March 7, 1967 L. M. HARVEY ET AL 3,307,737

ATTACHMENT OF AN OPENER TO THE WALL OF A CAN

Original Filed Dec. 11, 1964 2 Sheets-Sheet 1

FIG. 1.

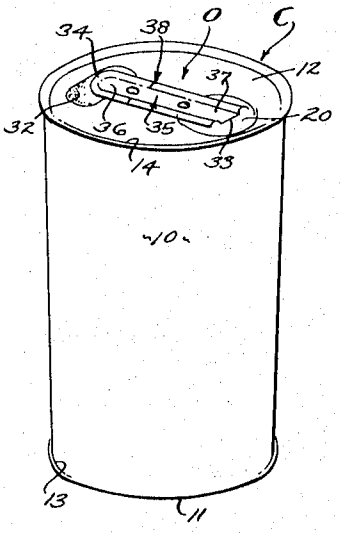


FIG. 2.

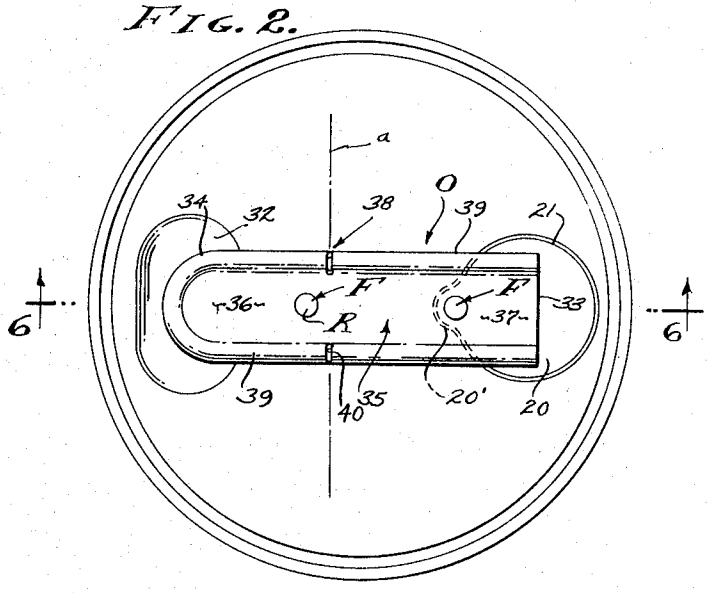


FIG. 3.

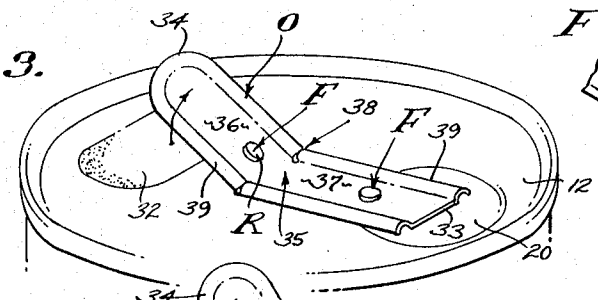


FIG. 3a.

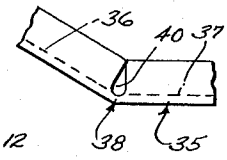


FIG. 4.

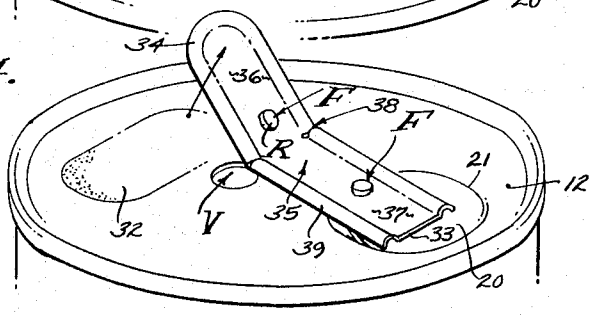
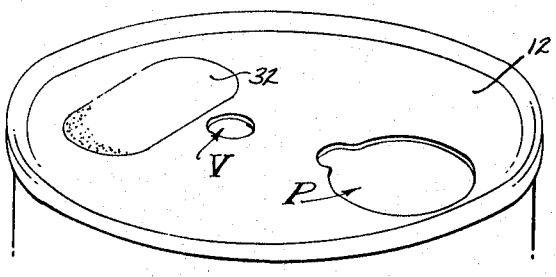


FIG. 5.



