

Sept. 17, 1968

J. W. ROUSE

3,401,824

FULL-OPEN CAN

Filed Sept. 7, 1967

2 Sheets-Sheet 1

Fig. 1

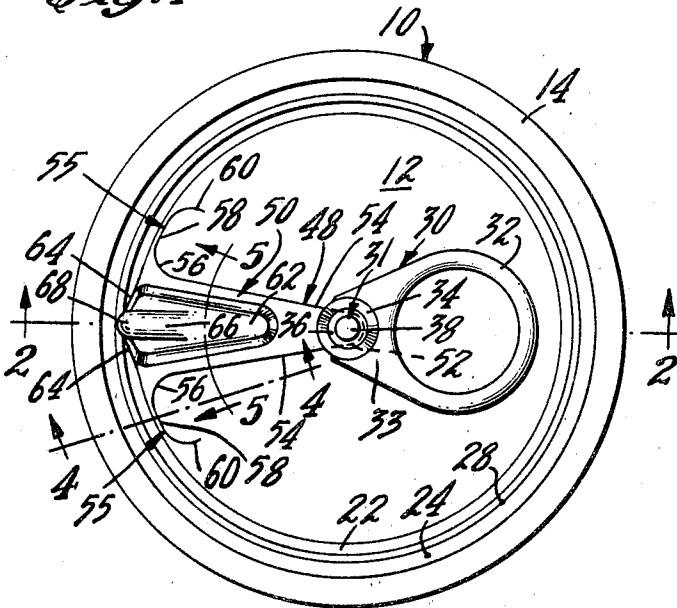


Fig. 4

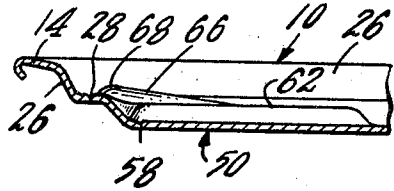


Fig. 5

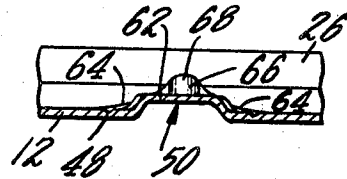


Fig. 2

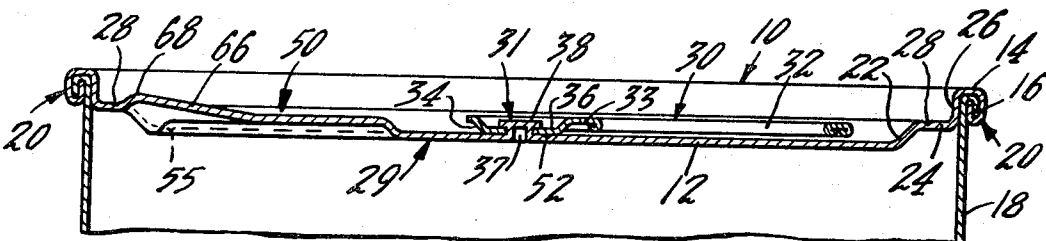
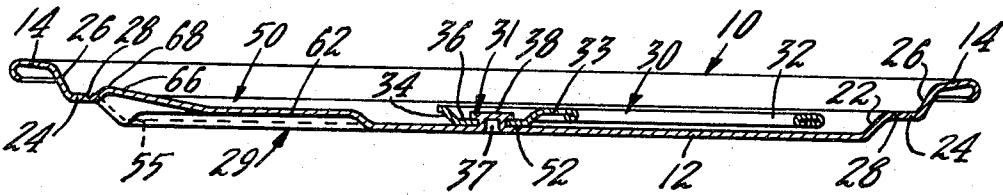


