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F. K. KRAG

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CAN OPENER AND THE LIKE

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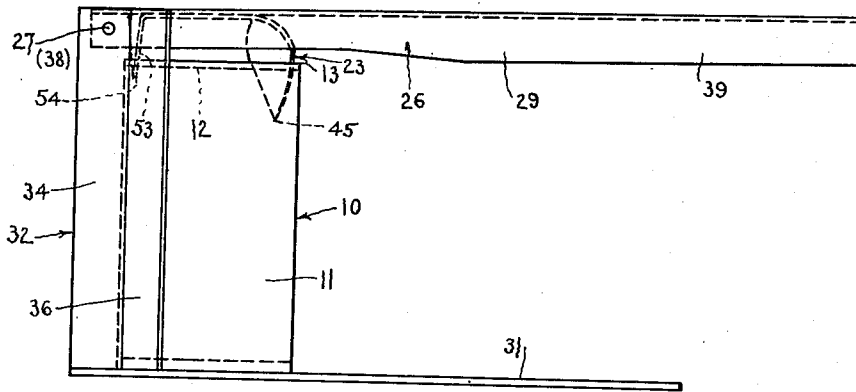


Fig. 1.

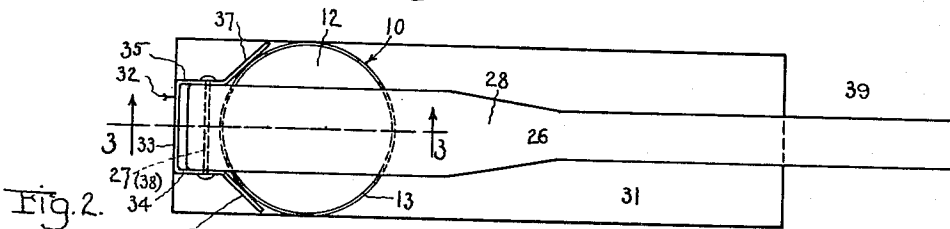


Fig. 2.

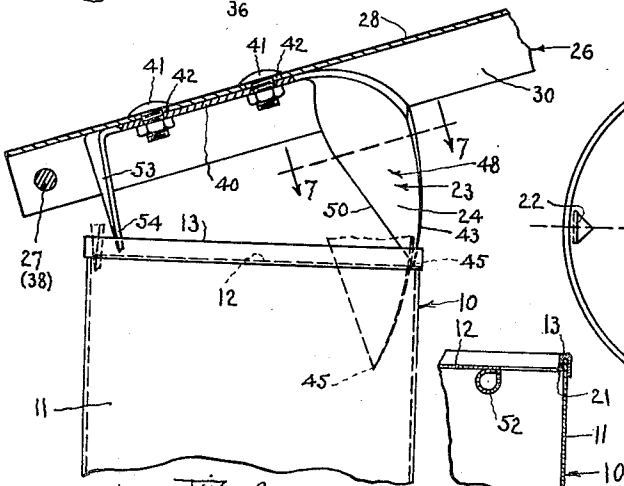


Fig. 3.

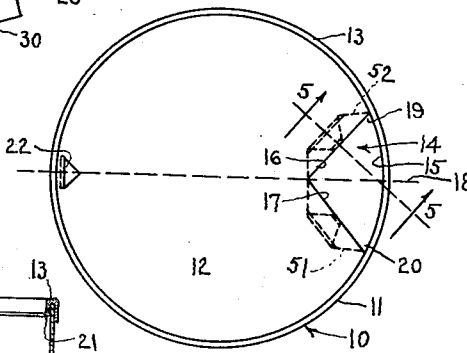


Fig. 4.

Fig. 5.

