Feb. 21, 1956 J. HREBICEK 2,735,318

BOTTLE CAP OPENER WITH CAP PIERCING MEANS

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Fig. 1

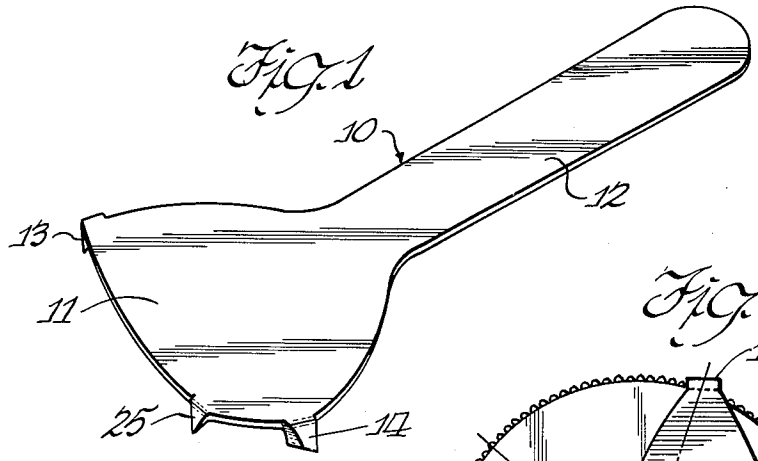



Fig. 2

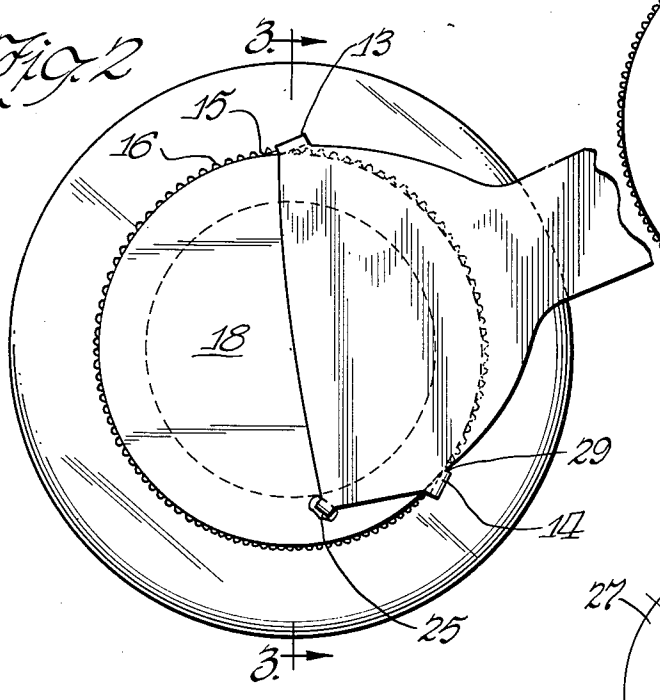



Fig. 5

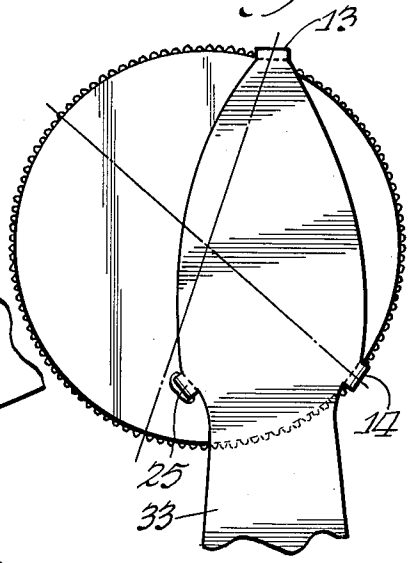



Fig. 7

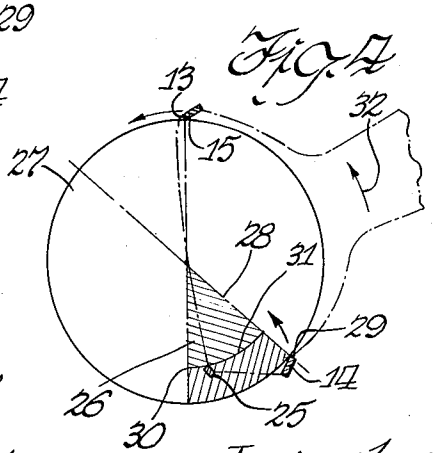
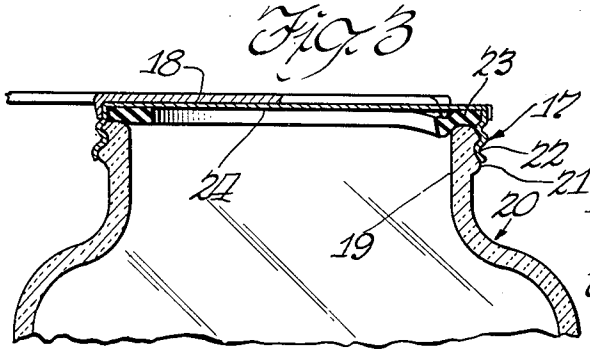



