19 is a view similar to Fig. 18 after assembly of the cap structure with the jar, but before telescoping of the parts of the cap structure;

Fig. 20 is a view similar to Fig. 19 following telescoping of the retaining ring with the cap element;

Fig. 21 is a perspective view showing the cap structure assembled with the jar;

Fig. 22 is a somewhat simplified view illustrating the telescoping of the parts of the cap structure; and

Fig. 23 is a fragmentary longitudinal sectional view generally similar to Fig. 20 and showing a further modified form of the invention.

Referring now in greater particularity to the drawings, and first to Figs. 1—5, there will be seen a cap structure identified generally by the numeral 30. This cap struc-

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ture comprises a cap element 32 having a flat top or diaphragm 34 adapted to lie across the top of a bottle 36 or the like, and a depending circumferential flange 38. The flange 38 is provided with an inner, annular ridge or bead 40 adapted to lie beneath the bead 42 of the bottle 36 and against the bilge 44 directly beneath the bead 42 at the top of the bottle. The bead or ridge 40 in the cap flange 38 is spaced from the diaphragm 34 by a groove or neck portion 46 adapted to receive the bottle bead 42. The cap structure 30 also includes a ring 48 joined to the cap element 32 along the junction of the diaphragm 34 and flange 38 by a narrow integral section 50 adapted to be fractured or sheared by downward pressure on the ring relative to the cap element.

The cap structure, including both the cap element and the ring, is made of elastic or deformable material, plastic material being preferred, and polyethylene plastic being a preferred example. The inside diameter of the retaining ring 48 and the outside diameter of the cap element flange 38 are substantially equal prior to installation on a bottle, as readily may be seen in Fig. 3. When the cap element is placed over the top of a bottle, it is stretched somewhat, thereby causing the outside diameter of the flange 38 to be enlarged somewhat over the inside diameter of the retaining ring 48, this flange also being tapered slightly outwardly away from the ring, as may be seen in Fig. 4. Thus, when a force is applied to the ring to force it down over the cap, by means such as a blow of a mallet or hammer, the ring will be stretched over the flange and thereby will grip the flange and force it tightly about the top of the bottle, the bead 40 of the cap element being deformed substantially into conformity with the junction of the bottle bead 42 and bilge 44, as readily may be seen in Fig. 5. The bottle thus is sealed sufficiently tightly for shipment in commerce, and any number of items could be shipped in the bottle. Such items might include catsup and other types of spices or condiments, or any of a variety of other items or substances. The cap element will be held tightly in place as long as the ring encircles the cap flange. In order to facilitate removal of the ring from the cap element when it is desired to utilize the contents of the bottle 36 or the like, the ring may be knurled or provided with serrations around its outer surface, as is illustrated at 52. Following removal of the ring, the cap element can be pulled off the top of the bottle by the fingers, generally without the aid of any additional implement, and at the most requiring a simple implement such as a table knife for added force. Since the cap is formed of elastic material, the cap element is not damaged by forcing it from the top of a bottle, and it may readily be reinstalled over the top of the bottle, again stretching somewhat in being so applied. The stretching of the flange of the cap element causes it to hold rather well on the top of the bottle for home storage, but it will be understood that the cap in this manner is not mounted on the bottle top nearly so securely as when the retaining ring is in place. It will be understood that the bottle and contents could not be shipped in commerce with only the cap element in place, the retaining ring being omitted.

As is shown in Fig. 5a, the ring 48 could extend above the cap element and be provided with an inner groove 51 receiving a disk 53 having identifying indicia or advertising matter thereon.

