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SEALED CONTAINER AND CAP

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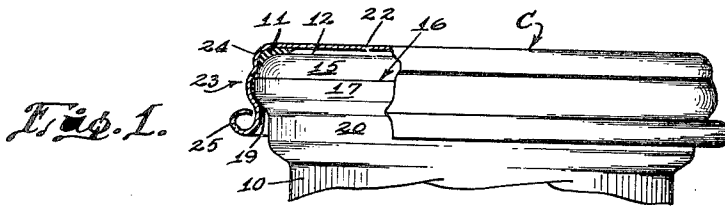


Fig. 1.

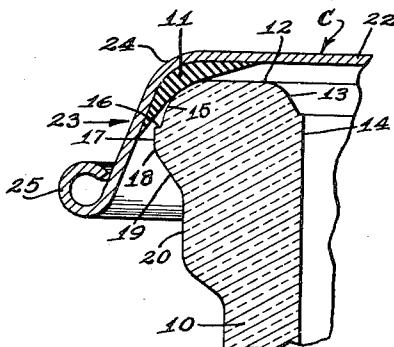


Fig. 2.

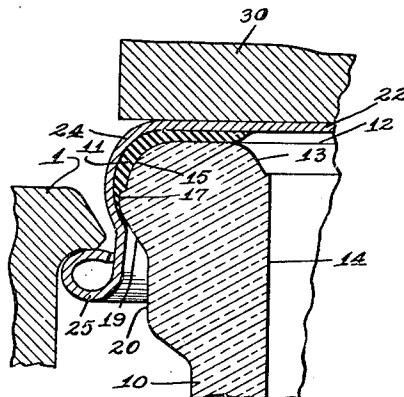


Fig. 3.

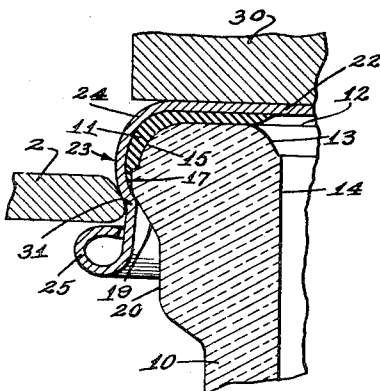


Fig. 4.

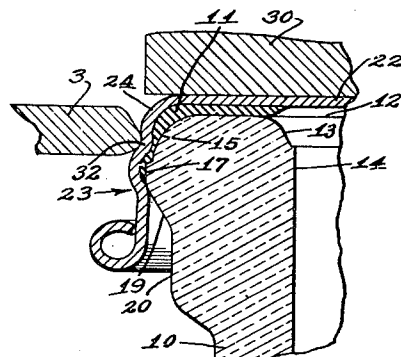


Fig. 5.

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SEALED CONTAINER AND CAP

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8 Claims. (Cl. 215-40)

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My invention relates to containers such as glass jars and to caps or closures therefor. The invention is adapted for use in packing various commodities, including food products such as fruits and vegetables. It provides a package comprising a glass jar or container which when filled and processed is closed with a sheet metal cap hermetically sealed to the container. It also provides a novel method and means for applying and hermetically sealing the cap to the container.

At the present day, food products are extensively packed and sealed in so-called tin cans and also in glass jars with sheet metal closures. The use of glass containers for packing food products and other materials has obvious and important advantages over the use of tin cans or metal containers, but presents certain manufacturing difficulties and objections that have restricted the use of glass for this purpose. In sealing metal caps to glass jars or containers, great difficulty has been experienced in attempting to seal the cap to the jar in a manner to provide the necessary mechanical strength to prevent the cap from being blown off the jar from internal pressure developed within the jar, particularly during processing. To overcome this difficulty, a practice now in vogue is to carry on the cooking processes in retorts in which a sufficient pressure is maintained to counteract the internal pressure developed in the jar and thereby prevent the caps from being blown off. This practice requires special equipment for providing and maintaining the desired pressures, and is objectionable, not only on account of added costs, but also because it greatly slows down the rate at which the processing can be carried on. An object of the present invention is to provide a novel form and combination of glass container, cap and sealing gasket which will reliably withstand any internal pressure which may be developed and thereby overcome the above objections and materially reduce the processing costs.

