United States Patent [19]

Monnerjahn

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[54] GRIPPER FOR UNSCREWING CAPS

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[52] **U.S. Cl.** **81/3.4**

[51] **Int. Cl.** **B67b 67/00**

[58] **Field of Search** 81/3.34, 3.38, 3.4, 81/3.48, 3.49, 120

[56] **References Cited**

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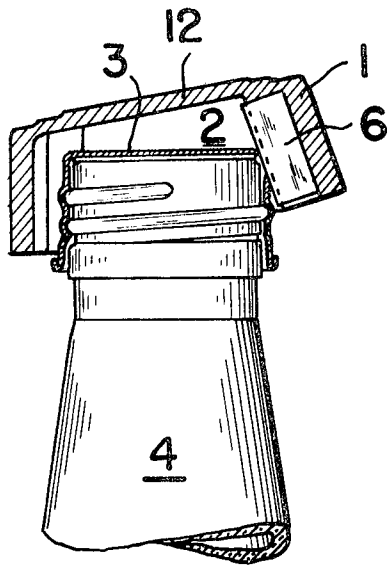
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Primary Examiner—James L. Jones, Jr.
Attorney—Webb, Burden, Robinson & Webb

[57] **ABSTRACT**

A gripper for unscrewing caps from bottles and the like being substantially disc-shaped and palm-sized and having a conical socket therein. The gripper may comprise a resilient material and have a metal knife edge mounted to project into the socket.

5 Claims, 7 Drawing Figures



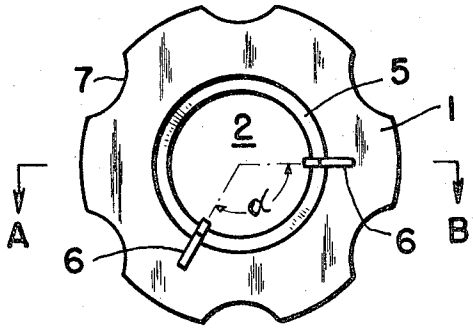


Fig. 1

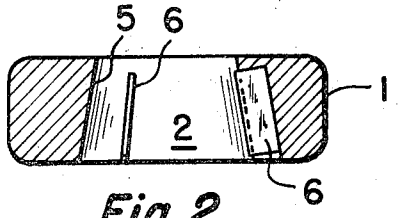


Fig. 2

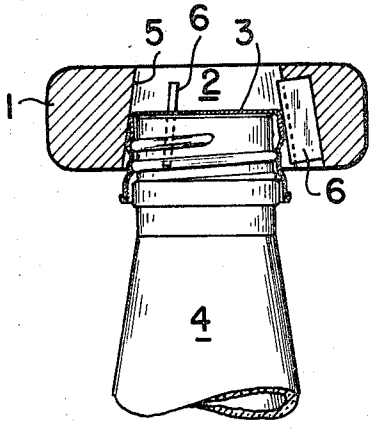


Fig. 3

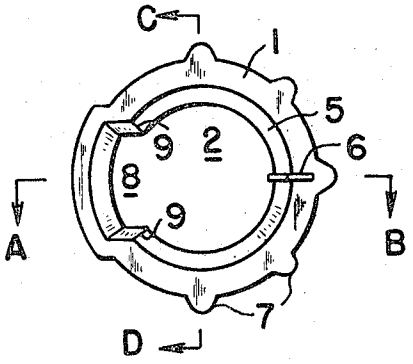


Fig. 4

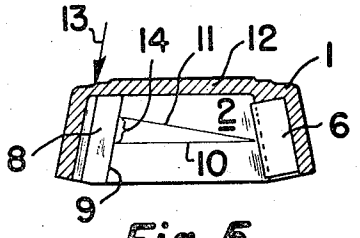


Fig. 5

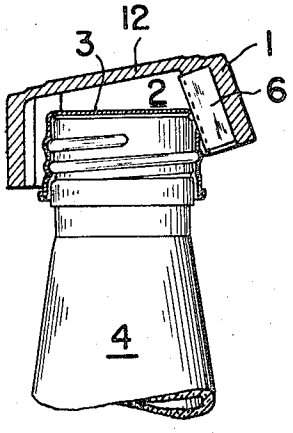


Fig. 7

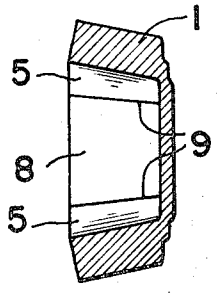


Fig. 6

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GRIPPER FOR UNSCREWING CAPS

This invention relates to a gripper device for unscrewing screw caps from bottles or the like. The gripper can be easily manufactured using very little material and combines maximum operational reliability with practically unlimited service life.

More and more the beverage industry is changing over to screw caps which can sometimes be opened only with a great deal of effort. In the case of beverages containing sugar there is the additional drawback that a screw cap which has been screwed back into place after the bottle has been used will be stuck so tightly due to the sticky liquid that the screw cap can only be unscrewed again with a great deal of effort or that the cap cannot be unscrewed at all without the aid of mechanical means.

By way of comparison, a proposed device for this purpose consists of a resilient arcuate member capable of encompassing the screw cap and possibly having two parallel gripping legs. A ribbed portion is provided on the inside of the arcuate member for engaging the external ribs of the screw cap. This arrangement has a fundamental drawback: The screw cap is engaged on all sides by the arcuate member and is compressed. Consequently, it is pressed against the threaded portion of the bottle. The ribbed portion on the inside of the arcuate member consists of many slightly protruding, closely spaced ribs. Hence, it soon wears out since it turns about the ribbed portion of the screw cap.

Grippers according to this invention are substantially simpler and smaller, but much more reliable and avoid all of the above-mentioned drawbacks.

