

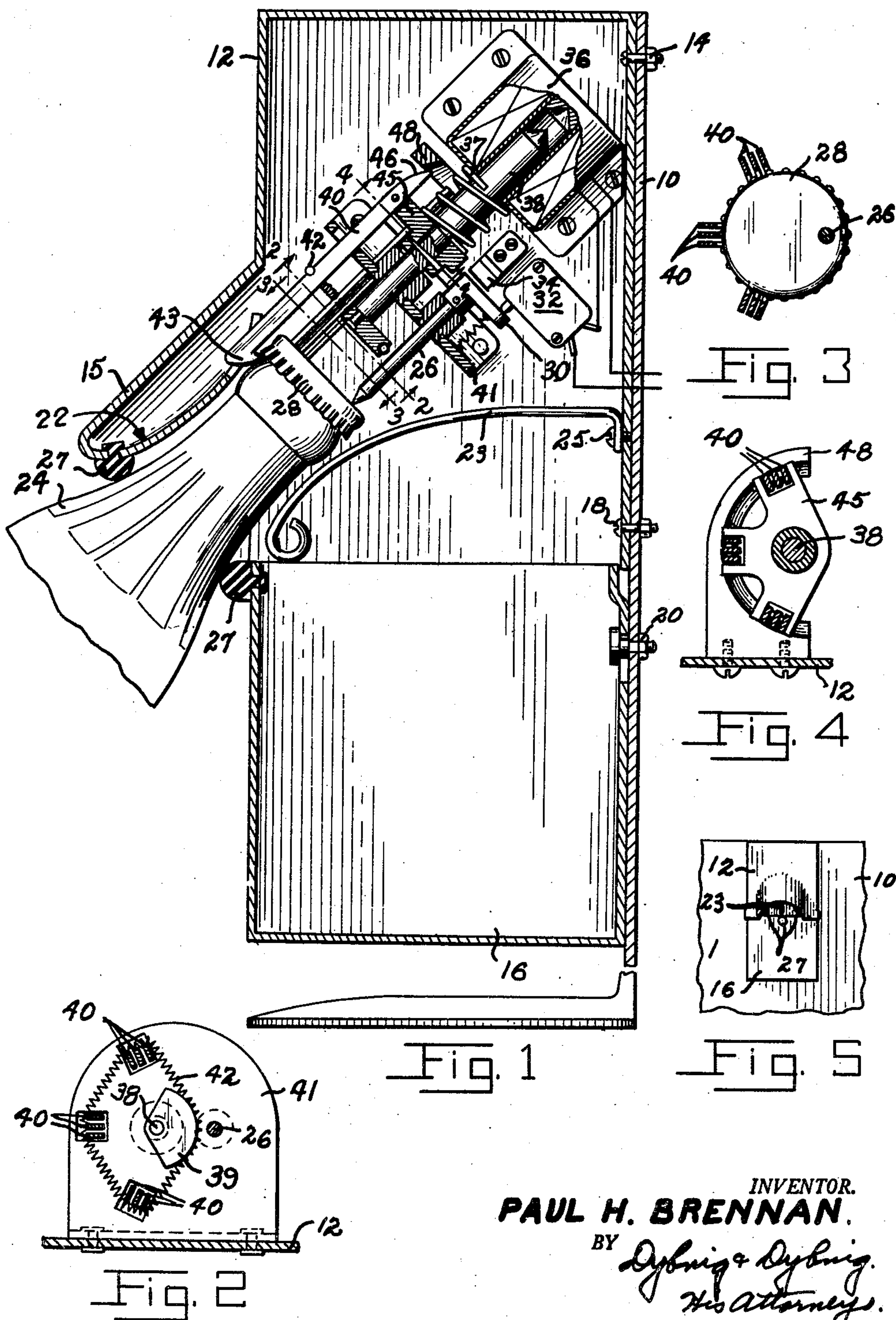
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POWER OPERATED BOTTLE CAP OPENER

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## POWER OPERATED BOTTLE CAP OPENER

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This invention relates to a bottle opener and more particularly to an opener of the type used in removing caps from containers such as soft drink or beer bottles and cans.