Fig. 3

INVENTOR.
JOHN WILSON ROUSE
BY *John E. Wilson*
ATTORNEY

Sept. 17, 1968

J. W. ROUSE
FULL-OPEN CAN

3,401,824

Filed Sept. 7, 1967

2 Sheets-Sheet 2

Fig. 7

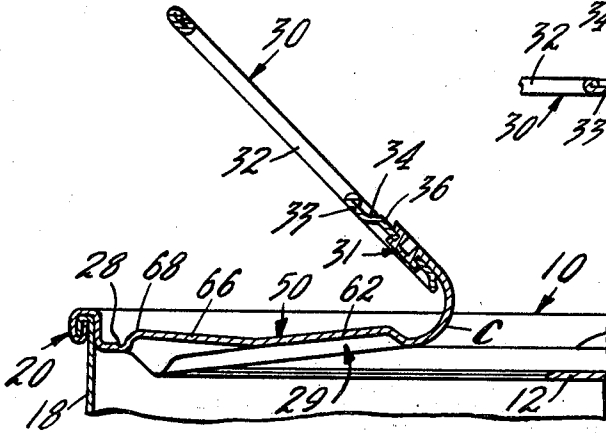


Fig. 8

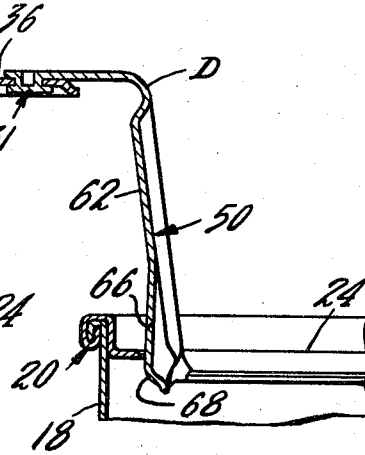


Fig. 6

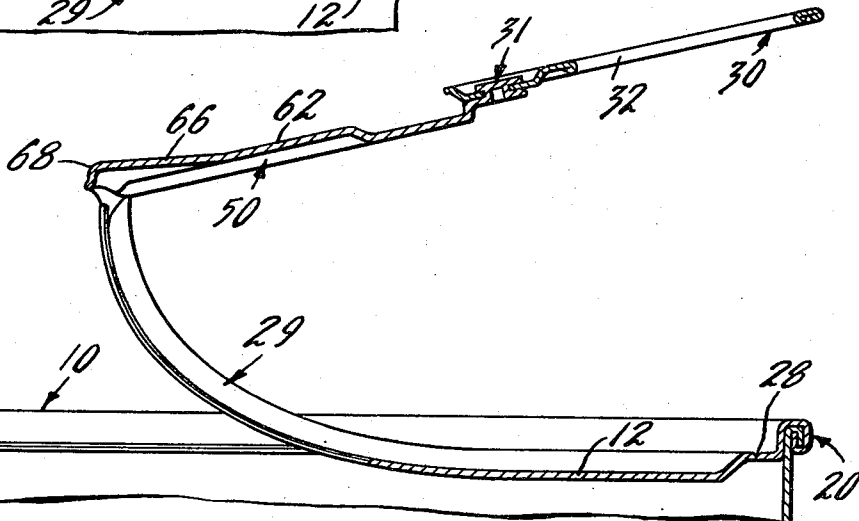
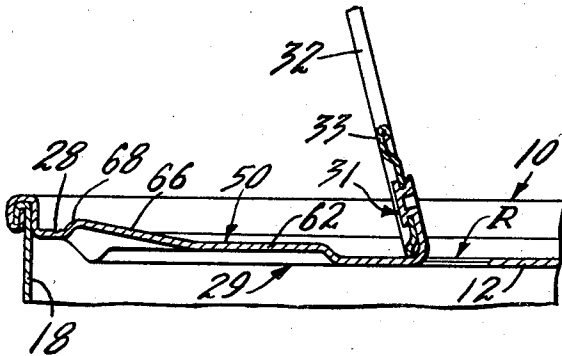


Fig. 9

INVENTOR,
JOHN WILSON ROUSE
BY
John E. Wilson
ATTORNEY

1

3,401,824

FULL-OPEN CAN

John Wilson Rouse, Ramsey, N.J., assignor to American Can Company, New York, N.Y., a corporation of New Jersey

Filed Sept. 7, 1967, Ser. No. 666,030

10 Claims. (Cl. 220—54)

ABSTRACT OF THE DISCLOSURE

A can end having a primary score defining a removable section therein and an opening tab which is secured to the removable section by a rivet which is spaced radially inwardly of the primary score is formed with an ancillary score located closely adjacent the rivet to permit the portion of the end which contains the rivet to be broken away from the balance of the end when the opening tab is lifted to facilitate manipulation of the opening tab to exert a downward pressure against the removable section immediately adjacent the primary score to effect rupture of the primary score.

