Jan. 13, 1942. H. F. RIGERMAN 2,269,785

CONTAINER

Filed Jan. 10, 1940

Fig. 1.

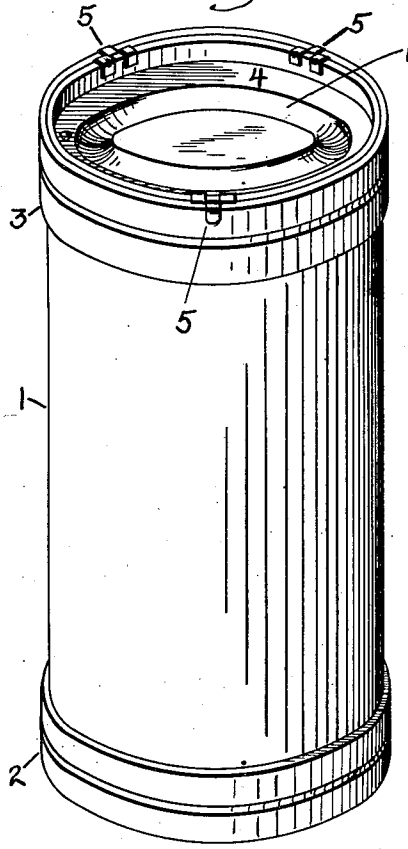


Fig. 2.

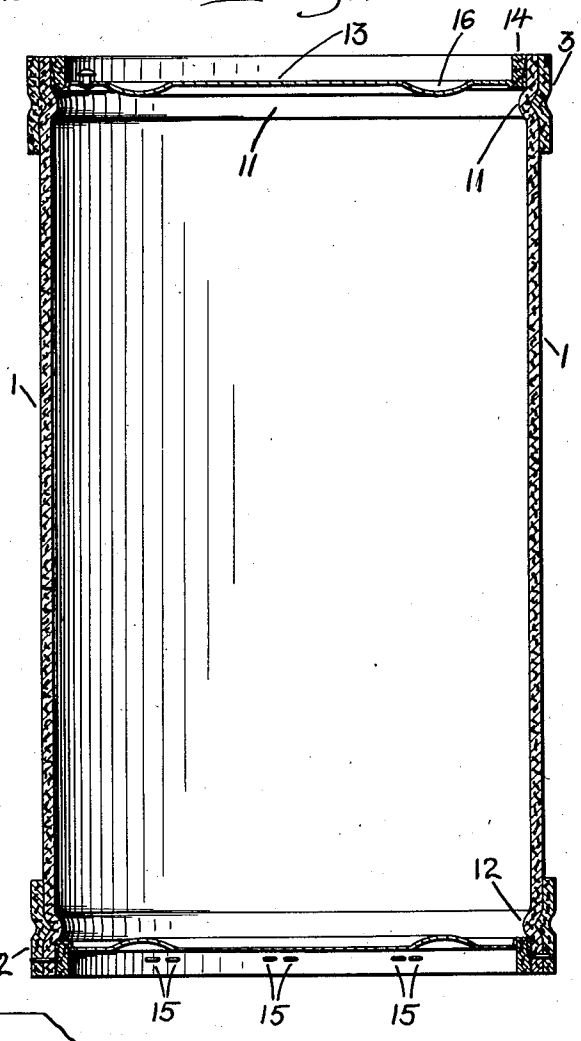
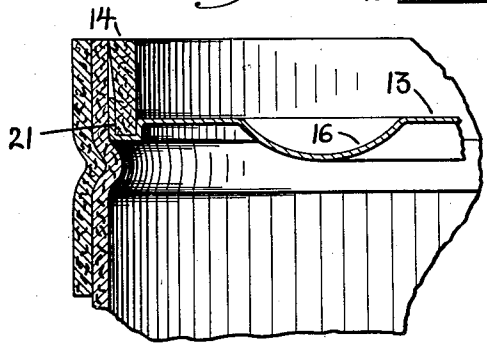


Fig. 3.



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CONTAINER

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6 Claims. (Cl. 229—5.5)

This invention relates to containers and has for its object the provision of an improved article of the class referred to. More particularly, the present invention relates to end closure means for containers.

While it has been possible to make containers having a shell or body portion of sufficient strength to withstand and carry heavy loads, great difficulty has been experienced in the past in providing end closure means that were of comparable strength and, at the same time, easily applied and easily removed for the purpose of removing the contents of the container.

The present invention provides closure means for a container, and the closure means provided by this invention are such that the container will withstand great stresses due to heavy contents and rough handling.

The appended drawing is referred to for an understanding of the invention. In the drawing—

Figure 1 is a perspective view of a container embodying the present invention;

Figure 2 is a section of a complete container embodying the present invention; and

Figure 3 is a fragmentary view, in section, of the upper section of a drum embodying the present invention.

