

June 8, 1965

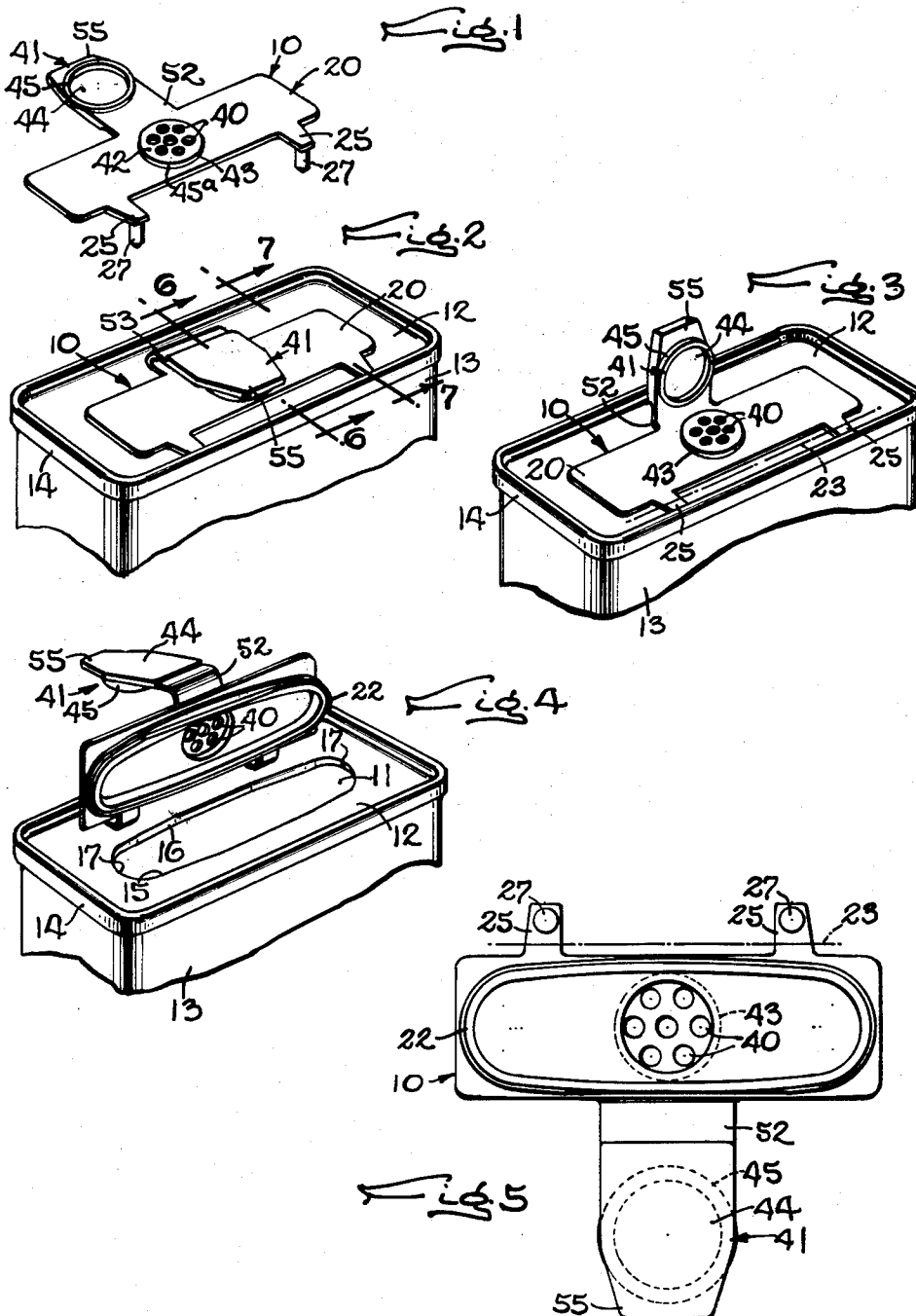
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3,187,964