A modified form of the invention as heretofore described is shown in Fig. 6, and in this modification it is simpler to remove the retaining ring. The parts shown in Fig. 6 are generally identical with those heretofore shown and described, and are identified by similar numerals with the addition of the suffix *a*. Thus, the cap structure 30a comprises a cap element 32a and a retaining ring 48a holding the cap element on the top of a bottle 36a. The outer surface of the retaining ring may be knurled in accordance with the previous embodiment, or it may not be. The significant feature is that the retaining ring is provided with an integral tab 54 which pref-

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erably is arranged with its plane more or less perpendicular to the axis of the cap structure. This tab facilitates removal of the ring from the cap element, and this may in some instances be extremely desirable. It will be understood that the cap element and retaining ring originally are joined together by a narrow shear section similar to that previously described.

A further embodiment of the invention is illustrated in Figs. 7 and 8. In this embodiment of the invention, the parts which are similar to those heretofore described are identified by similar numerals with the addition of the suffix *b*. The cap element 32b of the cap structure 30b remains substantially as before, comprising a top wall or diaphragm 34b having a depending peripheral flange 33b. The flange again is provided with an internal ridge or bead 40b and with a groove or space 46b for receiving the bead 42b at the top of a bottle 36b. The retaining ring 48b in the present instance is not knurled on its outer surface, but rather is provided with a tab or finger piece 56 for facilitating removal of the retaining ring from the cap element. The retaining ring is not integrally connected to the cap element by a shear section in the present instance, but rather is integrally connected by means of a flexible strip 58. This flexible strip is not sheared during telescoping of the cap element and ring, but simply is flexed into place and may serve along with the finger piece 56 as an aid to removing the ring. It is to be understood that the flange of the cap element normally has an outside diameter equal to the inside diameter of the retaining ring, but that stretching of the flange upon insertion over the top of the bottle increases this outside diameter so that the retaining ring must be stretched to fit over the cap element flange. Thus, a secure grip is had by the cap structure on the top of the bottle. The flexible strip 58 keeps the retaining ring from being lost, and it readily can be forced down over the cap element during reuse for the best possible securing of the cap structure on the bottle. It will be appreciated, that the ring in the previous embodiments similarly could be retained, although it would be less convenient since the ring in the prior forms is an entirely separate article following the first installation of the cap structure on the bottle. Alternatively, the flexible strip 58 could be cut off with a scissors or the like and the cap element could be reused alone in the absence of the retaining ring. The material again is elastic, and as in the two previous embodiments preferably comprises polyethylene plastic.

A further embodiment of the invention is illustrated in Figs. 9 and 10 for adapting a bottle or the like to use as a salt shaker or the like. This embodiment of the invention is generally similar to that shown in Figs. 7 and 8, and similar parts to those previously described are identified by the same numerals with the addition of the suffix *c*. The cap structure 30c again comprises a cap element 32c having a top wall, diaphragm, or web 34c joined thereto by a score line 60. The cap element again comprises a depending peripheral flange 33c having an internal bead 34c for facilitating association of the cap element with the top of a bottle 36c. The retaining ring 48c is provided across its upper end with a diaphragm or web 62 having a plurality of holes 64 therein, and the ring is secured to the cap element by an integral flexible strip 58c. For initial shipping, the cap element and retaining ring are placed over the top of a bottle as heretofore. For use by the consumer, the diaphragm or web 33c of the cap element is removed from the flange 33c by a simple punching or cutting operation, and the retaining ring 48c is reinstalled over the flange of the cap element. The holes 64 in the diaphragm or web 62 preferably would be preformed, but if not, it would be a simple matter to punch them in the rather soft material of which the cap structure is made, this material again being of an elastic nature, preferably polyethylene. Thus, the bottle 36c can be inverted and salt or other granular material can be shaken therefrom. Such salt or the like could be supplied

in a bottle initially, or the bottle could be converted for this use. Also, the bottle and perforated cap structure could be utilized for sprinkling water or other liquid from the bottle for purposes such as dampening clothes that are to be ironed. Furthermore, the web 34c could be perforated instead of being removed, and ring 48c could be rotated relative to the cap element to align these perforations with the perforations 64.