Background of the invention

A recent development in the can making industry is the scored "self-opening" can which can be opened by means of an opening tab which is secured to the can. One form of such a can is the beer and beverage can in which the product is dispensed through a comparatively small hole which is opened in the can when the opening tab is lifted to tear away a small removable section which is defined by a score in the end panel.

Another form of the "self-opening" can is the "full-open" can in which a peripheral score, generally circular in configuration, is formed adjacent to the periphery of the end panel to permit its complete removal. Such "full-open" cans are suitable for use in the packaging of products which are customarily removed by insertion of the hand or a spoon or measuring cup into the container. Examples of such products are candy, shelled nut meats, and coffee. They are also desirable for the packaging of solid or chunky products such as processed or frozen vegetables, fruits and fruit juices which are removed from the container in one piece, and sausage and other meat products which require a large opening if they are to be removed without mutilation.

In some of these "full-open" cans, the peripheral score comprises the outer score of a two-score peripheral tear strip which is circular or spiral in configuration and has a pull tab secured to its starting end which can be manipulated to progressively rupture the scores defining the tear strip until the end panel is completely separated from the container. This type of opening feature is under some circumstances somewhat objectionable because of the length of the tear strip, which requires the consumer to exert a long, continuous pull on the opening tab until the opening operation is completed.

In another form of "full-open" can, the tear strip is omitted, and an opening tab is provided to exert a downward pressure on the removable section immediately inwardly of the peripheral score to effect initial rupture of the score, after which the opening tab is pulled upwardly and backwardly relative to the area of initial rupture to cause the score to tear around the end of the can in opposite directions until it is completely ruptured and the removable section which it encloses is severed from the can.

This type of can has heretofore presented a number of problems, one of which has been the fact that the portion of the score which must be initially ruptured comprises a portion of an arc of substantial radius which extends at almost right angles to the longitudinal axis of the opening

2

tab, and which thus requires substantial pressure to effect the initial rupture of the score, which as a rule extends along a considerable length of the score. In addition, because of the fact that a substantial length of the score is ruptured during the initial opening operation, the existence of a pressure differential in the can creates a sudden violent flow of gas either into or from the interior of the can, as the case may be. Thus, when the can is vacuumized, the external air rushing into the can causes a loud implosive noise which is objectionable to the consumer, while, if the interior of the can is at an above-atmospheric pressure, as is true of coffee-cans, the sudden outflow of gas when the can is initially opened not only results in an objectionably loud explosive sound but carries with it particles of the contents and sprays them over the consumer.

Frequently, the initial surge of gas causes additional, spontaneous rupture of the score which only increases this undesirable explosive or implosive effect.

The present invention comprises an improvement of the latter type of full-open can wherein all of these problems are overcome by the provision of an ancillary score which is located closely adjacent the connection, usually a rivet, between the opening tab and the can. This ancillary score, which is designed to rupture before the primary score ruptures, frees the rivet from the surrounding, anchored portion of the can end and permits the opening tab to be easily rocked relative to the can end in such manner as to exert a substantial opening force on the end to readily effect initial rupture of the primary score. To further facilitate the opening operation, the opening tab is secured to a reinforced portion of the end, which portion is defined by the ancillary score, so that when the ancillary score is ruptured, the reinforced portion is freed to function as a lever and exert a substantial downward force on the can end adjacent the primary score to initiate its rupture.

In addition to the mechanical advantage which is thus gained, the ancillary score is preferably shaped so that only a short section of it is initially ruptured when the opening tab is lifted. As a result, the flow of gas through the resultant small opening is limited, and the objectionable implosive or explosive effect is eliminated or substantially reduced, as is the spraying of product when the initial opening operation is effected. Thus, the ancillary score provides what might be termed as pre-venting function.

Summary of the invention

An object of the present invention is to provide a full-open can which may be opened by a pull tab with the exertion of a relatively small force by the consumer.

Another object of the present invention is to provide a full-open container which will be vented upon initiation of the opening procedure to prevent spontaneous rupture of the peripheral score and/or spraying of product due to sudden large-scale release of pressure or vacuum.

These and other objects are attained by providing a container with an end closure having a peripheral score adjacent to the countersink wall and with a section defined by an ancillary score which section extends from a location adjacent to the peripheral score to a pull tab in the central panel of the end closure. The resulting end closure may be opened by manipulating the pull tab to hinge the scored section upwardly and thereby fulcrum it on or near the peripheral score to initiate its rupture. After initiating the rupture of the peripheral score, the pull tab is then manipulated to remove the entire portion of the end closure which is within the peripheral score.