SHEET METAL CONTAINER WITH PLASTIC CLOSURE PLUG

Filed Aug. 28, 1964

5 Sheets-Sheet 1



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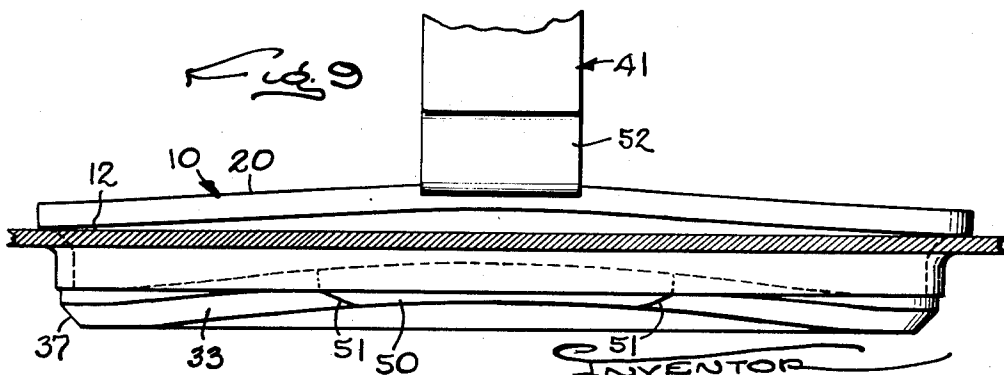
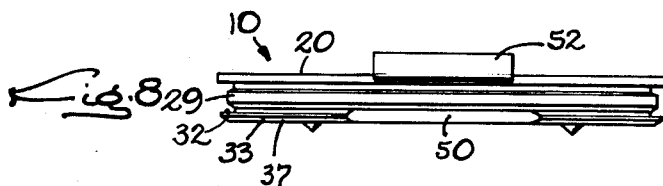
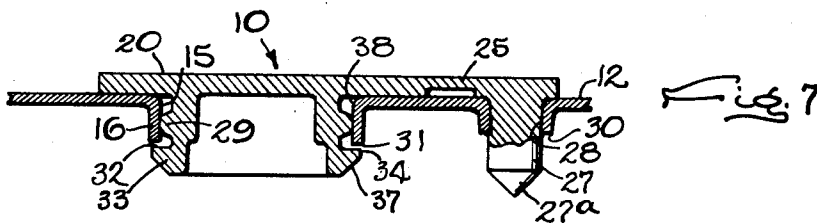
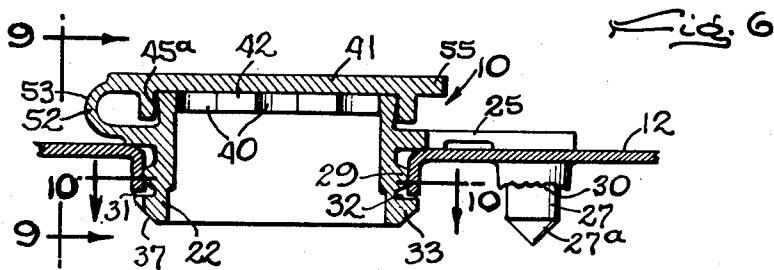
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SHEET METAL CONTAINER WITH PLASTIC CLOSURE PLUG

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5 Sheets-Sheet 2



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SHEET METAL CONTAINER WITH PLASTIC CLOSURE PLUG

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Fig. 10

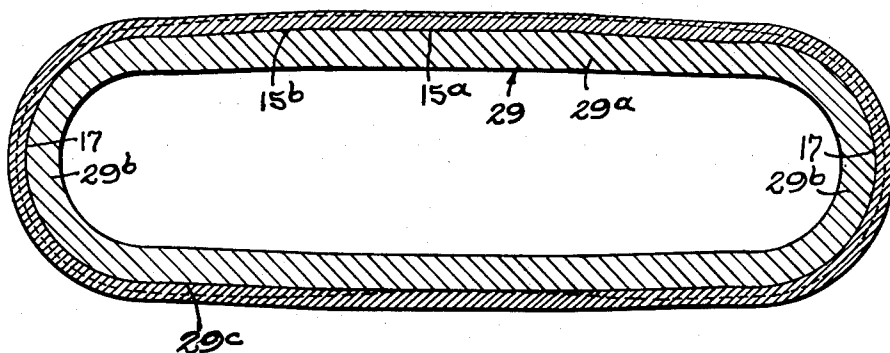


Fig. 11

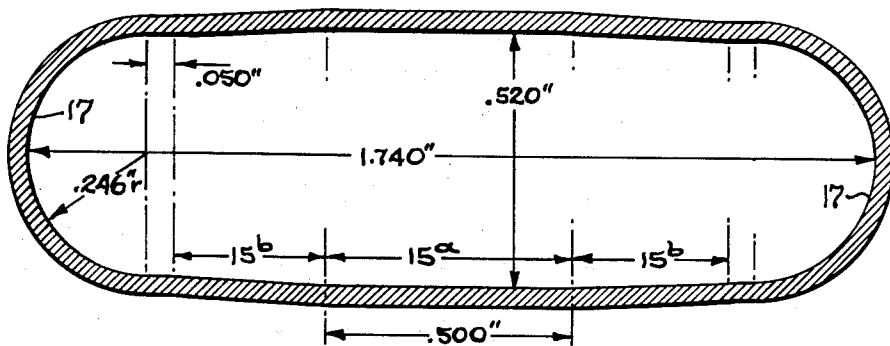
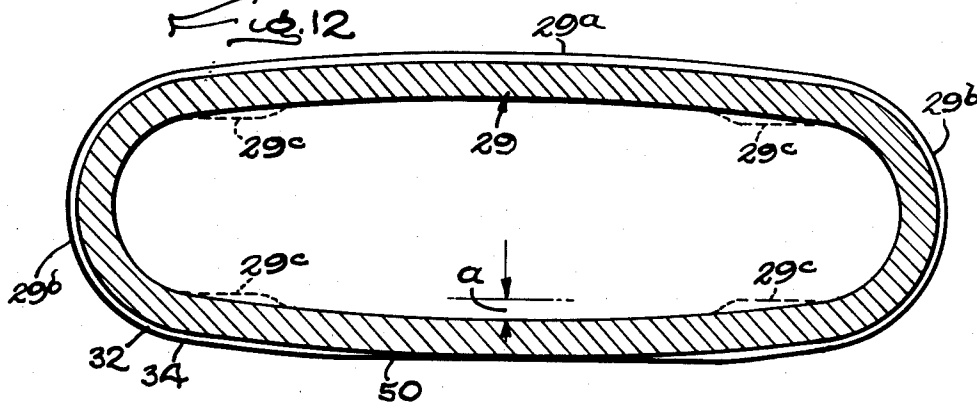