Under some circumstances it might be desirable to utilize a retaining ring of hard or other non-elastic material. Since the cap must be flexible or elastic for proper operation, then the cap element and retaining ring would generally be made separate. However, it is contemplated that suitable materials could be utilized so that heat or chemical treating of the cap element and ring by different processes would result in a generally flexible or elastic cap element and a hard and non-elastic ring. A construction wherein the ring is made of hard or other non-yielding material is shown in Figs. 11 and 12. The construction in the main is similar to that previously described, and similar numerals again are utilized, this time with addition of the suffix *d*. The cap element 32*d* of the cap structure 30*d* again is of elastic material, preferably polyethylene plastic as has been mentioned heretofore. The cap element again comprises a web or diaphragm 34*d* having a depending peripheral flange 38*d* with an internal ridge or bead 40*d*. In the present instance, the flange 38*d* is provided with a radially extending peripheral flange 66 at its lowest extremity to prevent inadvertent movement of the ring to a position beyond which it is supposed to be telescoped. The cap element further is provided with a tab 68 extending radially from the flange 66 to facilitate removal and reinstallation of the cap element. In the present example of my invention, the retaining ring 48*d* is shown as being separate from the cap element. The retaining ring in the present instance may be made of metal or of a hard plastic which will not stretch to any appreciable extent, thereby holding the cap element about the top of a bottle or the like with an even greater degree of tenacity than in the previous examples of my invention. It will be understood that the limiting or stop flange 66 could be applied to any of the forms of my invention, but is of particular utility when the cap element and ring are of different materials and wherein the non-elastic character of the ring may require a harder or stronger force or push to telescope with the cap element.

The bottle cap structure, in accordance with my invention, is capable not only of closing the top of a bottle or jar, but also is capable of forming a carrier or support for a plurality of bottles or jars. It is now common practice to carry various beverages, either in bottles or in cans, in units of a half dozen or so. Special carriers or containers of various types have been devised for this purpose, and the most advanced of these attach only to a can bead or the like, for carrying. However, it has heretofore been necessary to support jars or bottles from below, no satisfactory structure having as yet been devised for carrying bottles and jars only from the top. With some modification, my bottle or jar cap structure is capable of so carrying bottles and jars as is illustrated in Figs. 13-16. Thus, in these figures the cap structure 30*e*, similar parts again being identified by similar numerals with the addition of the suffix *e*, again comprises a cap element 32*e* and a retaining ring 48*e*. The cap element comprises a web or diaphragm 34*e* and a depending peripheral flange 38*e* having an internal ridge or bead 40*e*. The flange 38*e* again is held about the top of a bottle 36*e* with the internal ridge or bead 40*e* of the cap element fitting beneath the bead 42*e* of the bottle. A retainer ring 48*e* may be integrally connected to the cap element by means of a shear section, or by means of a flexible strip as heretofore has been described, or the retainer ring may be formed of a different material and may be entirely separate from the cap element. The latter alternative is illustrated in Fig. 14.

The novelty of the structure of Figs. 13-16 over the previous embodiments of the invention resides in the provision of flexible strips 70 interconnecting the cap elements 32*e* of a plurality of cap structures 30*e*. These strips 70 in turn are interconnected by cross strips 72 corresponding to the runners of the forming mold which are integrally connected at the intersection 74 corresponding to the sprue. Thus, the connecting strips 70 secure a plurality of bottles 36*e* in abutting relation, and the group of bottles can be lifted simply by slipping the fingers under one or more of the connecting strips 72. The material of the strips and of the cap elements again is of an elastic nature, preferably comprising polyethylene, and this material is sufficiently soft that the bottles readily can be separated by cutting the strips 70 by means such as a knife or scissors, or the bottles may be separated one by one by removing the cap structures therefrom.

