

Dec. 24, 1968

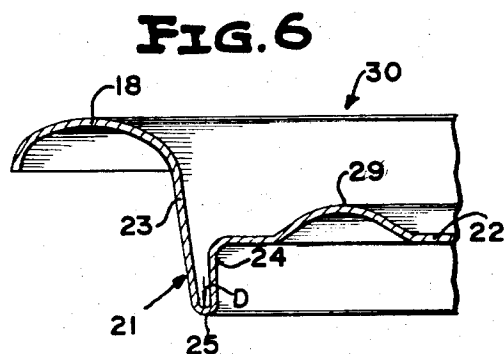
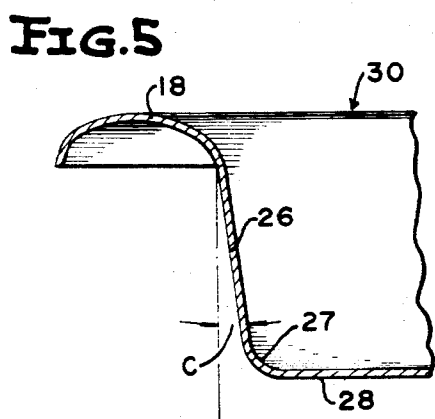
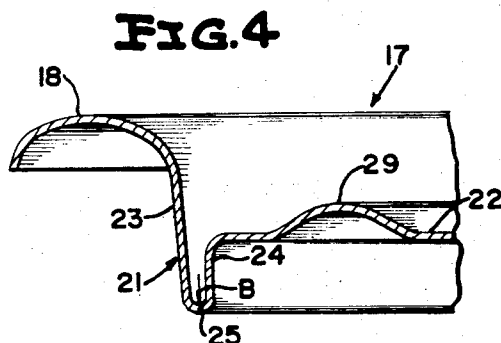
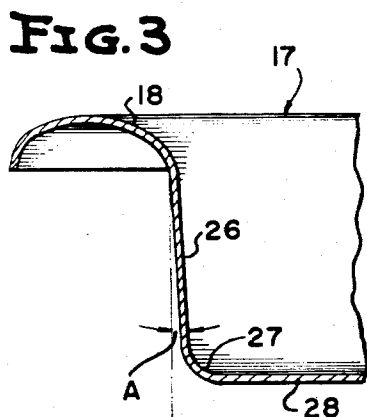
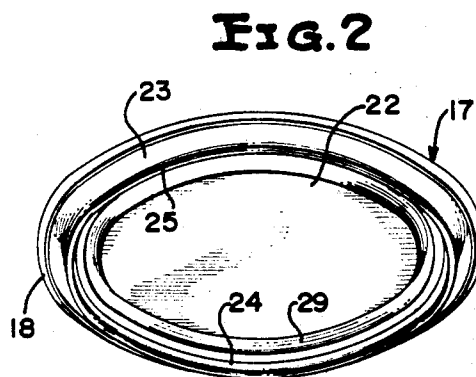
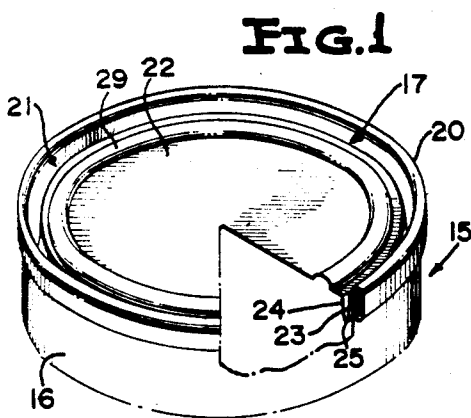
J. S. BOZEK ET AL