Fig. 3




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Fig. 6

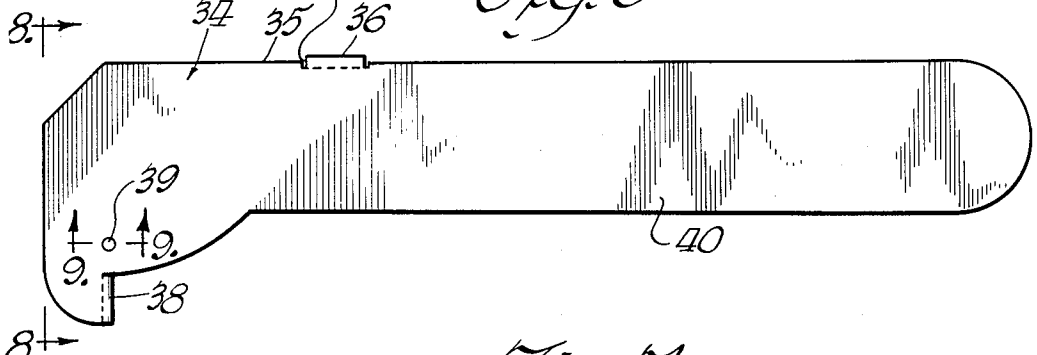



Fig. 7

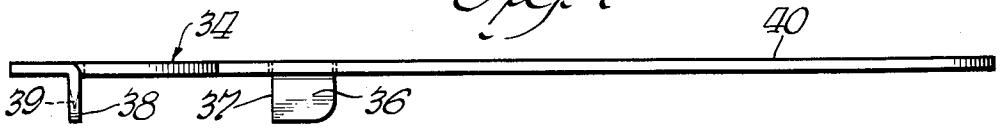



Fig. 8

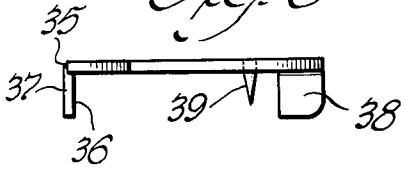



Fig. 9

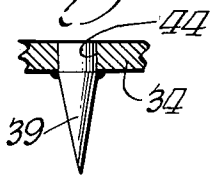
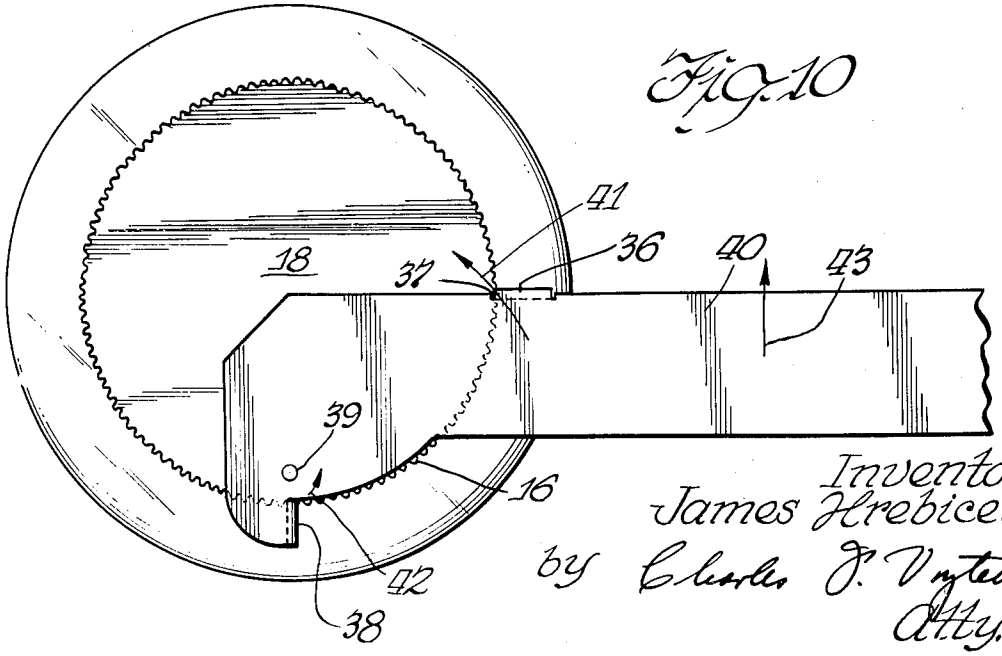



Fig. 10




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United States Patent Office 2,735,318 Patented Feb. 21, 1956



2,735,318

# BOTTLE CAP OPENER WITH CAP PIERCING MEANS

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Application July 15, 1953, Serial No. 368,095

4 Claims. (Cl. 81—3.48)

This invention relates to bottle cap openers for bottle caps of the screw type.

In a copending application of Charles F. Voytech, Serial No. 356,346, filed May 21, 1953, and now Patent No. 2,695,536, there is disclosed an opener for screw caps made from a single piece of metal and having spaced tabs which serve to locate the opener on a bottle cap. A needle is provided as a part of the single piece opener, said needle being used to pierce the cap to equalize the pressure on both sides of the cap, and also as an anchor means for the opener about which the opener may be turned in order to unscrew the bottle cap after pressure on both sides thereof has been equalized. In this prior structure the needle is so disposed relative to the tabs that but one tab of the two disclosed is useful in exerting torque upon the cap to unscrew it. It would be desirable in order to secure a more equal distribution of forces to utilize both tabs for transmitting a torque from the opener to the cap to be unscrewed and accordingly it is the principal object of this invention to improve the design of the aforementioned opener so that both tabs of the opener may be utilized to exert a torque upon the cap to be unscrewed.

A more specific object of this invention is to provide an improved opener for caps of the screw type wherein the opener is of simple construction and provides a needle for piercing the cap to equalize pressure on both sides of the cap, said needle being so disposed relative to cap-gripping portions of the opener that said portions may be utilized to best advantage to unscrew a cap and thereby increase the efficiency of the device.

A still more specific object of this invention is to provide a bottle cap opener for caps of the screw type which is so constructed that the opener is made of a single piece of metal having spaced tabs extending along the corrugated side of a cap, with means for causing said tabs to bite into the corrugations when the opener is turned in a direction to unscrew the cap.

Yet another specific object of this invention is to provide a single piece opener for screw caps wherein the needle, the gripping devices and the handle are disposed relative to a cap in a manner to produce an optimum turning effect upon the cap.

