ATTACHMENT OF AN OPENER TO THE WALL OF A CAN

LEO M. HARVEY
RALPH W. HILTON
INVENTORS.

BY

THOMAS O. WINTERS
Attorney

and

W. H. MUNNELL
Registrar
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Leo M. Harvey, Los Angeles, and Ralph W. Hilton, Torrance, Calif., assignors to Harvey Aluminum (Incorporated), Los Angeles, Calif., a corporation of California


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This application is a divisional application of Serial No. 417,567, filed December 11, 1964, entitled, "Can Opener," now Patent No. 3,221,924.

The invention relates to containers commonly referred to as "cans" and is particularly concerned with those which utilize precored areas designed to form pouring and/or vent openings when said areas are removed. Specifically, this invention is concerned with self-opening cans wherein the "can opener" is integrally incorporated in the wall of the can, it being a general object to provide a method of attachment of a manually operable means for opening such a can with extreme facility together with safety.

Ordinary self-opening cans of the type under consideration are a hazard and are the subject of complaint from those persons who have broken their fingernails, or who have experienced difficulty in initiating the opening operation, and who have cut themselves in one way or another with opening such cans. Reference is made to precored self-opening cans wherein a rigid lever is lifted, usually twisted, in order to tear a precored area from the top of the can. Generally, it is necessary for a person to wedge his fingernail beneath a tab and then to lift the same with the exertion of considerable force, to the end that it is not uncommon for a person to experience difficulty, especially with cans containing pressurized contents which require substantially heavy and/or stiff container walls. A further problem for consideration is sharpness of any and all parts and edges involved, and with the shape of said parts and edges, all of which affects safety.

In addition to the foregoing generalities the prior art can opening devices of this type require pulling action on the part of the person operating the same, and this results in tearing and/or ripping of the precored area from the can. In other words, the usual tab might aid in initiating the removal of the precored area but after said initiation the usual tab affords no mechanical assistance except in providing a grip. In order to accomplish tearing action, the usual tab is diagonally related to the strip of metal that is to be removed and it is this relationship that affords twisting action which is necessary when pulling out the precored area by means of brute force. The said pulling action can be dangerous since it is not uncommon for the precored area to be larger than the tab, and since there is a tendency for a person's fingers to slip from the tab, and because a better grip is often gained by a person encroaching his fingers onto the already torn portions of the area being removed. Obviously, any slippage of the fingers on the torn portions is likely to result in cuts from the sharp edges.

An object of this invention is to provide a can opener that is particularly adapted to the merchandising of beverages and wherein facility and mechanical advantage is realized throughout the opening operations and especially during initiating said removal and thereby eliminating the necessity of applying primitive pulling force in the removal of the predetermined area.

An object of this invention is to provide a self-opening can with predetermined areas that are sequentially removable in order to establish firstly a vent opening and secondly a pouring opening.

Another object of this invention is to provide prelocated and removable vent and pouring openings in a can of the type under consideration that are shaped so as to be removed with the application of substantially uniform pressures and so as to eliminate sharp corners.

It is still another object of this invention to provide a new and improved method of attachment of a can opener to the imperforate wall of a can, whereby the material forming said perforate wall is made to project tubularly from the said imperforate wall, to one side thereof, to receive the opener by engagement in an opening in the said opener, and whereby pressure is applicable to the assembly of parts for the purpose of completing the said attachment. With the method hereinafter disclosed the can, or wall thereof, remains imperforate, the attachment comprising a rivet-like fastener formed integrally with the wall of said can.

It is also an object of this invention to provide a method of attachment of an opener or the like to a can or the like, all of the character thus far referred to and which is adapted to be easily operable so as to permit shearing of the attachment from or out of said imperforate wall of the can, thereby establishing an opening such as a vent.

The various objects and features of this invention will be fully understood from the following detailed description of the typical preferred form and application thereof, throughout which description reference is made to the accompanying drawings, in which:

FIG. 1 is a perspective view of a typical can with the opener, in its first and preferred form, incorporated thereon.

FIG. 2 is an enlarged fragmentary view of the can and its opener as shown in FIG. 1.

FIGS. 3, 4 and 5 are enlarged perspective views showing the sequential operations of the opener shown in FIG. 1, and FIG. 3a is an enlarged fragmentary view of the parts as they occur in FIGS. 3 and 4.