A feature of the invention relates to the provision of a novel form of side seal for sealing a metal cap to a glass jar or the like. When a sealing ring or gasket is positioned between the top surface of the jar and the metal cap, it is found that the internal pressure developed in the container tends to lift or bulge the cap upwardly in a manner to weaken or destroy the seal so that such a sealing method is unreliable. To overcome this difficulty, side seals have been adopted in which the sealing ring or gasket is placed between the vertically disposed cap flange or skirt and the adjoining side surface of the jar. With this ar-

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angement, it is especially difficult to secure the cap on the jar with sufficient mechanical holding strength to prevent it from being blown off by internal pressure. The present invention provides a side seal combined with means for locking or securing the cap to the container in a manner to effectively withstand the internal pressure.

In the conventional use of sheet metal caps with jars having side seals, the sealing material consists of a pre-formed ring or gasket of rubber or the like, which is secured within the cap prior to the application of the cap to the container. Ordinarily, the gasket consists of a ring cut from tubing. For a typical example of such use of a side seal, reference may be had to U. S. Patent #2,339,827, to White, January 25, 1944, Closure cap and package. An object of the present invention is to provide a side sealing type of container with a gasket consisting of a composition which is flowed into the cap prior to applying the cap to the container, thus providing a comparatively inexpensive sealing gasket requiring much less material than the pre-formed gaskets, and made and attached to the caps by comparatively simple methods, thereby materially reducing the cost.

A further object of the invention is to reduce the cost of the caps by providing for use with a side seal type of glass container, a sheet metal cap so constructed that while adapted to be securely held on the container, it permits the use of "tin plate" or sheet metal which is substantially lighter in weight than that required for prior art caps; is formed from a blank of comparatively small diameter; and is shaped from a blank by forming operations which are greatly simplified as compared with those required for the formation of prior art caps.

A further object of the invention is to provide a novel container and cap of the side seal type which, while securely holding the cap in the sealed position, permits the ready removal of the cap by a conventional bottle or can opener of the hook type and also avoids any liability of the glass being chipped or broken by the can opener hook.

A further object of the invention is to provide in the manufacture of a side seal type of container and closure, a novel method of applying and maintaining a localized portion of the sealing material under a comparatively high pressure along a side sealing surface of the container.

Other objects of the invention will appear hereinafter.

Referring to the accompanying drawings:

Fig. 1 is a side elevation of the upper portion of a container with a cap sealed thereon, parts being broken away and a portion of the cap and sealing material being shown in section;

Fig. 2 is a fragmentary sectional elevation, on a larger scale, of the container or jar with the cap loosely placed thereon; and

Figs. 3, 4, and 5 are similar views showing successive steps in the processes of attaching and sealing the cap to the container, said views also showing respectively, the spinning rolls for spinning the cap to sealing position on the container.

The drawings illustrate the neck portion and finish of a glass jar 10 and the method of applying a closure or cap C to the jar and sealing it thereto by means of a sealing ring or gasket 11, formed of rubber composition or the like, as hereinafter described. The circular mouth and neck portion of the jar are of the shape and contour illustrated in cross section in Figs. 2 to 5 inclusive. The mouth of the jar is formed with a flat top surface 12, and an inner curved surface portion 13 extending from the surface 12 to the vertical cylindrical interior surface 14 of the neck of the jar. The lip of the jar includes a curved surface portion 15, the cross section of which is an arc of a circle, tangent to or merging into the horizontal surface 12. The lower edge of the curve 15 terminates at a shoulder 16 or annular narrow ledge 16. From the shoulder 16, the surface extends downward substantially vertically and provides a vertically disposed exterior, side sealing surface 17 which surrounds the container. The sealing surface 17 at its lower edge 18, is united with or curves into a frusto-conical surface 19 which is substantially flat or straight in cross section. The surface 19 is tapered downwardly and inwardly at an angle preferably of about 35° to the vertical, the purpose of this degree of inclination being set forth hereinafter. The tapered surface 19 at its lower edge meets or curves into a substantially vertical surface 20.

