April 24, 1934. G. W. BOOTH 1,956,217

CONTAINER CLOSURE

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Fig. 1.

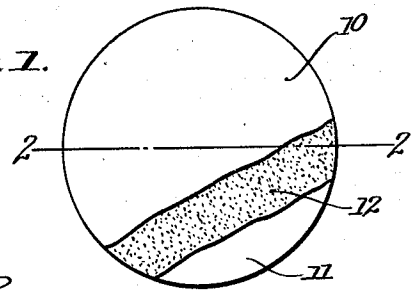


Fig. 2.

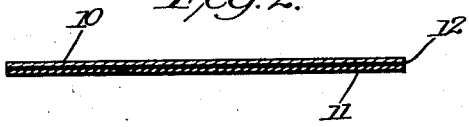


Fig. 3.

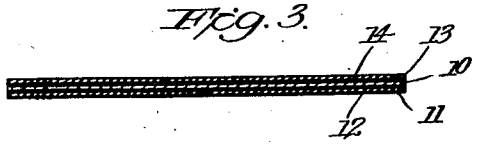
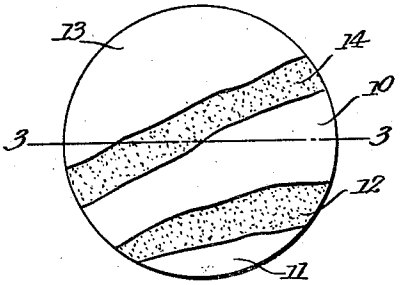


Fig. 4.



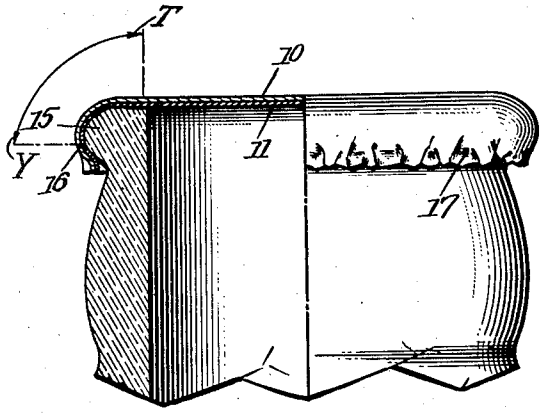
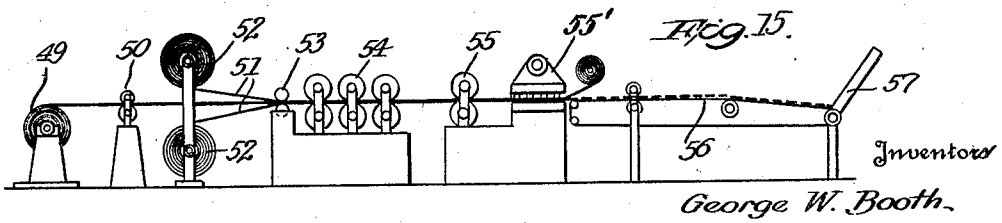


Fig. 5.

Fig. 15.



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By Lindsay, Parkinson, Bryant, Darby & Lindsay
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CONTAINER CLOSURE

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Fig. 6.

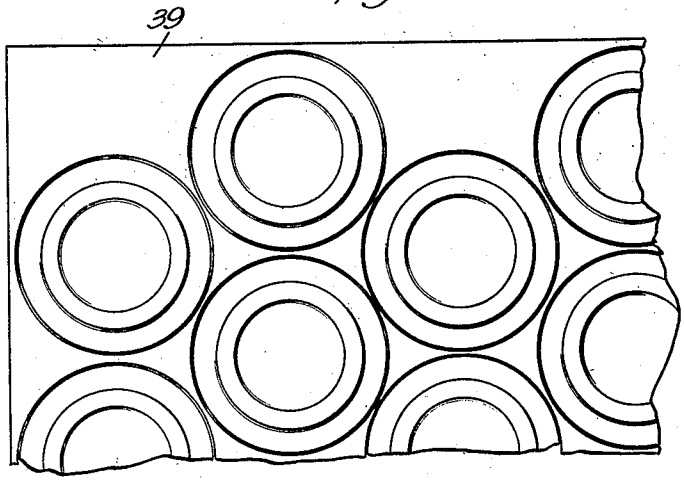


Fig. 9.

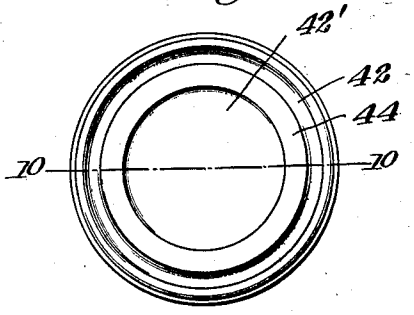


Fig. 7.

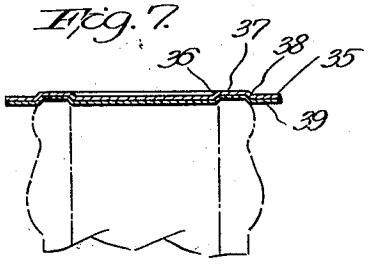


Fig. 10.

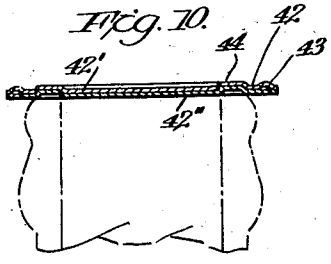


Fig. 8.

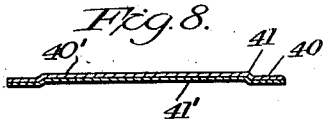
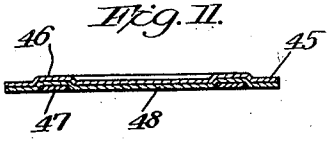


Fig. 11.



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By

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CONTAINER CLOSURE

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Fig. 12.

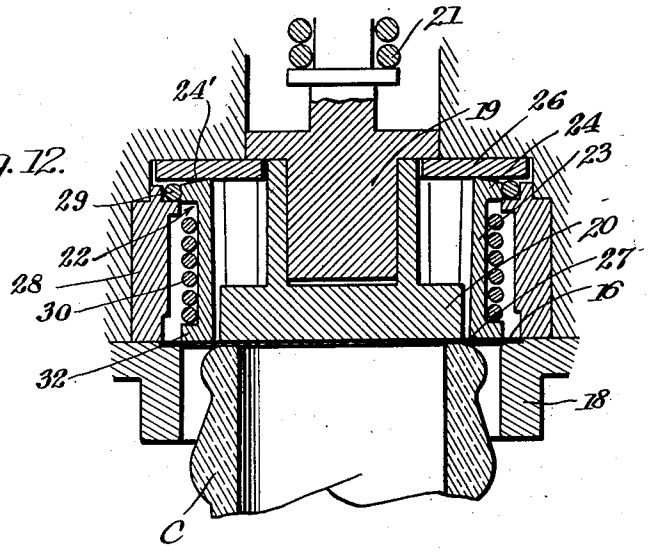


Fig. 13.