Briefly, this invention provides a gripper device that is roughly the size of the palm of the hand provided with a socket that is at least partly conically reduced for the purpose of clamping the screw cap seated snugly on the bottle. Preferably, there are one or more sharp-edge elongated projections having an exposed edge parallel to the generatrix of the conical surface of the socket through which they project. The palm-sized member may have a basically planar or disc-shaped configuration. The disc-shaped member may be made either in one piece from a homogeneous material or the disc may be made of plastic material and the projections of one or more small inserted metal plates which project slightly from the annular disc into the socket. Appropriately, the two metal inserts include a sector angle alpha of roughly 120°. The periphery of the palm-sized member is advantageously notched, ribbed or equipped for gripping in some suitable manner.

Another embodiment is distinguished by the fact that the cone-shaped socket has an outwardly bulging portion disposed opposite a single projection. Preferably, two sharp edges separate this outwardly bulging portion from the rest of the socket.

It is advantageous to close off the socket on its top side by an end wall. The gripper may be made of a resilient material so that the socket will resilitently enclose the inserted screw cap.

Two embodiments of the invention will be more fully explained and described with the aid of the accompanying drawing in which:

FIG. 1 is a bottom view of a first embodiment;

FIG. 2 is a cross section taken on line A–B of FIG. 1;

FIG. 3 is a view similar to FIG. 2 but with the screw cap inserted therein;

FIG. 4 is a bottom view of a second embodiment;

FIG. 5 is a cross section taken on line A–B of FIG. 4;

FIG. 6 is a cross section taken on line C–D of FIG. 4; and,

FIG. 7 is a cross section similar to FIG. 5, but with the screw cap inserted therein.

The embodiment shown in FIGS. 1 to 3 consists of an annular plastic disc 1 having a cone-shaped socket 2. In the conical surface 5 of socket 2 elongated projections 6 are provided with a sharp edge parallel to the generatrix of the conical surface through which they extend and which may consist of small inserted steel plates projecting slightly into the inside area of socket 2.

When the screw cap 3 which is seated on a bottle 4 is inserted into socket 2, the sharp projecting edges of metal inserts 6 are pressed into the upper edge of screw cap 3 so that they will carry the screw cap along when annular disc 1 is turned. To increase the gripping capacity of disc 1 the periphery of the latter may be provided with notches 7 or may be cornered in design.

In the embodiment illustrated in FIGS. 4 to 7, the gripper 1 also has a cone-shaped socket 2 into whose conical surface 5 a metallic projection 6 having a sharp edge parallel to the conical surface. Socket 2 has an outwardly bulging portion 8 opposite projection 6. Two sharp edges 9 suitably delimit this outwardly bulging portion from the rest of the socket hole. The additional inside space created by outwardly bulging portion 8 greatly facilitates the mounting of gripper 1 on screw cap 3 of bottle 4 as well as the entire operation.

When it is applied, gripper 1 is set on screw cap 3 in an approximately horizontal position so that the screw cap will be contacted at three points of a plane indicated by straight line 10 in FIG. 5. Thereupon, a slight pressure is exerted in the direction of arrow 13 on the one side of the mounted gripper so that the single metal insert 6 will penetrate into a groove and will be pressed into the material of the screw cap. Then the three points of contact between gripper 1 and screw cap 3 will be disposed in a plane which is indicated by straight line 11 in FIG. 5. Together with straight lines 10 and 11 the path of insertion 14 roughly forms a right triangle whose hypotenuse is formed by straight line 10 and whose longer short leg is formed by straight line 11. Thus knife-like projection 6 will penetrate into the screw cap for a distance equal to the difference in length between straight line 11 and straight line 10. After gripper 1 has been set in place and has been pressed downwardly on one side, it can be turned readily with the aid of external ribbing 7.

Sharp edges 9 which delimit outwardly bulging portion 8 from the rest of the socket 2 are also pressed into the outer grooves of the screw cap similarly to knife 6, but to a lesser degree, and consequently, in this way a firm three-point encirclement is achieved by which the screw cap remains tightly clamped, thus preventing any possible slipping off or wiggling. Thus, the devices described are distinguished by a very simple construction requiring a minimum of material and guaranteeing reliable functioning and long service life.

Having thus described the invention with the detail and particularity as required by the Patent Laws, what is desired protected by Letters Patent is set forth in the following claims.

I claim:

1. A gripper for unscrewing caps comprising a palm-sized body defining a socket at least partially reduced conically such that the socket may tightly clamp a screw cap when placed thereover, said gripper having at least one elongated projection having a sharp edge substantially parallel to the generatrix of the conical socket surface which projects into the socket, said gripper having a portion outwardly bulging from said socket disposed opposite said elongated projection wherein the outwardly bulging portion is delimitated from the rest of the socket surface by two sharp edges.

2. A gripper for unscrewing caps comprising a palm-sized body defining a socket, at least partially reduced conically such that the socket may tightly clamp a screw cap when placed thereover, said gripper having at least one elongate projection having a sharp edge substantially parallel to the generatrix of the conical socket surface which projects into the socket, said gripper having a portion outwardly bulging from said socket disposed opposite said elongate projection.

3. A gripper for unscrewing caps comprising a palm-sized substantially planar disc-shaped body defining a cone-shaped socket passing entirely through said body, such that the socket may tightly clamp a screw cap when placed thereover, said gripper having at least one rigid elongate projection having a sharp edge substantially parallel to the generatrix to the conical surface which projects into the socket.

4. A gripper according to claim 2 wherein a disc-shaped body consists of an annular disc made of plastic material and one or more inserted rigid metal projections.

5. A gripper according to claim 1 wherein the disc-shaped body consists of an annular disc made of plastic material and one or more inserted rigid metal projections.

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