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Gedde

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[54] **CONTAINER END WALL CONSTRUCTION**

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[52] **U.S. Cl.** **220/67**

[51] **Int. Cl.** **B65d 7/42**

[58] **Field of Search** 220/66, 67; 229/5.5

[56] **References Cited**

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[57] **ABSTRACT**

Increased resistance against internal pressure in an end wall for a highly pressurized container is provided by an outwardly descending substantially planar portion at the periphery of a concavely domed central panel where the central panel meets a substantially vertical countersink wall.

3 Claims, 2 Drawing Figures

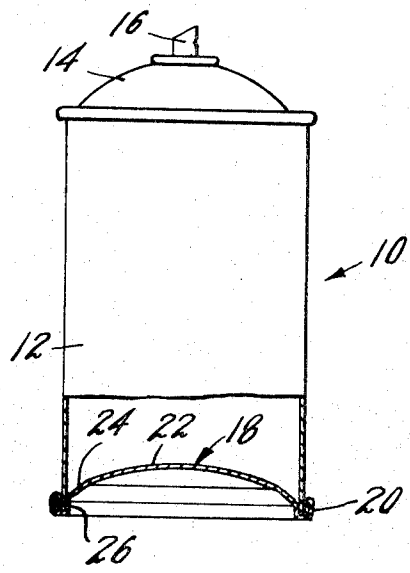
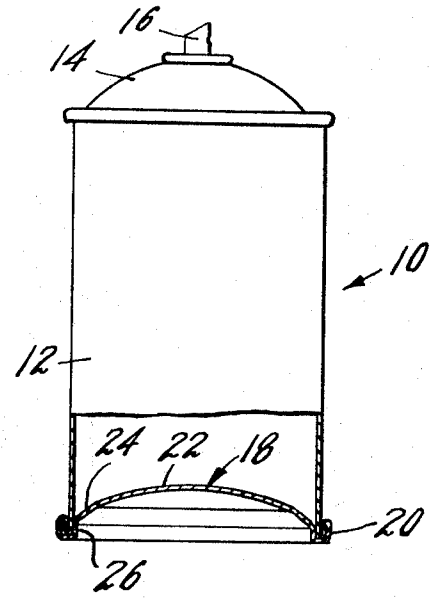


Fig. 1



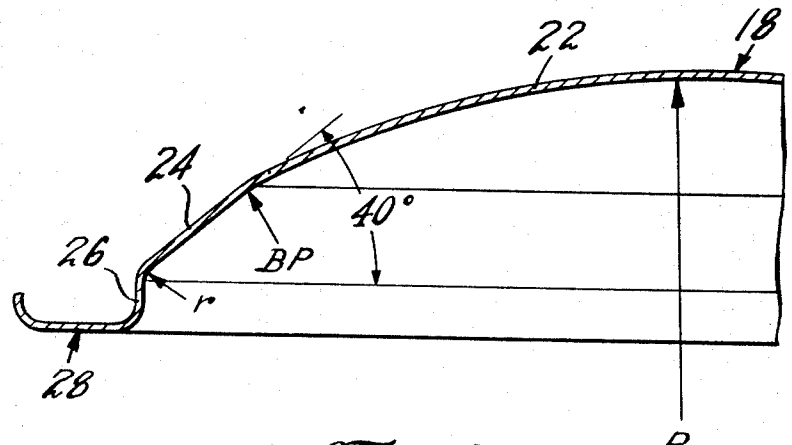


Fig. 2

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CONTAINER END WALL CONSTRUCTION

It is known that end walls of pressured cans, especially highly pressurized cans such as those of the aerosol type, sometimes buckle due to internal pressure.

Accordingly, it is a primary object of the present invention to provide an improved end wall structure for pressurized containers that is capable of withstanding substantially higher pressures than those which can be withstood by comparable conventional end wall structures.

Another object is to provide an end wall structure for pressurized containers which affords improved resistance to buckling without changing the weight or type of sheet metal used.

Still another object is to provide an improved container end wall which affords economies in pressure can production, especially by allowing the use of lighter weight plate while at the same time maintaining strength requirements.

This invention relates to containers adapted to withstand high pressures, and more particularly, it involves an improved end wall structure for such containers. Specifically, the end wall construction of this invention comprises a generally concavely domed central panel whose periphery is an outwardly descending substantially planar portion adjoining a peripheral vertical countersink wall which merges with and terminates in a peripheral U-shaped flange for attaching the end wall to a container. Within the purview of this invention is an end wall construction by itself, as secured to a container body as by a double seam, and as part of or integral with a container body.

The objects and advantages of the invention will be apparent as it becomes better understood from the following description which, when read in connection with the accompanying drawings, discloses a preferred embodiment of the invention.

In the drawings:

FIG. 1 is an elevational view, partially in section, of a container embodying the present invention.

FIG. 2 is an enlarged sectional fragmentary view showing the end wall of FIG. 1.