3,417,898

DUAL WALL CAN END

Filed Oct. 20, 1965

2 Sheets-Sheet 1



INVENTORS
JOHN S. BOZEK
& JOHN S. SONG

BY
Mason, Porter, Miller & Brown
ATTORNEYS

Dec. 24, 1968

J. S. BOZEK ET AL

3,417,898

DUAL WALL CAN END

Filed Oct. 20, 1965

2 Sheets-Sheet 2

FIG. 7

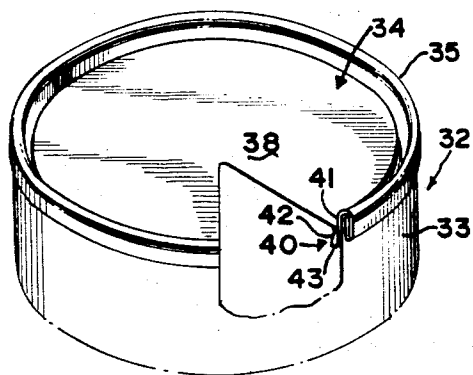


FIG. 8

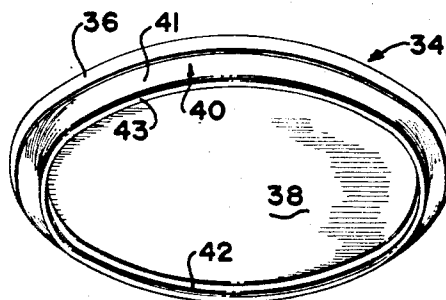


FIG. 9

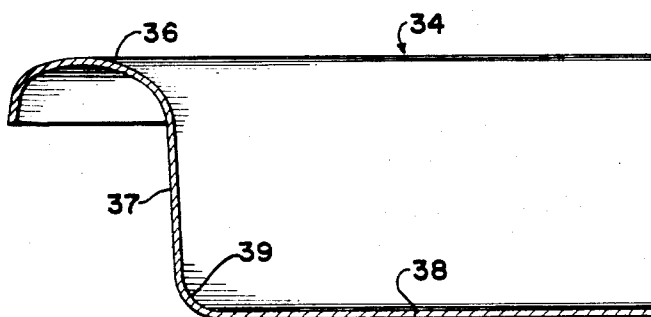


FIG. 10

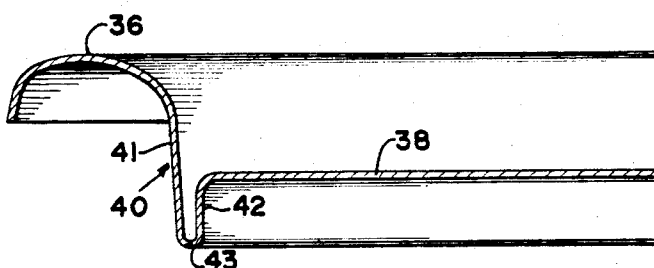
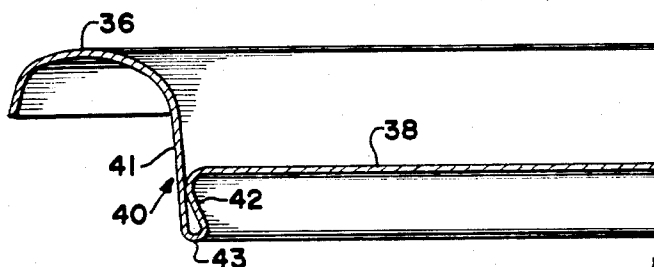


FIG. 11



INVENTORS

JOHN S. BOZEK
& JOHN S. SONG

BY

Mason, Porter Miller & Brown
ATTORNEYS

1

3,417,898

DUAL WALL CAN END

John S. Bozek, Chicago, and John S. Song, Addison, Ill.,
assignors to Continental Can Company, Inc., New York,
N.Y., a corporation of New York

Filed Oct. 20, 1965, Ser. No. 498,365

7 Claims. (Cl. 220-66)

ABSTRACT OF THE DISCLOSURE

This disclosure has to do with a can end particularly adapted for use as a part of a can which is subjected to high internal pressures. The high internal pressures react against the end panel of the can end and tend to outwardly bow the end panel. This bowing reaction of the end panel results in a radially inwardly directed force being applied upon the chuck wall which, when the pressure is sufficient, pulls the chuck wall away from the can body and opens the double seam. This is prevented by providing the can end with a double wall construction between the chuck wall and the end panel, which double walls projects axially inwardly into the interior of the associated can body.

