Jan. 2, 1940. C. E. McMANUS ET AL 2,185,216

METAL CONTAINER

Filed Sept. 14, 1935 2 Sheets-Sheet 1

Fig. 1.

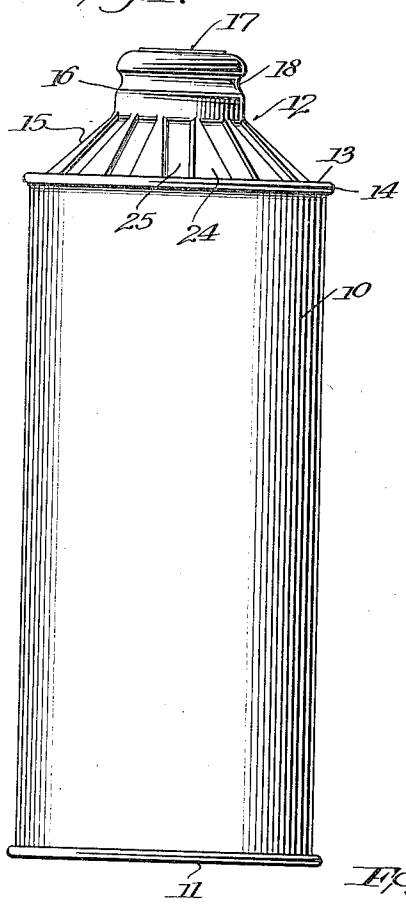


Fig. 4.

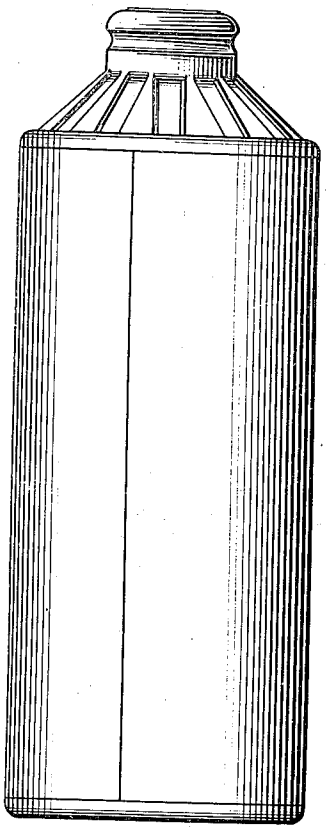


Fig. 5.

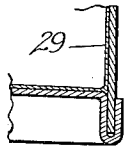


Fig. 2.

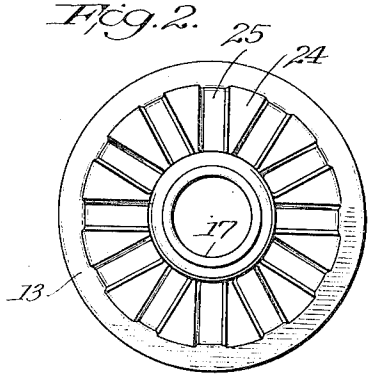
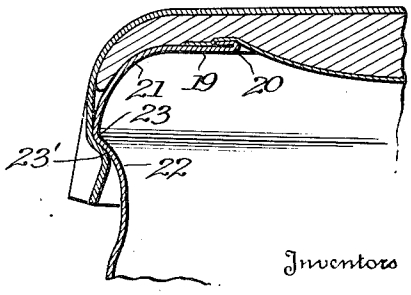


Fig. 6.



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Fig. 7.

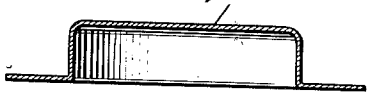


Fig. 8.

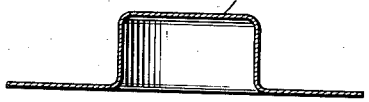


Fig. 9.

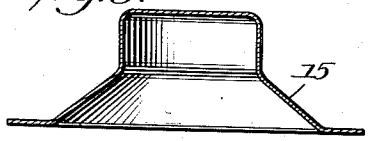


Fig. 10.

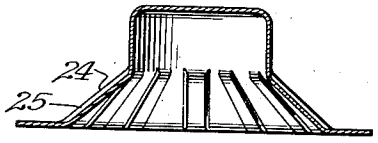


Fig. 3.

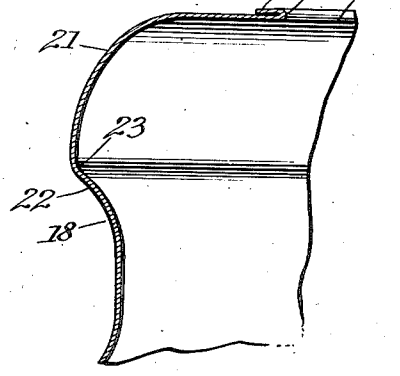


Fig. 11.