Fig. 12



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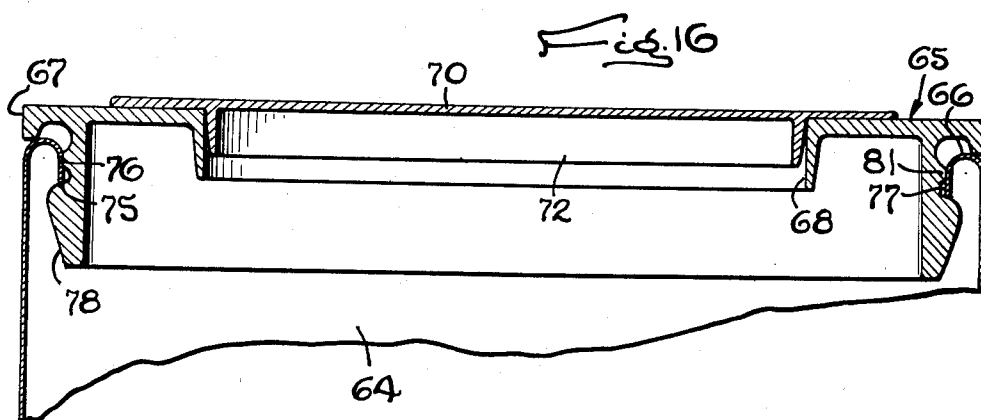
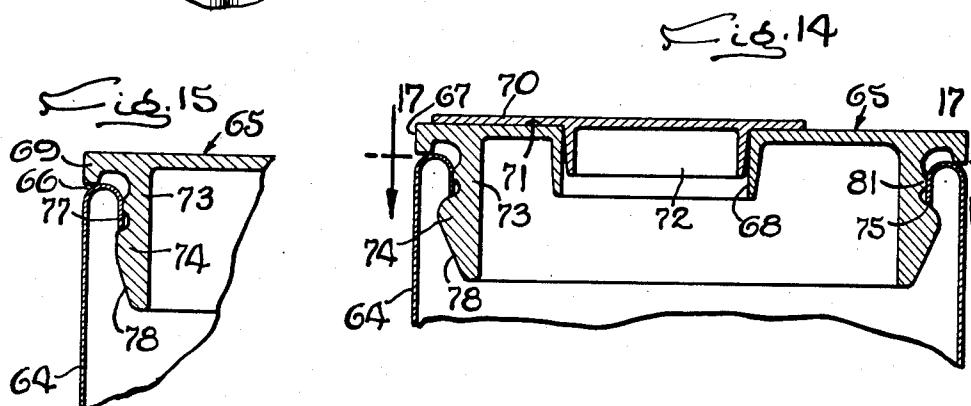
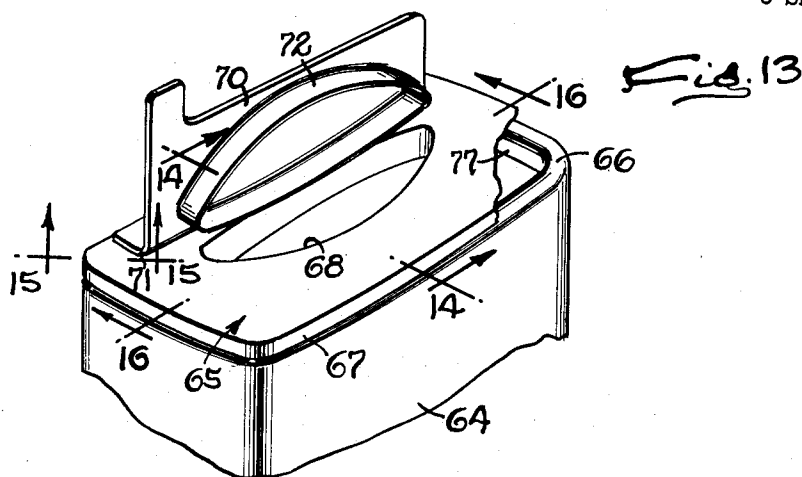
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SHEET METAL CONTAINER WITH PLASTIC CLOSURE PLUG