The cap C which may be made of metal, preferably "tin plate," and which is formed from a circular blank, comprises a flat, horizontal circular top 22 and a depending flange or skirt 23 with an intermediate curved section or shoulder 24 uniting the top and skirt. The lower edge of the skirt is rolled to form a circular bead or false wire edge 25. The skirt 23 is downwardly and outwardly flared, as shown in Fig. 2, which illustrates the cap seated loosely on the container before being reshaped or spun into sealing position.

The sealing ring or gasket 11 is of the "flowed in" type. That is, it is formed by flowing a viscous compound emulsion into the inverted cap and drying it in place so that it is adhered to the cap. This provides an inexpensive gasket as compared to the usual cut or pre-formed gasket, and requires a comparatively small amount of the material. In this connection it should be noted that the cross section of the parts as shown in the drawings are on an enlarged scale, magnified as compared to the diameter of the jar. Thus, as applied to a jar having a mouth opening of 2½ inches in diameter, more or less, the surface 15 may be curved to a radius of ¾ of an inch, the other surfaces being proportionate although the dimensions may be varied.

The gasket may comprise a solvent compound of rubber or synthetic rubber which provides an elastic gasket and which is flowable under the pressure to which it is subjected in sealing the cap to the jar. The material is such as to with-

stand the action of the steam and elevated temperature to which it is subjected in processing food products. The gasket material retains its high viscosity while under heat and pressure and moreover, provides a gasket which is free from stickiness so that it will not adhere to the surface of the glass when the cap is removed. The material is also such that it will permit stacking of the caps without sticking together, such stacking being required in the usual methods of automatically applying the caps to the jars.

I have found that the solvent compound put on the market by the firm of Dewey and Almy, under the trade name "MK-25 solvent compound," satisfactorily meets the above specifications.

In the process of packing the jars with food products such as fruits and vegetables, it is customary to fill the jars with the product at an elevated temperature. The caps C are loosely placed on the filled jars while the latter are in an atmosphere of steam, a small amount of head space being left in the jar so that when cooling takes place and the steam in the head space condenses, a partial vacuum is produced, thereby holding the cap in place.

For sealing the jar, which may or may not be vacuumized, a spring loaded chuck or plate 30 is brought into position to overlie and bear against the cap on the jar, either by lifting the jar or lowering the chuck, thereby holding the cap firmly in place on the jar, under spring pressure. The skirt 23 of the cap is then spun inwardly for sealing the jar. For this operation, spinning rolls 1, 2, 3 are employed. The rolls are moved horizontally inward toward the jar while they revolve around the jar and make several complete revolutions around the jar during each spinning operation. The roll 1 engages the bead 25 and spins the skirt inwardly to the position shown in Fig. 3. During this operation, the gasket material is caused to flow downwardly, covering the side sealing surface 17. The pressure of the plate 30 on the top of the cap permits a thin layer only of the material to flow or be retained between the cap and the flat surface 12, and limits the flow of the material inwardly toward the center of the cap, so that the main body of the gasket material is forced to flow downwardly and fill the sealing space between the cap and the opposite sealing surfaces 17, 15 and 12 of the jar finish. The sealing material is thus placed under compression which is maintained in the finished package.

The roll 2 (Fig. 4) engages the cap skirt at a level opposite the tapered surface 19, preferably just below the meeting line 18 between the surfaces 17 and 19, and forces the skirt inwardly so that it is brought into contact with the tapered holding surface 19 of the glass. The roll 2 is shaped to form a crimp or seam 31 in the cap at the line of contact with the glass. In this manner, the cap, by engaging the upwardly flared surface 19 of the jar, is securely held or locked to the jar so that it can effectively withstand the upward pull of the cap caused by pressure within the jar.

The roll 3 (Fig. 5) moves horizontally inward as it revolves around the jar and thereby bends or crimps the skirt inwardly, forming an inwardly curved or biased seam 32 surrounding the container a short distance above the sealing surface 17. This inwardly biased seam 32 stiffens the skirt while the localized pressure of the roll as it constricts the skirt at this seam, applies a localized pressure to the gasket material by which

the latter is constricted between the seam and the opposite surface 15 of the jar. This operation of the roll 3 also places the gasket material which overlies the side sealing surface 17 under a higher compression than the gasket material above the seam. Thus in the sealed package, the sealing material overlying the surface 17 is maintained under a higher compressive force than the adjacent portion of the gasket. This results in a reliable and permanent seal at the surface 17 as internal pressure developed in the jar during the processing or at any time, while tending to force or bulge the cap upwardly, has no tendency to reduce the pressure of the sealing material at the surface 17 or to weaken the seal at this point.