At many places where bottled drinks are in great demand, such as at sporting events, picnics and the like, a large amount of time is wasted in removing the caps from the bottles by those opening the bottles. Some of this time is wasted due to the need for accurately aligning the bottle with the bottle opener and the need for thereafter tilting the bottle relative to the bottle opener one or more times before the cap is removed. Furthermore, repeated tilting or manipulation of the bottle causes the jarring of the contents, with the result that excessive foaming often takes place when the cap is once removed. It is recognized that various arrangements have been proposed from time to time for removing bottle caps, but these arrangements have either failed to function properly, have caused undue bottle breakage, or have been otherwise objectionable. It is an object of this invention to provide an automatic means which quickly and effectively removes the cap without jarring or damaging the bottle.

More particularly, it is an object of this invention to provide an automatic bottle opener which is adapted for improving service at locations where high peak sales are encountered, as well as in locations where young children buy the drinks and remove the caps from the bottles.

It is a known fact that a high percentage of soft drinks is consumed by children in the 8 to 14 year age group and that these children frequently have difficulty in removing the caps from the bottles when using openers of the type now provided. Another object of this invention is to provide a bottle opener which may be operated by small children as well as grown people.

A further object of this invention is to provide a bottle opener capable of quickly removing the bottle cap without injury to the bottle.

Still another object of this invention is to provide a bottle opener in which the mere insertion of the bottle into the bottle opener initiates the operation of automatic means for quickly removing the bottle cap.

A further object of this invention is to provide a combination bottle opener and cap receptacle which facilitates the collection of the used caps.

The American public has always shown a great interest in new devices and particularly in automatic devices and likes to use such devices when the opportunity presents itself. Still another object of this invention is to provide a bottle opener which will increase the sales of bottled drinks because of the added fascination which results from using the bottle opener and from the popping sound which results from the quick operation of the bottle opener.

Other objects and advantages reside in the construction of parts, the combination thereof and the mode of

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operation, as will become more apparent from the following description.

In the drawing:

Figure 1 is an elevational view, with parts broken away, showing a preferred embodiment of my invention;

Figure 2 is a fragmentary sectional view taken substantially on line 2—2 of Figure 1;

Figure 3 is a fragmentary sectional view taken substantially on line 3—3 of Figure 1;

Figure 4 is a fragmentary sectional view taken substantially on line 4—4 of Figure 1; and

Figure 5 is a fragmentary elevational view of the device on a reduced scale.

Referring now to the drawing wherein I have shown a preferred embodiment of my invention, reference numeral 10 is intended to designate a portable stand on which the bottle opener may be mounted and reference numeral 12 designates a housing which serves to support the bottle opening mechanism to be described more fully hereinafter. The housing 12 is adapted to be permanently secured to the support 10 by means of fastening means, such as one or more bolts 14. A cap receptacle 16 has been provided which is removably supported directly beneath the housing 12, so as to receive the caps removed by the bottle opening mechanism within the housing 12. For purpose of illustration I have shown the receptacle 16 removably secured to the support 10 by means of a hanger 18 which is adapted to pass through a keyhole slot 20 provided in one wall of the receptacle 16, whereas any suitable fastening means could be provided and the receptacle could be removably attached directly to the housing 12, if desired, rather than being attached to the support 10 as shown. If desired, the stand or support 10 could be eliminated, as the device could be attached directly to or built into some such device as a vending machine for bottled drinks, a counter, or a bar.

The housing 12 is provided with suitable guide means 22 for guiding the insertion of a bottle 24 into the housing 12. The bottle guide means consists of a rigid portion 15 formed integrally with the housing 12, as shown in the drawing, and a yieldable portion which comprises a wire element 23 which has its one end secured to the back wall of the housing 12 by means of a bolt or screw 25, as shown. By virtue of this guide arrangement, the device can accommodate bottles of various shapes. Rubber bumpers 27 are provided as shown in Figures 1 and 5 and serve to engage the neck of the bottle. In lieu of using rubber bumpers, such as the bumpers 27 shown herein, one could, if desired, use a rubber ring or the like at the mouth of the bottle opener, so as to prevent the bottle from hitting against any hard metal surface.