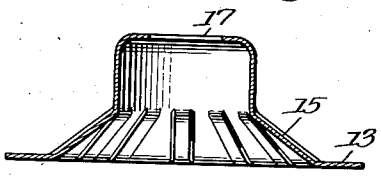


Fig. 12.

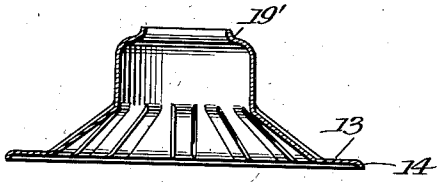


Fig. 13.

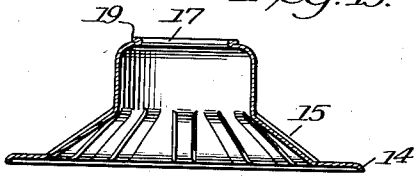
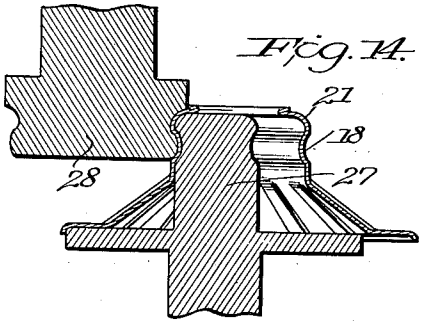


Fig. 14.



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2,185,216

UNITED STATES PATENT OFFICE

2,185,216

METAL CONTAINER

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Application September 14, 1935, Serial No. 40,630

4 Claims. (Cl. 220—24)

This invention relates to metal containers. More particularly, it relates to containers of the type adapted to be sealed by a removable closure, such as a closure of the crown type. The container of the present invention has been designed so as to facilitate its use with such closures, and its details of construction cooperate with a crown cap in a novel manner.

It is an object of the present invention to provide a metal container which is of such inexpensive construction that it may be discarded after once being used, so that it need not be returned to the packer. It is thus an object of the invention to provide a metal container adapted to take the place of the more expensive glass bottles now used, thereby not only avoiding the nuisance and expense of returning the bottles to the dealer and packer, but also reducing the cost of packing and marketing the product. The container of the present invention therefore has particular utility as a package for beverages, such as beer and ale. It retains all of the functional advantages of conventional bottles, since it permits of the efficient use of the well known, highly popular, and readily removable crown type of closure, which is usually of the twenty-six millimeter size. With the new can, it is not necessary to use a conventional can opener or any type of rupturing or metal cutting tool, since the crown cap can be removed in the usual manner.

It is a further object of the invention to provide a metal container for beverages and the like, which can be filled and capped by standard bottle filling and crowning machinery intended for applying the standard or conventional twenty-six millimeter crown, thus making it unnecessary for the bottlers to install new machinery or to alter their present machinery. In this connection, it is an important object of the invention to provide a metallic receptacle having a neck and mouth characterized by great strength and rigidity, so that these parts of the can will not be deformed when the sheet metal crown caps are applied thereto with the usual high crowning pressures.

In the accompanying drawings, two specific embodiments of the can of the present invention are illustrated, together with certain of the steps followed in a preferred method of manufacturing the neck member thereof.

In the drawings:

Figure 1 is a side elevation of a can of the present invention.

Figure 2 is a top plan view of the can of Figure 1.

Fig. 3 is an enlarged fragmentary sectional view showing the details of construction of the upper end of the neck member.

Fig. 4 is a side elevation of a modified form of can, in which all of the joints are butt welded.

Fig. 5 shows a modified form of welded seam which can be substituted for the butt welded seam at the bottom edge of the can of Fig. 4.

Fig. 6 is a view similar to Fig. 3, showing a crown closure applied to the receptacle.

Figs. 7 to 14 show several stages in the development of the upper end member of the can, in accordance with a preferred method of making the same.

The can of the present invention comprises a cylindrical or otherwise shaped body 10, a bottom end member 11 and an upper end member 12. The body 10 and the bottom 11, shown in Figure 1, per se, constitute no part of the present invention, and may be of conventional form secured together by standard seamed and soldered joints. The upper end member 12, however, is of novel structure, and results in the accomplishment of the objects and advantages mentioned above.

