May 7, 1963 A. KRAUTKRAMER 3,088,617

CONTAINER

Filed June 7, 1960 3 Sheets-Sheet 1

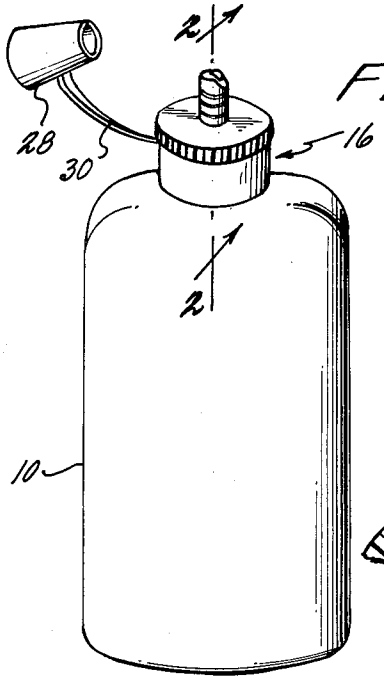


FIG. 1.

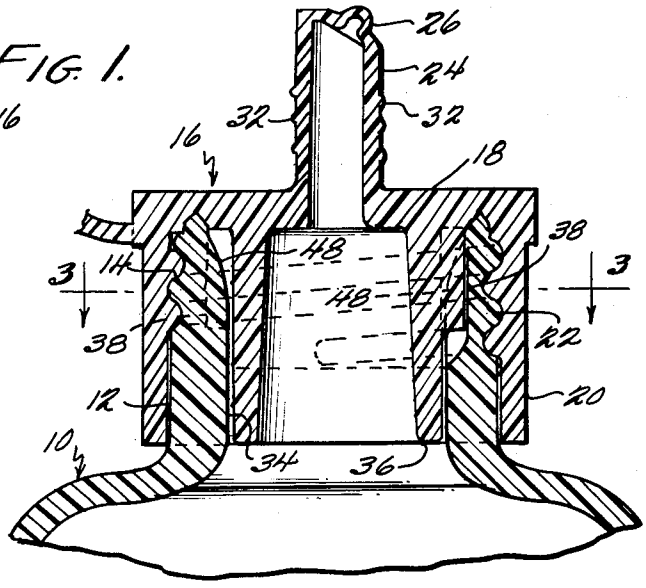


FIG. 2

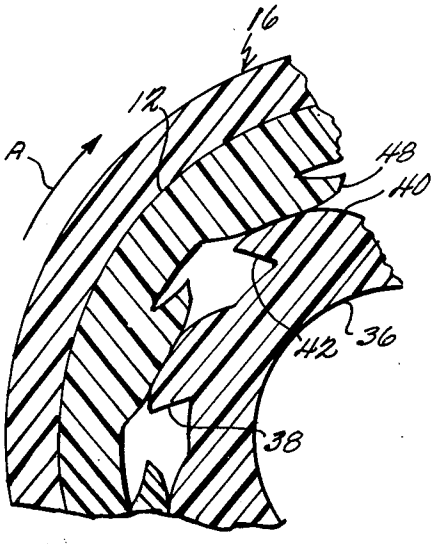


FIG. 5

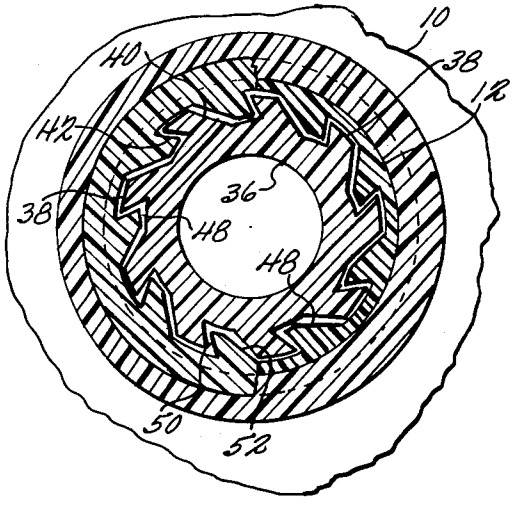


FIG. 3

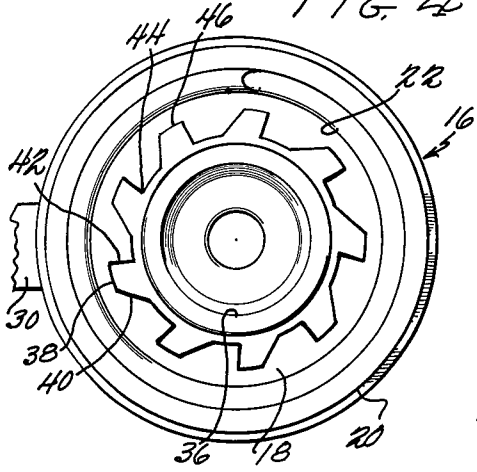