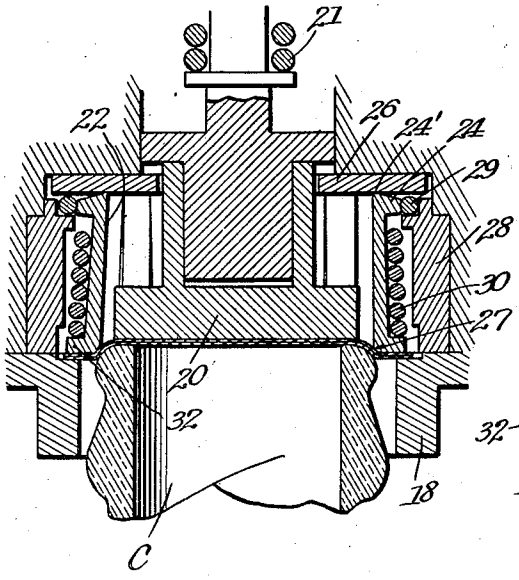
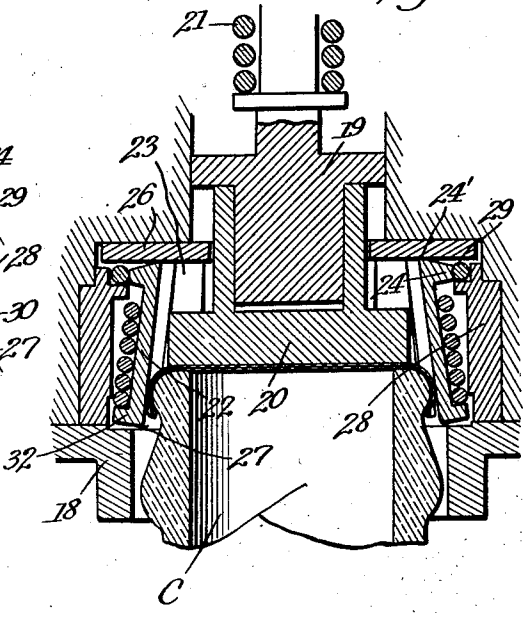


Fig. 14.



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CONTAINER CLOSURE

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Fig. 16.

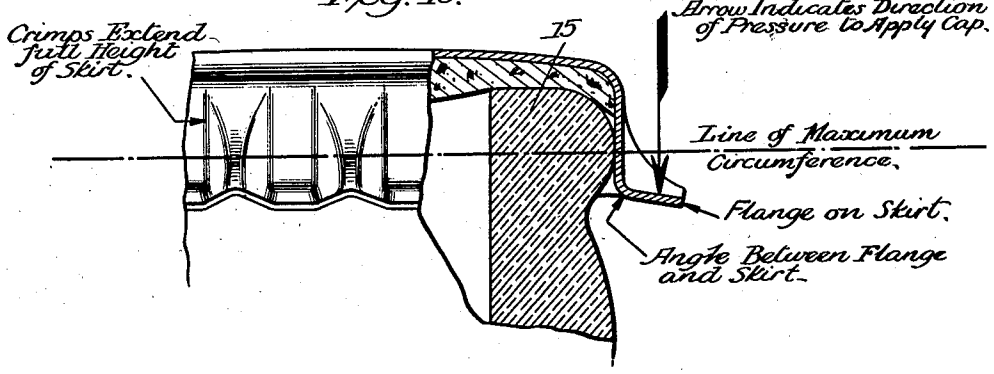


Fig. 17.

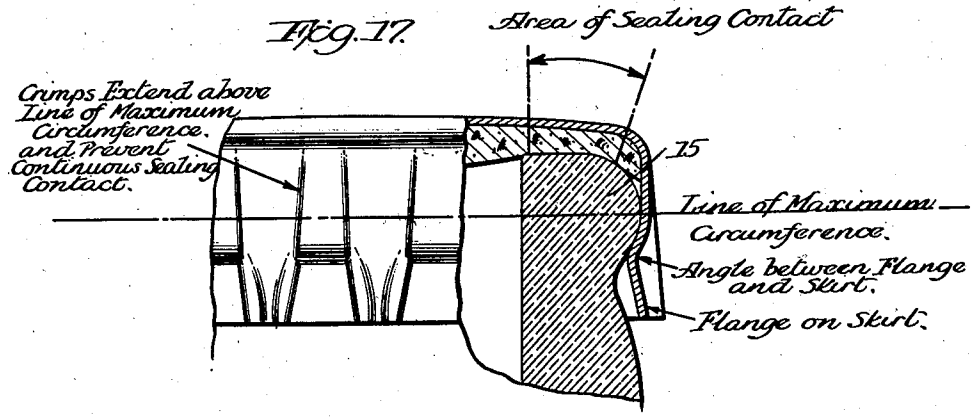
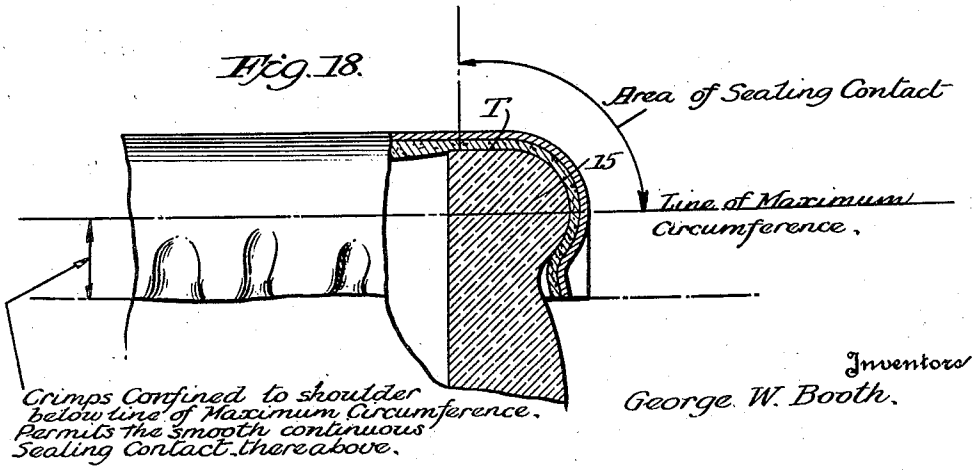


Fig. 18.



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CONTAINER CLOSURE

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Fig. 19.

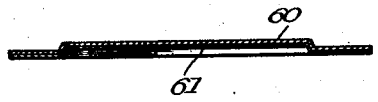


Fig. 20.