The member 12 comprises, as a preferred, but not essential feature, a substantially flat narrow marginal portion 13 terminating outwardly in a downwardly turned edge 14, which is adapted to be secured to the can body in any conventional manner, or by butt welding, as indicated in Figure 4. Inwardly of the marginal portion 13, the end member 12 is provided with an intermediate portion 15 which preferably tapers upwardly and inwardly and is of generally frusto-conical shape. This portion merges at its upper end into an upstanding neck 16, provided with a pouring opening or mouth 17 and a crown retaining groove 18.

Referring to Fig. 3, the material of the neck adjacent the opening 17 is preferably folded upwardly and outwardly upon itself as at 19 to provide a rounded, turned edge 20. This turned edge is of considerable importance and has a number of advantages. In the first place, it eliminates the danger of exposing the raw edge of the sheet metal to the contents of the receptacle, and thereby prevents rusting or corroding of the sheet metal, which would injuriously contaminate the contents of the receptacle.

Second, the danger of a user of the receptacle cutting his hands on such a raw edge is eliminated.

Third, the turned edge constitutes a reinforcing element for the mouth of the receptacle and

prevents it from becoming bent, during the crowning operation, or at any other time. If the upper end of the neck should bend downwardly a slight amount during crowning, the extra thickness at 19 will compensate for such bending, and thereby provide a proper sealing surface.

Fourth, the turned edge provides an upstanding rib adjacent the mouth of the bottle which improves the sealing action of the crown cap. The rib 19 is so positioned that it will engage a center spot liner of a crown cap adjacent the edge thereof, to cooperate therewith in a novel manner and provide an extremely efficient seal. A typical center spot crown cap is shown, for example, in the patent to McManus, No. 1,339,066, May 4, 1920. If a spot liner is not used, the rib will be embedded in the cork cushion of the crown cap, so that the seal will be improved in any event.

Fifth, the turned edge eliminates the possibility of creating any pockets or cavities in which bacteria might collect to contaminate the contents of the receptacle.

Sixth, the construction of the upper end of the neck, in accordance with the present invention, facilitates pouring of the liquid from the receptacle.

As stated above, the receptacle neck is provided with a crown retaining groove 18 below the upper end thereof. Preferably, the details of construction are substantially in accordance with the disclosure of Figures 3 and 6. The upper end of the neck is of a shape such that an upper portion 21 thereof lies on an upper substantially arcuate, convex curve, while a portion 22 immediately therebelow lies on a substantially arcuate concave curve which intersects the first mentioned curve at 23 to provide a locking shoulder at the junction of those two portions. The shoulder 23 is engaged by the crimps 23' of a conventional or standard crown closure, to retain the same in place.

The portion 15 of the can end member intermediate the neck and margin thereof, is preferably of generally frusto conical form and is reinforced.

In the application of crown caps, it is necessary to exert a substantial pressure which is applied directly downwardly on the top of the crown. The capping of glass bottles presents no serious problems since it has been well known to construct the same in a manner to resist this pressure. But a problem has heretofore existed in connection with the manufacture of metallic containers for the reception of crown caps. We are aware that it has been proposed to construct the containers of conical form with the conical walls tapering to a mouth of substantially the diameter of the crown. In the present instance, we have found it possible to retain the substantially uniform cylindrical body of the conventional can or metallic container by constructing the top between the crowning neck and can body of frusto-conical form, provided the body of the cone frustum is suitably stiff and of such configuration as to constitute a rigid thrust transmitting means between the neck and the metal body as distinguished from a top which would yield or buckle under the crowning pressures. We have found that if the body of the cone intermediate the neck portion and the marginal portion is provided with a multiplicity of reinforcing ribs extending, preferably substantially radially, between these portions, an effective resistance to collapse of the top under crowning pressure is afforded. We prefer to provide these ribs by deforming the metal of the top, thereby providing a series of circumferentially spaced, radially elongated deformations, and we further prefer to form them in such a way that they merge with the surfaces of the marginal portion and the neck. In the preferred embodiment illustrated in the drawings, the ribs 24 and grooves 25 lie on radial planes with respect to the longitudinal center or axis of the receptacle. As will be noted, the grooves each have parallel side edges and the ribs 24 are somewhat tapered. Upon application of pressure to the lip of the container, as in the crowning operation, the ribs receive the thrust exerted and transmit the same along straight lines directly to the marginal portion, which of course, is sufficiently strong to withstand the same. Thus, the ribs effectively eliminate any tendency of the top to buckle downwardly. As will be understood, and as illustrated in the drawings, the ribs from end to end have unbroken surfaces or, in other words, their surfaces are plane along radial lines. This distinguishes the top from such constructions as have heretofore been utilized, in which attempts have been made to obtain reinforcement by circumferentially grooving a top with the grooves radially spaced. Such grooves tend to weaken the top along circumferential lines and do not effectively resist the crowning pressure. Viewed in cross-section, the ribs may be considered as, in effect, the legs of an isosceles triangle. Downward pressure tends to expand or open these legs at the base where the opening movement is resisted by the body of the can and the marginal portion of the top. The legs thus convert the downward, axial forces, resulting from crowning pressure, into outward radial forces, which are effectively resisted by the marginal portion. The intermediate portion has no tendency to buckle upwardly or downwardly under this pressure, because all of the forces are applied thereto in a direction endwise or lengthwise of the reinforcing elements.