This invention relates in general to new and useful improvements in can ends, and more particularly to a novel can end of the type which is readily openable utilizing a punch type opener and at the same time will resist high internal pressures.

This invention particularly relates to can ends for use as components of cans adapted to have packaged therein a product under high gaseous pressure with the can ends being formed of as light weight metal as possible and at the same time having sufficient strength to resist bulging and buckling under pressure. The can ends of this invention are particularly adapted for use with high pressure beverage cans used for carbonated soft drinks.

The manufacture of can ends for high pressure beverage cans presents two conflicting problems. In the first place, the can end must be readily openable by all users utilizing conventional openers, such as the puncture type openers. On the other hand, the can end must have sufficient strength to resist bulging and buckling under pressure. It has been found that bulging and buckling under internal pressure has resulted only secondarily from the actual stretching and deformation of the end panel and primarily from the radially inwardly deformation of the side wall or chuck wall of the end panel due to the radial pull exerted thereon by the end panel as it is forced axially outwardly by the pressure within the associated can. In accordance with this invention, it is proposed to overcome the bulging and buckling of can ends for high pressure beverage cans within the range of pressures normally found in such cans by reinforcing the side wall of the can end in a manner which in no way interferes with the application of the can end or the opening thereof.

In accordance with this invention, it is proposed to make the side wall of the can end of a double wall construction. It has been found that by sharply bending the can end at the lower end of the conventional side wall or chuck wall and doubling the thickness of the side wall

2

at the lower portion thereof, the resistance of the side wall to radially inwardly directed deflections is greatly increased.

In view of the foregoing, it will be apparent that, simply stated, the object of this invention is to provide a novel can end for high pressure beverage cans which is made of a minimum thickness metal to facilitate the opening of the can and at the same time having sufficient strength to resist bulging and buckling under the internal pressure within the can.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawing.

In the drawings:

FIGURE 1 is a fragmentary top perspective view of a can having one end closed with a can end formed in accordance with this invention, an intermediate portion of the can end being broken away and shown in section to clearly illustrate the details thereof.

FIGURE 2 is a bottom plan view of the can end prior to the application thereof to the can body.

FIGURE 3 is an enlarged fragmentary sectional view showing the outer peripheral portion only of the can end of FIGURE 2 after a first forming operation.

FIGURE 4 is a view similar to FIGURE 3 showing the can end after the second and final forming operation.

FIGURE 5 is a view similar to FIGURE 3 showing a slightly modified form of can end.

FIGURE 6 is a view similar to FIGURE 4 showing the modified can end after the forming of a second operation on the can end structure of FIGURE 5.

FIGURE 7 is a fragmentary top perspective view of a can having still another form of can end attached thereto.

FIGURE 8 is a bottom perspective view of the can end of FIGURE 7 prior to the seaming thereof to a can body.

FIGURE 9 is an enlarged fragmentary vertical sectional view taken through a peripheral portion only of the can end of FIGURE 8 after a first forming operation.

FIGURE 10 is a view similar to FIGURE 9 and shows the can end after a second forming operation; and

FIGURE 11 is another view similar to FIGURE 9 and shows the can end after a third and final forming operation.

Referring now to the drawings in detail, it will be seen that there is illustrated in FIGURE 1 a high pressure beverage can which is generally referred to by the numeral 15. The beverage can 15 includes a conventional can body 16 which has secured to at least one end thereof a can end which is generally referred to by the numeral 17 and which is formed in accordance with this invention.