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SHEET METAL CONTAINER WITH PLASTIC CLOSURE PLUG

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Fig. 17

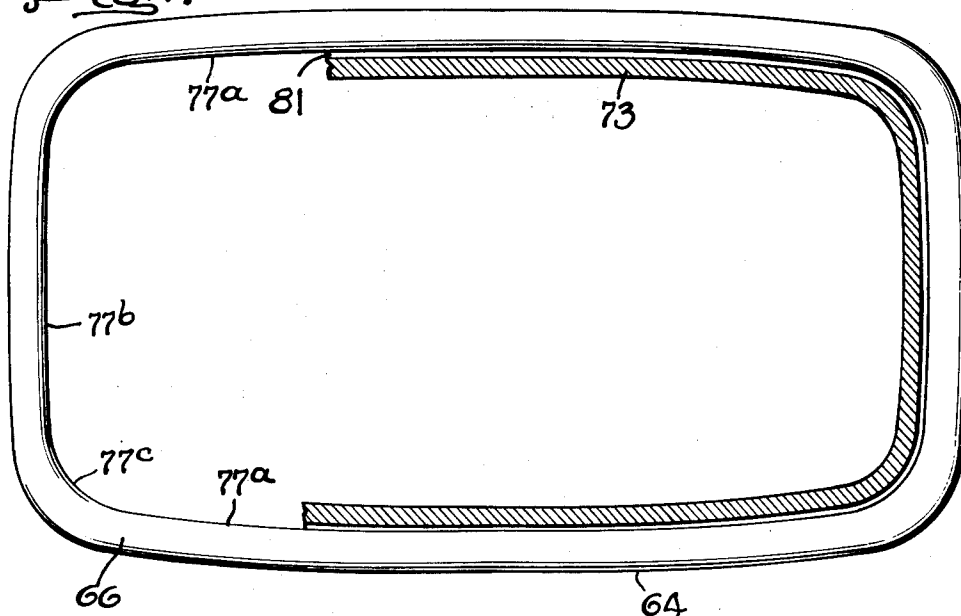
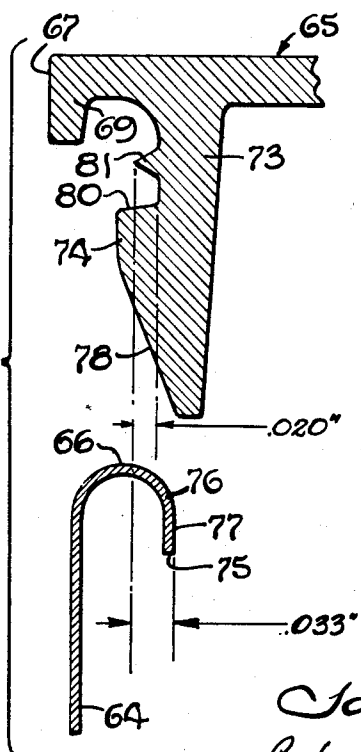


Fig. 18



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3,187,964 SHEET METAL CONTAINER WITH PLASTIC CLOSURE PLUG

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Filed Aug. 28, 1964, Ser. No. 393,488
3 Claims. (Cl. 222—480)

This is a continuation-in-part of application Serial No. 223,756, filed September 14, 1962.

This invention relates to the closure of sheet metal containers by means of a plug composed of resiliently yieldable plastic material and normally secured to the container through the medium of a depending flexible skirt pressed into an opening in the sheet metal top of the container. More particularly, the invention is concerned with the manner of sealing a molded plastic closure plug into an opening defined by an inturned sheet metal flange and of substantially greater length than width.

The primary object is to provide a plastic closure of the above character in which the skirt is of novel shape to insure effective sealing between the skirt and the container opening around the entire periphery of the latter in spite of its elongated character.

A more detailed object is to effect the desired sealing by insuring outward bulging of the plastic plug in the container opening around the entire periphery thereof.

Another object is to utilize a plastic closure plug of the above character in a novel manner to provide both sifter and spoon hole openings.

Other objects and advantages of the present invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

FIG. 1 is a perspective view of the plastic piece for providing a container closure embodying the novel features of the present invention.

FIGS. 2, 3 and 4 are similar fragmentary perspective views respectively showing the container fully closed and opened in different ways.

FIG. 5 is a bottom view of the closure piece shown in FIG. 1.

FIGS. 6 and 7 are enlarged fragmentary sections taken along the lines 6—6 and 7—7 of FIG. 2.

FIG. 8 is a front elevational view of the closure piece with the sifter holes thereof closed.

FIG. 9 is an enlarged fragmentary section taken along the line 9—9 of FIG. 6 in the course of lifting the plug to open the spoon hole.

