

[54] **JAR CAP REMOVER**

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[51] Int. Cl. **B67b 7/18**

[58] Field of Search..... 81/3.4, 3.3 R, 3.34, 81/57.33, 57.35, 120

[56] **References Cited**

UNITED STATES PATENTS

1,707,804	4/1929	Haase	81/3.4
1,841,270	9/1932	Aeschbach et al.....	81/3.3 R
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2,856,804 10/1968 Whiteley..... 81/3.4

FOREIGN PATENTS OR APPLICATIONS

326,394 3/1930 Great Britain..... 81/120

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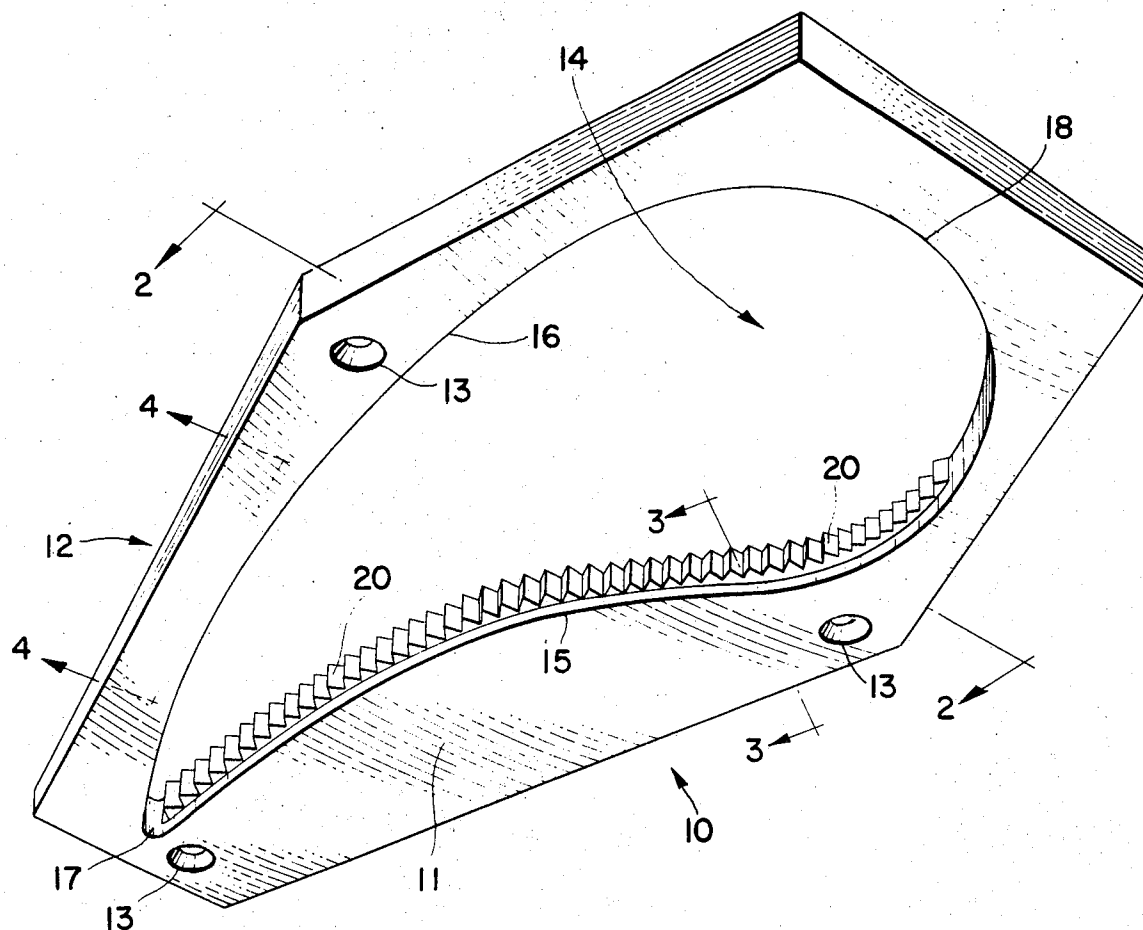
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[57] **ABSTRACT**

A cap removing device consisting essentially of a base member formed of thermo-plastic material, and having an opening, the opening being more or less of tear-drop shape, with one side having in part, a convex curve, and the other side having a concave curve, and with a metallic strip member embedded in the thermo-plastic material along-side the convex side with one edge of the metallic strip member exposed and extending into the opening, there being saw-toothed formations along such exposed edge.