LEO M. HARVEY
RALPH W. HILTON
INVENTORS.

BY Thomas D. Linton Jr.
Attorney

and W. H. Maxwell
Agent

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ATTACHMENT OF AN OPENER TO THE WALL OF A CAN

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FIG. 6.

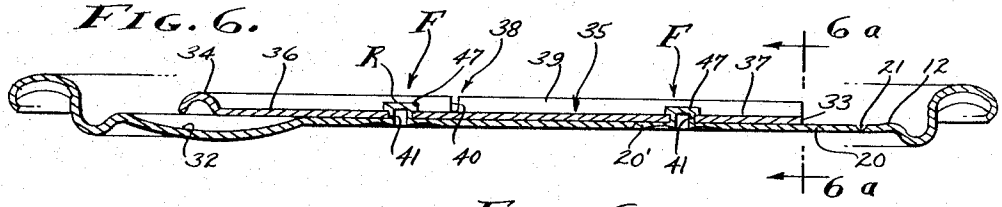


FIG. 6a.

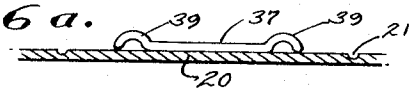


FIG. 7.

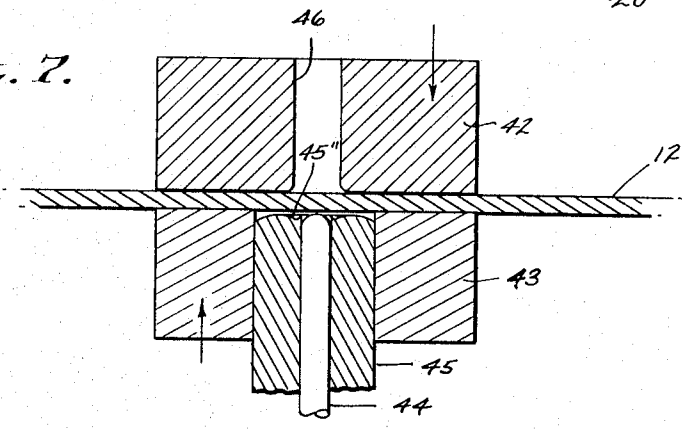


FIG. 8.

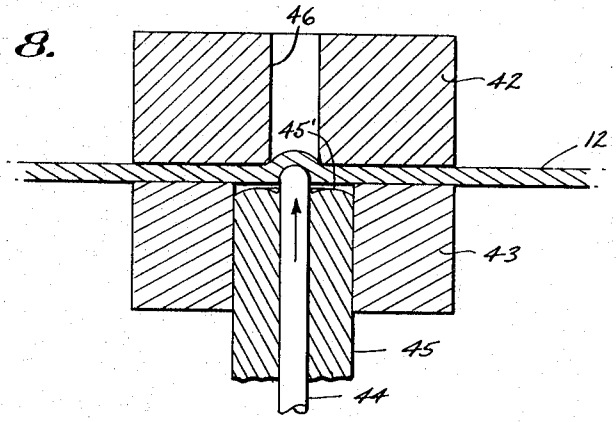
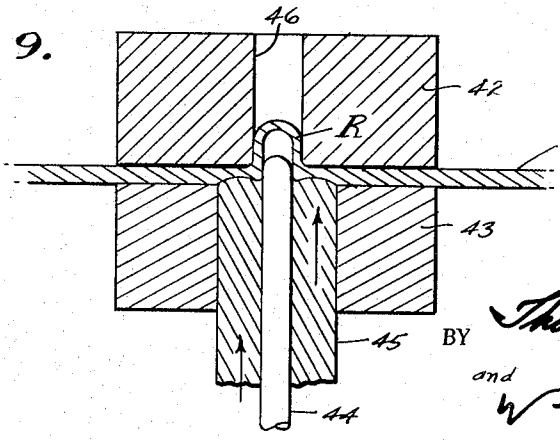