These and other objects of this invention will become apparent from a detailed description of the invention when taken together with the accompanying drawings in which:

Fig. 1 is a perspective plan view of an embodiment of this invention;

Fig. 2 is a fragmentary plan view of an embodiment of this invention showing it applied to a screw cap;

Fig. 3 is a cross section through the embodiment and cap taken along line 3—3 of Fig. 2;

Fig. 4 is a diagram showing the principle upon which this device is constructed;

Fig. 5 shows a fragmentary modification of the opener shown in Fig. 1 wherein the handle part is disposed at a



different location relative to the principal portions of the device;

Figs. 6, 7 and 8 are respectively plan, side and end views of a further modification of this invention;

Fig. 9 is an enlarged fragmentary section taken through a portion of the device of Fig. 6 substantially along line 9—9 thereof; and

Fig. 10 shows the device of Fig. 6 applied to a screw cap.

Referring now to the drawings for a detailed description of the invention, there is shown an opener in Fig. 1 bearing the general reference character **10**, said opener being preferably formed from a single piece of rigid material such as sheet steel. Said opener **10** is comprised of a main body portion **11** from which extends a handle **12**.

Handle **12** may be shaped in any desired manner to enhance the ease and comfort with which it may be grasped, and accordingly, it may be flat as shown, or it may be curved transversely of its longitudinal dimension, the latter form giving the handle greater rigidity in that direction.

Body portion **11** preferably provides sufficient area so that pressure may be exerted thereupon by the palm of the hand of the user without causing discomfort to the user.

Formed as integral parts of body portion **11** and at the opposite sides thereof, are tabs **13** and **14** which extend from said body portion at substantially 90 degrees from the plane thereof and are so disposed that when applied to a bottle cap in the manner shown in Fig. 2, a corner **15** of tab **13** will enter between two adjacent corrugations **16** formed in the side **17** of bottle cap **18** and similarly, a corner **29** of tab **14** will enter between two corrugations adjacent thereto. The top **19** of a bottle **20** to which cap **18** is secured has a thread **21** formed therein, and cap **18** has a corresponding thread **22** formed in side **17** thereof which is adapted to cooperate with thread **21** to tighten cap **18** on said bottle top **19**. A sealing washer **23** of rubber or other flexible, resilient material is inserted between the open end of bottle top **19** and the inside surface **24** of cap **18** and provides a fluid tight seal between cap **18** and bottle top **19**.

It is customary in the art of preserving food to maintain a vacuum within bottle **20** when said bottle is at room temperature or lower. This vacuum may be created in a number of ways, but is usually effected by tightening cap **18** on bottle top **19** when the contents of the bottle are at elevated temperature so that when the temperature within bottle **20** is reduced to room temperature, the pressure within the bottle will become less than atmospheric. It is this difference in pressure which is largely responsible for the difficulties encountered in unscrewing a cap **18** from a bottle **20**, when it is desired to remove the contents of the bottle.

In the aforesaid Voytech application and also in my prior copending application, Serial No. 308,196, filed September 6, 1952, there is disclosed an opener for screw type bottle caps wherein a needle is provided for piercing the cap to equalize the pressure on both sides thereof prior to impressing a torque on the cap in a direction to unscrew the cap from the bottle top.

In the present invention, similar means is applied for equalizing the pressure on both sides of a bottle cap and in particular is comprised of a needle **25** which in the form shown in Fig. 1 is a pointed tab bent over from the side of body portion **11**, said pointed tab being preferably ground to a sharp point and heat-treated or hardened to enable it to pierce a bottle top without becoming prematurely dull or without breaking. Said needle **25** is

preferably shorter than tabs 13 and 14 so that when the opener 10 is placed upon a table or counter such as is normally found in a kitchen, the sharp needle 25 will be elevated from the surface of the table or counter and will not scratch it.