8 Claims, 5 Drawing Figures



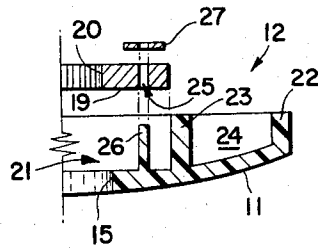


FIG. 3

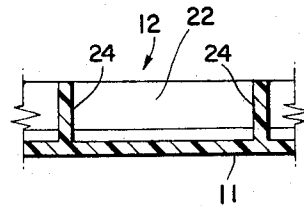


FIG. 4

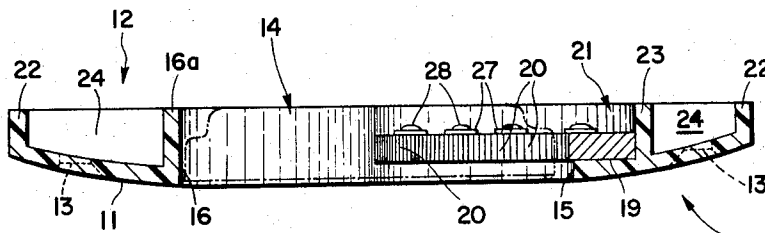


FIG. 2

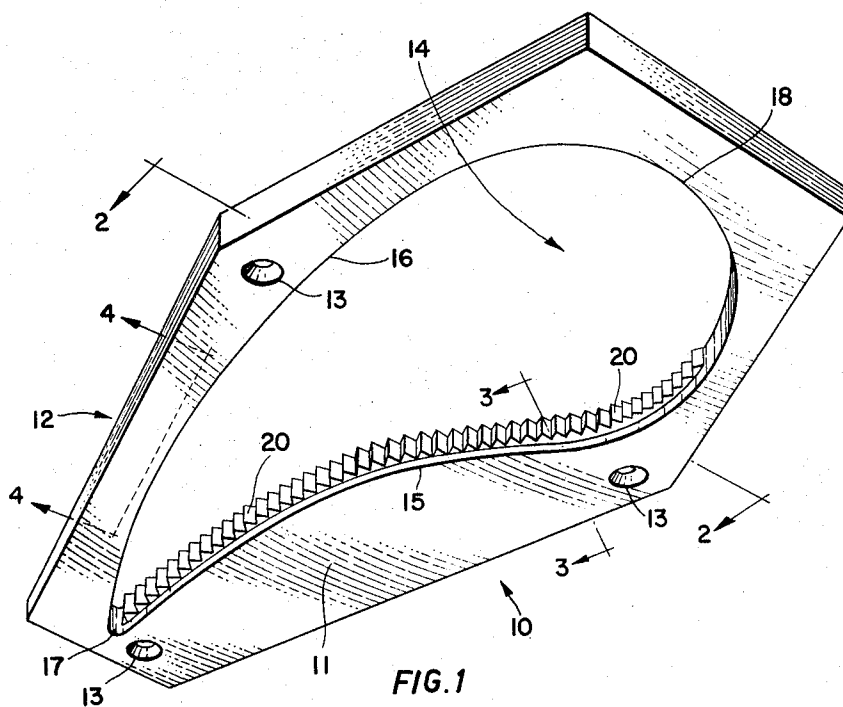


FIG. 1

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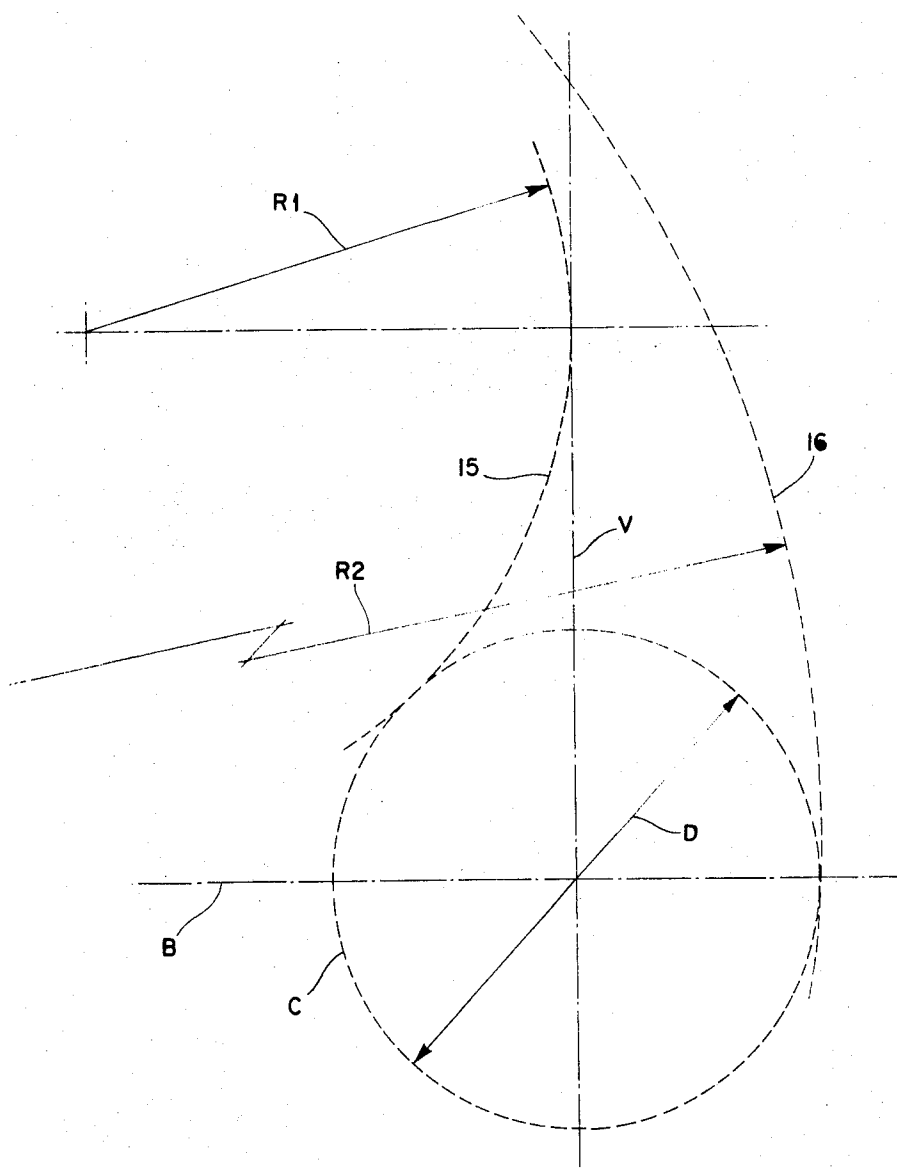


FIG. 5

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JAR CAP REMOVER

The present invention relates to a device for removing caps from screw top jars.

BACKGROUND OF THE INVENTION

Difficulties are frequently experienced with the removal of caps from jars, bottles and the like having screw tops. Such bottles and jars come in many different sizes, and although in the smaller sizes the caps can usually be loosened with a pair of household pliers, the removal of the larger sizes of caps presents a greater problem.

Many different devices have been proposed in the prior art to alleviate this problem. One class of such devices is the type in which a metal plate is provided with a generally V-shaped recess or slot, having a serrated or sawtoothed edge down one side. The jar top is inserted into the slot, and is pressed firmly into engagement with the serrated edge on the one side of the slot, and the jar is then rotated. Examples of such earlier cap removers are shown in U.S. Letters Pat. Nos. 1,707,804; 1,841,270; and 2,856,804, to give only a few examples of the different patents relating to this particular type of device.