The container illustrated in Figure 1 comprises a shell 1 having a reinforcing band 2 at the bottom and another reinforcing band 3 at the top, with a head or end closure member 4 held in place by the clips or detents 5. As illustrated in Figure 2, the shell 1 is provided with an inwardly-projecting bulge 11, which runs peripherally of the shell at the top, and a similar inwardly-projecting bulge 12, which runs peripherally of the shell at the bottom. Inasmuch as these bulges are similar and serve the same purpose, the description will be confined to the bulge 11, which runs peripherally at the top of the container. Registering with the depression in the face opposite the bulge 11 is shown the reinforcing band 3 tightly embracing the shell 1.

Resting on the bulge 11 is shown, in Figure 2, a closure member comprising a corrugated metal disc 13 and a chime strip 14 fastened to the said disc 13.

The bottom closure illustrated in Figure 2 is the same as that illustrated at the top of the container, but is shown as being fastened to the drum 1 and the lower reinforcing band 2 by means of staples 15. It will be realized, of course, that the upper closure member can be attached to the shell 1 and reinforcing band 3 by the same means and, also, that other suitable means, such as clips or detents similar to those shown in Figure 1, can be used to attach either the top closure member or the bottom closure member, or both, to the shell or body of the container.

Figure 3 is an enlarged view of a portion of the container embodying the present invention.

In Figure 3, the chime strip 14 is shown tightly embraced in a channel 21 formed in the metal plate 13. Thus, the plate or disc 13 and the chime strip 14 are joined to form a unitary closure member for the container.

As illustrated in the drawing, the disc or plate 13 has a corrugation 16 that is concentric with the chime strip 14 and projects inwardly of the plate or disc 13. The inward projection of the corrugation 16 and its location with respect to the center of the plate or disc 13 are of importance in the present invention.

By providing an inwardly-projecting corrugation located relatively close to the periphery of the plate or disc, a closure member of great strength is obtained. The inwardly-projecting corrugation 16 preferably is located close to the outer edge of the disc or plate 13 in order that it may be most effective in minimizing buckling of the plate when the drum is subjected to stress.

The inwardly-projecting corrugation 16 is located so that its outer periphery has a maximum diameter equal to the over-all diameter (in inches) of the plate 13 less the product obtained by multiplying the over-all diameter of the plate (in inches) by

$$\frac{1}{4(2.3\sqrt{d}-1)}$$

in which d is the over-all diameter of the plate (in inches), and a minimum diameter equal to the over-all diameter of the plate less the product obtained by multiplying the over-all diameter of the plate (in inches) by

$$\frac{1}{2.3\sqrt{d}-1}$$

in which d is the over-all diameter of the plate (in inches).

In the preferred embodiment of the invention, the plate or disc 13 is provided with a concentric inwardly-projecting corrugation whose outer periphery has a diameter equal to the arithmetic mean of the maximum and minimum values obtained as described above. Expressed differently, the plate 13 of the preferred embodiment has a concentric inwardly-projecting corrugation

whose outer periphery is equal to the over-all diameter of the plate less the product obtained by multiplying the over-all diameter of the plate by

$$\frac{5}{8(2.3\sqrt{d}-1)}$$

in which d is the over-all diameter of the plate.

Inasmuch as the depth of the inwardly-projecting corrugation and its width at the widest portion are functions of the diameter of the plate and of the thickness of the metal used for the plate, and since those skilled in the art of forming sheet metal objects know how to proportion a corrugation to give maximum rigidity to a metal plate of a particular diameter and gauge, it is not considered necessary to specify such details for all cases. However, a corrugation having a depth of seven-sixteenths (7/16) of an inch and a width at its open side of one and three-eighths (1⅜) of an inch provides satisfactory reinforcement for a ten and one-half (10½) inch diameter plate of twenty (20) gauge steel.

The closure member of the present invention is made by spinning or otherwise forming a flat disc of metal, for example, steel, to provide a concentric corrugation located as described above, and to provide a channel at the outer portion for receiving a chime strip, which may be of any suitable material, such as wood, vulcanized fibre or paper board. The chime strip is placed in the channel 21 and fastened therein by pressing the walls of the channel into close engagement with the chime strip so that the chime strip is joined to the metal plate and can be removed therefrom only with difficulty.

While the shell 1 of the container may be of any suitable material, the preferred shell is made by tightly winding a continuous strip of paper onto a mandrel of suitable size until the desired thickness is obtained. At least the beginning portion and the end portion of the paper should be attached to the surfaces of the paper contiguous thereto by a suitable adhesive such as glue, and usually the entire strip is coated on one side with glue just prior to its being wound on the mandrel. While the thus-formed shell still is damp, the bulges 11 and 12 are formed therein, and then the shell thus formed is set aside to dry. In drying, the shell thus formed shrinks slightly. When the shell has dried, it is again placed on a suitable mandrel and the reinforcing bands 2 and 3 are then wound thereon in the same manner as was used in forming the shell. When these bands have been wound, and while they are still damp, they are formed to register with the peripheral depressions formed in the shell at the top and bottom. By thus forming the reinforcing bands on a previously dried shell, no adhesive is necessary for joining the bands to the shell because they, too, shrink in drying and thus are intimately joined to the shell.