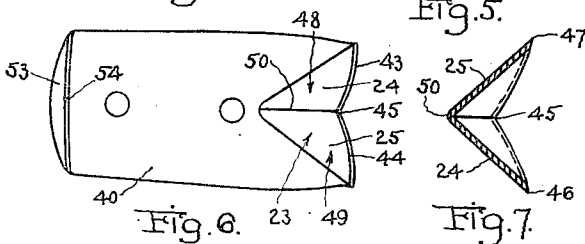


Fig. 6.

Fig. 7.

Inventor:
 Franz K. Krag,
 by *W. L. Krag*
 ATTORNEY

UNITED STATES PATENT OFFICE

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CAN OPENER AND THE LIKE

Franz K. Krag, Chicago, Ill.

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3 Claims. (Cl. 30-10)

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This invention relates to improvements in can openers, and the like. The present invention has particular reference to can openers of that type in which the end of the can is perforated in such manner as to allow the contents of the can to be poured therefrom, or, as in the case of a wide use of cans used for holding beverages, to allow the contents of the can to be drunk directly from the can. Many cans containing beer and other beverages are used for direct consumption of their contents without pouring said contents into a glass or other drinking vessel, and the features herein disclosed are especially useful in connection with cans which are thus used.

Various can top perforating and opening devices have been provided in the past which are intended to so perforate the can top that the contents can be readily poured from the can, or so that the beverage can be drunk directly therefrom. Such perforating devices have also been provided with means to produce a secondary perforation opposite to the perforation from which the can's contents are dispensed, such secondary perforation being for ingress of air to replace the liquid contents during the dispensing operation. All such perforating devices with which I am familiar have been so constructed that the can top material which is displaced to produce the drinking opening is folded back and laid against the inside surface of the wall of the can. When such a can provided with a drinking opening formed in this manner is placed to the mouth the can is held and its contents dispensed into the mouth with the opening at the bottom position, and with the cylindrical outer surface of the can against the lower lip, the ventilating opening being at the top or up side of the can. The upper lip is then sealed against the surface of the can top during the drinking operation. However, much experience has demonstrated that the presence of the can top material lying against the inside surface of the body of the can directly below the drinking opening greatly interferes with the flow of the liquid contents through such opening, and produces a tendency for such liquid contents to discharge at the lower side corners of the drinking opening. Consequently it has been found difficult to avoid a tendency for the liquid contents to dribble down from the corners of the can opening, and over the chin of the drinker. In other words, a can perforated in the foregoing manner can only be brought to the drinker's mouth, and sealed thereagainst with sufficient firmness to avoid such dribbling action by the use of great care, and with constant atten-

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tion to the position of the can during such use.

I have discovered that when the drinking opening is made in such manner that none of the can top material is folded against the inside surface of the body of the can at a location below the drinking opening the aforesaid tendency for the liquid to dribble during the drinking operation is greatly reduced or even completely eliminated. In other words, it is very desirable to keep the inside surface of the can body clear and unobstructed by such a folded portion of the can top. This may be done by cutting the material of such opening completely away from the can top, leaving the opening as a sharply cut opening throughout its perimeter.

Such an opening as just above defined requires the use of special cutting agencies; and in addition thereto it is noted that the presence of the sharp edge of an opening is undesirable around that portion of the perimeter which is contacted by the upper lip.

It is also noted that it is desirable to use an opening of triangular form in which the base of the triangle lies adjacent to the can body. Such an arrangement ensures a maximum width of the opening in the lower portion of the opening during the drinking operation, and also brings such maximum width of opening adjacent to the mouth opening during the drinking operation.