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May 7, 1963 A. KRAUTKRAMER 3,088,617

CONTAINER

Filed June 7, 1960 3 Sheets-Sheet 2

FIG. 4



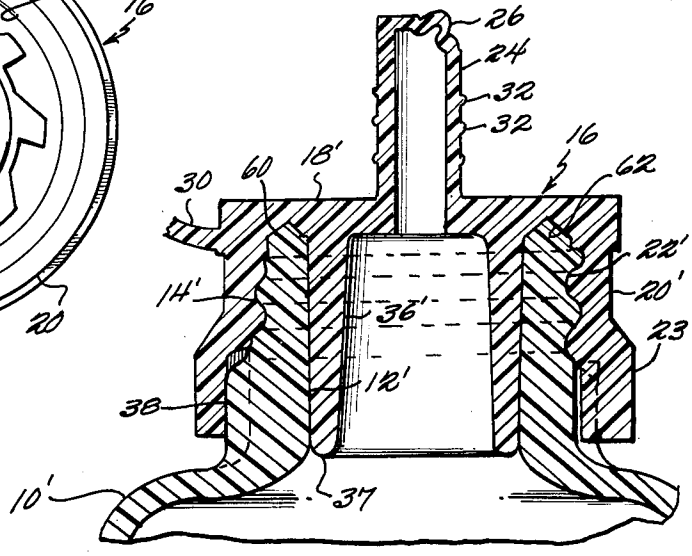


FIG. 6

FIG. 7

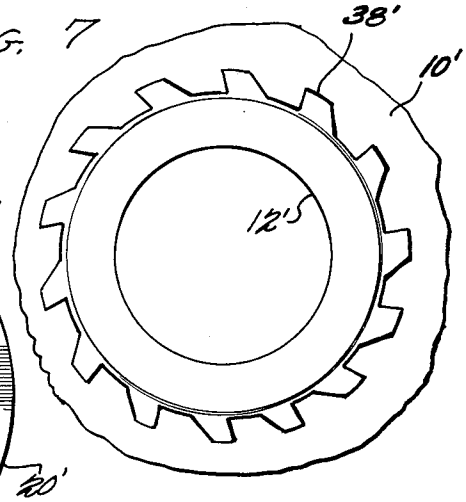
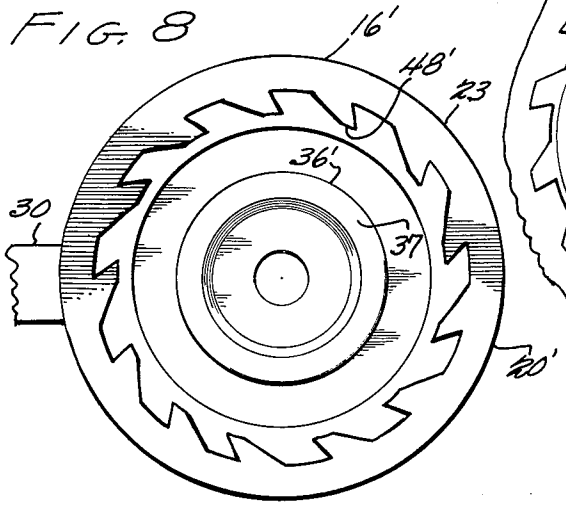


FIG. 8



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May 7, 1963 A. KRAUTKRAMER 3,088,617