FIG. 10 is a section taken along the line 10—10 of FIG. 6.

FIGS. 11 and 12 are sections of the container top and plug alone taken along the line 10—10 of FIG. 6.

FIG. 13 is a fragmentary perspective view of a modified form of the invention.

FIGS. 14, 15 and 16 are fragmentary sections taken respectively along the lines 14—14, 15—15 and 16—16 of FIG. 13.

FIG. 17 is a section taken along the line 17—17 of FIG. 14.

FIG. 18 is a fragmentary cross-section of the container and closure plug in separated relation.

While certain closure constructions embodying the present invention have been shown in the drawings and will be described in considerable detail, it should be understood that I do not intend thereby to limit the invention to the specific forms disclosed but aim to cover all modifications, alternative constructions, and uses fall-

ing within the spirit and scope of the invention as expressed in the appended claims.

In the illustrative embodiment shown in FIGS. 1 to 12, the invention is incorporated in a cover 10 of the plug type adapted to telescope directly into the defining wall of a relatively large and elongated opening 11 in the top 12 of a conventional spice can 13 of elongated generally rectangular cross-section. The top is a sheet metal stamping joined to the can body by a seam 14 and usually set below the latter. A hole 11 by which the container contents may be removed by a spoon is defined by a narrow inturned flange 16 extending around the entire periphery of the hole and having arcuate ends 17 merging with generally parallel sides 15 which are specially contoured in accordance with the present invention as will appear later. With the sides 15 extending in the direction of the longest dimension of the container top 12 and about 1 3/4 inches when used in a conventional 2 1/4 x 1 1/4 spice can, the hole 11 will accommodate all present day measuring spoons of teaspoon size.

The plug 10 to be pressed into and removed to cover and expose the spoon hole 11, the sifter openings 40, a cap 41 for closing these holes, and the means for hinging the plug on the top and the cap onto the plugs are molded in one integral piece shown in FIG. 1 of relatively stiff but resiliently yieldable plastic material such as low density polyethylene, a suitable material being polyethylene sold by Du Pont under the trade name of Alathon-17. The top of the plug is a generally flat plate 20 of a size and shape generally corresponding to but somewhat larger than the spoon hole 11 so that its marginal edge portion overlaps the flange 16 and lies flat against the container top 12 as shown in FIGS. 6 and 7 when the plug is pressed fully into the spoon hole. The extent of insertion of the plug into the top is thus limited positively.

Cooperating with the plate 20 to form the plug is a depending skirt or narrow flange 22 molded integral with the bottom of the plate and conforming in size and shape but slightly larger than the metal flange 16 defining the spoon hole. Thus the skirt, when pressed into the opening 11, is bent or compressed inwardly around its entire periphery to provide the desired airtight seal without interlocking with any part of the flange 16. To make the plug a captive closure, that is, secured permanently to the container top 12 but nevertheless movable between closed and open positions (FIGS. 2 and 4), the plug is connected to the top through a hinge whose axis 23 (FIG. 5) is disposed adjacent but spaced above the top and outwardly beyond but adjacent one side 15 of the spoon hole. Herein the hinge is formed by a pair of flat and relatively thin ears 25 molded integral with one side edge of the cover plate 20 in the plane thereof and widely spaced apart near opposite ends of the plate (see FIG. 5). Preferably, the ears are made thinner intermediate their ends as shown in FIG. 4 so as to facilitate bending and locate the hinge axis 23 in the desired position.

Outwardly beyond this axis, the ears 25 are fastened securely to the container top 12 preferably by simply pressing depending lugs 27 thereon into holes 28 punched through the metal of the top 13. Herein the lugs are short cylinders somewhat tapered at their ends 27^a to guide their entry into the holes. The latter are preferably punched by a tapered tool point so as to leave converging side walls which terminate in somewhat jagged edges 30 which bite into the plastic and assist in retaining the lugs and holding the ears firmly against the container top 12. By making the lugs slightly larger in diameter than the upper ends of the holes, the plastic will be compressed as the lugs are forced into the holes and assume

the exact contour of the walls of the holes. In this way, an effective airtight pressure seal is formed between the plastic and metal surfaces.

To provide adequate sealing pressure between the skirt 22 and the flange 16 around the entire periphery 11 and avoid leakage therefrom when the plug is pressed into the hole, the invention contemplates a novel contour of the surface of the flange and of the outer surface of the skirt 22 and sizing of the two. For these purposes, an integral bead 20 substantially narrower than the flange and having an outer surface of arcuate section extends around the skirt and is spaced below the plate 22 so that, when the bead is compressed against the flange, a narrow band of such outer surface contacts and is compressed against the flange about midway between the edge thereof as shown in FIGS. 6 and 7. Because of the substantial length of the sides 15 of the spoon hole, these sides tend to buckle laterally as an incident to pressing the relatively narrow arcuate ends of the bead into the ends 17 of the spoon hole. To insure that such buckling will always be in the outward direction, the present invention contemplates bulging the side portions 29^a of the bead 29 outwardly gradually as shown in FIG. 12 between the arcuate ends 29^b, the total amount *a* of the bulge being about .020 of an inch in this instance in which the spoon hole is .520 of an inch wide, and 1.740 long.