According to the principal feature of my present invention I have provided the can top with an opening of triangular form with the base of the triangle adjacent to the inside surface of the can body; and I have formed such opening in such a manner that no portion of the can top material is folded down against or towards the inside surface of the can body, leaving such base portion of the drinking opening completely unobstructed by any can top material, and with the base of the drinking opening substantially flush with the inside surface of the can body. Such a drinking opening has been found to substantially avoid the tendency to dribble during the drinking. Specifically, I have formed such drinking opening by folding or rolling the material of the can top (removed during the forming of the opening) back towards the center of the can top and away from the base portion of the drinking opening itself. Still more specifically, I have provided the means to so perforate the can top as to produce a cutting or shearing operation along the can top close to the inside surface of the can body, and in both directions from the radial line passing through such opening, for such distance in each direction as to provide the desired size

of base of the drinking opening; and at the same time I have provided means to roll or fold back the can top material in both directions from such radial line, such rolling or folding being effected continuously during the first mentioned shearing action, and continuously in such manner as to produce the desired embraced angle between the two sides of the triangular opening. Thus as the opening is formed and enlarged to its final dimension it is always of triangular form, and the can top material is continuously split along the radial line, the material at one side of such radial line being rolled towards the right, and the material at the other side of such radial line being rolled towards the left, and the shearing at the base of the triangular opening being simultaneously produced in both directions, from the said radial line. The final size of the opening is determined by the amount of movement of the cutting tool during the perforating operation.

It is also noted that the shearing of the can top material is produced on a curved line corresponding to the curvature of the can body (cylindrical), so that the "base" of the triangular opening is not a straight line, but is a segmental arc matching the inside surface of the can body and lying very close or even at the cylindrical inside surface of the can body. Experience has shown that by this process or operation it is possible to produce the desired size of drinking opening with substantially a single more or less complete roll of the can top material cut and rolled towards each side of the opening.

Still more specifically, I have provided a cutting or shearing tool whereby such form of opening will be produced in the can top, together with simple means to operate such tool, together with means to support the can in correct position during the production of the opening. I have also provided such tool with a second cutter element which will produce the desired vent opening simultaneously with the cutting of the drinking opening, and at a location directly opposite to the drinking opening.

Other objects and uses of the invention will appear from a detailed description of the same, which consists in the features of construction and combinations of parts hereinafter described and claimed.

In the drawing:

Figure 1 shows a side elevation of a simple unit for producing the desired form of drinking opening in the can top, and also for producing a vent opening in such can top; and in this figure the operating handle is swung down into a substantially horizontal position, to substantially complete the operations of forming the openings, a typical can being in place on the base of the unit; and in this figure the parts are shown on reduced scale;

Figure 2 shows a plan view corresponding to Figure 1;

Figure 3 shows a fragmentary view of the upper portion of a typical beer can, in elevation, and with the operating lever in raised position ready to begin the perforating operation; and in this figure the operating lever is shown in section along a vertical longitudinal plane, and the cutting tool is shown in elevation, but attached to said lever; and the pivotal point of the lever is shown; and in this figure I have also shown in fragmentary form the perforating section of the tool in its lowered position, to show generally the path which it travels during the perforating operation;

Figure 4 shows a top plan view of a typical beer can on larger scale than Figures 1 and 2, and with its can top provided with a drinking opening embodying the features of the present invention, and also showing a typical vent opening opposite to the drinking opening; and in this figure the material rolled back towards the center of the inside face of the cover during the perforating operation is shown by dotted lines;

Figure 5 shows a fragmentary section taken on the line 5-5 of Figure 4, looking in the direction of the arrows; and this figure shows how the material of the can top is rolled towards the can center, and how the base of the triangular drinking opening is sheared close to the inside surface of the can cylindrical body so as to avoid the dribbling operation during drinking from the can;

Figure 6 shows a bottom face view of a tool for producing the desired shearing operation of the drinking opening, being on substantially the same scale as Figures 3 and 4; and

Figure 7 shows a horizontal cross-section taken on the line 7-7 of Figure 3, looking in the direction of the arrows.

Referring first to Figures 4 and 5, I have therein shown a typical beer can top (Figure 4) and provided with the drinking opening embodying the features of the present invention, and also showing a typical vent opening; and in Figure 5 I have shown a detail section through the drinking opening and the adjacent portions of the can top. The can as an entirety is designated as 10. It includes the cylindrical body 11 and the top 12, these parts being folded and formed together in the usual and well understood manner. In the construction illustrated the edge portion of the top blank is folded up and over and down against the upper edge of the body element 11, to establish a tight seal. This produces the slightly upstanding peripheral rim element 13, the top proper, 12, being set down slightly below the top of said rim.