The various examples of my invention heretofore shown and described all have utilized internal ridges or beads for locking beneath the beads at the top of the bottles or small jars. The cap structure also is usable in conjunction with bottles or jars of the wide-mouth variety having a bead of rather substantial axial length, thereby rendering it in some instances impractical to form a cap structure to extend below this bead. In this case, the cap structure may be held on the bead frictionally, as is illustrated in Figs. 17-22. The parts in this figure are largely similar in construction and function to those previously described, and brevity again is served by utilizing similar numerals with the addition of the suffix *f*. The container in this instance is illustrated as being a jar 36*f* having a rather high bead 42*f*. This is the type of jar often used for packing fruit preserves and the like.

The cap structure 30*f* again comprises a cap element 32*f* and a retaining ring 48*f*, the cap element and retaining ring in this instance being joined by a narrow shear section 50*f*. The cap element again comprises a web or diaphragm 34*f* and a depending peripheral flange 38*f*. In the present instance, due in part to the rather great height of the bead 42*f* of the jar, there is no internal ridge or bead provided on the flange of the cap element.

It will be appreciated that the large diameter of the cap structure in Figs. 17-22 relative to the height thereof, renders the cap structure more flexible than in the previous forms of the invention. As a result, accidentally encountered forces might tend to remove the retaining ring from the cap element. Such accidental separation is combatted by the provision of a circumferential ridge on the outside of the cap flange, this ridge being identified by the numeral 76, and by a complementary internal groove in the retaining ring 48*f*, the latter being indicated at 78. Thus, when the ring is telescoped over the cap from the position of Figs. 18 and 19 to the position of Fig. 20, the complementary ridge and groove will interlock securely to hold the ring on the cap until it is desired to remove the same. It will be appreciated that the cap element is stretched in being placed over the bead 42*f* as may be seen with reference to Fig. 19 as against Fig. 18, and that the retaining ring thus will be stretched in moving over the cap element. Accordingly, the cap element flange and retaining ring exert a substantial inward radial pressure frictionally to lock the cap on the jar 36*f*. This frictional force may be augmented if the material in the jar is vacuum packed, as often is the case, by atmospheric pressure bearing against the diaphragm or web 34*f* of the cap element.

It has been indicated heretofore that the retainer ring and cap element might be telescoped by any suitable force such as a blow from a mallet or hammer. It will be appreciated that this is a rather crude method of assembly, since it requires an undue amount of hand labor. An improved and more practical method of assembly is illustrated in Fig. 22 in connection with the jar 36*f* and the cap structure 30*f*. In this figure, the jars are shown

as supported by a conveyor 80 of any suitable type which carries them beneath a roller 82. The roller successively engages the retainer rings 48f of the cap structures 30 to force them down over the cap elements 32f, shearing off the integral connecting sections 50f in so doing.

One further form of my invention is illustrated in Fig. 23. The parts again are generally similar to those previously shown and described, and similar part numerals are utilized with the addition of the suffix g. The container again is illustrated as being a jar 36g having a cylindrical bead 42g. The cap structure 30g includes a cap element 32g having a web or diaphragm 34g and a depending peripheral flange 38g. The retaining ring 48g is generally similar to those previously described, but additionally is provided with a radially inwardly directed circumferential flange 84 at its upper edge. This flange overlies the top of the cap element 32g and prevents the ring from being telescoped with the cap element to a degree beyond that which is intended.

It will be seen from the foregoing description that I have invented an improved cap structure comprising two major sections, namely a cap element and a retainer ring. The retainer ring serves securely to hold the cap element about the top of the bottle, jar, or the like, and the cap element can be reused either with or without the retainer ring. The elastic nature of the material of the cap permits it to be used a large number of times without being permanently deformed or destroyed. In several forms of my invention, the retainer ring is made integral with the cap element, thereby facilitating initial handling of the closure or cap structure before assembly with a bottle or jar. In several forms of my invention, the integral connection is sheared off during assembly, while in other forms the integral connection remains as a flexible tab facilitating removal both of the ring and of the cap element. In no case is any decapping tool needed for either the retaining ring or cap element, thus representing an important stride forward in the art.