In theory, and according to the explanations given in the various patents in this field, all that the householder has to do to remove the cap is simply to insert the jar cap into the slot, and force the cap into engagement with the serrated edge or teeth down the one side of the slot, and then simply rotate the jar. According to the principle of operation of such devices, the cap will be firmly held by the serrated edge or the saw teeth and the jar will be rotated. However, this is not exactly what happens in practice. Usually, with all of such devices, the jar cap will, in fact, rotate with the jar, and will not be held by the serrated edge down the one side of the slot. The reason for this is that the slot is V-shaped, and as the saw teeth attempt to grip one side of the cap, the pressure applied to the opposite side of the cap by the other side of the V-shaped slot will cause a resultant force tending to eject the cap from the slot. If it is attempted to overcome this by applying greater pressure to the jar to force the cap deeper into the slot, then it becomes difficult to rotate the jar, with the result that the cap will sometimes slip out of the slot, and in some cases, the jar can even be broken as a result. One patent which appears to provide a partial solution to this problem in U.S. Pat. No. 1,841,270. In this patent, an additional gripping action is provided by means of a sliding gripping member adapted to slide down one side of the slot and engage the cap at two spaced points, rather than at a single point on its circumference. However, this solution was not satisfactory. In the first place, it greatly increased the manufacturing cost of the article. In addition, it is not generally speaking desirable to grip the cap firmly on both sides. What is required is a device in which the teeth will grip the cap on one side, and on which the opposite side of the slot permits the cap to slide deeper into the slot as the teeth bite deeper into the cap.

Another problem which is experienced with such devices is the fact that in order to make them at a sufficiently low price, the teeth are usually formed by stamping them out of the sheet metal from which the remainder of the article is made. This usually results in the formation of relatively weak teeth out of inferior

material, such that they soon become blunt and ineffective.

BRIEF SUMMARY OF THE INVENTION

The present invention seeks to overcome the disadvantages of such prior art cap removers by the provision of a cap removing device consisting essentially of a plate-like member formed of thermo-plastic material, and having an opening, the opening being more or less of tear-drop shape, with one side thereof having a convex curve, and the other side thereof having a concave curve, and with a metallic strip member embedded in the thermo-plastic material alongside the convex side, with one edge of the metallic strip member exposed and extending into the opening, there being sawtoothed formations along such exposed edge.

Preferably, the device according to the invention is provided with screw holes or other means for fastening the same in any suitable position in a kitchen, such as, for example, underneath a kitchen cabinet or the like.

It is a further object of the invention to provide a device having the foregoing advantages in which the metallic strip member is held in position in the thermo-plastic base member in such a way that it will be spaced from the underside of a kitchen cabinet or other such surface to which the device may be attached.

The foregoing and other advantages will become apparent from the following description of a preferred embodiment of the invention which is given here by way of example only with reference to the following drawings in which like reference devices refer to like parts thereof throughout the various views and diagrams.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective illustration of the cap removing device according to the invention;

FIG. 2 is a section along the line 2—2 of FIG. 1;

FIG. 3 is an enlarged section along the line 3—3 of FIG. 1;

FIG. 4 is a section along the line 4—4 of FIG. 1; and,

FIG. 5 is a schematic illustration showing a method of calculating the radius of a location of the respective convex and concave curves.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, it will be seen that this preferred embodiment of the invention comprises a base member 10 having a front surface 11 and a rear surface 12. The base member 10 being of thermo-plastic material, and formed by injection moulding techniques, may be formed in any desired shape or configuration, but preferably, the rear surface 12 will be flat so as to permit the same to lie flat on a mounting surface, such as the underside of a kitchen cabinet (not shown). The front surface 11 of the member 10 may have a slight curve or contouring as shown in FIG. 2, and the side edges of the member 10 may be formed in the generally siz-sided shape as shown, although this is a mere matter of preference.

In order to permit attachment of the base member 10 in position, the screw holes 13 may be provided.

Member 10 is formed with a cap receiving opening 14 which will be seen to be of generally tear-drop shape, and defining a convex side 15 and a concave side 16, and having a narrow end 17 and a wide end 18.

In order to permit the acceptance of a wide range of sizes of caps, the wide end 18 of the opening 14 is of more or less circular shape so that in fact, both sides of such wide end 18 are of concave contour, the side 15 being of convex contour along only part of its length as shown. Thus, the side 15 of opening 14 is in fact of generally S-shape in plan.