FIG. 6 is an enlarged detailed sectional view taken as indicated by lines 6—6 of FIG. 2, and FIG. 6a is a detailed section related to FIG. 6.

FIGS. 7, 8 and 9 are diagrammatic sections illustrating the process utilized in the formation of the fastener employed in securing the opener to the can.

Cans of the type under consideration are intended to hold liquid or malt beverages and are made of material thick enough and stiff enough to withstand any normal internal gas pressures that may be caused by sterilization or by heating or by shaking of the cans. Because of the design of existing can handling equipment, it is necessary to avoid projections on the cans, although it is permissible to have flat parts superimposed over certain areas of the cans. For example, a flat part can lie adjacent the top or bottom of the can, recessed within the confines of the can rim or head.

Self-opening cans of the prior art utilize the recessed top in which to carry an opening lever that is manipulated to tear or break out a precored pouring and vent area. Again, and with the present invention, it is this recessed top which is preferred to be employed for locating the opener hereinafter described. However, this preferred location is not to be implied as a limitation, since the novel means disclosed herein can be advantageously applied to the various surfaces of a can.

The invention is applicable generally to a container C which is of the type commonly referred to as a can. A typical can is illustrated wherein there is a cylindrical body 10 closed by disc-shaped bottom and top closures 11 and 12. The bottom 11 is attached to the body 10 at a chime 13 while the top 12 is joined to the body 10 by a double seam 14. In practice, the top 12 is applied and the seam 14 formed after the can is filled, and it is usual that the top 12 is recessed within the seam 14 so formed.
3,807,737 3 tially the can C is a shell of relatively thin material, preferably metallic.

We provide a pair of openings P and V which are sequentially established at predetermined areas respectively. In FIGS. 1 to 5, 6 and 6a, we have illustrated the preferred form wherein there is a pouring opening P of generous capacity and in accordance with the invention. In the opening P of restricted capacity, the invention being characterized by the shape and size of said opening V and by the single opener O which is related to the two said predetermined areas to open them consecutively and independently. The openings P and V, are established in such a way that 12 and are spaced apart, preferably diametrically across the center of the can top. The said predetermined areas vary in shape in order to best serve the purpose for which they are intended, and although it is advantageous to provide a rather large pouring area 20 or opening P it is also advantageous to provide a substantially small prescored area 20' for the initiation of the shearing action necessary for its removal. Also, as above stated, it is advantageous to have a rather small vent opening V. Therefore, the feature of this invention is the provision of a unique and small diameter fastener F that secures the open O to the two prescored areas individually. As shown, the pouring opening P or area 20 is essentially a rounded opening in area and in cans of 2 and 3/4 inch diameter an opening or area of 3/4 inch diameter. Thus, the pouring opening P or area 20 features the peripheral enlargement 28' that is described to a rather small diameter, a diameter to receive the fastener F. It is preferred that the enlargement 28' and rivet area be of like or identical diameter, for instance .150 inch diameter. In practice, the top 12 is approximately .015 inch thickness in which it has been found to be practical to form a fastener F with an outside diameter of .093 inch, and which has a head diameter of .10 inch. Thus, the area 28' is but slightly larger than the fastener F and is defined by a line of scoring 21 applied as by indenting the top 12 to a substantial depth so as to weaken the material of the top. It will be apparent that the depression of line 21 is entirely on radial lines or curves with an absence of sharp corners.

The opener O as shown in FIGS. 1, 5, 6 and 6a comprises a sectional body 35 with a section or lever 36 secured to the top 12 by a fastener F and with a section or lever 37 secured to the prescored area 20-20' by a fastener F. In accordance with the invention the body 35 is reinforced so as to be rigid and so that the sections 36 and 37 are operable as levers. However, the two sections 36 and 37 are coupled by hinge means 38 in order that the levers are independently operable as best illustrated in FIG. 1. The single body 35 is flat and elongate, and recessed below the rim or seam 14 of the can. The body 35 is preferably a metal part, for example of aluminum, approximately two inches in length and 3/4 inch width, made of sheet of about .020 inch thickness. It is significant that the body 35 is a piece construction that is formed in a straight, flat and elongate configuration. In order for the body 35 to be operable for the several functions of the opener O, the body is made of a bendable material and in practice can be advantageously made of relatively soft aluminum. Therefore, in order for the sections 36 and 37 to operate as levers the body 35 is reinforced as by ribs 39 raised along each opposite side margin of the body. As shown, the ribs 39 are round banded and are straight and which are effective in establishing beams coextensive with each side of the body 35.