It is desirable to pierce cap 18 at a region which is normally covered by sealing washer 23 so that when the cap is restored to the bottle after having been once removed with the aid of the opener 10, the rubber washer 23 will be restored to its normal flat condition and will tend to cover the opening made by the needle 25 in cap 18. By thus covering the opening made by the needle, the contents of the bottle are afforded some measure of protection against deterioration by exposure to air. Tab 14, therefore, is so disposed relative to tab 13 and needle 25 that it will cause said needle 25 to contact cap 18 over the region under which washer 23 is disposed.

It is desirable, however, that tab 14 serve not only as a locating means, but also as a means for impressing a torque upon cap 18 to assist tab 13 in unscrewing cap 18 from bottle top 19. I have discovered that if needle 25 is disposed in a region such as that shown in the shaded sector 26 of a circle 27 representing the corrugated periphery of bottle cap 18, said tab 14 will assist in impressing a torque upon bottle cap 18 in the manner desired. Said sector 26 is defined by the radius 28 of circle 27, which radius passes through corner 29 on tab 14, and by a diameter 30 passing through corner 15 on tab 13. It will be noted that with needle 25 serving as a pivot, the arcs described by corners 15 and 29 intersect the circle defining the periphery of cap 18. The location of needle 25 in the shaded sector 26 as thus defined insures that a drive or torque will be impressed on the side of bottle cap 18 by both tabs 13 and 14. However, as hereinbefore described, needle 25 should preferably be located over a sealing washer 23, and the desirable location for said needle is therefore still further limited to the area of the cap bounded on the inside by the segment of a circle 31 defining the inner periphery of washer 23.

It is understood, of course, that the diagram shown in Fig. 4 is intended to represent favorable conditions when the opener 10 is to be rotated in the direction of the arrow 32 and that this direction is assumed to be the direction in which cap 18 is to be turned in order to unscrew it from the top 19 of the bottle. If, however, it should be desired to use the principles of Fig. 4 in a device similar to opener 10 but designed to rotate in the opposite direction, then needle 25 would preferably be located in the sector adjacent corner 15 and defined by diameter 30 and by a diameter coinciding with radius 28.

In another form, shown in Fig. 5, the relative locations of tabs 13 and 14 and needle 25 may be the same as in the form shown in Fig. 1, but the location of handle 33 has been changed to make it extend radially outwardly from between needle 25 and tab 14.

In the form shown in Figs. 6 to 10 inclusive, the locations of the tabs, needle and handle have been coordinated to produce the greatest torque on cap 18 for the least turning effort exerted on the opener by the user. It may be appreciated that the direction in which force is applied to the handle of the device will have some bearing on the pressures exerted on the cap by the tabs and needle. Thus, if the handle is located in such a manner relative to the tabs that a tangential force applied to the handle results in a predominately radially inwardly directed force on the tabs, then the friction between the cap and bottle top may be increased and the removal of the cap rendered more difficult. If on the other hand, the handle is located relative to the tabs in such a manner that at least one of the tabs is urged tangentially of the cap by the force applied to the handle by the user, then the radially inward force on the tab is minimized and more force is available to help turn the cap.

Referring now to Figs. 6 to 10 inclusive, the opener



is comprised of a main body portion 34 having an edge 35 generally coinciding with a radius of a cap 18, and a tab 36 extending from the edge 35 at right angles to body portion 34. Said tab 36 has a corner or edge 37 which contacts the corrugations 16 on cap 18. Substantially 90 degrees away from edge 35 is a tab 38 which likewise extends at right angles from body portion 34 to contact corrugations 16. A needle 39 is mounted in body portion 34 at a point radially inwardly of tab 38 and on a radius of cap 18 which is substantially 90 degrees away from edge 35. Thus the location of needle 38 satisfies the optimum conditions set forth in Fig. 4 and both tabs 36 and 38 are effective to exert a torque on cap 18.

The opener is formed with a handle 40 which extends outwardly from body portion 34 in a direction parallel to radius 35. As in the forms described above, said handle 40 may be shaped in a manner to make it stronger in a transverse direction and easier to hold in the hand. It may be noted from Fig. 10 that tab 36 will tend to rotate about needle 39 in the direction of arrow 41 and tab 38 will tend to rotate about needle 39 in the direction of arrow 42, both arrows 41 and 42 turning inwardly toward the corrugations 16 in cap 18.