Referring to the drawing in detail, FIG. 1 shows a pressurized container, generally designated **10**, formed of a suitable material such as sheet metal and comprising a cylindrical body **12**, a convex top wall **14**, a dispensing valve **16** and a concave bottom or end wall generally designated **18**. The bottom wall is secured to the lower edge of body **12** by a folded seam or bead **20** in a conventional manner. Within the purview of this invention are can constructions wherein the bottom and body are secured by other means and constructions wherein the bottom and the end wall are integral, i.e. one piece.

FIG. 2 shows an enlarged sectional portion of end wall **18** of FIG. 1 and clearly illustrates the improvement of this invention. Specifically, FIG. 2 shows end wall **18** comprised of a generally concavely domed central panel **22** having at its periphery an outwardly descending substantially planar portion **24**, adjoining a peripheral substantially vertical counter-sink wall **26** which merges with and terminates in a peripheral U-shaped flange **28** for attaching the end wall to a container body.

Concavely domed central panel **22** has a relatively large radius of curvature R extending from a center point (not shown), and the panel's concavely domed central portion blends into its peripheral outwardly descending planar portion **24** at a point or locality designated BP (Blend Point). Planar portion **24** merges with countersink wall **26** at an area along an arc formed by relatively small radius of curvature *r*. Planar portion **24** is shown at an angle blending with the domed portion of the central panel **22** and merging with countersink wall **26**. The angle is about 40° and is formed on the one hand by one of the surfaces of planar portion **24**, preferably its inner surface, that surface being tangent to the arc formed by radius of curvature *r*, and on the other by a line drawn horizontally through the upper portion of vertical countersink wall **26** (shown) and extended horizontally through a corresponding portion of a countersink wall on the opposite, i.e. right, side of the end wall (not shown). This horizontal line is substantially parallel to a horizontal line which could be drawn along the bottom of the U-shaped flanges of vertically standing container **10** (one flange, **28**, is shown). The angle could also, of course, be formed by an imaginary line extended or drawn out from a surface, preferably the inner surface, of planar portion **24** so that the line meets the horizontal line which, as aforementioned, could be drawn along the bottom of flanges **28** of container **10**.

The angle formed by planar portion **24** and the horizontal line running from countersink wall **26** can be any angle less than 90°, but practically speaking the angle generally is from about 35° to 45° and preferably is from about 38° to 42°. The most preferred and most advantageous angle is about 40°.

The improvement of this invention resides in providing the end wall with planar portion **24** itself and in providing that portion with the aforementioned particular angle, for it is the combination of these, i.e. the planar portion and its angle, that provides the end with significantly improved resistance against buckling or bursting due to high internal pressure. For example, tests of end walls made of 107 pound TU tinplate and having the same thickness and diameter, have shown that whereas a conventional end wall having a hemispherical profile has a buckle resistance of about 180 to 200 psi, and, whereas a commercially successful ellipsoidal or generally concavely domed end wall formed of two merging arcs such as described in U.S. Pat. No. 3,360,158 issued to A. J. Klein on Dec. 26, 1967, has a buckle resistance of about 260 psi, an end wall of this invention, for example, having a 45° angled planar portion, has a buckle resistance of about 360 psi.

The amount of buckle resistance that can be provided by the end wall of this invention varies with the angle of planar portion **24**. This is seen from results of the aforementioned tests, shown in the table below:

End No.	Angle	Buckle Resistance (P.S.I.)
1	35°	220
2	38°30′	260
3	42°	270
4	45°	360°
5	60°	200°

Although, as previously indicated, angles under 90° can be employed, it has been found advantageous to use as small an angle as practicable under the circumstances. This is because larger angles protrude more deeply into the interior of the can. This reduces container capacity and requires more metal to manufacture the end.

The end wall construction of this invention can be manufactured with any suitable material such as for example steel, tin free steel, or aluminum. As previously seen, satisfactory results were obtained using 107 pound TU tinplate. Satisfactory results can also be obtained when aluminum is employed. For instance, tests have shown that 40° angled aluminum end walls in three piece cans having soldered side seams had buckle resistances averaging about 315 psi, and two piece drawn aluminum cans having 40° angled ends had buckle resistances of from about 265 to 280 psi. This latter example can be compared to buckle resistances of about 160 psi for presently commercially successful two piece drawn aluminum cans having ellipsoidal ends of two merging arcs as disclosed in the aforementioned U.S. Pat. Number 3,360,158.

In the inventioned disclosed herein, there is presented an improved end wall construction which, although fabricable of a lighter weight plate material, is capable of withstanding higher pressures than

withstood by comparable conventional hemispherical or ellipsoidal end wall constructions.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form of the end without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. An end wall for a container adapted to withstand high internal pressure comprising a generally concavely domed central panel whose periphery is an outwardly descending substantially planar portion adjoining a peripheral, vertical countersink wall which merges with and terminates in a peripheral U-shaped flange for attaching said end wall to said container.

2. The end wall of claim 1 wherein said end wall is secured to a container by a double seam formed by said U-shaped flange being interfolded with a peripheral flange of said container.

3. The end wall of claim 1 wherein said end is integral with said container.

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