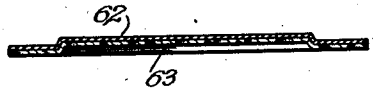


Fig. 21.

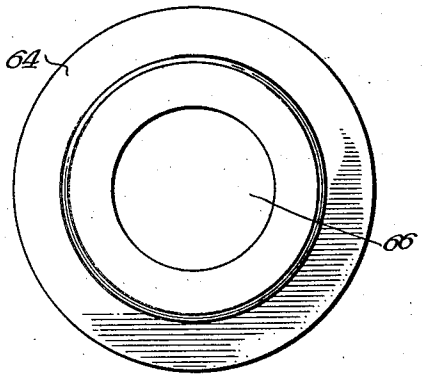


Fig. 24.

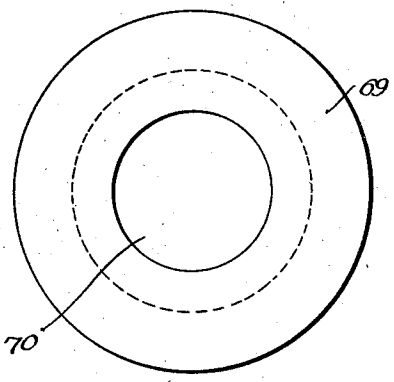


Fig. 22.

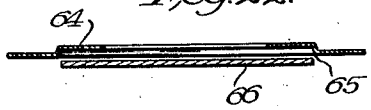


Fig. 25.

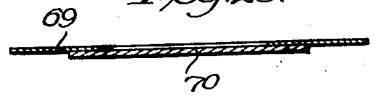


Fig. 23.

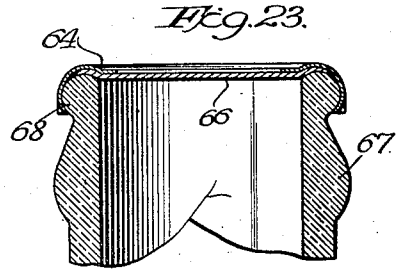


Fig. 26.

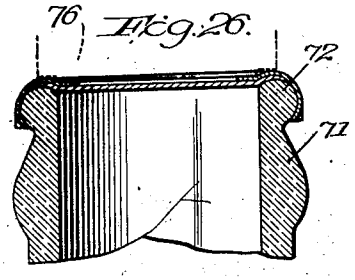
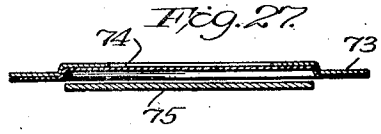


Fig. 27.



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CONTAINER CLOSURE

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Fig. 28.

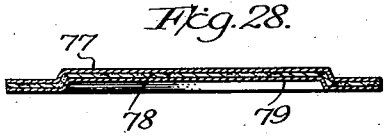


Fig. 29.

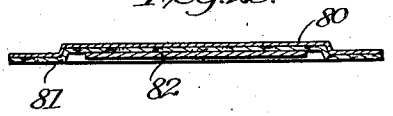


Fig. 30.

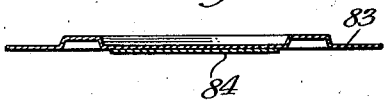


Fig. 31.

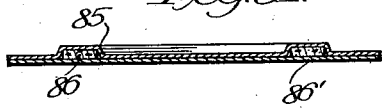


Fig. 32.

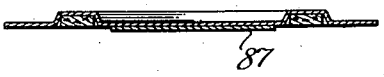


Fig. 33.

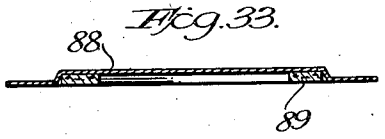


Fig. 34.

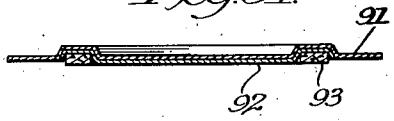


Fig. 35.

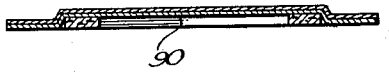


Fig. 36.



Fig. 37.



Fig. 38.

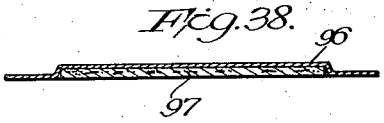


Fig. 39.

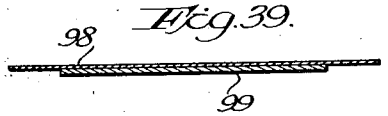


Fig. 40.



Fig. 41.



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Patented Apr. 24, 1934 1,956,217

UNITED STATES PATENT OFFICE

1,956,217

CONTAINER CLOSURE

George W. Booth, Baltimore, Md., assignor to Crown Cork & Seal Company, Inc., Baltimore, Md., a corporation of New York

Application December 13, 1933, Serial No. 702,263
In Canada October 10, 1931

14 Claims. (Cl. 215—39)

The present invention relates to improvements in container closures and method of making the same, particularly to that type of closure which is adapted to be secured over the mouth and to the neck of a container by crimping or folding its marginal edge upon the bead or shoulder forming the finish commonly provided about a container mouth in the manner particularly described in my copending application, Serial No. 553,464, filed July 27, 1931. The present application is in part a continuation of my application Serial No. 553,463, filed July 27, 1931.

The improved closure, while of general application, is particularly adapted for use with containers for milk, and among the objects of the invention are to provide a closure which will be relatively inexpensive of manufacture, may be easily applied to the container, and which will not have any deleterious effect on the contents of the container to which it is applied.

Heretofore, closures of the same general type as that of the present invention have included a skirted metallic shell adapted to be placed over and around a bottle mouth, or a simple disc of paper or similar material which has been seated within the mouth of the bottle.

In some types of closures, including a skirted metallic shell, the practice has been to provide the shell with a skirt having an outwardly flared fluted edge or marginal portion, which edge, when the closure is applied to a bottle, is deformed by the throat of a capping machine so as to cause the inward corrugations of the fluted portion of the skirt to pass beneath and engage the locking bead or finish about the bottle mouth.

In other forms of this type of closure, the metal shell has been provided with a substantially vertical or cylindrical skirt, the lower edge of which has been forced below the locking bead or finish of a bottle by a spinning operation.

Heretofore, in closures of the types above referred to, the shells, prior to being brought into operative relation to a bottle, have been, by a stamping operation, given a skirted or cupped form. Furthermore, a suitable separately produced gasket or lining member has commonly been inserted by a separate operation into such preformed shell before the closure is applied to the bottle.

With closures of the old type above referred to, it is necessary to provide the capping machine, by which the closures are applied to bottles, with a feeding mechanism adapted to receive such closures in bulk and to adjust them in relation to a feed chute so as to cause them to be successively presented in proper position and relation to the closure applying mechanism.