It may also be noted from Fig. 10 that the force applied to corrugations 16 by tab 38 is tangential and that with tab 36 acting as a fulcrum, needle 39 is pulled in the opposite direction from arrow 41 and tends to push corrugations 16 away from the top of the bottle, thereby contributing to the reduction in any binding effect which might be present between cap 18 and the bottle top 19.

It has been found from actual test that the form of screw cap opener shown in Figs. 6 to 10 requires less force to unscrew a given size screw cap than any of the other forms described herein.

Although needle 39 may be made in the form of a sharpened tab such as needle 25 in Fig. 1, it may be more economical to form it separately and then press it into a slightly undersized opening 44 (Fig. 9) in body portion 34. Under ordinary circumstances, the press fit is sufficient to hold needle 39 in place, but where additional safety is desired, the needle may be soldered or brazed in place. When made separately, a higher quality steel may be used for the needle than for the remainder of the device and in fact all but the needle can be made of an entirely different metal such as aluminum, stainless steel, etc.

The devices herein described may be used in precisely the same manner as the device disclosed and described in the aforesaid Voytech application. Thus, the user merely holds the opener 10 with tabs 13 and 14 pressed against the corrugated side of cap 18 and then exerts pressure upon body portion 11 with the palm of the hand against cap 18 to cause needle 25 to pierce said cap. After cap 18 has been pierced, the user may then push against handle 12 in a counterclockwise direction as viewed in Fig. 2 thereby causing the corners 15 and 29 to bear against the corrugated side of cap 18 and thus provide a gripping effect which serves to transmit the torque in handle 12 to bottle cap 18. During the unscrewing operation, needle 25 serves as a fulcrum or pivot about which opener 10 may turn to produce the desired torque in cap 18. The same mode of operation may be applied to the form shown in Figs. 6 to 10.

It is understood that the foregoing description is merely illustrative of a preferred embodiment of the invention. Therefore it is not to be limited thereto but is to be determined by the appended claims.

I claim:

1. A device for turning caps of the screw type for bottles, jars or the like, said device comprising a body member for placement against the top of a cap, spaced gripper members extending from the body in the same direction from the plane of the body and adapted to engage the sides of the cap when the device is turned in a

direction to loosen the cap, said gripper members being spaced apart a distance less than the diameter of the cap across said sides, and means on the body for piercing the cap, said piercing means being disposed in a sector of the cap bounded by diameters struck from each gripper member at the point of contact of the gripper member with the side of the cap and exterior to and trailing the sector included between the gripper members when the device is turned in the said direction.

2. A device for turning caps of the screw type for bottles, jars or the like, said device comprising a body member for placement against the top of a cap, spaced gripper members extending from the body in the same direction from the plane of the body and adapted to engage the sides of the cap when the device is turned in a direction to loosen the cap, said gripper members being spaced apart a distance less than the diameter of the cap across said sides, a handle extending from the body in proximity to one of said grippers, and means on the body for piercing the cap, said piercing means being disposed in a sector of the cap bounded by diameters struck from each gripper member at the point of contact of the gripper member with the side of the cap and exterior to and trailing the sector included between gripper members when the device is turned in the said direction,



and said handle extending from the portion of the body disposed between the piercing means and one of said grippers.

3. A device for turning caps as described in claim 1, wherein the distance between the gripper members being angularly represented by ninety degrees, and a handle on the body member, said handle extending radially outwardly of the cap along a radius passing through one of the gripper members.

4. A device for turning caps as described in claim 1, wherein the distance between the gripper members is represented by an angle of ninety degrees, a handle on the body member extending radially outwardly of the cap along a radius passing through one of the gripper members, said piercing means being disposed on a radius other than the one along which said handle extends.

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