A chime strip formed by tightly wrapping paper in the manner described above in connection with the container shell is particularly suitable for a container embodying the present invention.

A container constructed in the manner herein described has great strength and is capable of carrying heavy materials because of the degree of yieldability existing in the structure, particularly at the ends thereof.

Probably the greatest difficulty in providing a container for heavy materials has been that of obtaining a suitable closure member because containers laden with heavy materials are handled roughly and frequently are permitted to drop considerable distances, and on one edge of the container.

A container having a rigid closure member falls under such treatment because of its rigidity. One frequent cause of failure of the end portion of a container is that upon being dropped, while heavily laden, onto one edge, the shell naturally yields somewhat and goes out of round. An end plate, on the other hand, that is rigid and unyielding does not yield with the shell and either buckles or rips out the means by which the end closure member is attached to the body, or both buckling and such ripping out of the attaching members, takes place.

The closure member of the present invention has none of the defects of the closure members heretofore known and, when joined to a shell of suitable strength, provides a structure that is capable of carrying heavy loads and withstanding exceedingly rough treatment.

The inwardly-projecting concentric corrugation of the closure member reduces the buckling of the plate to a minimum and is not to be confused with an outwardly-projecting corrugation. The inwardly-projecting corrugation located as herein described introduces sufficient yieldability to avoid the defects of a rigid plate and, at the same time, provides sufficient strength to keep the plate in shape.

While it is difficult to definitely explain why an end plate with an inwardly-projecting concentric corrugation will withstand more abuse than one having an outwardly-projecting corrugation, it is a fact that such is the case. Actual dropping tests have proved conclusively that a plate with an inwardly-projecting concentric corrugation will withstand many more falls than a closure member having an outwardly-projecting corrugation.

Without meaning to limit the invention in any way, the action of the closure member of the present invention may be attributed to the manner in which the closure member acts, due to the momentum of the material contained in the container.

Actual dropping tests indicate that the closure member of the present invention tends to expand and thereby maintain intimate contact between the chime strip and the shell when the momentum of the contents of the container is directed against the end closure means by virtue of the sudden stopping of the container when it drops upon the floor or other surface. On the other hand, actual dropping tests indicate that an end closure member having an outwardly-projecting corrugation buckles in the center portion, and such buckling causes the plate to exert a lever action on the chime strip and thereby causes the rivets, clips, staples or stitchings to pull out and thereby permit disengagement of the end closure means from the shell.

Having thus described my invention, I claim:

1. A container comprising a shell having a shoulder on its interior and near its end, and a closure plate in engagement with said shoulder, said closure plate comprising a metal plate with a channel located at its periphery and a concentric corrugation projecting inwardly of the container and spaced apart from said channel, and a chime strip fastened into the channel located at the periphery of said plate.

2. A container comprising a shell having a shoulder on its interior and near its end, and a closure plate in engagement with said shoulder,

said closure plate comprising a metal plate with a concentric corrugation projecting inwardly of the container, and a chime strip fastened into a channel located at the periphery of said plate, said concentric corrugation having an outer periphery whose maximum diameter is equal to the over-all diameter of the closure plate less the product obtained by multiplying the over-all diameter of the plate by

$$\frac{1}{4(2.3\sqrt{d}-1)}$$

wherein d is the over-all diameter of the plate.

3. A container comprising a shell having a shoulder on its interior and near its end, and a closure plate in engagement with said shoulder, said closure plate comprising a metal plate with a concentric corrugation projecting inwardly of the container, and a chime strip fastened into a channel located at the periphery of said plate, said concentric corrugation having an outer periphery whose minimum diameter is equal to the over-all diameter of the plate less the product obtained by multiplying the over-all diameter of the plate by

$$\frac{1}{2.3\sqrt{d}-1}$$

wherein d is the over-all diameter of the plate.

4. A container comprising a shell having a shoulder on its interior and near its end, and a closure plate in engagement with said shoulder, said closure plate comprising a metal plate with a concentric corrugation projecting inwardly of the container, and a chime strip fastened into a channel located at the periphery of said plate, said concentric corrugation having an outer periphery whose diameter is equal to the over-all diameter of the plate less the product obtained by multiplying the over-all diameter of the plate by

$$\frac{5}{8(2.3\sqrt{d}-1)}$$

wherein d is the over-all diameter of the plate.

5. A container comprising a continuously wound paper shell having a shoulder on its interior and near its end, and a closure plate in engagement with said shoulder, said closure plate comprising a metal plate with a channel located at its periphery and a concentric corrugation projecting inwardly of the container and spaced apart from said channel, and a continuously wound paper chime strip fastened into the channel located at the periphery of said plate.

6. A container comprising a continuously wound paper shell having a shoulder on its interior and near its end and a continuously wound paper reinforcing band tightly embracing said shell at an end thereof, and a closure plate in engagement with said shoulder, said closure plate comprising a metal plate with a channel located at its periphery and a concentric corrugation projecting inwardly of the container and spaced apart from said channel, and a chime strip fastened into the channel located at the periphery of said plate.

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