Moreover, the fact that the ribs and grooves are disposed on radial planes of the receptacle, is important in that they facilitate, rather than hinder, the flow of liquid from the interior of the container outwardly through the mouth thereof. Reinforcing elements of this kind have been found to be a great improvement over circumferentially disposed annular ribs and grooves, which tend to impart a swirling cascade effect to the outwardly flowing liquid, with the result that liquid is unduly agitated when it is poured. Such agitation results in excessive foaming of many beverages, such as beer and ale.

It is advantageous to have the lower ends of the ribs and grooves merge substantially directly with the narrow marginal portion 13, and to avoid an annular depression or groove around the periphery of the can end. Such a groove tends to collect dirt during storage and drippings, after a partial pouring operation so that, upon pouring a further quantity from the receptacle, the beverage will be contaminated. With the present invention, no such collection of dirt and drippings is possible.

The form of container shown in Figure 4 differs from the first form only in that the body, the lower end member, and the upper end member are all joined by butt welds, instead of by conventional seamed and soldered joints. The can in accordance with this disclosure is of particular advantage in the packing of pressure beverages,

such as beer, ale and carbonated drinks generally, because of its greater strength and resistance to leakage along the joints. Moreover, substantial economies in the amount of metal used in making the cans are effected by the elimination of seamed joints. Figure 5 shows a modified form of welded joint which may be used between the bottom end member and the body in place of the simple butt weld of Figure 4.

Figures 7 to 14 represent a number of steps which may be followed in the manufacture of the end member 12 of the present invention. A conventional hat shaped blank 26 is made in a strip feed press, as shown in Figure 7. Next, this blank is redrawn so as to increase the depth of the crown of the blank and decrease its diameter. The result of this step is shown in Figure 8.

The blank then has the frusto conical, intermediate portion 15, formed as shown in Figure 9, and that portion is then pressed, rolled or otherwise treated to provide the corrugations, comprising ribs 24 and grooves 25. After the blank has been formed as shown in Figure 10, it is perforated and trimmed to make it of accurate size and to provide the opening 17, as shown in Figure 11. Next, the marginal portion 13 is turned down at its outer edge 14, and the sheet metal adjacent the mouth is bent upwardly as at 19', Figure 12. This upstanding lip is simultaneously or subsequently folded outwardly and downwardly as at 19 in Figure 13.

The final step in the manufacture of the upper end member, that is, forming the groove 18, is represented diagrammatically in Figure 14. The blank of Figure 13 is positioned upon a rotatable mandrel 27 having its upper end shaped to correspond to the crown finish which is to be applied to the neck. A second rolling die 28 is positioned exteriorly of the blank for cooperation with the mandrel 27 to roll the groove 18 and crown finish 21 upon the neck. The rolling die 28 has a peripheral shape which is complementary to the shape of the mandrel 27.

After the blank has been rolled to final form, it may be assembled with the can body in any convenient manner, either by a conventional soldered seam, or by a butt weld as shown in Figure 4.

In the manufacture of metallic containers for beer and like beverages, it is desirable that the interior be provided with a coating which will retain plasticity but not melt or flow at temperatures well above normal pasteurizing temperatures. For purpose of illustration, we have indicated such a coating in Figure 5 by the reference character 29. It will be understood that this coating is to extend throughout the interior of the container, including the inner surface of the neck. We prefer to apply the coating after the container has been formed so as to lodge the same in film-form at and in the seams as well as on the walls, thereby preventing the contents from coming into contact with the metallic surface. The coating should be tasteless and odorless so as not to impart taste to or harm the flavor of the contents. A suitable coating may comprise approximately 20% of carnauba wax and 80% commercial ozokerite wax. The ozokerite wax consists ordinarily of 60% straight ozokerite and 20% paraffin. If desired, a certain amount of latex may be included, for example, in the manner described in the patent to Weiss, No. 1,563,410, granted December 1, 1925. The coating is applied either by spraying, followed by hot air blasts to remove excess material or the wax composition may be poured into the container and removed by tilting the latter. It is desirable to heat the container to the approximate temperature of the wax solution, when applying the latter, the heat to be in the neighborhood of from 200 to 220° F. The actual melting point of this solution is approximately 180° F., which is ample to permit pasteurization, the temperature of which seldom exceeds 150° F. The formula mentioned may be varied if desired but we prefer, as a base, a mixture of the waxes mentioned.