In such closures, there is required a firm bonding of the lining of the metal shell, and imperfect sealing of bottles frequently occurs owing to the accidental escape of the lining from its shell prior to their delivery to the closure applying means.

With the closures heretofore commonly employed, the practice has been to limit the area of the lining or packing gasket so that it extends only over the area of the top of the metal shell within the skirt, or is in the form of a ring positioned adjacent the skirt against the top of the shell.

The present invention contemplates a closure which, prior to its application to a container, lacks the usual skirt. The closure has a substantially flat marginal portion, preferably disposed in substantially the plane of the body of the cap; the margin is not necessarily crimped or corrugated as in the conventional crown type of cap and when formed is retained in, or substantially in, parallelism with the plane of the blank from which it is produced.

In other words, the closure is a substantially flat disc, although it may be provided inwardly from its edge with one or more shoulders or ribs which will serve to strengthen the cap and center it upon a container when applied thereto. This shoulder or rib is to be distinguished from the usual skirt provided for the purpose of encircling the mouth of the container.

Moreover, the closure is preferably provided on one or both surfaces with a facing coextensive in area with the body. Such a facing serves to form a seal against the top surface of the pouring lip of the bottle and about the sides of the lip when the cap is applied to the container, thereby providing a sanitary and protective finish. However, the sealing facing may be omitted, the ductile body alone affording adequate sealing for some purposes.

The cap body is formed from any suitable ductile material which permits the cap to be ironed or drawn over the lip of the bottle and into close engagement with the lip by pressure applied uniformly around the mouth of the bottle in such a way as to cause the edge or marginal portion, as the ironing pressure is continued, to buckle beneath the bead or shoulder which surrounds the container mouth.

The cap of the present invention, being a substantially flat disc, permits the formation of a skirt after application thereof to the container

in such a way that the cap may conform to any surface irregularities upon the container mouth, and to variations in the dimensions of containers about the pouring lip and the locking bead or shoulder. This permits of the formation of an extended sealing area and minimizes likelihood of an imperfect seal and the possibility of injury to the container during the capping operation.

In the application of the closures by the ironing and drawing method herein contemplated, the applied closure, as above stated, has a naturally crimped locking band beneath the container bead. Where its outer marginal portion is initially absolutely flat and otherwise undeformed, the locking band is generally characterized by some irregularity in the form and spacing of the crimps. However, by suitably deforming the marginal portion, for example as described in my copending application Serial No. 668,659, filed April 29, 1933, the crimps may be developed in predetermined, uniform relation.

Ordinarily a sealing facing will be provided and this may be of any suitable material. The facing may be a relatively compressible substance applied by a coating operation or it may be suitable sheet material adhesively or separably associated with the ductile body. When an overall facing is provided it must be of such nature as not to impede materially the natural buckling of the disc margin. Thus, theoretically, the thinner and more pliable the facing material, the better, and from this viewpoint, cellophane makes an ideal facing. Heavier facings may be used with perfect success, however, and a particularly efficient sealing facing is afforded by a thin layer of cork.

While the ductile body is ordinarily imperforate, it may be in the form of an annulus and the facing may be separably associated therewith. The shoulder with which the ductile body is preferably provided may serve as centering means for the separable facing as well as means for centering the closure over the container mouth.

The invention also has to do with an improved method of manufacturing a closure of the type described.

The method broadly involves the use of a body of ductile material, to one or both surfaces of which is preferably applied a suitable facing, preferably of fibrous material in sheet or strip form such as suitable parchment or paper or other cellulosic material. This facing is, of course, resistant to liquids or other container contents with which the closure is to be used, especially where it is compressed against the container bead. After the formation of the multi-ply blank, the substantially flat discs are stamped therefrom, and in the stamping operation it is preferred that the diameter of the disc be reduced relative to the opening formed in the blank so that following the stamping operation, the closure may be passed through the opening in the blank. In reducing the diameter of the disc, a suitable shoulder or groove may be formed in the blank, thereby strengthening the blank and producing means for centering the same upon the container.

In the accompanying drawings, there are shown certain preferred embodiments of the invention and preferred means for practicing the method.

In the drawings,

Figure 1 is a face view of a bottle closure constructed in accordance with the invention, portions being broken away;

Figure 2 is a section substantially on the line 2—2 of Figure 1;

Figure 3 is a similar view to Figure 2 illustrating a slightly different embodiment of the invention, being a section substantially on the line 3—3 of Figure 4;

Figure 4 is a view similar to Figure 1 of the embodiment illustrated in Figure 3;

Figure 5 is a partial elevation and part section through a bottle having a closure embodying the present invention applied thereto;

Figure 6 is a plan view of the blank illustrating a modified form of closure, several closures being illustrated in a series of openings in a blank;

Figure 7 is a sectional view of the closure illustrated in Figure 6, the same being shown as positioned on a container;

Figure 8 is a sectional view of another modified form;

Figure 9 is a plan view of another modification;

Figure 10 is a sectional view on the line 10—10 of Figure 9;

Figure 11 is a sectional view of still another modification, similar to that illustrated in Figure 7;

Figure 12 is a sectional view showing the first step in applying the closure to a container;

Figure 13 illustrates a further step in the application of the closure to a container;

Figure 14 illustrates the final position of the closure as shown in Figure 5;

Figure 15 is a diagrammatic view of a means for carrying out the improved method of making the closure;

Figure 16 is a fragmentary view partly in section and partly in elevation showing a conventional crown cap during the course of application to a container having the usual crown finish;

Figure 17 is a view similar to Figure 16 showing the position of the parts after application of the crown;

Figure 18 is a view similar to Figure 16 showing the cap of the present invention applied to a bottle having a conventional crown finish;

Figure 19 is a section through a closure having a cellophane facing;

Figure 20 is a section through a closure having a cork facing;

Figure 21 is a plan view of a closure comprising an annular ductile body and a separable facing or liner;

Figure 22 is a section through the closure of Figure 21;

Figure 23 is a sectional view of a bottle top having the closure of Figures 21 and 22 applied thereto;

Figure 24 is a plan view of slightly different forms of closure embodying an annular ductile body;

Figure 25 is a section through the closure of Figure 24;

Figure 26 is a sectional view of a bottle top having the closure of Figures 24 and 25 applied thereto;

Figure 27 is a sectional view of a closure embodying an annular ductile body, an adherent transparent facing and a separable opaque liner; and

Figures 28 to 41 are cross sections through closures according to the present invention showing various forms of faced ductile discs.

Referring to the drawings and particularly to Figures 1 to 4 inclusive, it will be seen that the

improved closure constitutes a complete article of manufacture which has roughly the form of a disc. Although a disc of circular outline is illustrated, it will be understood, of course, that this configuration is not necessary and that the same may be of any suitable outline. Since the closure is of the type intended for a container having around its mouth a bead or shoulder formation, it is simply essential that the area of the disc be greater than the overall area of the mouth of the container to which it is to be applied.

