Jan. 16, 1940. W. F. PUNTE 2,187,433

METHOD OF FORMING AN EASY OPENING CONTAINER

Filed Jan. 28, 1937

FIG. 1.

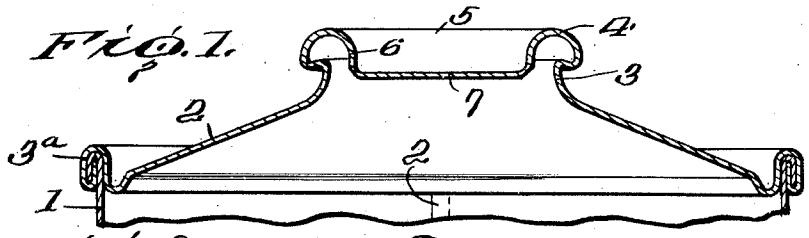


FIG. 2.

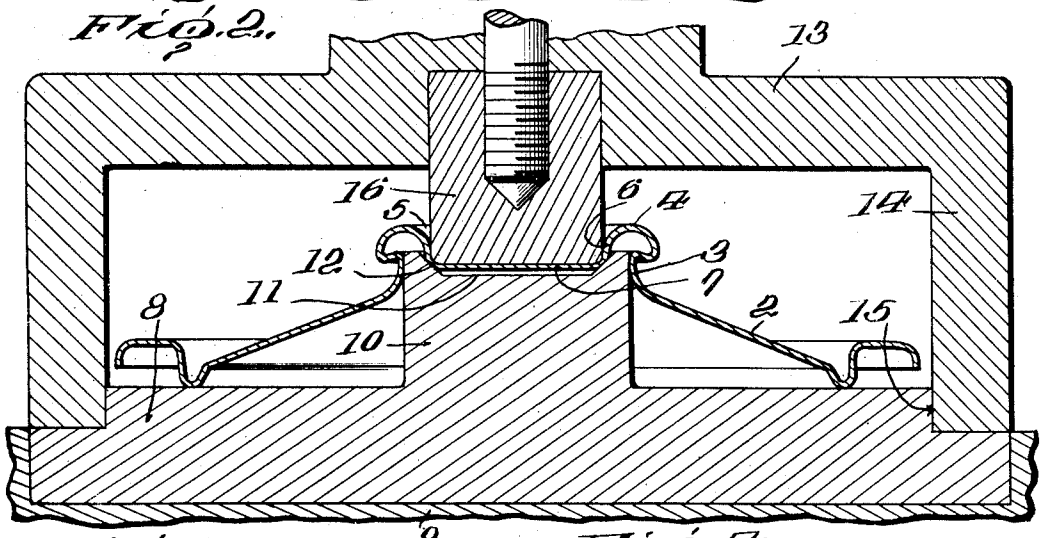


FIG. 3.

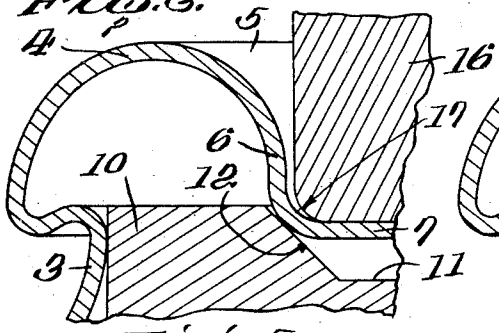


FIG. 4.

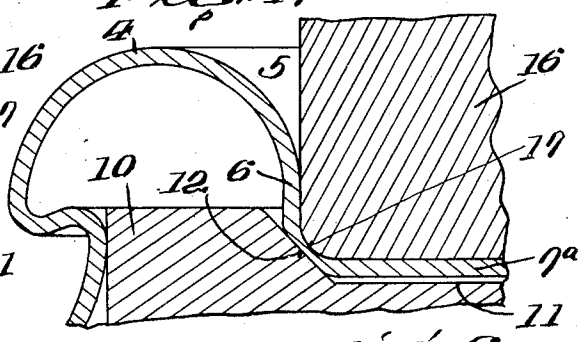


FIG. 5.