Brief description of the drawings

FIG. 1 is a plan view of an end closure made in accordance with the present invention;

3

FIG. 2 is an enlarged sectional view taken substantially along the line 2—2 in FIG. 1;

FIG. 3 is a sectional view similar to FIG. 2, but showing the end closure after it is seamed to a can body;

FIG. 4 is an enlarged fragmentary sectional view taken substantially along the line 4—4 in FIG. 1;

FIG. 5 is an enlarged fragmentary sectional view taken substantially along the line 5—5 of FIG. 1;

FIG. 6 is an enlarged fragmentary sectional view of the present container showing the position of the parts after the pull tab has been rocked upwardly a sufficient distance to initiate the rupture of the ancillary score;

FIG. 7 is an enlarged fragmentary sectional view of the present container showing the position of parts after the pull tab has been manipulated partially to hinge or pivot the scored section upwardly;

FIG. 8 is an enlarged fragmentary sectional view showing the position of parts after the pull tab has been moved to initiate rupture of the primary peripheral score; and

FIG. 9 is an enlarged sectional view showing the position of parts after the pull tab has been pulled to rupture a considerable portion of the peripheral score and break away a large portion of the end closure.

Description of the preferred embodiment

FIGS. 1 and 2 of the drawings illustrate the instant invention as embodied in a circular can end closure 10 which is preferably made of aluminum, thin tin plate or other rupturable material. The end closure 10 is formed with a substantially flat central panel 12 and has an edge-curved peripheral flange 14 which is adapted to be interfolded with an end flange 16 of a can body 18 to form a double seam 20, as seen in FIG. 3. The bottom end of the can body 18 is closed in any suitable manner.

An annular, upwardly inclined wall 22 extends outwardly and upwardly from a periphery of the central panel 12 and at its upper end merges into an annular substantially horizontal wall 24 which in turn merges into an upright countersink wall 26 which connects the wall 24 and the flange 14.

Impressed in the horizontal wall 24 is a circular score 28 which constitutes the primary, peripheral score of the closure and which encloses a major, circular, central portion 29 of the closure which is to be removed from the closure to provide access to the contents (not shown) of the container.

An opening tab 30, also known as a pull tab or lift tab, is secured to the panel 12 in inwardly spaced relationship to the primary score 28 by a rivet 31 which preferably is formed integral with the metal of the panel 12 in the manner described in United States Letters Patent 3,191,797, granted June 29, 1965.

The opening tab 30 comprises a gripping ring or handle portion 32 from one side of which extends a generally triangular web section 33 which has formed in it a recessed, dish-shaped portion 34 which is formed with a bottom wall 36 which lies against the panel 12 and is formed with a circular hole 37 through which the shank of the rivet 31 extends, the rivet 31 being formed with an expanded head 38 which overlies and engages the wall 36 around the hole 37 to secure the opening tab to the end closure 10. The opening tab 30 as illustrated is covered in copending United States patent application Ser. No. 545,714, filed Apr. 27, 1966, but it should be understood that other suitable forms of opening tab may be substituted.

In order to provide for easy initial rupture of the primary score 28, an ancillary score 48 is formed in the central panel 12 in order to set off therein a reinforced, radially extending lever segment 50 of generally wedge-like configuration which contains, in its inner end portion, the rivet 31 and which is in substantial diametral alignment with the opening tab 30.

As best seen in FIG. 1, the ancillary score 48 comprises a central arcuate section 52, which closely encircles the rivet 31, and two straight, generally radial

4

score sections 54, each of which terminates in a flared foot, generally indicated by the numeral 55, which includes a short arcuate score section 56, a short straight score section 58 which is disposed generally parallel to and closely adjacent the base of the inclined wall 22, and a short arcuate terminal score section 60 which curves inwardly, i.e., away from the primary score 28.

The lever segment 50 is reinforced for a major portion of its length by means of a raised embossment 62 which has the shape of a regular trapezium and which at its outer end intersects the inclined wall 22 along a pair of upwardly converging lines of intersection 64.

The radially outermost portion of the embossment is formed with an additional, upwardly and outwardly projecting reinforcing bead 66 which terminates in a pressure applying nose or nose 68 which projects outwardly beyond the projected point of intersection of the converging lines 64. The outer edge of the nose 68 merges downwardly into the horizontal wall 24 immediately adjacent and inwardly of the primary score 28.