The body 10 of the disc is of thin ductile material, such as sheet metal, and any suitable material such as flat rolled plate, black rolled plate or aluminum may be used. It is essential that the material be of such character that when the skirt is formed, the free edge or marginal portion, will, under the uniform pressure applied around the mouth of the container as hereinafter described, buckle beneath the bead or shoulder and securely lock the cap upon the container.

It is preferred that at least one surface of the body be provided with a facing 11 which is resistant to liquid or other contents of the container and if a plastic or fluid facing is not desired, suitable parchment, cellophane, or other cellulosic material may be used, the same being treated, if necessary, to make the same substantially impervious to the liquid contents of the container. Metal foil may be employed and for some purposes sheets of resilient material such as rubber compounds or composition cork may be applied to the ductile body.

If a facing of sheet form is employed, it is usually preferred to securely bond the same to the surface of the body by suitable adhesive stratum 12 and any desired adhesive commonly used in the closure art may be employed, such as gutta percha or other liquid resistant adhesive.

As illustrated in Figure 2, the closure comprises two plies 10, 11, and an interposed adhesive stratum 12 is used when the facing ply is applied in sheet form.

The ductile body imparts the rigidity necessary for handling and to provide protection to the container contents, although its marginal portion may be readily deformed from its normal substantially flat form by capping mechanism adapted to apply closures of paper or other thin material.

If desired, both surfaces of the ductile body may be coated as illustrated in Figure 3, wherein the exposed or upper surface of the body 10 is provided with a facing 13 adhesively united to the ductile body by an adhesive layer 14. The facing on one or both surfaces of the body affords a sanitary contact surface, and compressible paper or similar material may be employed to afford a somewhat compressible medium which improves the sealing contact.

In some instances it may be desired to decorate the exterior surface and either the exposed metal surface of Figures 1 and 2 may be decorated with advertising or other matter, or the coated surface 14 of Figure 3 may be similarly treated. A cap of this type offers many advantages both in application to a container and from a manufacturing standpoint.

In Figure 5 the cap is shown as applied to a container having the usual shoulder or bead 15 surrounding its mouth and as will be observed, the marginal portion 16 closely fits over and surrounds the surface of this bead from its top portion outwardly and downwardly beneath the bead wall. The crimps or corrugations 17 in the margin of the deformed disc securely lock the closure upon the container, and these crimps are to be distinguished from the conventional corrugations or flutes which are preformed in the skirt of a cap of the usual crown type since they differ both in construction and mode of formation, as will be clear from a description of the method of applying the closure to a container which is illustrated in Figures 12, 13 and 14.

Referring to Figure 12, the closure is shown as positioned above a container C with its marginal portion 16 supported as by means of a surrounding guide or annulus 18. Inwardly from the marginal portion, the cap is placed under pressure, as by means of a spindle 19 having a presser tool 20 forced downwardly against the cap and container by means of a spring 21 surrounding the spindle. This pressure insures a proper centering of the disc upon the container and a close contact between the undersurface of the disc and the top surface of the bottle lip.

While held under pressure, the portion of the disc between its marginal portion 16 and the presser tool 20 is uniformly drawn downwardly or ironed over the curved surface of the locking bead as illustrated in Figure 13. During this operation, it is preferred to continue supporting the marginal portion or edeg 16 of the closure, thereby insuring a gradual or progressive deflection of the closure along the surface of the container bead as distinguished from a bodily bending of the same from the point of initial application of pressure outwardly to its edge.

This ironing and drawing of the metal to form a closure skirt in situ may be accomplished by means of a bending throat 22 surrounding the presser tool 20. The throat is formed of a plurality of segmental strips 23 each having at its upper end an outwardly directed flange 24, the top beveled surface 24' of which bears against a flat follower plate 26. Relative movement of the plate 26 and container toward one another forces the lower edge 27 of each segment against the closure to draw the metal thereof downwardly and iron the same over the surface of the bead.

The several segments are supported at their upper ends within the housing 28 by means of a ring 29, against which the outer edge of each flange 24 has a fulcrum bearing and an encircling coil spring 30 yieldingly holds all of the segments in contacting engagement with each other while permitting relative movement between such segments when they encounter resistance during the operation of applying the closure to a container. At the lower end, each segment has a sharp bending edge 27 and a flange 32 spaced slightly from the housing or casing 28 a sufficient distance to permit a limited expansion of the throat adjacent the bottom thereof. As will be observed, the segments have a slight longitudinal taper with longitudinally flat inner surfaces so that the diameter of the lower end of the throat is less than that of the upper end. This reduces the contact between the inner surfaces of the segments and the cap with the result that substantially the entire ironing action is produced by the edges 27.

Relative movement between the container and the bending throat, while pressure is maintained against the closure by means of the presser tool and while the marginal portion of the disc is supported by the guide annulus 18, may be effected either by moving the container upwardly or moving the throat downwardly and relative movement is permitted by means of the yield-

ing of spring 21 which permits the presser tool 20 to move upwardly within the bending throat.

In Figure 14 the final position of the closure is illustrated and as will be understood, the relative movement between the throat and closure results in the progressive ironing and drawing of the metal of the closure outwardly and downwardly toward the edge of the closure until the free marginal portion is disengaged from the support 18 and under the drawing and ironing action buckles inwardly, as illustrated in Figure 14, beneath the bead or shoulder of the container.

This buckling action produces the crimps or corrugations shown most clearly in Figure 5 and the same will at all times be maintained free of engagement with the ironing and bending throat which, in effecting the free buckling of the marginal portion of the disc, does not move inwardly beneath the shoulder, but has its edge 27 and inner ironing surface in contact only with the portion of the bead above and down to the horizontal plane of its greatest radius.

It will be apparent, therefore, that the flat marginal portion of the cap will buckle and crimp beneath the bead or finish of a container simply by applying bending and drawing pressure around the container mouth above the marginal portion or inwardly therefrom, and that the formation of the skirt in situ or upon the container automatically produces the buckling of the free edge or marginal portion of the closure and the locking of the formed closure in position. When no provisions are taken to predetermine the crimp lines in the freely buckled portion of the disc, the crimps are ordinarily somewhat irregular, as shown in Figure 5.

The closure in final position is best shown in Figures 5, 14 and 18. The applied closure is held in sealing engagement with the container by a freely buckled edge portion having a locking engagement with the shoulder beneath the bead 15 surrounding the mouth of the container. The irregular form of the crimps and the freely buckled characteristics of the metal are evident from an examination of the article, and these crimps are produced by the drawing of the metal as it is ironed over the top surface or lip of the bottle and the surrounding bead. This drawing action sets up stresses which cause the metal, along the edge of the disc, to buckle freely beneath the shoulder formed beneath bead 15.