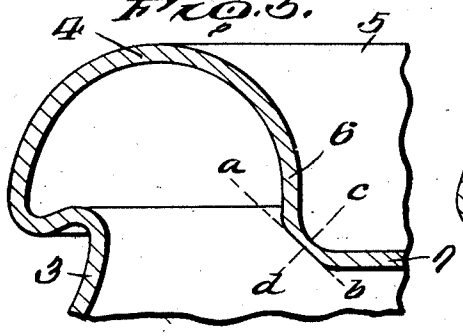
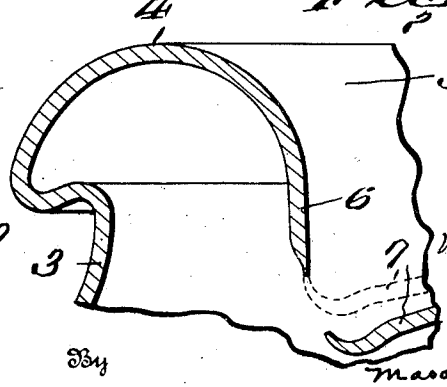


FIG. 6.



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METHOD OF FORMING AN EASY OPENING CONTAINER

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Application January 28, 1937, Serial No. 122,852

1 Claim. (Cl. 113—121)

The invention relates to new and useful improvements in a method of forming an easy opening container wherein the metal is ruptured by force applied to the metal in a direction at an angle to the plane of the metal.

An object of the invention is to provide a method of forming an easy opening container wherein the metal is thinned by drawing as distinguished from cutting or pressing to produce a line along which the metal may be easily ruptured.

A further object of the invention is to provide a method wherein the metal is shaped and thinned by drawing so as to produce a line along which the metal may be easily ruptured when pressure is applied to one face of the metal adjacent the thinned portion and wherein said metal will not be ruptured when a similar pressure is applied to the opposite face of the metal.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawing—

Figure 1 is a view in vertical section showing a portion of a container having a section thereof thinned for easy opening by the improved method;

Fig. 2 is a view showing more or less diagrammatically one form of apparatus which may be used for carrying out the invention;

Fig. 3 is a view on an enlarged scale showing a portion of the can end and the arrangement of the dies relative to each other at the initiating of the drawing action for thinning the metal;

Fig. 4 is a view similar to Fig. 3, showing the dies moved to complete the drawing action;

Fig. 5 is an enlarged sectional view of a portion of the can end showing the metal thinned by the improved method; and

Fig. 6 is a view similar to Fig. 5, but showing in broken lines the position of the metal when pressure is applied to the bottom wall adjacent the thinned portion almost to the point of rupturing the metal, and in full lines the metal as ruptured.

It has been a common expedient to score the wall of a container so as to thin the same and thus produce a line along which the metal may be easily ruptured for the opening of the container. This is usually accomplished by a cutting die or rollers having cutting edges which cut into the surface of the metal and thus thin the same so that it may be easily ruptured along the scored line. This cutting into the surface of the metal in connection with tin plate often exposes the steel core which is likely to rust. In connection with plates which are enameled in the sheet, it also cuts through the enamel coating and leaves the metal exposed. The present invention has to do with a method of forming a thinned section by drawing the metal in a definite region so as to thus produce a section wherein the metal may be ruptured by pressure along a definite line. The method also contemplates the shaping of the metal parts and the drawing to thin certain portions of the shaped parts, so that the same may be easily ruptured when pressure is applied to one face thereof adjacent the thinned section, while the same, or even a greater pressure, when applied to the other face, will not rupture the metal.

It is thought that the invention will be best understood by a brief description of a form of apparatus which may be used for practicing the method, and also the application of the method to a specific form of container. In Fig. 1 of the drawing there is shown a sheet metal container consisting of a body portion 1 to which a can top 2 is secured by a double seam 3a. This can top 2 has an outwardly tapering portion terminating in a nozzle 3 which is shaped so as to provide a pouring lip 4. The outer end of the nozzle is closed by a portion of metal which is an integral part of the can top. This can top contains a thinned portion of metal produced by the improved method embodying the invention. The can top is subjected to a die-forming operation which produces a depression 5 surrounded by a side wall 6. The bottom wall 7 of the depression joins the side wall so that a vertical line centrally of the lower portion of the side wall 6 will cut a plane containing the bottom wall substantially at right angles. The can end thus described is formed from a single piece of metal and after it is formed in the manner described, it is then subjected to the drawing dies which are shown in Fig. 2. The drawing dies shown in this figure include a lower die member 8 which is of tool steel, and mounted on a cast iron shoe 9. This die member 8 has an upwardly extending portion 10 formed with a depression 11, the side walls 12 of which are in a line disposed substantially at forty-five degrees to the axis of the die members. Mounted above the lower die member 8 is the upper die member 13. Said upper member 13 may be mounted in any suitable way so that it may be moved toward and from the lower die member. This upper die member is also formed of tool steel and has a depending skirt 14 which is adapted to engage a vertical shoulder 15 on the lower die member so that the