As a result of the just-described construction, a consumer may readily open the closure by rocking the opening tab 30 upwardly to twist the rivet 31 out of the plane of the panel 12 and thus rupture the arcuate section 52 of the ancillary score 48 (see FIG. 6) to thus form a restricted opening R in the closure which serves as a preventing opening to equalize the internal and external pressure, if the interior of the can is vacuumized or pressurized. Since the opening tab 30 fulcrums on the external surface of the dish-shaped portion 34 which is located closely adjacent the rivet 40, and since the arcuate score portion 52 is positioned close to the twisting rivet 31, the user obtains a substantial mechanical advantage and can initiate the rupture of the score section 52 with the exertion of a comparatively small upward force on the tab 30. During this portion of the opening operation, the inner, unreinforced portion of the lever segment 50 bends transversely in the area designated as B.

The user thereafter pulls upwardly and outwardly on the opening tab 30 to cause continued tearing of the ancillary score 48 to free the lever segment 50 from the end panel 12.

This continued tearing of the ancillary score 48 extends from the ends of the initially ruptured arcuate score section 52 in the form of two spaced, separate tears which progress simultaneously along the straight score sections 54, then into and along the short arcuate score sections 56, and then into and at least partially along the short straight score sections 58. During the initial portion of this tearing action, the unreinforced, inner portion of the lever segment 50 is bent upwardly into a smoothly curved section C (see FIG. 7), but as the tearing action continues, the inner end of the reinforcing embossment 62 stops further outward curvature of the lever segment and results in a reshaping of the curve C into a somewhat sharper curve D which is located adjacent the inner end of the embossment 62 (see FIG. 8). The particular configurations of the curves C and D are of course dependent to some extent on the specific directions in which the pulling pressures are exerted on the opening tab 30.

The tearing of the ancillary score 48, as described, enables the freed lever segment 50 to rock upwardly in a pivoting action around a pivot axis which generally follows the imaginary chordal line which extends between the inner ends of the short straight score sections 58, thus causing the outer end of the lever segment 50, including the nose 68 which projects beyond this pivot axis, to be forced downwardly to stress the thinned metal in the primary score 28 adjacent the nose 68 beyond its rupturing point, thus initiating rupture of the primary score 28, as seen in FIG. 8. During this portion of the opening operation, the metal in the inclined wall 22 and the horizontal wall 24 between the lines of intersection 64 and the primary score 28 is of course distorted and reshaped as the lever segment is pivoted upwardly.

The tears in the ancillary score 48 usually terminate in the short straight score sections 58. However, if for some reason these tears continue on, as in the event the lever segment 50 is forced too far beyond the vertical position shown in FIG. 8, they then enter the arcuate score sections 60 and are directed away from the primary score 28, thus eliminating any possibility of having them inadvertently spill out into the primary score 28. By virtue of this construction, the ancillary score segments 54 and 56 can be positioned closely adjacent the primary score 28, thereby decreasing the amount of metal which must be distorted in order to rupture the primary score 28, while at the same time always maintaining the connections between the outer end of the lever segment 50 and the balance of the removable portion 29.

As seen in FIG. 8, the lever segment 50 provides the user with a large mechanical advantage when he initiates ruptures of the primary score 28. This is due to the large distance between the rivet 31 and the pivot axis as compared to the small distance between the pivot axis and the tip of the nose 68. This advantage can be varied, as desired, by changing these relative distances, and especially by changing the location of the rivet 31. In the illustrated embodiment, the rivet is centrally located on the end closure 10. This is advantageous in that it simplifies the indexing operations required for the manufacture of the end closure. However, it may be desirable, as when the diameter of the end closure is increased, to move the rivet off-center to bring it closer to the primary score 28.

After the rupture of the primary score 28 has been initiated in the manner just described, the user need only pull the opening tab 30 in the opposite direction back across the top of the container toward its opposite side as seen in FIG. 9 to extend the initial tear in the primary score. This continued tearing takes the form of two spaced tears which progress in opposite directions from the opposite ends of the initial tear and ultimately meet each other at the far side of the score 28, at which time the removable section 29 becomes completely detached from the end closure 10 to effect complete opening of the container. During this portion of the opening operation, the bend D in the lever segment 50 tends to disappear, as seen in FIG. 8.