The applied closure is also characterized by a very extended area of sealing contact. In other words, the cap has a sealing engagement with the container not only over the top surface of lip T of the container, but also over the surface of the bead 15 extending outwardly and downwardly from the top surface T to the line of maximum circumference (Figure 18). This sealing engagement is continuous, both axially and circumferentially, over the bead and, as will be observed, (Figure 18), the freely buckled portion is confined below the line of maximum circumference of the container bead. Above this line or plane of greatest dimension of the locking bead the margin of the cap has a sealing contact produced by the ironing action which draws the metal outwardly and downwardly over the bead surface and finally results in the free buckling of the edge. The marked distinction between the irregularly and freely buckled edge portion, illustrated in Figures 5 and 18, and the uniformly and regularly crimped skirt of the conventional crown cap, will be evident upon a comparison of Figure 18 with Figure 17. In Figure 16, there is illustrated a conventional crown having the usual crimps which extend from substantially the top of the cap downwardly along the skirt and then outwardly along the flange. In applying the conventional crown, pressure is exerted on the flange in the direction indicated by the arrow (Figure 16) and this pressure exerts a bending action on the flange which causes the inwardly extended corrugations or indentations at the angle between the flange and skirt to be pressed beneath the shoulder of the bottle finish to the position illustrated in Figure 17.

This bending action compresses the sealing disc of cushion material positioned within the crown, and results in an area of sealing contact which is confined to substantially the top or lip of the vessel, as contrasted with the extended area of sealing contact produced by my improved method and which characterizes my cap as applied to the container as illustrated in Figure 18.

Moreover, in the conventional crown cap, as shown in Figures 16 and 17, the preformed corrugations are substantially coextensive with the skirt and flange. That is to say, they are not confined below the line of maximum circumference. Consequently, although there may be contact between the skirt and the bead of the container above the line of maximum circumference, this contact exists only at spaced points circumferentially of the bead, and, therefore, is not a sealing contact.

I am aware that it has heretofore been proposed to employ crown caps in which the skirt is substantially plain or uncorrugated; for example in the patent to Painter, No. 468,258, granted February 2, 1892. But in caps of the character shown in Figure 14 of this patent, for example, the skirt is preformed, and while there may result a contact between the skirt and the bead surface above the line of maximum circumference, this cannot be a sealing contact, due to the fact that there is no ironing and drawing action of the metal over the bead, the skirt having been preformed and merely fitted over the bead in frictional engagement therewith.

Moreover, the subsequent indenting of such a cap, as illustrated in Figure 15 of the Painter patent, for example, results in spacing of the cap skirt from the wall of the bead not only in the plane of the indentations, as illustrated in Figure 16 of said patent, but also upwardly above the line of indentations due to the natural tendency of the corrugations to extend upwardly when the skirt is pressed inwardly to form the corrugations. Such regularly indented or corrugated portions are distinguishable from the freely buckled edge of the present cap not only by the method of formation, but by their physical characteristics.

A closure of any given dimension may be applied to containers which vary considerably in dimensions, and due to the fact that the skirt is formed by ironing pressure applied over the container surface, it will conform to irregularities in the bottle formation and provide a maximum area of sealing engagement.

Closures of this character may be stacked in suitable containers and being substantially flat and thin, a comparatively large number may be very compactly packed in stacked formation, which will enable them to be supplied in packaged form to the delivery chute of a capping machine of the character disclosed, for example, in my copending application, filed July 27, 1931, Serial

No. 553,462. This permits sanitary packing and delivery of the closures and of use without removal of the same from closures and of use without removal of the same from the package as well as a saving of space in shipping and handling as compared to the usual skirt and closure. The stacked or tube form of packing instead of bulk packing which is customary in the shipment and handling of the usual skirted closure protects the caps against contamination which is of considerable importance when the same are used in the capping of milk or other liquids which must be maintained in sterilized condition.

Referring to Figure 7, there is shown a modified form of closure which inwardly from its marginal portion 35 is formed wtih a shoulder 36. The shoulder 36 is formed by deflecting the circular portion 37 of the body and there is formed between the shoulder 36 and an outwardly spaced shoulder 38 a channel adapted to receive the top surface of the lip. This channel or groove is comparatively shallow, and not only facilitates the centering of the cap upon the container, but facilitates the manufacture of the cap from a blank such as the blank 39, a portion of which is illustrated in Figure 6.

As will be understood, the ductile body is stamped from a sheet of faced ductile material, of suitable size to provide a number of closures, and it is desired after the stamping of the cap that the same be passed upwardly through the opening in the blank produced as a result of the formation of the cap. By forming the shoulder or channel, the area of the produced closure is less than the area of the opening and thus subsequent to the stamping operation of the cap, the latter may be passed upwardly through the opening and discharged, which is not possible in the production of caps of the form shown in Figures 1 to 4, inclusive.

It will be understood that although the cap of Figure 7 is shown with only a single facing 39, the same may be provided with a facing on both surfaces, if desired. It has in common with the form of Figures 2 and 3 the flat marginal portion disposed substantially in the plane of the body of the disc and in the production of both forms, the margin is retained substantially in a plane paralleling the plane of the blank as distinguished from deflecting the margin to produce a skirted closure

The form shown in Figure 8 has the flat marginal portion 40 and the two plies of ductile material 40′ and facing material 41′. The margin is disposed in substantially the plane of the body of the disc and is retained, when stamped from the blank, in parallelism with the plane of the blank. It is reduced in diameter, as in the form of Figure 7 by forming inwardly from the marginal portion a shoulder 41 which is produced by deflecting slightly the central portion of the disc. This shoulder will also strengthen the cap, as does the channel in the form previously described, and assists in centering the cap upon the container.

In Figures 9 and 10, there is illustrated still another form which also has the flat, i. e., uncrimped, margin 42 formed from a ply 42′ of ductile material and a facing ply 42″. The margin in the present instance has a circular channel 43 which limits to some extent the length of the flutes or corrugations which are formed when the edge is buckled. The marginal portion is retained, as will be observed, in the plane of the body of the disc. Inwardly from the margin portion the cap is formed with a channel 44 which assists in centering the cap upon the container.

The form of Figure 11 is similar to that illustrated in Figure 7 and has a flat marginal portion 45 disposed outwardly from a channel 46, the marginal portion being in the plane of the body of the disc. Within the channel 46 may be disposed a compressible member such as a cork or rubber composition gasket 47 and this may be used in lieu of, or to supplement, the facing 48. As shown in Figure 11 the lower surface of gasket 47 is flush with the lower surface of the closure. The walls of the channel 46 still exercise their centering function, the centering action taking place upon initial compression of the gasket.