Referring now to FIGURE 4 in particular, it will be seen that the can end 17 includes a conventional curl 18 for facilitating the securement of the can end to the can body 16 by means of a conventional double seam, such as the double seam 20 illustrated in FIGURE 1. The curl 18 has integrally joined to the inner edge thereof a side wall or chuck wall which is generally referred to by the numeral 21. The side wall 21, in turn, has integrally joined thereto an end panel 22.

The side wall or chuck wall 21 differs from conven-

tional side or chuck walls in that it is of a double wall construction. It is to be noted that the side wall 21 includes an outer side wall 23 and an inner side wall 24. The side walls 23 and 24 are connected together along their bottom edges by a relatively sharp bend 25.

radius of the bend, which radius is referred to by the letter D varies from 0.00 inch to 0.025 inch.

Comparative tests have been made with can ends formed in accordance with this invention and other known can ends with the following results:

Contour	Thickness	Bulge (p.s.i.), average	Bulge recovery from 82 p.s.i., average, percent	Buckle (p.s.i.), average	Opening force, lbs., average
Conventional.....	0.0099 steel.....	81	Over 52	99	16.5
Soft top.....	0.0145 aluminum.....	71	30	84	11.5
Feather touch Patent No. 3,186,583.....	0.0094 steel.....	74	51	110	12.5
Dual wall.....	do.....	(1)	(2)	143	12.55
Do.....	0.0082 steel.....	101	(2)	106	9.5

¹ None at 143, fails by buckle.
² Not applicable.

The outer side wall 23 is integrally connected at its upper edge to the curl 18. The outer side wall 23 slopes downwardly and radially inwardly from the curl 18 with the angle of slope being between 7° and 10°. On the other hand, the inner side wall 24 is cylindrical. The bend 25 has an internal radius B of approximately 0.012 inch.

Referring now to FIGURE 3 in particular, it will be seen that the can end 17 is formed in a two-stage operation. The can end is initially drawn to be relatively deep and includes a side wall 26 which is integrally connected at its upper end to the curl 18 and which is connected by means of a relatively large radius 27 to a deeply recessed panel 28. The side wall slopes downwardly and radially inwardly at the angle A which corresponds to the final angle of slope of the outer side wall 23.

Then in a subsequent forming operation the panel 28 is moved axially upwardly and the radius 27 is deformed, together with a lower portion of the side wall 26 to form the inner side wall 24 and the sharp bend 25. The panel 28, which is moved upwardly, becomes the end panel 22 and may be provided with an upwardly directed reinforcing bead 29.

The can end 17 is applied to the can body 16 utilizing a conventional double seamer and the curl 18 is rolled together with the flange (not shown) of the can body to form the double seam 20. When the can 15 is utilized as a beverage can, particularly for carbonated soft drinks, there is an extremely high pressure within the can, the pressure being even greater than that existing in beer cans. This pressure, of course, tends to move the end panel 22 axially away from the can body 16. Inasmuch as the peripheral edge of the end panel 22 is restrained by the side wall 21, except for the slight bowing or bulging thereof due to the slight deformation of the metal of the end panel 22, the dual wall construction restricts the axial movement of the end panel 22 both with respect to buckling and bulging. In order for bulging and buckling to occur to any extent, it will be apparent that the side wall 21 will have to be materially deformed. It has been found that the double wall construction of the side wall 21 resists undue bulging and buckling of the end panel 22 under the pressures normally found in carbonated soft drink cans even though the metal of the can end 17 is of a much thinner gauge than that normally utilized in forming can ends for high pressure beverage cans. Because of the metal of the can end 17 being thinner than that normally utilized, the can 15 may be more readily opened utilizing a conventional punch type opener. Thus, the specific structure of the can end 17 provides for a greater strength while at the same time being easier to open.