CONTAINER

Filed June 7, 1960 3 Sheets-Sheet 3

FIG. 10

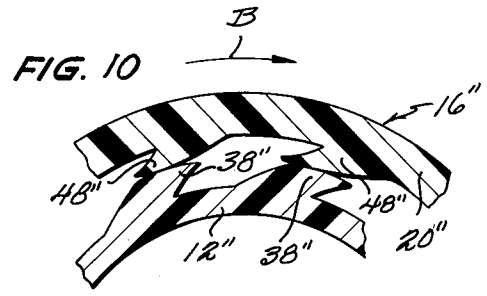
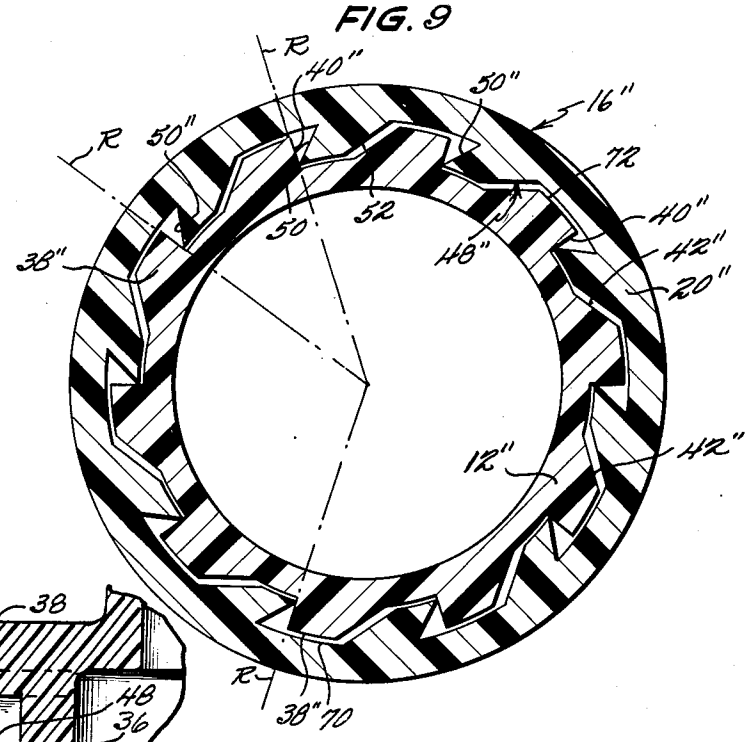


FIG. 9



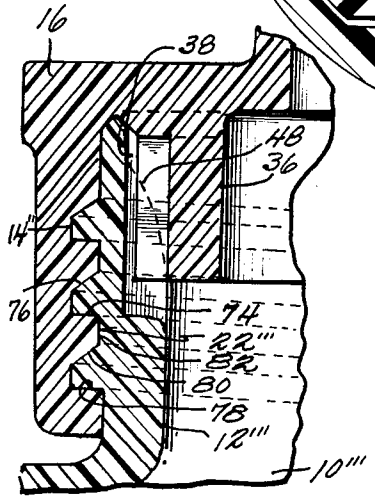


FIG. 11

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3,088,617

CONTAINER

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8 Claims. (Cl. 215—42)

The present invention relates to containers and, more particularly, to plastic containers having plastic spout-type closures inserted therein after the containers are filled.

Containers such as tubes, bottles or the like are usually provided with a neck portion having an enlarged opening therein through which material or liquid may be flowed when the containers are filled. After the containers are filled, it has heretofore been the practice to close the same by applying a screw-type of closure or the like. In many instances, the closure is provided with a spout which may in itself be provided with a small cap to close the same. Additionally, closures have been inserted into the opening of the neck of the container after filling, the closures being provided with a collar which expands and abuts against a shoulder in the neck to prevent the closure from being removed. In this latter type of closure, the containers or necks of the containers were usually made of a substantially rigid material such as metal or the like. Where the closure was merely threaded onto the neck of the container, it, of course, could be removed from the container and, thus, the container could be reused or the contents of the container could be tampered with prior to use by the purchaser. Efforts have been made to provide a screw-type of closure for containers which could not be removed once the closure had been threaded onto the neck of the container. However, with the advent of the use of plastic materials such as polyethylene and the like for making both the containers and the closure, it has been found that such prior closures and containers have not been satisfactorily locked onto the container and, thus, the container was not a true non-refillable container.