It has also been found that if the periphery of the flange 16 is sized and shaped to correspond to that of the bead shown in FIG. 12 but with the necessary interference, the bead will, under the compression applied to the end 29^b of the bead in order to achieve the desired sealing pressure, buckle inwardly over the short lengths 29^c of the skirt. The invention contemplates contouring the flange 16 not only to insure outward bulging of the sides 29^a of the bead 29 but also to compensate for any tendency toward inward buckling of the bead areas 29^c while at the same time providing proper interference between the bead and the flange for deriving the desired sealing pressure between the two over all of the different areas.

While this may be accomplished by shaping the flange 16 to complement the ultimate outward bulging contour of the bead, adequate sealing pressure and proper distribution thereof may be achieved by the contour and dimensions shown on FIG. 11. In this instance, central portions of the opposite sides 15^a of the flange are made parallel but spaced to provide for the outward bulging *a* (FIG. 12) less the desired interference between the bead and the flange which is about .030 to .050 of an inch. Somewhat lesser interference, for example, .010 to .020 is provided around the ends 17 of the flange. Between the parallel portions 15^a and the ends 17, the sides 15 over the areas 15^b are tapered and blended into gradual merge with the ends 17 and the sides 15^a. Over the areas 15^b, the interference between the bead and the flange is made about the same as at the sides 15^a.

When sized and contoured as described above, the bead 29 is compressed around its entire periphery when the plug is pressed into the spoon hole and points around the entire peripheries of the two come into full contact as shown in FIG. 10 and are placed under the desired sealing pressure, the outer surface of the bead taking the contour of the flange surfaces 15^a, 15^b and 17.

Provision is made for interlocking the lower edge portion of the skirt 22 and the inner edge 31 of the flange 16 so as to hold the plug positively but releasably in the opening 11. This is accomplished by forming around the outer face of the skirt a shoulder 32 which is spaced below the underside of the covering plate 20 a distance only slightly greater than the width of the flange 16. This shoulder is on a second bead 33 spaced below the bead 29 with its outer face 34 disposed a short distance beyond the inner surface of the flange 16 so that in the fully closed position of the plug, the shoulder 32 projects at least partially across and underlies the edge of

the flange. Such underlying of the shoulder and interlocking with the flange edge extends around the entire periphery of the skirt 22 except for a short length 50 later described. In this instance, the outer edge of the shoulder is disposed about .015 of an inch beyond the periphery of the bead 29.

As the plug is swung downwardly and pressed into the opening 11, the bead 33 is collapsed along with the bead 29 until the shoulder 32 passes the flange edge 31. Thereupon, the bead is free to expand and snaps outwardly beneath the flange edge as illustrated in FIGS. 6 and 7. The shoulder thus becomes effective to hold the plug in the container opening. At the lower edge of the skirt, the bead 33 is beveled around its outer edge as indicated at 37. The inner edge of this bevel is smaller than the rounded edge 38 at the top of the spoon hole opening 11 which edge, coacting with the bevel, guides the plug into proper centered position as it starts to enter the opening.

To prevent the bead 33, when expanded beneath the edge of the flange 16, from interfering with the lifting of the free edge of the plug out of the opening 11, the radial width of the bead over a substantial length 50 (FIGS. 4, 6 and 9) along this edge is narrowed considerably. Thus, the outer edge of the shoulder 32 is disposed short of or at least does not overlap the flange edge 31 far enough to prevent this depressed length of the plug from being raised above the flange edge as permitted by yielding of the plug material as illustrated in FIG. 9. Near opposite ends, the surface of the depression 50 rises gradually and outwardly as indicated at 51 into merge with the outer surface 34 of the bead 33, and these rises act as cams to contract the bead and guide its upward entry past the flange edge 31 progressively first along the free edge of the plug and then along the ends thereof.

In the exemplary closure shown, the plug which normally closes the spoon hole also provides sifter openings 40 normally closed by a second captive closure or cap 41 which is hinged on the plug for swinging to an open or sifting position (FIG. 3). Preferably the sifter holes are formed in the top wall 42 of a hollow cylindrical dome or boss 43 upstanding from the center of the plug and somewhat smaller in diameter than the width of the spoon hole 11 and only a small fraction of the length of the spoon hole. The cap 41 is an inverted cup having a flat bottom 44 and a narrow circular side 45 adapted to telescope snugly down over the boss 43 with a tight friction fit and preferably with somewhat of a snap action so as to hold the cup securely but nevertheless releasably in closed position (FIG. 2) covering the sifter holes. Such snap action is achieved by molding the boss to converge the outer surface 45^a thereof inwardly at a small angle, for example five degrees, and forming the internal wall 45^a of the cup side with a corresponding but reverse angle.

