

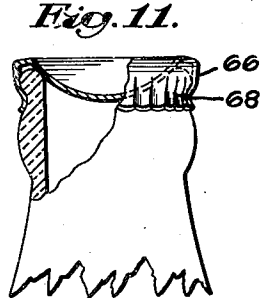
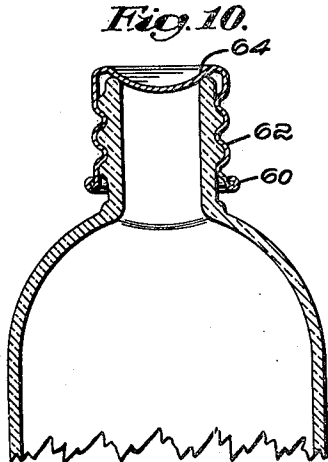
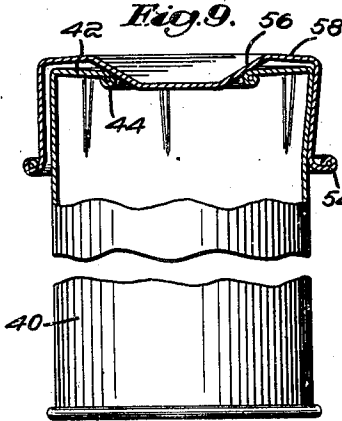
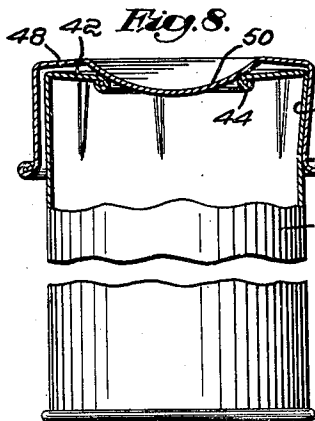
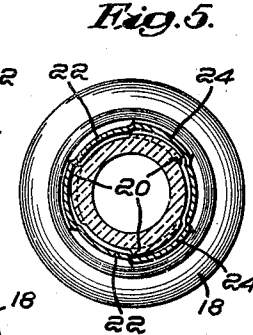
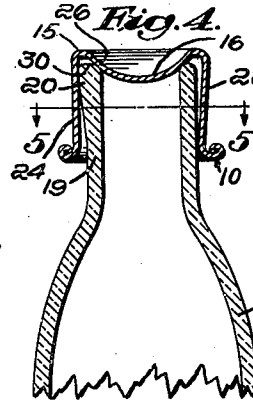
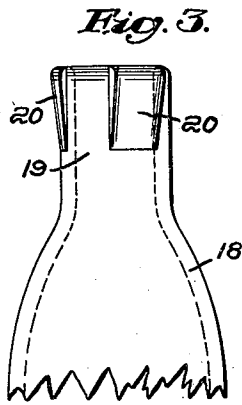
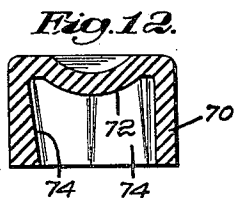
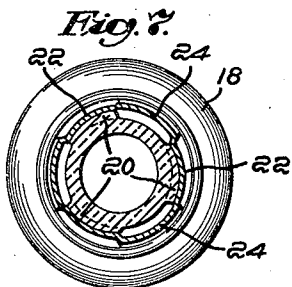
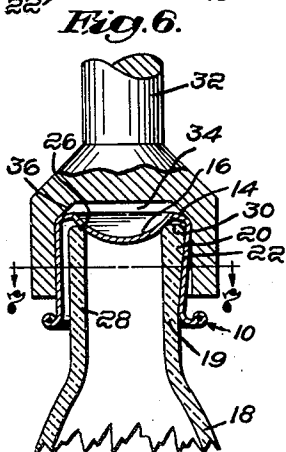
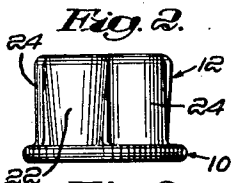
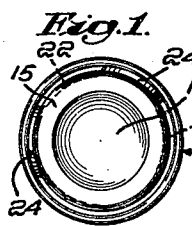
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E. L. SHAW

2,331,939

CLOSURE CAP

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UNITED STATES PATENT OFFICE

2,331,939

CLOSURE CAP

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2 Claims. (Cl. 220—40)

This invention relates to closure caps and more particularly to a novel cap adapted to provide a superior and more sanitary seal for containers of various kinds. Closure caps are commonly of tubular construction with one closed end and are arranged to be threaded or otherwise anchored to the containers, such anchoring being adapted to hold the closed end of the cap in flat sealing contact with the open end of the container. In accordance with my invention I provide a closure cap having the inner face of its closed end of substantially convex shape whereby somewhat to enter the opening into the container and form a uniform annular sealing contact therearound.