A primary object of the present invention is to provide a container and closure wherein once the closure is threaded onto the container after filling, the closure cannot be removed from the container without destroying the container or closure.

Another object of the present invention is to provide an improved container and closure structure made from plastic materials such as polyethylene or the like, the arrangement being such that once the closure is applied to the container, it cannot be removed even through the container and the closure are made from plastic material having a degree of resiliency.

Another object of the present invention is to provide a threaded type of closure for a container having means to permit threading of the closure onto the container but positively preventing the closure from being unthreaded as the tangential forces applied during unthreading become effective to more tightly hold the closure on the container.

Ancillary to the preceding object, it is a further object of the present invention to provide a container and closure structure including means to prevent rocking of the closure on the container in an effort to loosen the threaded relationship between the container and the closure.

Still another object of the present invention is to provide improved ratchet means between a threaded closure and a container, the ratchet means being effective over a greater length parallel to the axis of the container and the closure.

These and other objects and advantages of the present invention will appear more fully in the following specification, claims and drawings in which:

FIGURE 1 is a perspective view of a container constructed according to the present invention;

FIGURE 2 is an enlarged vertical sectional view taken substantially on the line 2—2 of FIGURE 1 and illustrating the container of the present invention;

FIGURE 3 is a horizontal sectional view taken substantially on the line 3—3 of FIGURE 2 and illustrating the tooth configurations of the ratchet means for preventing unthreading of the closure from the container;

FIGURE 4 is a bottom plan view of the closure shown in FIGURES 1 and 2 and with the container omitted for purposes of clarity;

FIGURE 5 is an enlarged fragmentary sectional view illustrating the threading on of the closure onto the neck of the container;

FIGURE 6 is a vertical sectional view similar to FIGURE 2 but illustrating a modified form of the present invention;

FIGURE 7 is a fragmentary top plan view of the container illustrated in FIGURE 6 and with the closure removed for purposes of clarity;

FIGURE 8 is a bottom plan view of the closure of the modification shown in FIGURE 6 with the container removed for purposes of clarity;

FIGURE 9 is an enlarged horizontal sectional view through a closure and neck of a container of the present invention and illustrating a modified form of teeth configurations for ratchet means;

FIGURE 10 is an enlarged fragmentary view similar to FIGURE 5 but illustrating the action of the teeth of modification shown in FIGURE 9 when the closure is being threaded onto the neck of a container; and

FIGURE 11 is a fragmentary view similar to FIGURE 2 but illustrating a modified form of threads on the closure and the neck of a container.

Referring now to the drawings wherein like character and reference numerals represent like or similar parts, the container of the present invention is illustrated as a plastic bottle **10** having a neck **12** of reduced diameter. The outer surface of the neck **12** is provided with conventional threads **14** for receiving a plastic spout-type closure **16**. Plastic closure **16** is provided with a top portion **18** having an annular downwardly depending skirt **20** with threads **22** on its inner surface for cooperating with the threads **14** on the neck **12** of container **10**. The closure **16** is provided with an upwardly extending discharge nozzle or spout **24** usually closed at its upper end or tip as indicated at **26** until such time it is desired to partially dispense the contents of the container. By cutting off the tip portion **26**, it will be understood that there is free passage through the spout **24** to the interior of the container. It is desirable to provide a cap member **28** integrally secured to the closure **16** by a resilient strip **30** for closing the spout **24** when not in use. The cap member **28** frictionally fits over the ribs **32** provided on the spout **24**.

As will be evident from FIGURE 2, the neck **12** of the container **10** is provided with a relatively large opening or bore **34**. Filling tubes or nozzles may be easily inserted through the bore **34** when it is desired to fill the container with either granular material or liquid. The opening **34** is subsequently closed by application of closure **16** and as will be apparent later in the specification, the contents can then be dispensed only through the spout **24** of the closure.

Referring now to FIGURES 2, 3 and 4, it will be noted that the closure **16** is provided with an annular substantially cylindrical extension **36** projecting from the bottom surface of the top portion **18**. The extension **36** has an outside diameter at its lower end substantially equal to the inside diameter of the neck **12** so that when the clo-

sure is positioned on the neck 12, the lower end of the extension is contiguous with the inner surface of the neck.