FIG. 9.



LEO M. HARVEY
RALPH W. HILTON
INVENTORS.

BY Thomas D. Kirsten Jr.
Attorney

and W. H. Magnell
AGENT

United States Patent Office

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ATTACHMENT OF AN OPENER TO THE WALL OF A CAN

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

Original application Dec. 11, 1964, Ser. No. 417,567, now Patent No. 3,221,924, dated Dec. 7, 1965. Divided and this application June 30, 1965, Ser. No. 468,343

10 Claims. (Cl. 220—54)

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

This invention relates to containers commonly referred to as "cans" and is particularly concerned with those which utilize prescored 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 prescored self-opening cans wherein a rigid lever is lifted, usually twisted, in order to tear a prescored 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 prescored area from the can. In other words, the usual tab might aid in initiating the removal of the prescored 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 prescored area by means of brute force. The said pulling action can be dangerous since it is not uncommon for the prescored 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 imperforate 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 plan 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. 3*a* is an enlarged fragmentary view of the opener parts as they occur in FIGS. 3 and 4.

FIG. 6 is an enlarged detailed sectional view taken as indicated by lines **6—6** on FIG. 2, and FIG. 6*a* 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 prescored 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 chine **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. Essen-

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 6*a*, we have illustrated the preferred form wherein there is a pouring opening P of generous capacity and in accordance with the invention a vent opening V 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 or at the top **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 or area and in cans of 2 and ¾ inch diameter is an opening or area of ¾ inch diameter. Thus, the pouring opening P or area **20** features the peripheral enlargement **20'** that is described to a rather small diameter, a diameter to receive the fastener F. It is preferred that the enlargement **20'** 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 case 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 prescored area **20'** 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 radius lines or curves with an absence of sharp corners.

The opener O as shown in FIGS. 1–5, 6 and 6*a* comprises a sectional body **35** with a section or lever **36** secured to the can 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 ½ inch width, made of sheet of about .020 inch thickness. It is significant that the body **35** is a one 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 beads that 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 or lever **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 means **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 interruption effective 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 crowned portion 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. 3*a* 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 diameter hole **41** is provided (two places) in the body **35**, one for removal and establishment of vent opening V and one 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 appertured portion **45''**. As shown, the portions **45'** and **45''** are well rounded convexly and concavely, 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 underlying 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 opposite the active end **34** 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 bear 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 touching the top **12**. In the event that flexibility permits bulging or crowing of the area immediately surrounding the dimpled area of the rivet prior to the commencement of tipping or revolvement 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 revolves 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 displaced 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'** nearest 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 a consequence, 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 shape of prescored area **20** 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 oposite 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 movable as a lever to lift 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 matter 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 predetermined areas 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 engagament 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 pounring-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 ourselves any modifications or variations that may appear to those skilled in the art and fall within the scope of the following claims:

Having described our invention, we 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 securing said opener to said can top, 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 having an outside dimension through its center at said can top no greater than 0.15 inch.

2. A container and opener therefor comprising a can having an imperforated top, an unbroken hollow circular rivet extruded 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 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 imperforate 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.

4. 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.

5. A device according to claim 3 wherein the transverse head is initially unworked and is reduced in thickness and 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 imperforated 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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THERON E. CONDON, *Primary Examiner.*

G. T. HALL, *Assistant Examiner.*