My invention more particularly contemplates a closure cap of resilient sheet material having its closed end dished inwardly whereby adapting it to enter the mouth of the container and form an annular sealing contact therewith. The invention furthermore contemplates such construction of the cap and such anchoring of the cap to the container as to hold the seal under a predetermined resilient pressure maintained by the resiliency of the cap. Such new construction not only provides a superior seal forming substantially an annular line contact in the mouth of the container opening but furthermore maintains the seal under uniform resilient pressure. In some cases I may also so construct the container that it provides a sealing resiliency which may also cooperate with the resiliency of the cap. While the cap may be attached to the container by any means found suitable, I prefer to employ the improved joint coupling construction disclosed in my Patent No. 2,198,922, dated April 30, 1940.

These and other features of the invention will be best understood and appreciated from the following description of preferred embodiments thereof selected for purposes of illustration and shown in the accompanying drawing wherein,

Fig. 1 is a top plan view of my improved closure cap,

Fig. 2 is a side elevation thereof,

Fig. 3 is a fragmentary side elevation of a bottle constructed to receive the cap,

Fig. 4 is a longitudinal sectional view through the bottle with the cap placed loosely thereon,

Fig. 5 is a cross sectional view through the bottle and cap, taken on line 5—5 of Fig. 4,

Fig. 6 is a view like Fig. 4 but showing the cap forced to and secured in its final sealing position on the bottle,

Fig. 7 is a cross sectional view through the bottle and cap, taken on line 7—7 of Fig. 6,

Fig. 8 is a side elevation of a sheet material container employing my invention, a portion of the container and its cap or cover being shown in section,

Fig. 9 is a view like Fig. 8 but showing a slight modification of the cap,

Fig. 10 is a longitudinal sectional view through a bottle and cap employing my invention, the cap being screw threaded onto the bottle,

Fig. 11 is a fragmentary side elevation, partly broken away, of a bottle and cap employing the invention, the cap being crimped onto the bottle,

Fig. 12 is a longitudinal sectional view through a plastic composition cap embodying the invention.

My improved closure cap is preferably made of resilient sheet material and comprises a tubular portion having one end open and its other end closed, the closed end wall being dished inwardly to concavo-convex form or its equivalent. The tubular portion of the cap and the corresponding portion of the container on which it is used are provided with means for anchoring the cap to the container and in such position that the inwardly dished end wall of the cap is held in tight sealing contact with the open end of the container. The arrangement and construction are such that a very uniform and superior seal is produced, all as hereinafter more specifically described.

Referring first to the preferred form of the invention as illustrated in Figs. 1-7 of the drawing, the cap 10 is constructed of resilient sheet metal and comprises a tubular portion 12 and a closed end wall. The end wall comprises an annular portion 15 adjacent to and integral with the cylindrical wall and substantially right-angular thereto and an inner portion 16 within and integral with said annular portion and dished inwardly to provide an annular sealing surface facing downwardly and outwardly toward the cylindrical portion of the cap, this portion being illustrated as concavo-convex throughout its area.

The container or bottle 18 on which this cap is to be used has a neck portion 19 and three equally spaced lands or lugs 20 are formed thereon adjacent to the end of the neck. Each of these lands has its outer face converging toward the body of the bottle and is curved eccentrically as shown in Fig. 5. The tubular portion 12 of the cap has three equally spaced depressions 22 formed therein, each corresponding substantially to the

shape of a land 20, and disposed between each two depressions 22 is a cylindrical segment 24 of a size to receive a land 20 thereinto.