Provided upwardly on the cylindrical extension 36 are a plurality of circumferentially spaced teeth 38 extending from the outer surface of the same. The teeth 38 have side walls 40 and 42 which extend longitudinally of the extension 36 and outwardly from the extension at an angle to each other and also at different angles to radii of the extension extending through the same. By having the side walls 40 and 42 extending outwardly at an angle to each other and also in generally the same direction but on different angles to a radius through the same, the teeth are provided with a base portion 44 which is relatively thick and rigid. The outer tip 46 of each of the teeth 38 is blunt as shown in FIGURES 3 and 4. By the particular arrangement of teeth 38 which extend generally in a direction counter to a threading direction of the closure 16, it will now be evident that the teeth can only flex in the direction counter to a threading direction.

As best shown in FIGURES 2 and 4, the upper end portion of the inner surface 34 of the nozzle is provided with teeth 48 extending inwardly and at an angle to a radius of the neck 12 in a direction counter to the threading direction of the container. The teeth 48 are complementary to the teeth 38 and cooperate therewith to provide a ratchet effect when the closure 16 is threaded onto the neck 12 of the container. In more detail, the teeth 48 are provided with surfaces 50 and 52 for cooperating with the surfaces 40 and 42 of the teeth 38. The surfaces 50 and 52 extend parallel to the axis of the container and inwardly from the neck at an angle to each other and also the angles to radii through the same. Like the teeth 38, the surfaces 50 and 52, while extending at different angles to a particular radius passing through the particular tooth, also extend in generally the same direction so as to have a relatively thick base portion with a blunt tip.

Referring now to FIGURE 5, it will be noted that the closure 16 is illustrated being threaded in a clockwise direction on the neck 12 as indicated by the arrow A. The teeth 38 and the teeth 48 being made from a resilient plastic material and being so directed with respect to one another are able to cam over one another when the closure 16 is being threaded onto the neck 12. However, when the closure 16 has been completely threaded onto the neck 12, the teeth 38 and 48 will assume their normal position as shown in FIGURE 2 and if an attempt is made to reverse the rotation of the closure from that shown in FIGURE 5, the surface 42 of the teeth 38 will abut the surface 50 of the teeth 48 and, thus, the closure cannot be screwed off of the neck 12.

Since the containers 10 are presently being molded of plastic material as well as the closures 16, efforts have been made to avoid the ratcheting effect of the teeth 38 and 40 by rocking the closure on an axis transverse to the axis of the container 10. Such rocking of or applying radial forces to the closure because of the resiliency of the material from which it is made as well as the resiliency of the neck of the container sometimes cause the threads 14 and 22 to slip, thus, permitting possible working of the closure 16 axially off of the neck 12. To positively prevent such an operation, the extension 36 is made long enough to extend below the lowermost position of the teeth 38 and 40 and since the extension bears against the inner surface 34 of the neck 12, such rocking movement and removal of the closure is positively prevented.

Referring now to FIGURES 6 through 8 inclusive a modification of the present invention is illustrated. In the modification, the container 10' is provided with a neck 12' having threads 14' on its outer surface. Extending upwardly from the junction of the body of container 10' with the neck 12' are a plurality of circumferentially spaced teeth 38' substantially similar in shape to the teeth 38 of FIGURE 2. In this instance, the teeth project outwardly from the outer surface of the neck 12'.

The closure 16' is provided with a top portion 18', an outer downwardly depending skirt 20' having a thread 22' for cooperating with the thread 14'. Adjacent the lower edge portion of the skirt 20', it will be noted that the skirt flares outwardly as indicated at 23 so that it may be provided with inwardly extending teeth 48' substantially similar to the teeth 48' of FIGURE 2. When the closure 16' is threaded onto the neck 12', the teeth 38' and 48 cooperate in substantially identical manner as the teeth 38 and 48 in that they deflect in a direction opposite to a threading direction thereby permitting ratcheting of the closure as it is being threaded onto the neck of the container. However, the closure 16' cannot be unthreaded as the teeth 38' and 48' coact to provide a positive stop.