With reference to FIG. 5, the convex side 15, and the concave side 16 are preferably formed with different radii, and about different centres, the radius of the concave side 16 preferably being substantially greater than the radius of the convex side 15 for maximum efficiency. In FIG. 5, the radius of the convex side 15 is shown as R1, and the radius of the concave side 16 is shown as R2. A circle C is shown as representing the maximum designed cap diameter, the circle C having a diameter D.

While no specific formula or calculation has been made which can be established as applying to all possible cases, by a process of trial and error, it has been established that a highly effective device can be manufactured according to the invention by observing certain practical design rules. Thus to start with, the designer must select the maximum designed cap diameter which can be accommodated by the device, and this will be the dimension D. A circle C is then drawn having a diameter D. A horizontal base line B is then drawn, passing through the centre of the circle C, and will extend outwardly to the left of the circle C as shown, and a vertical reference line V is drawn at right angles thereto also passing through the centre of cap C. The convex side 15 is then drawn in, by describing an arc of a circle having a radius equal to approximately the same dimension as the diameter D of the circle C. This arc, which is represented by the arc 15, will be drawn in so that it is tangential to circle C and to the line V. Having drawn in this arc, the arc for the side 16 must then be drawn in. The radius of the arc 16 which is shown as R2 will preferably be in the region of between about 2 and 2½ times R1. The arc 16 is drawn in, by selecting a point along the base line B at which the arc 16 will be tangential to the circle C as shown. When drawn in, the arcs 16 and 15 will closely approach one another or in fact intersect at a point which is more or less vertically above or slightly to the left of the vertical line V as shown. Obviously in the manufacture of the devices, since the circle C represents the maximum cap diameter, the large end 18 of the device simply represents a continuous arc (not shown) established between the arcs 15 and 16.

Referring to FIG. 2, it will be seen that there is fastened within the base member 10, a metallic bar member 19 of relatively thick massive construction, running along the convex edge 15 of the opening 14, and extending outwardly from such convex side 15. Serrations or saw teeth 20 are formed continuously along the exposed edge of the bar member 19. Bar member 19 is also of generally S-shape in plan to conform to the shape of side 15 of opening 14. Preferably, the serrations or saw teeth 20 are relatively coarse and deep, so as to effectively bite into the material of the cap. It is found in practice that if the serrations 20 are of too fine a pitch, then they act simply like a file and wear away the surface of the cap without holding it. While no specific design criterion can be laid down for these dimensions, it is found in practice that for caps up to a maximum diameter of about four inches, the serrations 20

should be approximately not less than about 1/10 of an inch apart, and preferably more.

Clearly, the bar member 19 may be embedded in the thermo-plastic base member 10 either during moulding, or afterwards in a subsequent fastening operation. In this preferred embodiment of the invention, the base member 10 is shown formed with a recess 21 formed in the rear surface 12 of the member 10 around the extent of the convex side 15 of the opening 14. Preferably, it will be noted that the recess 21 is of a depth equal to about twice the thickness of the bar member 19 whereby to locate the bar member 19 spaced away from the surface upon which the base member 10 may be mounted.

For greater strength, the base member 10 is of more or less hollow shell-like formation as shown in FIGS 2, 3 and 4, having outer side walls 22 and the recess 21 is formed by an inwardly offset wall member 23 extending around recess 21 defining a shape corresponding to the profile of bar member 19. Reinforcing ribs 24 extend at spaced intervals between outer side wall 22 and wall member 23 on the convex side 15 of slot 14 and between outer side wall 22 and the wall member 16a on the concave side 16 of slot 14.

Bar member 19 is preferably formed with a plurality of fastening holes 25 and thermo-plastic pin members 26 are moulded integrally with the inwardly offset wall member 23 and extend perpendicularly therefrom in registration with the holes 25. Washers or spacer members 27 fit around pin members 26, and the free ends of pin members 26 are thermo-formed, or formed by ultra-sonic techniques as at 28 to flow over part of the washers 27 and hold the bar member 19 in position.