The drinking opening 14 is of generally triangular form, preferably a substantially equilateral triangle, but the base of said opening, 15, is preferably not formed on a straight line, but is curved on a circular arc corresponding closely to the curvature of the inside surface of the cylindrical body of the can. The two sides, 16 and 17, of this opening are formed symmetrically with respect to a radial line 18 passing through the center of the can top. During drinking through this opening the lower lip of the drinker is brought against the outside surface of the can body at the location just outside of the opening 14, and the upper lip is held firmly against the outside or top surface of the can top 12, just beyond the locations of the edges 16 and 17 of the opening. In order for the liquid to flow smoothly and evenly to the drinker's mouth the opening 14 should be so formed that there will be substantially no obstruction to such liquid flow over the entire width of the opening, and between the two lower corners of the opening, 19 and 20. In Figure 5 there appears the slight offset 21 at the base of the drinking opening, due to the thickness of the material from which the can top is made, but in Figure 5 this thickness of the material is greatly exaggerated, and actually it is hardly perceptible when running the finger over the inside surface of the cylindrical body, the finger extending down through the opening 14. Sometimes even this small amount of offset is eliminated by a slight inward forming of the can body just below the location of the inside surface of the can top.

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It is noted that in forming the drinking opening the base 15 thereof closely conforms to the curvature of the inside surface of the can body, so that no obstructing ledge is produced against the outflow of liquid even at the central portion of such base 15.

Examination of Figure 5 in particular shows that the material at each side of the triangular opening is formed towards the center of the can top, and is rolled downwardly, then towards the center of the top, and then upwardly into substantially one convolution. Examination of Figure 4 also shows that the material thus rolled from the opening 14 during the process of making that opening, is of substantially triangular form, and that the two triangles thus rolled away from the opening in opposite directions measured from the radial line 13, comprise the material released from the two lateral halves of the opening, measured from said radial line. Accordingly, each of these rolled sections includes a point (shown in dotted lines in Figure 4), the two points having originally been in contact with each other at the intersection of the radial line 13 with the base of the opening. At this point I call attention to this fact, since, during the operation of forming the opening the material released from each half of the opening is rolled away from the radial line 13 in a direction substantially at right angles to the final edge of the opening for such half, with the point rolled into the center of such rolled material.

Examination of Figure 5 in particular will show that when this opening forming operation has been completed the released material is located close to the inside surface of the can top, and does not project down into the body of the can more than the diameter of the so-formed roll. Also, that even so, this material is carried back towards the axial center of the can and towards the center of the top of the can, so that during the drinking operation the liquid material within the can has its upper surface at all times below such rolls, and such liquid surface constantly descends during the removal of the liquid contents from the can. Examination of Figure 4 also shows that commencing at the outer corner, 19 or 20, of the opening, as the case may be, the released material is so cut and formed that its outer edge quickly departs from the inside surface of the can body, so that no traps are formed even at these corners for the interference with free and unobstructed flow of liquid to and past the curved base of the triangular opening.

It will now be seen that I have provided a form of drinking opening admirably adapted to meet the conditions imposed in the drinking of the contents directly from the can; and I have also disclosed certain of the characteristics of the opening itself, as respects the disposition of the released can top material. I shall now describe the form of tool which I have herein disclosed for quickly and accurately forming the said opening, and for also forming a vent opening. Such a vent opening is shown at 22 in Figure 4, and it may be of any suitable form and may be formed in any suitable manner. In the present case this vent opening is shown as being formed by folding the material of the can top outwardly against the inside face of the can body.