It should be understood that the foregoing describes only one embodiment of the present invention and that elements may be added, subtracted or modified without departing from its scope as defined in the following claims.

I claim:

1. An end closure for a container, said end closure having a removable area defined by a score line adjacent to the periphery thereof, a rivet formed in said removable area, a pull tab secured to said removable area by said rivet and an ancillary score in said removable area, said ancillary score having a central portion adjacent to one side of said rivet, the ends of said ancillary score extending towards said peripheral score so that said pull tab may be manipulated to rupture said ancillary score and stress the metal between said scores to initiate rupture of said peripheral score.

2. The end closure defined in claim 1 wherein said central portion of said ancillary score encircles said rivet for a portion of the circumference of said rivet.

3. The end closure defined in claim 1 wherein said ends of said ancillary score are separated from said peripheral score by an inclined wall which slopes outwardly and upwardly from said ancillary score.

4. The end closure defined in claim 3 wherein said central portion of said score merges at each end into a straight score segment each of which merges into a curved segment which in turn merges into a segment which lies close to and parallel to said peripheral score.

5. A circular end closure for a container, said end closure comprising a substantially flat central panel, an

annular inclined wall extending outwardly and upwardly from the periphery of said central panel, an annular horizontal wall extending outwardly from said inclined wall, a countersink wall extending upwardly from said horizontal wall and an annular flange extending outwardly from said countersink wall and adapted to be interfolded with the end flange of a can body to form an end seam and secure said end to said body, an annular peripheral score impressed in said horizontal wall, a pull tab secured to said panel by a rivet, an ancillary score, said ancillary score having a central portion disposed adjacent to said rivet and two segments which extend from said central portion to locations adjacent to said peripheral score, said peripheral and ancillary scores defining a scored section, said scored section having a raised reinforcing bead extending radially outwardly to a nose, said nose being adjacent to said peripheral score, whereby said tab may be rocked to initiate rupture of said ancillary score at said central portion and thereafter pulled upwardly to hinge said scored section and force said nose downwardly to initiate rupture of said peripheral score and then pulled to completely rupture said peripheral score and separate the entire portion of said end closure within said peripheral score.

6. A container component, said component having a primary score defining a removable section in said component, an opening tab, means connecting said opening tab to said removable section, and an ancillary score in said removable section adjacent said connecting means whereby when said opening tab is pulled upwardly to stress said connecting means relative to said removable section said ancillary score will rupture to permit said connecting means to move out of the plane of said removable section to facilitate the application of rupturing pressure against said primary score.

7. A container end closure, said end closure having a primary peripheral score defining a removable section, an opening tab, a rivet connecting said opening tab to said removable section, means on one side of said rivet for applying pressure to said removable section immediately inwardly of said primary score to initiate rupture of said primary score, handle means on said opening tab disposed on the opposite side of said rivet, and an ancillary score disposed closely adjacent said rivet on said opposite side thereof, said ancillary score being rupturable when said handle means is lifted to stress said rivet relative to said removable section, whereby said rivet is enabled to move out of the plane of said removable section to permit said pressure applying means to be moved by further manipulation of said handle means to effect initial rupture of said primary score.

8. The end closure of claim 7 wherein said pressure applying means comprises a reinforced segment of said removable section.

9. The end closure of claim 8 wherein said reinforced segment is defined by extensions of said ancillary score and is movable from the plane of said removable section.

10. The end closure of claim 9 wherein said reinforced segment includes a reinforced pressure applying nose which is located immediately inwardly of said primary score and wherein said reinforced segment is pivotally connected with said removable section inwardly of said pressure applying nose whereby when the portion of said reinforced segment inwardly of said pivotal connection is moved upwardly, said pressure applying nose is moved downwardly to rupture said primary score.

References Cited

UNITED STATES PATENTS

3,366,270 1/1968 Khoury ----- 220—54

THON E. CONDON, *Primary Examiner.*

G. T. HALL, *Assistant Examiner.*

Disclaimer

3,401,824.—*John Wilson Rouse*, Ramsey, N.J. FULL-OPEN CAN. Patent dated Sept. 17, 1968. Disclaimer filed Aug. 1, 1973, by the assignee, *American Can Company*.

Hereby enters this disclaimer to claims 1, 2, 6 and 7 of said patent.

[*Official Gazette September 11, 1973.*]