Body section or lever 36 is the manually engaged part of the opener O and is a gently rounded part that is adapted to be conveniently gripped beneath the fingers. The body section to be gripped and used as a lever must be substantially rigid and in addition to the marginal ribs, above described, it has a transverse continuation of said ribs that extends across the active end 34, said end 34 being formed on a radius merging tangentially with the ribs 39. Thus, the arcuate continuation of ribs 39 through the end 34 reinforces the body 35 so as to establish a rigid lever 36.

Body section or lever 37 is coupled to the above described body section 36 and is adapted to be operated through the manual movement of the lever 36. The body section or lever 37 is a straight and rigid part terminating in a straight transverse butt end 33. The ribs 39 continuous with the body 35 reinforce this section or lever 37 thereof, and so that it is a rigid lever.

The opener O is characterized by the two levers 36 and 37 which are independently operable in their respective functions of opening the riveted areas of the can and to this end the hinge 38 is provided in order to connect the levers 36 and 37 movably relative to each other. The hinge means 38 can vary and in the first and preferred form employs to advantage the bendable property of the metal from which the opener is made, for example aluminum, and involves weakening of the ribs 39. The said weakening can be accomplished in various ways and can be any depression, crease or sized opening to disrupt the continuity of the ribs 39. In the form under consideration the weakening comprises an interruption in the crown of each rib there being a slit 40 disposed along a transverse line a extending across the body 35. In accordance with the invention the slit 40 involves the removal of material from the top of the rib, without removal of material from the flat portion of the body 35 extending between the ribs, and further the slit 40 is made of predetermined dimension in order to control the hinged movement between the two levers 36 and 37. Therefore, the invention advantageously employs the slit 40 to establish the hinge lines a and to limit the hinged movement of lever 36 relative to lever 37, limiting said movement as shown in FIG. 3a when the side walls of said slit close together.

In accordance with the method the body sections or levers 36 and 37 are each secured to the top of the can and in each instance by the fastener F of minimized diameter. In accordance with the invention the fastener F is adapted to be sheared from the top 12, the fastener F being a rivet type of fastener extruded from the surrounding material of the can top 12. The fastener F is also efficient in its securement capabilities, and a small diametrical hole 41 is provided (two places) in the body 35, one for removal and establishment of vent openings V. The time for removal of the prescored area 20-20'; the fastener F comprising an upstanding stud-shaped projection that is extruded from the thickness of the material forming the top 12. The top 12 is confined (FIG. 7) between the flat faces of a pair of opposed pressure plates 42 and 43, to prevent lateral flow of material from the rivet area, during which a mandrel 44 and an extrusion punch 45 work the rivet area of top 12 from the underside and extrude therefrom a closed top tubular rivet R into a sized opening 46 in the upper pressure plate 42. The sized opening 46 in the upper pressure plate is to the size of the external diameter of the rivet R, while the said mandrel 44 is to the size of the internal diameter of the rivet R. The said mandrel 44 is moved (FIG. 8) to occur at the said sized opening in the upper pressure plate, thereby establishing an extrusion orifice and whereupon the said extrusion punch 45 moves (FIG. 9) into pressured engagement with the underside of the top 12 immediately surrounding the mandrel 44 and sized opening 46. The outside diameter of punch 45 establishes the radial extent of the rivet area, the top engaging face of the punch 45 being characterized by a dished or concaved configuration wherein the peripheral portion 45' is axially forward of the aperturalt portion 45". As shown, the portions 45' and 45" are well rounded convexity and concavity, respectively, into order to form a dimple at the underside of the top 12. As a result, material is displaced by the extrusion punch 45 and a small diameter and cylindrical rivet R is projected by means of
extrusion from the top 12 to be received in the hole 41. Thus, the dimple is pressed into the top 12, beneath the extrusion to be formed, with a concavely reduced peripheral portion and with a convexly reduced opening to the interior diameter of the rivet that is worked from the sheet material, said dimple establishing an area of weakening at and/or immediately surrounding the diameter of the rivet per se. It is then a simple matter to head the rivet according to usual procedure applying force axially to flatten the head 47 as shown.