In Figure 19, I have shown a closure comprising a shouldered ductile body 60 and a facing 61 of cellophane. I have found that by utilizing cellophane not only is the inner surface of the cap full protected against all affection by the bottle contents, but further, any leakage which might be accounted for by porosity of the facing is entirely obviated. Furthermore, as above mentioned, cellophane, due to its thinness and flexibility, impedes to a minimum extent the free buckling of the closure margin in the applying operation. The facing as here shown is of overall extent.

In Figure 20, I have shown a closure comprising a shouldered ductile body 62 and an overall facing 63 of cork or cork composition. This material has been used with considerable success. It is stable under heat, as in the sterilization of filled and capped containers, and being used in thin sheet form, does not, it has been found, interfere appreciably with the self-buckling of the closure margin.

Referring to Figures 21 to 23, reference numeral 64 designates a substantially flat annulus of ductile material. The inner marginal portion of the annulus, as particularly shown in Figure 2, is somewhat upwardly offset to provide a portion lying in a plane parallel to the plane of the outer marginal portion with a shoulder 65 between the two portions. A full or imperforate disc 66 is disposable in the offset to be centered by shoulder 65, the lower surface of disc 66 being substantially uni-planar with the lower surface of the outer margin of disc 64. Disc 66 may be formed of any suitable material such as paper. As here shown, it may be assumed to be of the substance of the ordinary milk bottle cap. The disc 66 may be provided on its exposed portion with any desired printing. For example, in the marketing of milk, the date is frequently printed on the cap. This operation can be readily carried out locally in accordance with the demand from day to day. Thus this changeable data need not be printed on the cap in the production of the latter so that the production of the metal portion is rendered considerably cheaper. In Figure 23, reference numeral 67 denotes the neck of a bottle which, at its upper edge, is provided with an external bead or locking flange 68. Disc 66 is of such diameter that its marginal portion overlies the lip of the bottle and disc 64 is of such diameter that upon ironing its outer portion downwardly over the bead, its edge will eventually take a natural locking crimp under the bead to hold the cap securely in place.

According to Figures 24 to 26, the annulus 69 is perfectly flat and the full disc 70 is adhesively secured to its lower face. The cap is applied to the top of a bottle 71 in the manner described with reference to Figure 23 so that the outer margins

of disc 69 are in locking engagement with the bead 72.

In applying the discs with the annular ductile body, a presser tool is preferably used which has a central downwardly offset portion adapted to enter the bottle neck a short distance so that the inner marginal portion of the ductile body is conformed to the top inner surface of the bottle lip. Such a pressure tool is indicated at 76, Figure 26. The sealing area is thus increased.

According to Figure 27, the annulus 73 is conformed as described with reference to Figures 21 to 23 but is faced with a full disc 74 which is preferably adhesively united therewith. If the disc 74 is of cellophane, it forms in itself an effective closure and at the same time permits inspection of the container contents. However, if desired, a disc 75 similar to disc 66, above described, may be used in conjunction with the cap 73, 74, the disc being seated in the upward offset. If disc 66 carries printing, ply 74 is of transparent material such as cellophane.

The ductile disc, which is the essential element of the closure of the present invention, may be faced or lined in many ways and with various material and combinations of materials and with facings of overall or less than overall extent. Various forms of closures are shown in Figures 28 to 41.

Figure 28 shows a ductile disc 77 faced with an adhesively united layer 78 of relatively compressible material such as cork which in turn is faced with a moisture repellant ply 79 of material such as cellophane. The cork and cellophane plies are shown as being coextensive with the ductile disc.

In Figure 29 the ductile disc 80 has an overall cork facing 81 and a spot 82 of moisture repellant material such as cellophane.

The channeled ductile disc 83 of Figure 30 has a protective facing or spot 84 confined to the flat central disc portion.

In Figure 31 the channeled ductile disc 85 has a compressible annular facing 86 in its channel and flush with the lower surface of the disc. An overall facing 86' of moisture repellant material covers the bottom of the disc. Figure 32 differs from Figure 31 in the use of a spot 87 instead of the overall facing.

The ductile disc 88 of Figure 33 is shouldered and inwardly of the shoulder has an annular facing 89 of cork or the like. In Figure 35 an overall facing 90 of cellophane or the like is interposed between the ductile disc and annular cork facing.

Figure 34 shows a channeled ductile disc 91 having a waterproof facing 92 which terminates outwardly at the bottom of the outer wall of the channel, a compressible facing gasket 93 being imposed on the facing 92 in the channel.

The closure of Figure 36 differs from that of Figure 34 only in that the ductile disc 94 has an outer shoulder instead of a channel, the closure of Figure 37 varying in the use of a perfectly flat ductile disc 95.

In Figure 38 the ductile disc 96 is outwardly shouldered and a compressible facing 97, here shown as cork is coextensive with the central upwardly offset portion and flush with the lower surface of the marginal portion.

Figure 39 shows a perfectly flat ductile disc 98 provided on its lower surface with an adhesively united spot 99, Figure 40 showing the same arrangement with the addition of a top facing ply 100 of less diameter than the ductile disc.

Figure 41 shows an outwardly shouldered ductile disc 101 whose central portion has a facing 102 applied to the top thereof.

While the several plies of the improved closure may be assembled by different methods, I have illustrated in the drawings somewhat conventionally an improvement for rapidly and economically producing the same where the closure is to have one or more overall facings.

Referring to Figure 15, 49 designates a roll of flexible or ductile material, such as sheet or strip metal, which is to constitute the body of the completed closure. As shown, the strip or sheet 49 is first passed between means adapted to apply to one or both sides an adhesive coating, depending upon whether one or both sides are to be given a facing. In the form illustrated, both sides are to be coated and the rolls 50 represent a means for applying any suitable adhesive either in fluid or plastic form. Preferably, the adhesive employed is gutta percha, either in dough-like form or in solution. Of course, the gutta percha may be applied in the form of thin sheets or strips. Obviously, in its broader aspect, the method is not limited to the use of an adhesive.

The adhesively coated ductile strip 49 passes with strips of suitable facing material 51 drawn from rolls 52 between rolls 53 by which the strips and intermediate metal body are securely united. Supplemental rolls 54 or similar means may be employed for obtaining a close union of the ductile body and facing strips, and if desired, heat may be applied to these rolls, in any suitable manner, if the adhesive employed is of the character which requires heat.

After passing the rollers 54, the facing may be decorated or marked as at 55 and thereafter the closure discs may be stamped from the united plies by stamping mechanism as at 55' and delivered to a conveyor 56 which conducts the same to a stacking mechanism 57. Should it be desirable, the closure discs thus formed may be treated on one or both surfaces with wax or other suitable material, and since wax applying means is old and well known in the art, it is thought that the same need not be illustrated.

If it is desired to apply a facing to only one side of the metal body, it is obvious that the decorating means 55 may be utilized to suitably decorate or mark the metal. Either or both of the facings may be produced from liquid or plastic materials, and in that event, appropriate applying means will be utilized.