It must be understood that the present invention is not limited to the precise form of the invention disclosed in the drawings and described above, nor to the particular method steps described, but must be construed to cover any alternative construction or method, falling within the scope of the appended claims or their equivalents.

We claim:

1. A metal container for sealing high pressure beverages, such as beer, comprising a substantially tubular sheet metal body having directly connected thereto, the outer margin of a substantially frusto-conical upstanding sheet metal end member extending inwardly and upwardly at a slant from the body a substantial distance and merging into an upstanding neck of a diameter adapted to receive a standard crown cap and forming a continuation of said frusto-conical slanted member, said neck at its upper end being provided with an inwardly projecting terminal flange defining the margins of the pouring and filling opening and disposed on a substantially horizontal plane entirely around said opening and extending a substantial distance radially outwardly from the opening to provide a substantially plane annular sealing surface of substantial width around said opening, the material of the flange being turned back upon itself along and entirely around the margin of the opening to provide a turned edge for the opening and a reinforcement for the inner edge of the flange to constitute said inner edge a substantially rigid abutment, to resist the sealing pressure of a standard crown cap, the material of said neck immediately below said flange being curved outwardly and downwardly convexly to a circumferential line on said neck, said material being curved downwardly and inwardly concavely from said line to provide a locking shoulder and a groove therebelow for the crimped skirt of a standard crown closure, said neck terminating at its lower end in a portion merging with said frusto-conical portion and defining the lower end of said groove.

2. A metal container for sealing high pressure beverages, such as beer, comprising a substantially tubular sheet metal body having directly connected thereto, the outer margin of a substantially frusto-conical upstanding sheet metal end member extending inwardly and upwardly at a slant from the body a substantial distance and merging into an upstanding neck of a diameter adapted to receive a standard crown cap and forming a continuation of said frusto-conical slanted member, said neck at its upper end being provided with an inwardly projecting terminal portion defining the margins of the pouring and filling opening and disposed on a horizontal plane entirely around said opening and extending a substantial distance radially outwardly therefrom to provide a plane annular sealing surface of substantial width around said opening, the material of said horizontal sealing

surface being folded upwardly and outwardly upon itself along and entirely around the margins of said opening to provide a turned edge for the opening and an upstanding sealing rib around the opening, the material of said neck immediately below said horizontal plane portion being curved outwardly and downwardly convexly to a circumferential line on said neck, said material being curved downwardly and inwardly concavely from said line to provide a locking shoulder and a groove therebelow for the crimped skirt of a standard crown closure, said neck terminating at its lower end in a portion merging with said frusto-conical portion and defining the lower end of said groove.

3. A metal container for sealing beverages under high pressure, such as beer, comprising a containing portion, said containing portion terminating in an open annular portion, said portion having a locking shoulder thereon adapted to receive a crimped cap of the crown type, said annular portion at its upper end being provided with an inwardly extending substantially horizontal seating flange defining a pouring opening, the inner edge portion of said seating flange being turned outwardly along the outer surface of said seating flange, and a cap of the crown type crimped on said locking shoulder and having a sealing pad therein, said outwardly turned portion being embedded in said sealing pad, thereby preventing contact of said edge with the contents of the container.

4. A metal container for sealing beverages under high pressure, such as beer, comprising a containing portion, said containing portion terminating in an open annular portion, said portion having a locking shoulder thereon adapted to receive a pressure applied, crimped cap of the crown type, said annular portion at its upper end being provided with an inwardly extending substantially horizontal seating flange defining a pouring opening, the inner edge portion of said seating flange being turned and folded back upon itself along and entirely around the margin of the pouring opening to provide a turned edge for the opening and a reinforcement for the inner edge of the flange, thereby to constitute said inner edge a resisting abutment for the cap applying pressure and a cap of the crown type crimped on said locking shoulder and having a sealing pad therein in contact with said seating flange, said turned and folded edge portion serving to reinforce said seating flange against deformation under the sealing pressure applied thereto by the sealing pad of said cap during the application of the latter to the container.

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