In FIGURES 5 and 6 there is illustrated a modified form of the can end of FIGURES 1 through 4. This modified can end is generally referred to by the numeral 30 and has the same over-all appearance as the can end 17. However, the angle of slope of the outer side wall 23, which is identified by the letter C as opposed to the letter A of the can end 17, ranges from 4° to 12°. Also, the

Referring now to FIGURE 7 in particular, it will be seen that there is illustrated another form of beverage can which is generally referred to by the numeral 32. The beverage can 32 includes a conventional can body 33 which has at least one end thereof closed by means of a can end which is formed in accordance with this invention and is generally referred to by the numeral 34. The can end 34 is secured to the can body 33 by means of a conventional double seam 35.

The can end 34 is formed in three progressive steps. In the first step, the can end 34 is shaped to include a peripheral curl 36, a relatively deep side wall 37 and an end panel 38 joined to the side wall 37 by a radius 39. In a second forming operation, the radius 39 and a lower portion of the side wall 37 are deformed to define a double wall side wall or chuck wall which is generally referred to by the numeral 40. At the same time the end panel 38 is moved axially upwardly. The contour of the curl 36 remains unchanged. At this time the double wall side wall 40 includes an outer side wall 41 and an inner side wall 42 which are joined at their lower edges by a relatively sharp bend 43. The outer side wall 41 slopes downwardly and radially inwardly at a slight angle which may range from 4° to 12°. The inner side wall 42 is cylindrical.

In a third operation, the arc of the bend 43 is increased and the inner side wall 42 is outwardly flared so that it now slopes upwardly and radially outwardly and the upper portion of the inner side wall 42 is adjacent to or in contact with an intermediate portion of the said wall 41. When the inner side wall 42 is flared, the end panel 38 moves downwardly very slightly. The shape of the can end 34 at the end of the third operation, as shown in FIGURE 11, is the final section of the can end.

The can end 34 is double seamed to the can body 33 in the same conventional manner as that described above. It will also be understood that the specific shape of the can end 34 provides the same beneficial effects as those set forth above. In fact, the can end 34 is stronger because of the specific configuration of the double wall side wall 40. On the other hand, a third operation is required to form the same and it is less desirable for this reason only. It is also pointed out here that the end panel 38 is illustrated as being plain. If desired, it may be provided with a rib, such as the peripheral reinforcing rib 29 of the can ends 17 and 30.

We claim:

1. An easy opening can end for cans subjected to high internal pressures, said can end having a high strength to material thickness ratio and comprising means for forming a double seam including a peripheral curl and a side wall connected to the curl, an end panel, and a dual wall connecting the side wall to the end panel, said dual wall comprising an outer wall portion connected to the side wall and an inner wall portion connected to the end panel, said wall portions being joined by an intermediate bend for increasing resistance to inwardly directed radial deflection and bulging and buckling of the end panel, said

5

side wall sloping downwardly and radially inwardly from said curl, and said inner wall portion sloping upwardly and radially outwardly at an angle greater than the slope of said outer wall portion.

2. The can end of claim 1 wherein the slope of said outer side wall is at an angle between 4° and 12°.

3. The can end of claim 1 wherein the slope of said outer side wall is at an angle between 7° and 10°.

4. The can end of claim 1 wherein said intermediate bend is a sharp bend having an internal radius of no greater than 0.025 inch.

5. The can end of claim 1 wherein said intermediate bend is a sharp bend having an internal radius of approximately 0.012 inch.

6. The can end of claim 1 wherein an upper part of said inner wall portion contacts said side wall.

7. A can incorporating the can end of claim 1 wherein

6

said can end is secured to a can body with said side wall being telescoped within said can body and said curl forming part of a double seam securing said can end to said can body.

References Cited

UNITED STATES PATENTS

1,756,585	4/1930	Curtis	220—67
2,205,685	6/1940	Conner	220—72
2,309,341	1/1943	Condon	220—66
2,971,671	2/1961	Jhakman	220—66
3,229,847	1/1966	Fox	220—66
3,288,342	11/1966	Tinker	220—67

15 THERON E. CONDON, *Primary Examiner*.

JAMES R. GARRETT, *Assistant Examiner*.