For purpose of illustrating the invention, there has been shown a conventional bottle design, whereas the device is adapted to remove caps from a large number of different types of bottles and containers. The term "bottle" is used in its broadest sense and is intended to include containers made of glass, as well as other well known materials commonly used in packaging beverages and the like.

The upward movement of the bottle into the housing 12 is limited by means of a plunger 26 which is adapted to engage the bottle cap 28 at a point between the center of the cap and the one edge of the cap, as shown in Figure 1. This plunger is mounted for limiting sliding movement and is provided with a switch operating portion 30 which cooperates with a switch 32 for a purpose to be explained more fully hereinafter. The upward movement of the plunger 26 is limited by a resilient stop or rubber pad-like element 34, with the result that the plunger 26



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remains in engagement with the top surface of the cap 28 and functions as a fulcrum during the process of prying the cap from the bottle.

The switch 32 is connected in circuit with a solenoid 36 which operates a reciprocating armature 38 in accordance with well known practice. A spring 37 biases the armature downwardly when the solenoid is deenergized. The armature 38 pivotally supports a plurality of cap engaging fingers 40 which are arranged as shown in the drawing. The construction and arrangement of the switch operating plunger 26 is such that the switch 32 will not be operated until after the bottle cap 28 has moved up beyond the lower hook-like projections 43 on the fingers 40. These fingers are biased towards the central axis of the armature 38 by means of a spring 42. This spring is a garter type of spring which surrounds all of the fingers whereby only the one spring is required for biasing all of the fingers into the cap engaging position. A spring support or guard 39 is secured to the armature 38, as best shown in Figure 2, and moves with the fingers and the armature. In order to prevent the fingers from obstructing the passage of a bottle cap into cap removing position, the stationary guide bracket 41 is designed to limit the inward radial movement of the fingers. As shown, these fingers are arranged in sets of three and each finger is made in the form of a sheet metal stamping pivotally mounted on the bracket 45 which is secured to the armature 38 and, in effect, is a part of the armature. By using the above described arrangement of fingers, it is obvious that one or more of the fingers in each set will engage under a projection or serration on the cap. It will be noted that these sets of fingers are all disposed along an arc extending less than 180° directly opposite the point at which the plunger or fulcrum 26 engages the cap. By virtue of this arrangement, energization of the solenoid in response to insertion of a bottle will cause the fingers to lift the one edge of the cap in such a manner as to pry the cap from the bottle. By using a direct acting solenoid of the type shown, the prying action will be substantially instantaneous, with the result that the cap will be removed from the bottle without unduly jarring the bottle. The quick action of the solenoid will cause the cap to be removed with a popping sound.

In order to facilitate the release of the fingers from the cap after the cap has been removed from the bottle, the upper ends of the fingers are provided with cam surfaces 46 which strike a stationary cam ring 48 at the end of the cap removing stroke, with the result that the fingers tend to spread out and thereby release their hold on the cap.

Upon release of the cap from the fingers 40, the cap will fall by gravity into the receptacle 16 from which the caps may be emptied from time to time.

The receptacle 16 is preferably designed to hold liquid, so that if for any reason any of the beverage is spilled during the cap removing process, that beverage will be caught by the cap receptacle 16 rather than spilling onto the floor. However, the angle at which the bottle is held during the cap removing process is such that no liquid will ordinarily be spilled from the bottle, since it is not necessary to give the bottle that extra tilt which is necessary when using conventional bottle openers.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. In a bottle opener, a support, means for guiding a bottle having a cap thereon into a predetermined position relative to said support, fulcrum means for engaging only one point on one edge of said cap so as to limit the

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upward movement of said bottle, and cap removing means comprising a solenoid operated plunger, means for energizing said solenoid, a plurality of cap engaging claws pivotally mounted on said plunger and arranged to engage the bottom edge of a bottle cap at spaced points on one side of the diameter of the cap and opposite said fulcrum means, spring means biasing said claws radially inwardly towards the central axis of the cap, and means carried by said support for spreading said claws at the end of the cap removing operation.