With the opener O fastened flat against the top 12 as shown in FIGS. 1, 2 and 6, means is provided in the form of a recess 32 depressed into the top 12 and underlyling the active end 34 of the lever 36 since the opener O extends across the can the recess 32 will occur at one side of the top 12 with the prelocated vent rivet R occurring toward the center of the can top. For example, the vent rivet R is located at or near the center of top 12 with the hinge line a displaced at or away from the side of the rivet R opposed, the rivet R is displaced from the top 12 of the lever 36. The hinge line a can be coincidental with the center of the rivet R, or it can be away from the side of the rivet as shown and in which case a second class lever 36 is established with the resistance at vent rivet R between the active power application end 34 and fulcrum at hinge line a. As best illustrated in FIG. 3, the hinge line a can be against the top 12 immediate to the rivet R, so that lifting force applied to end 34 causes the lever 36 to simultaneously lift, tip and pry the rivet R from the surrounding top 12. However, in some instances the mode of application and/ or flexibility in the top 12 permits tipping and prying of the rivet R without the lever fulcrum necessarily touch the top 12. In the event that flexibility permits bulging or crowning of the area immediately surrounding the dimpled area of the rivet prior to the commencement of tipping or reposition of the rivet area, then the rivet area is simply revolved by the lever action, and which ultimately results in shearing at or along the side thereof nearest the active end 34 of the lever, after which shearing action rapidly progresses completely around the rivet R while prying is continued. As a result, there are two theories of operation; one wherein the fulcrum engages top 12 in which case the lever 36 relies upon the hinge line a for its fulcrum; and one wherein the fulcrum does not necessarily touch the top 12 in which case the lever 36 directly revolus the rivet area immediately surrounding the rivet R. By placing the hinge line a just beyond the periphery of the dimple as indicated, complete removal of the top 12 at and immediately surrounding the rivet R is assured under either of the two specified theories of operation.

The prescored area 20 is placed at or near the side of the can in a straight line diametrically opposite the active end 34 of the opener O, and with the area enlargement 20' located in said straight line and toward the said active end of the lever 36. Having operated the lever 36 as above described, the rivet R is removed from the top 12 entirely by shearing action with the mechanical advantages afforded by the lever 36, and the lever 36 is moved until it is stopped by the limit of the hinge member 38 whereupon the lever 36 becomes inactive as such and is converted into a body section 36 or extension of lever 37. Continued lifting force applied to the body section 36, which now becomes a handle or grip, simultaneously tips and pries the prescored area 20-20' from the surrounding top 12. Again flexibility in the top 12 permits considerable tipping of the prescored area 20-20' prior to the commencement of shearing along the side of area 20' necessary for the active end 34 of the lever extension or section 36, after which shearing action along the line of scoring 21 rapidly progresses at least midway around the prescored area 20. A feature of the present invention is the termination of butt end 33 within the confines of the prescored area 20, about midway thereof and to the end that the lever 37 is a second class lever with resistance at fastener F between the power at end 34 and fulcrum at butt end 33. As best illustrated in FIG. 4, the butt end 33 bears against the mid-portion of prescored area 20 within the confines of scoring 21 and so that lifting force applied to the end 34 causes simultaneous tipping and prying of the prescored area 20-20'. As the smaller and slightly enlarged area 20' is first to shear upwardly, and with ease due to the considerable length of the extended lever 37.

In accordance with the invention the entire lever 37 (with section 36) forms a substantial sized lever for the continuation of shearing and final pulling away of the prescored area 20-20'. The lever action is instrumental in facilitating its removal by shearing action, said area being round and being joined to a lever 37 of substantial length. As a result, a well rounded pouring opening P is established at one side of the can C and a minimum sized vent opening V is established at the center or to the opposite side of the can C. When lifting force is applied to the lever 36 the second class lever action is as above described and thereby permits a substantially direct upward pull to shear the vent rivet R from its position in the top 12, and the two separate bodies or levers 36 and 37, are each independently moveable as a lever to lift the out the vent rivet R and/or the fastener F at the prescored areas 20-20' respectively. From the foregoing it will be apparent how the normally flat levers 36 and 37 are operated, each as a second class lever, first to operate the lever 36 to shear out the vent rivet R and second to operate the lever 37 to shear out the prescored area 20-20'.