The tool disclosed for forming the opening 15 is well shown in Figures 3, 6 and 7. It includes the angle shaped cutter 23 having the two wings 24 and 25. This cutter is carried by a suitable

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carrier 26, shown as a lever arm, which carrier is mounted for rocking movement about the center 27. Conveniently the carrier comprises a section of channel having the web 28 and the side flanges 29 and 30. A base plate 31 carries the stand 32 of height slightly greater than the height of the can 10. This stand is of generally channel shape, including the web 33 having the side flanges 34 and 35; and the flanges are formed outwardly into the angle wings 36 and 37. These wings are for the purpose of providing surfaces against which the can, standing on the base, may be set in order to bring the can to correct position for the formation of the openings by the tool. In Figures 1 and 2 a typical can is shown as set against these wings, thus correctly locating the can on the base plate.

The carrier arm 26 is pivoted to the upper end portion of the stand by the cross pin 38. The outer or free end of the carrier is formed into circular cross-section to provide the handle 39 by which said carrier may be rocked up and down. The friction of the pivotal support of this carrier will generally be found sufficient to retain said carrier in its raised position, but if desired special means may be provided to effect this result.

The cutter 23 is secured to the bottom face of the carrier web 28. For this purpose said cutter is provided with the plate 40, conveniently integral with such cutter, such plate being secured to the web 28 as by the bolts 41. These bolts may be passed through slightly elongated slots 42 in the web 28 so that the tool may be set into correct position on the carrier to ensure correct formation of the drinking opening in the can top.

The cutter wings 24 and 25 are provided with the curved edges 43 and 44 which are so formed that the wings draw to a piercing point 45. Evidently as the carrier arm 26 is rocked about its pivot 38 the piercing point 45 will travel on the arc of a circle about said pivot 38. The cutter is so formed that as the carrier is lowered to its position of start of the formation of the drinking opening this piercing point will come into contact with the can top at a point just inside of the flange 13, as shown by the full line position of the cutter in Figure 3. Under these conditions, also, the edges 43 and 44 of the cutter are also so formed that as the carrier is rocked downwardly about the pivot 38 each of these cutting edges will pass the plane of the can top on a line located at the line of joinder of the can top with the cylindrical body of the can. That is to say, these edges are so curved that they will cut through the plane of the can top on the desired circular arcs at the inside face of the flange 13, as the carrier is lowered, thus conforming to the requirement that the material of the can top is to be severed around a circular arc registering with the inside surface of the can body cylinder. In order to obtain the cutting operation these edges are also sharpened, preferably on their outer corners, as shown at 46 and 47. Then, as the carrier is depressed, forcing the cutter downwardly, these cutting edges will sever the can top from the body of the can, or from the flange 13. This cutting operation will commence at the center of the curved edge 15 of the opening 14 (that is, on the radial line 13), and will progress in both directions, to right and to left, for a distance dependent on the amount by which the cutter is forced down.

As the foregoing cutting operation progresses the faces 48 and 49 of the cutter will come into

action. These faces come together on the sharp line of joinder 50. Examination of Figures 3, 6 and 7 shows that this line of joinder extends from the piercing point 45 upwardly towards the carrier; and the downward rocking movement of the carrier about the pivot 38 causes this line of joinder 50 to work on the material of the can top progressively towards the can center as long as the downward rock of the carrier is continued. This line of joinder serves to sever the material of the can top progressively with the cutting operations of the edges 46 and 47, so that as fast as the can top is severed around the circular flange 13 the so severed material is also divided by the edge 50 into two sections, such severing occurring along the radial line 18. Thus two wings are produced, one at each side of said radial line. Concurrently with the foregoing cutting and severing operations the faces 48 and 49 of the cutter are forced towards the can top center, thus forcing the severed wings of can top material in directions determined by the forces exerted by the surfaces 48 and 49 on the said wings. A study of the said surfaces, their relative angles with respect to each other, and the changing angles at which they act on the severed wings of material, will show that said surfaces 48 and 49 act in a scooping manner, with an upward scooping action exerted on the wings concurrently with a movement towards the can top center; but the outward facing angles of said surfaces also produces forces on said wings tending to cause said wings to curl upwardly to produce the curled rolls such as shown at 51 and 52 in Figures 4 and 5. Thus the released material is curled up into the desired rolls 51 and 52 simultaneously with the severance of the two wings of material from the can top. And the curling operation will continue as long as the severing operation continues, so that the released material is curled up to an amount proportionate to the amount of severing action.