Depending downwardly from the top portion 18' of closure 16' and inwardly of the skirt 20' is an annular substantially cylindrical extension 36'. The extension 36' has its lower end 37 extending below the lowermost coacting portions of the teeth 38' and 48' when the closure 16' is fully threaded onto the neck 12'. The outside diameter of the extension 16' is substantially identical to the inside diameter of the neck 12' so that the extension 36' is contigious with the neck 12' thereby preventing tilting or rocking of the closure 16'. By providing the extension 36' coupled with the coacting ratchet teenth 38' and 48', the closure 16' for the container 10' cannot be removed once it has been applied to the container without destroying either the closure or the container.

In both the modifications shown in FIGURE 2 and FIGURE 6, it will be noted that the upper end or lip portion of the necks 12 or 12' are provided with a bevelled or exterior conical surface 60. Each of the closures 16 and 16' are provided with interior facing conical surfaces 62 for cooperating and abutting with the surfaces 60. When the closures have been fully threaded onto the necks of the containers, surfaces 60 and 62 abut one another, the abutting surfaces providing added friction to assist in the prevention of the removal of the closure of the necks of the containers.

Referring now to FIGURES 9 and 10, a modified form of teeth configurations for the ratchet means is disclosed. In FIGURE 9, the closure 16'' is provided with teeth 48'' which extend inwardly from the inner wall 70 of the skirt 20''. Teeth 48'' extend inwardly at an angle to a radius of the skirt in a direction counter to a threading direction for the closure and are provided with side walls or surfaces 50'' and 52'' that are at an angle to each other but extend generally in the same direction with respect to a radius through the same. The neck of the container 12'' is provided with a plurality of outwardly extending teeth 38'' which cooperate with the teeth 48''. Teeth 38'' are each provided with side walls or surfaces 40'' and 42'', the surfaces 40'' and 42'' extending longitudinally along at least a portion of the neck 12''. The surface or wall 40'' of each of the teeth 38'' extends outwardly from the neck 12'' on a radius R of the neck whereas the surface or wall 42'' extends at an angle to the radius R in a direction opposite to a threading direction of the closure. The outer tip 72 of the tooth 38'' is blunt or flat. Because of the sectional configuration of the tooth 38'' as defined by the side walls 40'' and 42'' and the tip 72, the tooth is substantially rigid as compared to the cooperating tooth 48''.

FIGURE 10 illustrates the action between the teeth 38'' and the teeth 48'' when the closure 16'' is being threaded onto the neck 12'' in the direction of the arrow B. It will be noted that the teeth 48'' are flexing in a direction counter to the threading direction of the closure 16'' but since the teeth 38'' are substantially rigid, they only flex a small amount. When the tips of the teeth 48'' pass completely over the tips 72 of the teeth 38'', the teeth 48'' will snap into the position shown in FIGURE 9 and thus the closure 16'' cannot be unthreaded. While the teeth 38'' and 48'' have been shown cooperating be-

tween the neck and skirt of a closure such as a container as shown in FIGURE 6, it of course, will be understood that it is within the scope of the present invention to utilize such a tooth configuration in a closure and container such as shown in FIGURE 2.

Referring now to FIGURE 11, a further modified form of closure 16''' is shown threaded onto the neck 12''' of a container 10'''. In this modification, the threads 14''' on the neck 12''' are provided with a downwardly facing substantially flat bearing surface 74, a flat bevelled bearing surface 76 and a blunt tip portion 78. On the other hand, the thread 22''' on the closure is provided with an upwardly facing substantially flat bearing surface 78, a lower flat bevelled bearing surface 80 and a blunt tip portion 82. Teeth 48 and 38 are provided on a neck 12''' and a short downwardly extending cylindrical extension 36''' respectively.

In the form of closure and container of FIGURE 11, the provision of the relatively rigid thread structure 14''' and 22''' does not make it necessary to provide the extension 36''' with a portion that is contiguous with the inner wall of the neck of the container. The substantially rigid threads prevent any tipping or cocking of the closure 16''' and, therefore, the closure cannot be removed from the container. While the closure and container shown in FIGURE 11 is somewhat similar to that shown in FIGURE 2 with the change in the threads and the shortening of the extension, it is also within the scope of the invention to use the thread structure shown in FIGURE 11 with the closure and container shown in FIGURE 6. When the ratchet teeth are provided between the skirt of the closure and the neck of the container, the downwardly depending extension 36''' can be completely omitted.