The rolls 1, 2 and 3 may operate either singly and in succession or simultaneously. I have found it practical to form the rolls 1 and 2 integrally on the same spinning head.

The angle at which the surface 19 is tapered, is sufficient to securely lock the cap to the jar, and is also such as to permit a conventional can opener of the hook type to be hooked beneath the bead for prying the cap up. On the other hand, the angle of the surface 19 to the vertical is small enough to prevent liability of the glass being chipped or broken by the can opener hook, and also to permit the cap to be pried loose without difficulty.

Modifications may be resorted to within the spirit and scope of my invention.

I claim:

1. An open-mouthed container having a substantially flat top sealing surface, a vertically disposed side sealing surface, a curved corner sealing surface between said top and side surfaces, and an upwardly facing shoulder in the form of an annular ledge extending outwardly from the bottom edge of said corner sealing surface to the top edge of the said side sealing surface, and a sheet metal cap having a flat top, a depending circumferential skirt and a curved shoulder portion uniting said top and skirt, said cap overlying the container and spaced therefrom, an annular gasket of sealing material within the cap and extending over said top, corner and side sealing surfaces of the container and held under compression between said sealing surfaces and the cap, said skirt being bent inwardly below said side sealing surface into contact with the surface of the container, said skirt being formed with an inwardly curved seam extending circumferentially of the container above said side sealing surface and spaced above said ledge.

2. An open-mouthed container having a substantially flat top sealing surface, a vertically disposed side sealing surface and a curved corner sealing surface uniting said top and side surfaces and merging therinto, a sheet metal cap having a flat top, a depending circumferential skirt and a curved shoulder portion uniting said top and skirt, said cap overlying the container and spaced therefrom, an annular gasket of sealing material within the cap and extending over said top, corner and side sealing surfaces of the container, said container having a downwardly and inwardly tapered circumferential surface below said side sealing surface and forming a holding surface for the cap, the cap being extended inwardly below the side sealing surface into engagement with said holding surface, said cap being seamed inwardly above said side sealing surface, thereby forming an inwardly protruding circumferential seam surrounding the container above the side sealing surface, said seam being below the major

portion of the said corner sealing surface, the sealing material below said seam and covering the side sealing surface being under greater compression than the sealing material above said seam.

3. An open-mouthed container having a substantially flat top sealing surface, a vertically disposed side sealing surface and a curved corner sealing surface uniting said top and side surfaces and merging therinto, a sheet metal cap having a flat top, a depending circumferential skirt and a curved shoulder portion uniting said top and skirt, said cap overlying the container and spaced therefrom, an annular gasket of sealing material within the cap and extending over said top, corner and side sealing surfaces of the container, said container having a downwardly and inwardly tapered circumferential surface below said side sealing surface and forming a holding surface for the cap, the cap being extended inwardly below the side sealing surface into engagement with said holding surface, said cap being seamed inwardly above said side sealing surface, the gasket material which overlies the side sealing surface being under greater compression and compressed into a substantially thinner layer than that which overlies to the said top sealing surface, said skirt being extended downward substantially vertically below its line of contact with said holding surface and at an acute angle thereto, the lower edge portion of the skirt being rolled to form a bead.

4. The combination of an open-mouthed jar having a circular neck formed with a circumferential exterior vertical sealing surface surrounding the neck, the neck being of smaller diameter than the said sealing surface immediately above said sealing surface, thereby providing a narrow annular ledge extending from the upper edge of said sealing surface to the neck at its said smaller diameter, a sheet metal cap comprising a top seated on the jar and a marginal skirt extending downwardly across said sealing surface and spaced therefrom, said jar having a downwardly and inwardly tapered circumferential surface below said sealing surface, the lower edge of the sealing surface coinciding with the upper edge of the tapered surface, the skirt being drawn inwardly beneath the sealing surface into direct holding contact with said tapered surface, the skirt having an inwardly curved seam portion surrounding the container immediately above said annular ledge and sealing surface, and a sealing gasket of elastic compressible material covering said sealing surface and held under compression between the skirt and said sealing surface.