In operation, the base member 10 will preferably be mounted on the underside of a kitchen cabinet or the like, (not shown) so that its front surface 11 will be directed downwardly. In order to remove a jar cap, the jar is held upright in the hand, and the cap is inserted into the opening 14 and pressed towards the narrow end 17 until it is wedged between the teeth 20 and the concave side 16. The jar is then rotated, and as it rotates, the teeth 20 will grip the cap on one side. However, on the other side, that is to say, the side of the cap corresponding to the concave side 16 of the slotted opening 14, the cap will be free to rotate and enter more deeply into the slotted opening 14, thereby still further increasing the gripping action of the teeth 20. Due to the fact that the concave edge 16 is perfectly smooth, the cap of the jar can, in fact, slide along it quite easily. In addition, due to the fact that the concave edge or side 16 is of a radius considerably greater than the radius of the convex side 15, in the order of between 2 and 2½ times as great in fact, the side of the cap in contact with the concave edge or side 16 will tend to move therealong to quite a substantial extent, whereas the side of the cap in contact with the serrations 20 on the convex side 15 will tend to be held more or less static. This will result in the two or three teeth or serrations 20 in contact with the cap in fact biting deeper and deeper into the material of the cap and thereby ensuring a progressively firmer grip. This type of movement is to be distinguished from the type.

What I claim is:

1. Cap remover for containers such as jars and the like having rotatable or twistable caps and comprising: a base member defining sides and at least one end;

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front and rear surfaces defined by said base member, said rear surface being shaped to permit said base member to lie flat on a plane surface;

cap receiving opening means in said base member having a narrow end and a wide end and two sides, one said side curving in a convex contour along at least part of its length and the other said side curving in a concave contour along at least part of its length

reinforcing means forming part of said base member adjacent said convex side of said opening, said reinforcing means being inwardly offset with respect to said opening means;

a metallic bar member mounted along said convex side, adjacent to said inwardly offset reinforcing means, and,

tooth means formed along one side of said bar member.

2. A cap remover as claimed in claim 1 wherein said base member is formed of thermo-plastic material, and including wall means defined by said base member, running continuously around said opening means along both said sides and said narrow and wide ends, completely enclosing the same.

3. A cap remover as claimed in claim 1 wherein said convex side is of generally S-shape in plan defining a portion of convex contour, and a further portion of concave contour, and including metallic bar means of generally S-shape in plan mounted along said side, said tooth means being formed along an exposed edge of said bar means.

4. A cap remover as claimed in claim 1 wherein said base member is of generally hollow shell-like construction defining a continuous outer wall, and inner wall means alongside either side and both ends of said opening means, and transverse rib members extending between said inner and outer wall means.

5. A cap remover as claimed in claim 1 wherein said base member is formed of synthetic thermo-plastic material, and defines a continuous recess along said convex side, and including synthetic thermo-plastic pin members formed integrally with said base member and extending therefrom within said recess, and metallic bar means defining a plurality of holes adapted to register with said pin members, said bar means being shaped

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to conform to and fitting within said recess, with said pin members extending through said hole means therein with the free ends of said pin members exposed therethrough, said free ends of said pin members being deformed to retain said bar means in position therein, and said tooth means being formed along an exposed edge of said bar means.

6. A cap remover as claimed in claim 1 wherein the said convex side describes an arc having a predetermined radius of curvature, and wherein the said concave side describes an arc having a predetermined radius of curvature equal to between about 2 and 2.5 times said radius of curvature of said convex side.

7. A cap remover as claimed in claim 1 including elongated metallic bar means mounted along said convex side of said base member, said tooth means being formed along one edge of said bar means, and wherein said bar means is arranged to lie in a predetermined plane lying between said rear surface and said front surface of said base member, and spaced from said rear surface, whereby to engage the edge of a cap a distance below the top of such cap.

8. Cap remover for containers such as jars and the like having rotatable or twistable caps and comprising: a base member defining sides and at least one end; front and rear surfaces defined by said base member, said rear surface being shaped to permit said base member to lie flat on a plane surface;

cap receiving opening means in said base member having a narrow end and a wide end and two sides, one said side curving in a convex contour along at least part of its length and the other said side curving in a concave contour along at least part of its length;

elongated metallic bar means mounted along said convex side of said base member, and,

tooth means formed along one edge of said bar means, said bar means being arranged to lie in a predetermined plane lying between said rear surface and said front surface of said base member, and spaced from said rear surface, whereby to engage the edge of a cap a distance below the top of such cap.

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