Generally it will be desirable to so proportion the parts, and to make the cutter of such dimension that the desired amount of severing and curling action, and production of the desired size of opening, will be produced when the lever arm has been depressed into a substantially horizontal position, as shown by Figure 1. In Figure 3 I have also shown the lower portion of the cutter (its pointed portion) at its substantially fully lowered position by the dotted lines.

In order to produce the desired vent opening I have also provided the small cutter 53 comprising an integral portion of the cutter element. This small cutter comprises a pointed prong having its lower end 54 sharply pointed to pierce the can top; and this small cutter is also provided with the face 55 looking in the direction of the pivot 38. This small cutter will therefore sever a small triangle of can top material close to the flange 13, but at position opposite to the opening 14; and the material thus severed will be folded back against the inside surface of the body of the can in well understood manner. Since the liquid contents of the can are not taken through this vent opening it follows that said opening may be made of any form convenient to the designer and user of the device.

Examination of Figure 3 will also show that both of the points 45 and 54 rise to the elevation of the top edge of the flange 13 at substantially

the same time, so that the can may be set into place or removed from the device when the lever has been tilted up to substantially the angle shown in Figure 3 or slightly higher.

I claim:

1. Means to perforate the top of a cylindrical container comprising in combination, a lever arm; means to pivot said lever arm for rock on a fixed axis of rock, and a cutter connected to said arm, said cutter comprising a blade element of V-shaped cross-section and including a pair of wings extending outwardly from the connecting line of the V of said blade element and away from the axis of rock of the lever arm, said wings lying at an angle of the order of ninety degrees to each other and the connecting line of said blade element lying in a plane substantially normal to the axis of rock of the lever arm and lying at an angle with respect to the radius of rock of the lever arm on said pivotal axis which angle is at least substantially ninety degrees at the convex side of the blade element, the wings of the blade element being of substantially triangular form, the V of the blade element comprising a common side for both of the triangular shaped wings and the apices of both wings being located at a common point on the V of the blade element and constituting a container top perforating point, the other sides of the blade element which sides extend from said perforating point extending outwardly from said perforating point and being sharpened to provide container top cutting edges which are separated from each other by a progressively increasing distance measured on successive planes which planes all contain the axis of rock of the lever arm and also pass through the wings of the V blade element at successive planar angles commencing at the perforating point, the said sharpened sides of the wings being of formation such that during rock of the lever arm on the pivotal axis the points of intersection of said cutting edges with a stationary plane shift in opposite directions from a common point and on circular arcuate segments of a common circle to thereby develop a combined arcuate segment of size equal to the combined cutting effects of both of the cutting edges progressively intersecting said stationary plane.

2. Means as defined in claim 1, together with means to support a cylindrical container with its top coincident with said stationary plane, and wherein the said circle of cutting is of the same size as the cylindrical size of the container.

3. Means as defined in claim 2, wherein the cylindrical container is supported at a location with respect to the axis of rock of the lever arm such that the circle of cutting of the container top lies substantially coincident with the inside cylindrical surface of the container.

FRANK K. KRAG.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,119,502	Bertels	May 31, 1938
2,197,449	Conill	Apr. 16, 1940
2,259,499	Taylor	Oct. 21, 1941
2,406,831	Hansen	Sept. 3, 1946
2,516,746	Barlow	July 25, 1950
2,556,731	Lapierre	June 12, 1951