The hinge for connecting the cap to the plug preferably comprises a single and flexible strap 52 about as wide as the cap and molded integral at one end with the bottom of the cap and at the other end with one of the longer edges of the plate 20 of the plug. Outwardly beyond this edge, the strap is, in the closed position (FIGS. 2 and 6) the cap, bent reversely to form a bend 53 which, in view of the stiffness of the strap, defines the hinge axis which is thus spaced outwardly from the plate 20 and disposed somewhat above the latter.

To facilitate manually lifting of the cap to expose the sifter holes 40, the tab 55 formed as an extension of the hinge strap is extended past the cap to or beyond the edge of the plate 20 so as to be spaced above the top of the plate and thus provide for entry of the user's thumb between the tab and the top 12 for convenient lifting of the cap off from the boss in spite of the location of all parts of the closure below the plane of the top seam 14. Such convenient access to the tab is made possible by the central

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location of the sifter holes and the resultant disposal of the tab between the widely spaced hinge ears 25.

To enable the strap 52 to be used as a convenient and elongated pull tab for lifting the plug out of the spoon hole, the strap is attached to the plate 20 on the long side thereof opposite the ears 25 which form the plug hinge. Thus, to expose the opening 11 for withdrawing a leveled spoonful of the contents from the container when the same is closed as shown in FIG. 2, the user, by inserting the tip of his thumb beneath the projecting tab 55, lifts the latter and first swings the same to the position shown in FIG. 3 which is maintained by virtue of the inherent resiliency of the strap 52 which tends to assume and remain in a right angular shape when the cap 41 is released from the boss and swung upwardly. With the holes 40 thus exposed and the cap out of the way, the desired small quantity of the container may be sifted out through the holes by shaking the container while in inverted position.

Now, if instead of sifting out a small quantity of the container contents, it is desired to remove a spoonful, the up-standing cap is grasped and pulled upwardly thus lifting the free edge of the plug out of the opening 11. By continuing the pull upwardly and outwardly, the strap 52 becomes straightened by swinging the plug into an upright position (FIG. 4) in which the spoon hole is fully uncovered. Usually the swinging is continued until the plate 20 comes against the seam 14 of the can top where it may be held conveniently by the thumb of one hand while a spoon is being inserted, filled, and leveled off by withdrawing it from the hole while the edge is pressed against the side 15 of the hole.

The invention, in its broader aspects, is equally applicable to containers in which a skirted closure plug of molded plastic is intended to remain sealed under adequate pressure against an internal metal wall of the container body during the full service life of the container. Such a modification is illustrated in FIGS. 13 to 18 in which a tubular body 64 of generally rectangular cross-section is closed by a molded cover 65 abutting around its outer margin 69 against one end 66 of the body. The cover is composed of the resilient plastic above described and is of substantially the same size as the tube so that the peripheral edge 67 is substantially flush with the outer surface of the body all around the latter.

Formed in the cover is a dispensing opening 68 through which the container contents may be removed as by a spoon. This opening is closed by a suitable cap 70 which may be molded separately or integral with the cover and hinged to the latter at 71 so as to be swingable between an open position (FIG. 13) and a closed position (FIG. 14) against the top of the cover. Tight closure of the dispensing opening 68 may be achieved by the telescoping of a continuous peripheral rib 72 into the opening as the cap 74 is swung down against the top of the cover 64 (FIG. 17).

As in the form first described, the cover 65 is formed with a depending skirt 73 molded integral with the underside of the cover and formed at its lower end with an outer peripheral bead 74 which interlocks with a downwardly facing shoulder 75 on the body to fasten the cover thereto. The shoulder is defined by the edge of a narrow flange 76 which is formed by rolling a short end portion of the body 64 inwardly and then reversely to space the flange a short distance inwardly from the body walls and form an internal peripheral sealing surface 77 which parallels the axis of the body. As shown in FIG. 17, the opening defined by this surface, which conforms to the generally rectangular cross-sectional shape of the container body, is substantially greater in length than in its width as shown in FIG. 17. The opposite generally parallel and elongated sides 77^a thereof are joined to the shorter ends 77^b by arcuate corners 77^c which match the corners of the container body.

The bead 74 is somewhat larger than the surface 77 so that the skirt is collapsed somewhat to permit insertion

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of the bead, such entry being guided by the lower coned surface 78 on the bead. After full entry of the skirt and abutment of the cover with the body, the bead expands beneath the shoulder 75 thus interlocking the latter and the upper surface 80 of the bead to secure the cover onto the body.