The construction of the cap is such that it can be slipped longitudinally over the end of the bottle neck when the cylindrical segments 24 are in alignment with the lands 20, such position of the cap being illustrated in Figs. 4 and 5. When the cap is rotated on the bottle to the position illustrated in Figs. 6 and 7, the engagement of the surfaces 22 with the surfaces 20 serve through the taper of the surfaces 20 to draw the cap longitudinally into the sealing position shown in Fig. 6 and the eccentricity of the surfaces 20 serve to tighten the cap onto the bottle. The inwardly dished portion of the cap is thus drawn and held in the sealing position shown in Fig. 6.

When the cap is in the final position of Figs. 6 and 7, its annular portion 15 is only slightly spaced from the end of the bottle neck, and the convex face 16 is held in sealing contact with the open end of the bottle neck along an annular line 26 located substantially between the inner cylindrical wall 28 and the outer end wall 30 of the neck. This sealing line contact is relatively narrow and uniform throughout and is resiliently maintained through the resiliency of the cap and more particularly its annular portion 15, the diameter of the portion 16 being less than the diameter of the cap and greater than the diameter of the opening in the bottle neck. The sealing pressure maintained at the line 26 is predetermined by the resilient co-efficient of the metal comprising the cap and by the construction of the cap particularly between the sealing line 30 and that part of the cap which engages the bottle neck.

When applying the caps to the bottles by machinery for commercial purposes, the cap will preferably be directly forced longitudinally onto the bottle neck from the position of Fig. 4 to the position of Fig. 6 and the bottle will then be turned to the position of Figs. 6 and 7, the cap being thereupon held under the desired and predetermined sealing pressure by the co-engaging surfaces at 20—22. The ram 32 shown in Fig. 6 may be employed for this purpose, the ram having its forward end recessed at 34 to receive the cap and bottle neck and having an annular surface 36 for engaging the outer top edge of the cap. This method of sealing, together with the cap and bottle construction illustrated, provides means for obtaining a definite and desired predetermined sealing pressure. For example, if it is desired to hold the cap under a sealing pressure of 40 pounds the ram 32 is forced against the cap with a pressure of 40 pounds and, upon rotation of the bottle to the cap locking position, the cap is retained under such pressure along the sealing line 26, it being understood that the gauge and character of metal used in the cap are such as to receive and support this pressure before the annular portion 15 of the cap comes into positive engagement with the end of the bottle neck.

While I have, by way of example, above described my invention as applied to a bottle I desire it to be understood that the invention is applicable to containers broadly and that in such cases the open end portion of the container is the equivalent of the bottle neck. In Fig. 8, I have illustrated a container 40 of sheet metal, paper or other suitable material having at its open end an annular end wall 42 of resilient sheet material with its inner edge bent to provide an annular

bead 44. A tubular closure cap 46 for the container has an end wall comprising an annular portion 48 and an inner concavo-convex portion 50, this portion 50 being of greater diameter than the bead 44. The construction of this cap 46 is substantially the same as the cap 10 above described and the cylindrical portion of the cap and the open end portion of the container are provided with cooperating surfaces at 52 corresponding to the surfaces 20—22. When the cap is in final sealing position on the container, the portion 50 is in sealing contact with the bead 44, and is held resiliently in such engagement not only by the resiliency of the annular portion 48 of the cap but also by the resiliency of the annular end wall 42 of the container, each opposing the other as will be understood. In some cases the cap may be substantially rigid and the end wall 42 of the container be relied upon for providing the sealing pressure resiliency.

While I have thus far described the sealing portion of the cap as being concavo-convex, I desire it to be understood that the term "concavo-convex" is herein used in a very broad sense to indicate any dished-in construction of the cap head which will provide the annular sealing surface as at 26 or that annular portion of the surface 50 which has sealing contact with the bead 44. For example, in Fig. 9 I have illustrated the container 40 as provided with a slightly modified form of cover or cap 54. This cap is substantially the same as the cap 46 except that the dished-in portion 56 within the annular portion 58 is frusto-conical. This portion 56, like the concavo-convex portion 50, provides an annular outwardly-downwardly facing sealing surface located uniformly about the center of the cap for engaging the bead 44. This frusto-conical construction and any similar construction which is adapted to provide such an annular sealing surface on the end wall of the cap is considered the full equivalent of the said concavo-convex shape for purposes of the invention. The use and application of the cap in Fig. 9 is identical with that shown in Fig. 8.