Obviously, the method of manufacture may be varied considerably without departing from the invention and the closure produced may take various forms. Although I have described a number of forms of the closure, it will be understood that such modifications come within the inventive concept as are comprehended by the following claims:

I claim:—

1. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat disc having a body of ductile material of larger diameter than the overall diameter of the container mouth and having a substantially flat marginal portion disposed in substantially the plane of the remainder of the body of the disc and engageable on both sides to support the disc and control the bending of said marginal portion during an ironing applying operation, said disc inwardly from said marginal portion

being deformed to provide means for engaging a container lip and centering the disc thereon.

2. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat disc having a body of ductile material of larger diameter than the overall diameter of the container mouth and having a substantially flat marginal portion disposed in substantially the plane of the remainder of the body of the disc and engageable on both sides to support the disc and control the bending of said marginal portion during an ironing applying operation, and an adherent sealing facing on said disc, said disc inwardly from said marginal portion being deformed to provide means for engaging a container lip and centering the disc thereon, said last mentioned means being in the form of an annular lip receiving channel presenting shoulders for engaging the radially inner and outer sides of the container lip.

3. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat disc having a body of ductile material of larger diameter than the overall diameter of the container mouth and having a substantially flat marginal portion disposed in substantially the plane of the remainder of the body of the disc and engageable on both sides to support the disc and control the bending of said marginal portion during an ironing applying operation, said disc inwardly from said marginal portion being deformed to provide means for engaging a container lip and centering the disc thereon, said last mentioned means being in the form of an offset portion presenting an annular shoulder for engaging the radially outer side of a container lip.

4. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat disc having a body of ductile material of larger diameter than the overall diameter of the container mouth and having a substantially flat marginal portion disposed in substantially the plane of the remainder of the body of the disc and engageable on both sides to support the disc and control the bending of said marginal portion during an ironing applying operation, and an adherent sealing facing on said disc, said disc inwardly from said marginal portion being deformed to provide means for engaging a container lip and centering the disc thereon, said last mentioned means being in the form of an offset portion presenting an annular shoulder for engaging the radially inner side of a container lip.

5. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat disc having a body of ductile material of larger diameter than the overall diameter of the container mouth and having a substantially flat marginal portion disposed in substantially the plane of the remainder of the body of the disc and engageable on both sides to support the disc and control the bending of said marginal portion during an ironing applying operation, said disc inwardly from said marginal portion being deformed to provide means for engaging a container lip and centering the closure thereon, said last mentioned means being in the form of an annular lip receiving channel presenting shoulders for engaging the radially inner and outer sides of the container lip, and a compressible gasket positioned in said channel having a surface substantially flush with the marginal surface of the closure radially outwardly therefrom.

6. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat disc having a body of ductile material of larger diameter than the overall diameter of the container mouth and having a substantially flat marginal portion disposed in substantially the plane of the remainder of the body of the disc and engageable on both sides to support the disc and control the bending of said marginal portion during an ironing applying operation, and an adherent overall sealing facing on said disc, said disc inwardly from said marginal portion being deformed to provide means for engaging a container lip and centering the disc thereon.

7. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat disc having a body of ductile material of larger diameter than the overall diameter of the container mouth and having a substantially flat marginal portion disposed in substantially the plane of the remainder of the body of the disc and engageable on both sides to support the disc and control the bending of said marginal portion during an ironing applying operation, and an adherent overall sealing facing on said disc, said disc inwardly from said marginal portion being deformed to provide means for engaging a container lip and centering the disc thereon, said last mentioned means being in the form of an offset portion presenting an annular shoulder for engaging the radially outer side of a container lip.

8. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat disc having a body of ductile material of larger diameter than the overall diameter of the container mouth and having a substantially flat marginal portion disposed in substantially the plane of the remainder of the body of the disc and engageable on both sides to support the disc and control the bending of said marginal portion during an ironing applying operation, and an adherent sealing facing of cellulosic material on said disc, said disc inwardly from said marginal portion being deformed to provide means for engaging a container lip and centering the disc thereon.

9. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat disc having a body of ductile material of larger diameter than the overall diameter of the container mouth and having a substantially flat marginal portion disposed in substantially the plane of the remainder of the body of the disc and engageable on both sides to support the disc and control the bending of said marginal portion during an ironing applying opera-

tion, and an adherent overall sealing facing of cellulosic material on said disc, said disc inwardly from said marginal portion being deformed to provide means for engaging a container lip and centering the disc thereon.

10. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat disc having a body of ductile material of larger diameter than the overall diameter of the container mouth and having a substantially flat marginal portion disposed in substantially the plane of the remainder of the body of the disc and engageable on both sides to support the disc and control the bending of said marginal portion during an ironing applying operation, and an adherent overall sealing facing of cellophane on said disc, said disc inwardly from said marginal portion being deformed to provide means for engaging a container lip and centering the disc thereon.

11. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat disc having a body of ductile material of larger diameter than the overall diameter of the container mouth and having a substantially flat marginal portion disposed in substantially the plane of the remainder of the body of the disc and engageable on both sides to support the disc and control the bending of said marginal portion during an ironing applying operation, and an adherent sealing facing of cork on said disc, said disc inwardly from said marginal portion being deformed to provide means for engaging a container lip and centering the disc thereon.

12. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat disc having a body of ductile material of larger diameter than the overall diameter of the container mouth and having a substantially flat marginal portion disposed in substantially the plane of the remainder of the body of the disc and engageable on both sides to support the disc and control the bending of said marginal portion during an ironing applying operation, and an adherent overall sealing facing of cork on said disc, said disc inwardly from said marginal portion being deformed to provide means for engaging a container lip and centering the disc thereon.

13. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat annular disc of larger overall diameter than the overall diameter of the container mouth and having an outer marginal portion slightly downwardly offset from its inner marginal portion whereby a shoulder is provided between the two portions, said outer marginal portion being engageable on both sides to support the disc and control the bending of said outer marginal portion during an ironing applying operation, said shoulder serving to center the closure on the container bead, and an imperforate disc of relatively compressible material centered relative to said annular disc by said shoulder and terminating outwardly at the shoulder to close said annular disc.

14. As a new article of manufacture, a closure for a container having an opening defined by a circumferential lip presenting an external shoulder or bead, said closure comprising a substantially flat annular disc of larger overall diameter than the overall diameter of the container mouth and having an outer marginal portion slightly downwardly offset from its inner marginal portion whereby a shoulder is provided between the two portions, said outer marginal portion being engageable on both sides to support the disc and control the bending of said outer marginal portion during an ironing applying operation, said shoulder serving to center the closure on the container bead, an imperforate disc of relatively compressible material centered relative to said annular disc by said shoulder and terminating outwardly at the shoulder to close said annular disc, and an adherent imperforate transparent facing on said disc closing the same and interposed between said annular and imperforate discs.

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