As before, tight sealing of the container is achieved by utilizing the resiliency of the plastic of the skirt 73 to compress an outwardly projecting peripheral bead 81 thereon against the surface 75 of the flange 76 around the entire periphery thereof. This bead, which is about .020 of an inch in radial depth as shown in FIG. 18, is spaced above the fastening bead 74 so that in its compressed and somewhat flattened condition (FIGS. 14 and 15) it contacts the intermediate area of the surface 77 when the cover 65 abuts the end 66 of the tubular body. The sealing pressure is achieved by making the bead somewhat larger than the surface 77 by an amount sufficient to provide the desired pressure after the skirt has been collapsed and the bead forced into the flange opening and flattened against the surface 75 as shown in FIGS. 15 and 16. In the present instance, the size difference or interference is on the order of .033 of an inch as shown in FIG. 18 for a container of the size of an ordinary two-ounce spice can.

As in the construction first described, the sealing surface 77 is specially contoured to overcome any tendency of the elongated sides of the bead 81 to buckle inwardly and become spaced from the surface when these sides of the bead are placed under endwise as well as radial compression as an incident to collapse of the bead as the skirt 73 is forced into the opening defined by the flange 76. To this end, the sides 77^a of the surface are bulged outwardly and away from each other intermediate their ends and over a substantial portion of their lengths. In this instance, the bulging extends over substantially the full lengths of the sides so that these sides lie on a shallow arc of about a ten-inch radius in the case of a two-ounce spice can. The bead 81 is molded to the same arcuate curvature as the sides 77^a but to the larger size, for example .033 of an inch, to provide the interference required to achieve the desired sealing pressure. Since the spacing of the flange 76 inwardly from the wall of the body 64 is uniform around the entire periphery, the desired outward bulging of the sides 77^a of the surface 77 is accompanied by a similar bulging of the sides of the body as shown in FIG. 17. Such bulging is at such a large radius that it does not materially change the cross-sectional size or appearance of the body.

Preferably, though not necessarily, the ends 77^b of the sealing surface 77 are also bulged outwardly over their full lengths to take the form of arcs of the same radius as the surfaces 77^a. The corners 77^c of the surface are also arcuate in shape but of a substantially smaller radius. The bead 81 is sized to provide the same amount of interference with the ends 77^b and corners 77^c as against the sides 77^a.

With the rigid surface 77 of the body and the bead 81 on the yieldable skirt shaped and sized as above described, it will be apparent that, as an incident to the peripheral compression of the bead as the skirt is forced into the body opening, the tendency of the bead to buckle inwardly is controlled and the accompanying circumferential compression is forced to take place outwardly and thus in a direction to always insure full contact and uniform sealing pressure between the bead and the surface around the entire periphery thereof.

I claim as my invention:

1. The combination of, a container top composed of sheet metal and having a relatively long and narrow opening defined by a rigid intumed peripheral wall, said opening being long enough to permit an ordinary teaspoon to be inserted therethrough and the removal of the container contents thereby, a plug type cover for closing said opening formed as a single piece of resiliently yieldable material comprising a plate larger than said

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opening, a laterally compressible skirt depending from said plate and sized and shaped to telescope in said wall with a close sealing fit, means securing said plate onto said top and defining a hinge axis for swinging of the latter away from said opening to fully expose the same for entry and removal of a spoon and to guide the entry of said skirt into the opening as a plate is swung toward and against said top, a flexible strap integral with and extending outwardly from one side of said plate opposite said hinge axis and adapted to be bent reversely onto the top of said plate, coating means formed on said plate and the intermediate portion of said strap and adapted to telescope releasably with each other when the strap is pressed against said plate thereby to hold the strap frictionally and against said plate, and a plurality of sifter holes extending through said plate within the area of said spoon hole opening and said strap so as to be covered and closed by the strap while said last mentioned means remains in telescoped relation, said strap when pulled upwardly to expose said sifter holes forming an elongated finger tab for lifting the free side of said skirt out of said spoon hole opening about said hinge axis whereby to fully expose such opening in the continued upward swinging of said plate.

2. The combination of, a sheet metal container having a top with an elongated opening therein defined by a rigid

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internal peripheral wall having elongated approximately parallel sides and substantially shorter ends merging therewith, said sides bulging outwardly to space the intermediate portions thereof apart a distance somewhat greater than the lengths of said ends, and a plug type cover for closing said opening composed of resiliently yieldable plastic material larger than said opening having a skirt integral with and depending from said cover and having a continuous outwardly projecting peripheral bead telescoped in said opening and larger than said wall by a small and substantially uniform difference sufficient to insure outward buckling of the bead and compression against said wall around the entire periphery thereof as an incident to peripheral compression of the bead as said skirt is pressed into said opening.

3. The combination defined in claim 2 in which said internal wall comprises a flange integral with one end of said sheet metal body and bent inwardly and reversely relative thereto to dispose the sides and ends of said wall substantially parallel to the sides and ends of said body with the flange and said sides and ends bulging outwardly to correspond to the outward bulging of said wall.

No references cited.

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