While I prefer to employ the above described tapering and eccentric surfaces for holding the cap in sealing position on the container, it will be understood that other securing means may be employed. For example, in Fig. 10 I have illustrated a cap 60 which is substantially like the cap 10 except that its tubular portion is threaded onto the bottle at 62. Otherwise this cap functions the same as the cap 10, the sealing end wall 64 resiliently engaging the bottle neck end as the cap is threaded onto the neck.

In Fig. 11 is illustrated a resilient cap 66 also like the cap 10 except that it is crimped onto the bottle neck at 68 in the fashion of the well-known crown seal. In this case the cap is forced onto the bottle neck with the desired pressure and is then crimped thereonto while held under such pressure.

In Fig. 12 is illustrated a cap 70 formed by molding a suitable plastic composition. While this form of the invention is believed to be less desirable because of its lack of the great resiliency inherent in a sheet metal cap, I desire it to be understood that a cap thus constructed is within the scope of my invention. This cap is provided with an end wall having a convex face 72 and its tubular portion may be provided with locking surfaces 74 similar to the surfaces 22 provided on the cap 10.

It will now be appreciated that I have produced

a novel sealing cap and sealing combination which is structurally and functionally superior in many respects. The predetermining of the sealing pressure makes it possible to produce a seal capable of holding a desired pressure within the container, this feature being particularly desirable in the bottling of carbonated beverages and other products under pressure. The sealing of a bottle immediately at the outer end of its neck opening is also of importance since this portion of the bottle is formed on a die or mandrel and this sealing surface is therefore uniform in all such bottles whereby producing a tight seal. Such sealing is also more sanitary since all areas outside of the interior of the bottle including its neck are eliminated from the contents of the bottle. Furthermore, the construction of the cap permits of its replacement on the bottle with a sealing effect equal to the original seal, this being useful in all beverages, condiments and the like wherever it is desirable to retain the interior of the bottle and its contents from exposure to the air.

Containers of the nature shown in Figs. 8 and 9 may also employ the novel seal to great advantage as, for example, in the packaging and distributing of beer, lye, and any product wherein a secure seal is desired and wherein a tight re-sealing of the container is also desirable. It will furthermore be understood that such containers may employ the caps shown in Figs. 8 and 9 or they may be provided with necks of restricted diameter and of a shape to receive thereonto caps of the nature of the cap 10. While I have herein illustrated and described the cap as being in contact or engagement with the container at the sealing line, it will be understood that if desired a light foil of any suitable material may be provided in the cap for engagement by and between the two sealing surfaces. The containers and caps may be made of any material capable of performing the sealing function and suitable for the product to be contained. For example, certain relatively stiff and resilient paper is suitable for use as containers for milk, ice cream, etc., and construction of my novel containers and caps from such material is entirely within the scope of the invention. It may also be mentioned that the resilient self-sealing feature of

my invention will automatically permit the release of pressure in excess of that for which the cap is designed to sustain and will thereupon after such release immediately return to sealing position without permitting passage of air into the container. For such purposes, it may be desirable to form the cylindrical portion of the cap of very stiff gauge or material and form the sealing top portion of a lighter or more resilient material.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination, a container having a circular open end, an inner cylindrical wall and an outwardly facing annular end wall, a plurality of lands providing eccentrically curved and outwardly facing surfaces on the container adjacent to and diverging outwardly toward said end, a closure cap on the container and having its end wall in sealing relation with the container solely along an annular sealing line located between the inner cylindrical wall and the outer end wall of said open end of said container, and means including a plurality of land surfaces on the cap respectively cooperating with the land surfaces on the container and substantially complementary thereto for maintaining the cap in said sealing position on the container, the adjacent lands being relatively spaced to provide open gaps therebetween to receive said means.

2. A tubular closure cap of resilient sheet material having one end open and its other end closed, the closed end being upset inwardly to provide an outwardly-downwardly facing annular sealing surface located uniformly about the center of the cap, the tubular portion of the cap being upset inwardly to form a plurality of lands providing eccentrically curved and inwardly facing surfaces on the tubular portion of the cap converging toward said open end, the resiliency of the cap being adapted to hold said sealing portion in resilient sealing relation with the open end of the container when said land surfaces are engaged with cooperating land surfaces on the container, the adjacent land surfaces on the cap being relatively spaced to provide open gaps therebetween to receive said cooperating land surfaces.

EDWARD L. SHAW.