two die members as they are brought into engagement with each other are positively centered and held from lateral movement. Secured to this upper die member is a die block 16. This block 16 is dimensioned so as to fit within the recess 5 formed in the can end during the formation of the can end. The lower corners of this die block 16 are rounded to conform to the shaping of the metal at the inner surface where the metal of the side wall leads into the metal of the bottom wall. The can end is placed on the lower die member and is supported so that the inner face 17 of the angle portion of the metal between the side wall of the depression and the bottom wall of the depression contacts with the inclined wall 12 of the die member. At this time the bottom wall of the die member is spaced away from the bottom of the depression 11 in the die member 10.

In Fig. 3 of the drawing, there is shown on an enlarged scale the position of the die members in the can end when this rounded angle portion 17 contacts with the inclined portion 12 of the lower die member. The upper die member is then forced downward, and as it moves downward, it will cause the bottom wall of the depression to move to the position indicated at 7*a* in Fig. 4 of the drawing. As the bottom wall moves downward, the metal at the angle portion is restrained by the inclined wall 12, and therefore, the metal will be drawn and thinned at the angle as indicated in Fig. 4. The inner face of the metal in the region of the angle between the bottom wall and the vertical wall now lies in the line *a*—*b* as shown in Fig. 5. The maximum thinning of the metal is along the line *c*—*d*. When the metal is thinned as shown in Fig. 5, the pressure applied to the upper face of the bottom wall of the depression will force the metal downward and cause the thinned portion to move substantially into alinement with the vertical wall as indicated in broken lines in Fig. 6, and a continued pressure upon the bottom wall in a downward direction will create within the thinned portion such a tension as to rupture the metal. If, however, a similar pressure, or even a greater pressure, is applied to the lower face of the bottom wall of the depression, as shown in Fig. 5, it will create compression forces which lie within the metal and which will be restrained by the vertical wall so that the metal will not be ruptured.

It will be noted, therefore, that by the improved method of thining the metal described above, the metal may be ruptured along a definite line by pressure applied thereto at one face of the metal, and a similar pressure, or even a greater pressure, when applied to the other face of the metal adjacent the thinned section, will not rupture the same. This will produce a container which may be easily opened by external pressure applied to the metal in the region of the thinned section, and at the same time, internal pressure will not rupture the metal. While the invention is shown as applied to the thinning of the metal in the recess formed in a can top of the nozzle type, it will be understood that it may be applied to any type of container, and it also may be applied to any type of closure member for a container. It is essential, however, that the thinning of the metal shall be obtained by drawing and by pressure applied in the same direction that force is to be exerted on the metal when rupturing the same for opening the container.

The container produced by my improved method is shown, described and claimed in my copending application Serial No. 122,851, filed of even date herewith.

It is obvious that various forms of apparatus may be devised for carrying out the invention without departing from the spirit of the invention as set forth in the appended claim.

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

The method of forming a pressure container which may be easily opened consisting in subjecting the metal which is to form the top of the container to a die operation for providing a depression in the end which is defined by a substantially vertical wall, a bottom wall the plane of which is substantially at right angles to the vertical wall, and a portion curved about a center within the depression and joining said vertical wall and said bottom wall, placing the curved portion against a die having the face thereof inclined to the plane of the bottom wall and applying pressure to the outer face of said curved portion and bottom wall in a direction so as to thin the metal in the region of the curved portion and securing the container top to the body of the container in such position that the thinned portion in the top is at the inner extremity of the vertical wall of the top whereby the metal at said thinned portion may be easily ruptured by external pressure and will withstand internal pressure without rupturing.

WILLIAM F. PUNTE.