The preferred forms of the invention have been described in connection with plastic containers and plastic closures. However, it is within the scope of the present invention to make either the closure or the container of non-plastic material such as metal or the like. Further, a portion of the container such as the body portion may be made of metal whereas the neck portion may be made of plastic material.

It is thus seen that the objects and advantages of this invention have been fully and effectively accomplished by the structure illustrated in the drawings and described hereinbefore. However, the specific embodiments are subject to some changes without departing from the principles of the invention involved. For this reason, the terminology used in this specification is for the purpose of description and not limitation, the scope of the invention being defined in the claims.

I claim:

1. In combination: a container having a neck with threads provided on at least a portion of one surface of the neck, a plurality of teeth elements extending from the inner surface of the neck at least adjacent the upper end thereof and in a direction opposite to a threading direction and at an angle to a radius of the neck; a closure member having a top portion, an annular skirt depending therefrom, and an inner substantially cylindrical extension for extending into the neck, said closure member having threads thereon for cooperating with the threads on said neck, teeth elements on the outer surface of the cylindrical extension of said closure member at least immediately below the top portion thereof and extending in an opposite direction to a threading direction and at an angle to a radius of the closure, said teeth elements on said neck and said teeth elements on said closure member being resilient and cooperating with each other to permit said closure member to be threaded onto said neck but preventing unthreading of said closure member from said neck, said inner substantially cylindrical extension of said closure member having a substantial length to be contiguous with a substantial portion of the inner surface of said neck whereby said closure cannot be removed from the container without destroying at least one of these members.

2. A combination of claim 1 wherein said neck of said container has a lip provided with at least an exterior cone-shaped surface and wherein said closure member is provided with a complementary interior cone-surface for bearing against the exterior cone-shaped surface of said lip when said closure member is threaded onto said neck.

3. The combination defined in claim 1 wherein said teeth elements of said closure member and said teeth elements of said neck have cooperating surfaces extending in planes parallel to an axis of said neck.

4. The combination of claim 1 wherein at least one of said teeth elements of said neck and said teeth elements of the extension of said closure member have tip portions which are substantially blunt.

5. The combination of claim 1 wherein said thread on said neck has a downwardly facing substantially flat bearing surface, an upper bevelled bearing surface and a blunt tip portion and wherein said thread on said closure has an upwardly facing substantially flat bearing surface, a lower bevelled bearing surface and a blunt tip portion.

6. In combination: a plastic container having a neck, said neck having threads on at least a portion of its outer surface; a plastic spout-type closure member having a top portion, an annular skirt depending therefrom, and an inner substantially cylindrical annular extension for extending into the neck of the container, said closure member having threads on the inner surface of said skirt for cooperating with the threads on said neck, ratchet means between the outer surface of the extension of said closure member and the inner surface of said neck to permit said closure member to be threaded onto said neck but preventing unthreading of said closure member from said neck, said ratchet means cooperating between said neck and the extension of said closure member above the lower end portion of the same, the lower end of said substantially cylindrical extension being contiguous with the inner surface of said neck when said closure member is threaded onto said neck whereby said closure cannot be removed from the container without destroying at least one of these members.

7. The combination of claim 6 in which said ratchet means includes circumferentially spaced teeth elements on the inner surface of said neck extending along a portion of the same and inwardly at an angle to a radius of the same, and circumferentially spaced teeth elements extending from the outer surface of said extension adjacent the top portion of said closure member, said outwardly extending teeth elements of said extension extending at an angle to a radius of the extension.

8. The combination defined in claim 6 in which said ratchet means includes a plurality of circumferentially spaced teeth elements extending from the neck of said container, each of said teeth elements having side walls extending at an angle to each other and at angles in the same general direction to a radius of the neck, and a plurality of circumferentially spaced teeth elements extending from the extension of said closure member and cooperating with said first-mentioned teeth elements, each of said latter-mentioned teeth elements having side walls extending at an angle to each other and at angles in the same general direction to a radius of said closure member.

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