In addition to closing the top of a bottle or jar, my closure structure is capable of acting as a sifting or a sprinkling head for disseminating salt or other condiments, or water or other liquids for sprinkling clothes or the like. The closure means or cap structure also is capable of integral interconnection for carrying a plurality of jars or bottles in contiguous relation as a unit.

The cap element and retaining ring of my invention both may be stretched during installation to provide an elastic retention of the closure means on the top of a jar, bottle, or the like. Alternatively, the retainer ring may be of hard and relatively non-yielding material positively insuring against any deformation of the cap flange when installed in order positively to guard against leakage of air or the like.

It is to be understood that the several embodiments of my invention herein shown and described are for illustrative purposes only. Various additional structural changes will no doubt occur to those skilled in the art, and will be understood as forming a part of my invention insofar as they fall within the spirit and scope of the appended claims.

I claim:

1. An elastic plastic closure device for application to an end portion of a container, such as a bottle and the like; and comprising a body member having an annular portion of predetermined axial extent adapted to be applied around the upper end portion of the container and having an inner surface adapted to substantially conform to the adjacent wall of the end portion of the container, and an annular retainer member initially axially offset from the body member with an inner surface substantially of the same diameter as the outer surface of said body member and of substantially the same axial extent, the outer

surface of said retainer member being radially offset outwardly with respect to the outer surface of said body member, and means providing a narrow integral and shearable junction substantially between the inner and lower edge portion of the retainer member and the outer and upper edge portion of the body member, said body member being adapted for slight expansion substantially independently of the retainer member upon application to the end portion of the container to a position where the inner surface of the retainer member is offset inwardly of the outer surface of the body member to grip the same upon telescopic association therewith, and said integral junction between the body and retainer members being broken upon shifting of the retainer member axially to telescope with and embrace substantially the entire outer surface of the body member under stress whereby to exert a compressive retaining force on the body member substantially throughout the axial extent thereof.

2. An elastic plastic closure device as claimed in claim 1, wherein a surface of the body member is provided with an annular bead operable to assist in maintaining the device in position on the end portion of the container.

3. An elastic plastic closure device as claimed in claim 1, wherein the inner surface of the body member is provided with an inwardly extending annular bead adapted for engagement beneath a complementary bead on the end portion of the container.

4. An elastic plastic closure device as claimed in claim 1, wherein the outer surface of the body member is provided with an outwardly extending annular bead, and wherein the inner surface of the retainer member is provided with a complementary annular recess receiving the annular bead when the body and retainer members are telescoped with respect to one another.

5. In combination with a container, such as a bottle and the like, having an open end portion of predetermined outside diameter; the provision of an elastic plastic closure device comprising a body member having an annular portion of predetermined axial extent with an inner surface of slightly smaller diameter than the outside diameter of the end portion of the container and stretched thereover to snugly engage the outer surface of the end portion of the container, said closure device also including an annular retainer member initially axially offset from the body member with an inner surface offset slightly inwardly of the outer surface of the body member when said body member is applied to the end portion of the container and said retainer member being of substantially the same axial extent as the body member, and means providing a narrow integral and shearable connection substantially between the inner and lower edge portion of the retainer member and outer and upper edge portion of the body member, said integral connection between the body and retainer members being broken upon shifting of the retainer member axially to telescope with and embrace substantially the entire outer surface of the body member under stress resulting from the inner surface of the retainer member being stretched over the outer surface of the body member whereby to exert a compressive retaining force on the body member substantially throughout the axial extent thereof which is in engagement with the outer surface of the end portion of the container.

References Cited in the file of this patent

UNITED STATES PATENTS

1,430,685	Sampson	Oct. 3, 1922
2,398,554	Nyden	Apr. 16, 1946
2,421,356	Saffady	May 27, 1947
2,439,845	De Swart	Apr. 26, 1948
2,665,023	Migneault	Jan. 5, 1954
2,669,369	Towns	Feb. 16, 1954
2,671,572	Satz	Mar. 9, 1954