Operation of the can opener hereinabove described is a simple manner accompanied by mechanical assistance throughout the operation and with safety. It is significant that the single unit of structure is incorporated in the wall of the can, and is operable at one time and in sequence to open spaced areas in the can. It is normal for these openings to be in the can top 12, one a rather large pouring opening P and one a rather small vent opening V. Pulling and tearing action is avoided by the provision of sequentially operable levers and the amount of force necessary to affect shearing of said portions, and thus is materially reduced by the provision of the unique and small diameter fasteners F in the form of extruded rivets R. The level 36 has stopped engagement with respect to the lever 37 and thereby establishes an extension that lengthens the lever 37; and this limited movement at the hinge 38 also prevents overbending of the body 35 thereby preventing fatigue in the metal forming the same. The prescored area commences to shear at a portion of reduced size, and the enlarged prescored area 20 is round (or rounded) with the absence of sharp corners. Finally, the lever used in removal of the vent rivet R is effective throughout the removal action, and the lever used in removal of the pouring-prescored area is substantially elongated, and is extended, and is thereby especially effective by virtue of its length and size as an instrument to cause final shearing and removal of the said prescored area.

Having described only a typical preferred form and application of our invention, we do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to others any modifications or variations that may appear to those skilled in the art and fall within the scope of the following claims:

**Claim:**

1. A container and opener therefor comprising a can having an imperforated top, an unbroken hollow rivet projecting outwardly of said can and continuous with said can top, an opener superimposed upon the top of said can, said opener being provided with an aperture receiving said rivet, said rivet including a peripheral wall and a transverse head portion and said fastener, said can top, said can top having a portion immediately surrounding said rivet of reduced cross section, said peripheral
7 wall being of the material solely out of said can top by which the thickness of said immediately surrounding portion is reduced, said rivet extruded outwardly from said can and continuous with said can top, an opener superimposed upon the top of said can, said opener being provided with an aperture receiving said rivet, said rivet including a peripheral wall and a transverse head portion securing said opener to said can top whereby said opener forms a second class lever to open said can, said can top having a portion immediately surrounding said rivet of reduced cross section, said peripheral wall being of the material solely out of said can top by which the thickness of said immediately surrounding portion is reduced, said rivet being formed in a scored removable area of said can top, said scored area including an arcuate edge adjacent said rivet defining an initial break point for said area, said rivet having an outside diameter at said can top no greater than 0.15 inch.

3. In a wall fabricated from sheet stock; means to accommodate an overlying member with an aperture therein and a permanent connection between the member and the wall comprising an perforate tubular rivet projecting from an integral with the wall and extending through the aperture in the member, said rivet having a peripheral wall and transverse head, the first mentioned wall being of reduced thickness surrounding the rivet and with material thereof being moved into said peripheral wall, said peripheral wall of the rivet being initially formed of material displaced solely from the material of the wall surrounding said rivet, and said head being supported out of the plane of the first mentioned wall by said material displacement forming said peripheral wall.

5. A device according to claim 3 wherein the transverse head is initially unworked and is radially extended from the peripheral and substantially unmoved rivet wall to overly and clampingly engage the rim of the aperture in said member.

6. A device according to claim 3 wherein the portion of the first mentioned wall that is of reduced thickness has a part of which defines a point of weakening where fracture is induced.

7. A device according to claim 3 wherein the portion of the first mentioned wall that is of reduced thickness has a primeter which defines a line of weakening where fracture is induced.

8. In a wall fabricated from sheet stock: a removable wall area; means to remove said wall area and comprising an overlying force applicating tab with an aperture therein; and a permanent connection between the tab and said wall area comprising an perforate tubular rivet projecting and integral with the removable wall area and extending through the aperture in the tab, said rivet having a peripheral wall and a transverse head, the first mentioned wall being of reduced thickness surrounding the rivet and with material thereof being moved into said peripheral wall, said peripheral wall of the rivet being initially formed of material displaced solely from the material of the removable wall area surrounding said rivet, and said head being supported out of the plane of the first mentioned wall by said material displacement forming said peripheral wall.

9. A device according to claim 8 wherein said removable wall area is defined by a prescored line to induce fracture thereto, and wherein said reduced thickness in the first mentioned wall and surrounding said rivet is confined to the removable wall area within the prescored line defining the same.

10. A device according to claim 8 wherein said removable wall area is defined by a prescored line to induce fracture thereto, and wherein said reduced thickness in the first mentioned wall and surrounding said rivet is confined to the removable wall area and tangent to a predetermined fracture point of the prescored line defining the same.

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