5. The combination of an open-mouthed jar having a vertically disposed sealing surface surrounding the neck of the jar, the neck being of smaller diameter than the said sealing surface immediately above said sealing surface, thereby providing a narrow annular ledge extending from the upper edge of said sealing surface to the neck at its said smaller diameter, a sheet metal cap comprising a flat top seated on the jar and a marginal skirt extending downwardly past said sealing surface and spaced therefrom, said jar having a downwardly and inwardly tapered holding surface below said sealing surface, the lower edge of the sealing surface coinciding with the upper edge of the tapered surface, the skirt being drawn inwardly beneath the sealing surface into direct holding contact with said tapered holding surface, the skirt having an inwardly biased seam surrounding the

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container immediately above said annular ledge and sealing surface, and a sealing gasket of elastic compressible material covering said sealing surface and held under compression between the skirt and said sealing surface.

6. The method of sealing to a container a sheet metal cap comprising a substantially flat circular top and a circumferential skirt depending from the periphery of said top, which method comprises placing the cap loosely on the container with an interposed annular gasket of resilient flowable material positioned within the circumferential bend of the cap and extending inwardly between the top surface of the container and the bottom surface of the cap top and extending downwardly between the said skirt and a side sealing surface of the container and covering said side sealing surface, applying a downward pressure on the top surface of the cap sufficient to compress the gasket between the cap top and the top surface of the container, applying to said skirt an inwardly direct pressure applied throughout the circumference of the skirt and thereby drawing the skirt inwardly into contact with the surface of the container at a line beneath the lower edge of the gasket, and spinning an inwardly biased circumferential seam in said skirt at a circumferential line spaced above said side sealing surface and spaced below said top surface of the container and thereby constricting the gasket material at said circumferential seam and placing the portion of the gasket below said seam under greater compressive force than that portion of the gasket above said seam.

7. The method of sealing a sheet metal cap to a jar, said cap having a substantially flat circular top and a depending circumferential skirt flared downwardly and outwardly from said top, the jar having a top surface, a vertically disposed exterior side sealing surface and an intermediate curved surface uniting said top and side sealing surfaces and having a holding surface extending downwardly and inwardly from said side sealing surface, which method comprises interposing an annular gasket of resilient flowable material between the cap and jar with the inner edge of the gasket extending between said top surface of the jar and the top of the cap, the gasket extending downward between the skirt and said side sealing surface and covering said side sealing surface, applying a downward pressure to the top of the cap and thereby compressing an edge portion of the gasket material between the top surface of the jar and the top of the cap, thereafter while said pressure is maintained, spinning the cap

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skirt inwardly and bringing it into contact with said holding surface, and spinning an inwardly biased circumferential seam in the said skirt at a plane above said side sealing surface and spaced below said top surface of the jar and thereby constricting the gasket material at said circumferential seam and placing the gasket material covering the side sealing surface under greater compression than the gasket material above said said seam.

8. An open-mouthed container having a top sealing surface, a curved corner sealing surface extending downwardly from said top surface, a vertically disposed side sealing surface concentric with and of slightly greater diameter than the lower edge of said corner surface, and an annular upwardly facing narrow surface uniting said corner surface and side surface, a sheet metal cap having a flat top, a depending circumferential skirt and a curved shoulder portion uniting said top and skirt, said cap overlying the container and spaced from said sealing surfaces, an annular gasket of sealing material within the cap extending over said top, corner and side sealing surfaces of the container, said container having a circumferential surface immediately below said side surface and extending downwardly and inwardly from the lower edge of said side surface and forming a holding surface for the cap, the cap being extended inwardly into contact with said holding surface, the cap having an inwardly biased seam surrounding the container above and in close proximity to the said upwardly facing surface and said side sealing surface and thereby by constricting the said gasket throughout its circumference, the gasket being continuous from the top sealing surface to substantially the point of contact of the cap with said tapered surface.

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