2. In a bottle opener, a main support having an opening for receiving the upper end of a bottle or the like, switch means carried by said support, a switch operating plunger, means for slidably supporting said switch operating plunger to be engaged by the cap of the bottle whereby upon insertion of a bottle into said opening said switch means will be operated, said plunger being disposed to engage the cap at a point between the center and one edge of the cap, means for limiting the movement of said plunger whereby the plunger serves to limit the upward movement of the cap, a solenoid coil controlled by said switch means, an armature arranged to be actuated in response to energization of said solenoid coil, and a plurality of cap engaging fingers carried by said armature and arranged to engage the bottom edge of the cap along one side thereof opposite the point engaged by the plunger so as to pry the cap from the bottle with said plunger serving as a fulcrum during the prying operation.

3. In a bottle opener, a main support having an opening for receiving the upper end of a bottle or the like, means for removing said cap comprising switch means carried by said support, a switch operating member, means for supporting said switch operating member on said support in a position to be engaged by the cap of the bottle whereby upon insertion of a bottle into said opening said switch means will be operated, said member being disposed to engage the cap at a point adjacent one edge of the cap, means for limiting movement of said member by said cap, a solenoid coil controlled by said switch means, an armature arranged to be actuated in response to energization of said solenoid coil, and cap removing means pivotally secured to said armature and arranged to engage the bottom edge of said cap along one side opposite the point engaged by said member so as to exert a prying force on the cap to thereby remove the same.

4. In a bottle opener, a support, means for guiding a bottle into a predetermined position relative to said support, and cap removing means carried by said support and comprising a solenoid operated plunger, means for energizing said solenoid, a plurality of cap engaging fingers pivotally mounted on said plunger and arranged to engage the bottom edge of a bottle cap at spaced points along an arc of less than 180°, spring means biasing said fingers radially inwardly towards the central axis of the cap, and means for limiting said inward movement so as to provide clearance for insertion of the cap upwardly past said fingers prior to removal of the cap.

5. In a cap removing device, a main support having an opening for receiving the upper end of a container having a cap removably secured thereto, means for removing said cap comprising switch means including a switch operating plunger disposed within said opening to be engaged by the cap of the container whereby upon insertion of a container into said opening said switch means will be operated, said plunger being disposed to engage the cap at a point adjacent one edge of the cap, yieldable means for limiting the movement of said plunger whereby said plunger limits the movement of the container and remains in engagement with the cap, a solenoid coil, an armature arranged to be actuated in response to energization of said solenoid coil, means for connecting said switch means in series circuit relationship with said solenoid coil whereby upon closing



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of said switch means said solenoid coil will be energized, and cap engaging fingers carried by said armature and arranged to engage said cap at a point opposite the plunger so as to exert a pull thereon whereby to pry the cap off the container.

6. In a cap removing device, a main support having an opening for receiving the upper end of a container having a cap removably secured thereto, switch means carried by said support, switch operated means mounted for limited movement relative to said support and having a portion arranged to engage said cap at a point adjacent one edge of the cap as the container is inserted into said opening, said switch operating means serving as a fulcrum for the cap during the cap removing operation, a solenoid coil arranged to be energized in response to actuation of said switch means, an armature disposed within the field of said solenoid coil, and cap removing claw means carried by said armature for pulling up on one edge of said cap opposite said fulcrum whereby upon energization of said solenoid coil said claw means pries the cap from the container.

7. In a cap removing device, a main support having an opening for receiving the upper end of a container having a cap removably secured thereto, means for removing said cap comprising switch means carried by

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said support, switch operating means mounted for movement relative to said support and having a portion arranged to engage said cap at a point adjacent one edge of the cap as the container is inserted into said opening, a solenoid coil arranged to be energized in response to actuation of said switch means, an armature arranged to move within the field of said solenoid coil, and cap removing means carried by said armature, said cap removing means comprising a plurality of sets of cap engaging fingers, each set of fingers comprising at least two individually movable hook-like elements for engaging the bottom edge of the cap, and means for biasing said hook-like elements towards the central axis of the cap, said sets of fingers being disposed in a semicircle on one side of the center line of said cap.

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