April 25, 1939. T. H. LOW 2,155,947

BOTTLE OPENER

Filed June 19, 1936

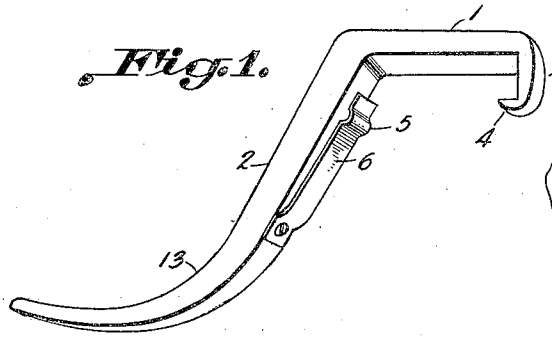


Fig. 1.

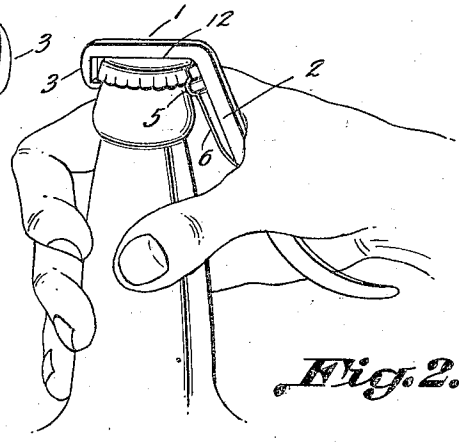


Fig. 2.

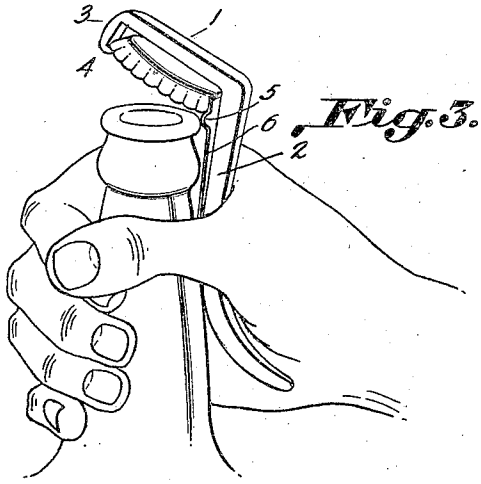


Fig. 3.

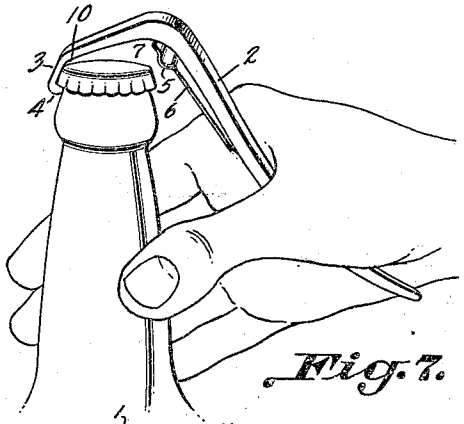


Fig. 7.

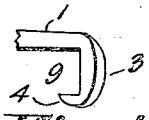


Fig. 4.



Fig. 5.

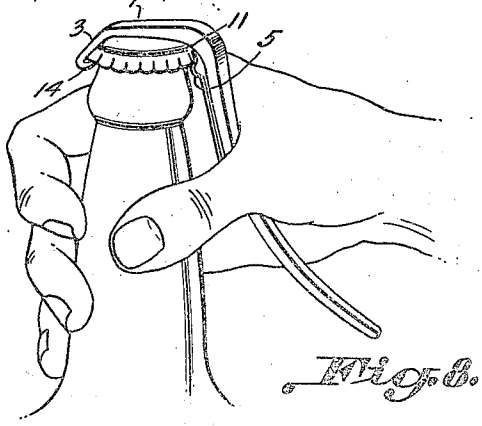


Fig. 8.

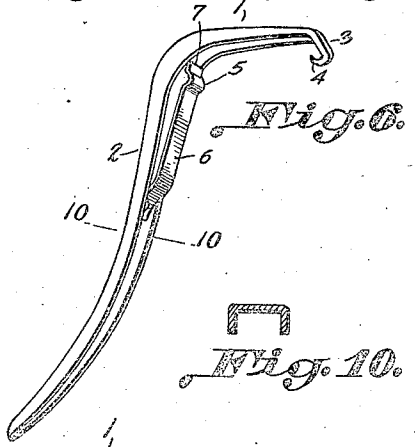


Fig. 6.

Fig. 10.

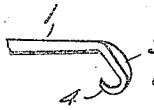


Fig. 9.

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2,155,947

BOTTLE OPENER

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Application June 19, 1936, Serial No. 86,029

7 Claims. (Cl. 65—46)

My invention relates to improvements in hand decappers or openers for bottles sealed with crown caps.

In my opener the cap can be lifted and the contents poured out with one hand as explained in my Patent No. 1,214,802 of which this is an improvement and to which reference is made.

Heretofore bottle openers constituting levers of the first class have not functioned well. The chief difficulty to be overcome with openers of this class of levers is the tendency for the flange engaging nib to slip off the flange on the application of pressure on the handle or to chip or break the bead on the bottle mouth. The means heretofore used to prevent slipping has been to jam the opener tightly on the cap. This prevents or hinders the necessary outwards spread of the crimped portion of the flange. Otherwise the nib is liable to chip or break the bead or jam, thus rendering the opener inoperative.

Crown caps seal the bottle mouths by crimping the lower part of the cap flange tightly round the lower half of the bead on the bottle mouth. To remove the cap, approximately half of this crimped flange must be lifted until it is clear of the bead. Obviously in order to slide past the bead, this crimped portion must be forced out as well as up.

If the opener of the preferred type fits the cap tightly without any play or clearance of the nib arm, the crimp cannot open out or the nib be passed easily over the bead. The cap is lifted, if at all, with such difficulty that the entire bottle mouth may be broken off or the bead chipped, owing to the restricted movement of the nib and the cap flange.

My invention overcomes these defects. I have invented a non-slip opener of the 1st class of levers which provides free outward movement of the nib and the crimped flange, sufficient to enable them to easily slip by the bead but insufficient to render the nib liable to slip clear of the flange. Thus by regulating the outward movement of the flange and nib, my opener lifts the cap with one hand easily without slipping or chipping the bead or breaking the bottle mouth.

In my present invention I provide means to enable the flange to spread outwardly the amount necessary to slip easily over the bead, means to prevent the opener from slipping off the cap and means to prevent the nib from chipping or breaking the bead and means to prevent the opener from becoming inoperative by jamming.

Furthermore, I shape my opener of the preferred type so that the hand gripping the opener on the bottle neck can exert at will either downward or inward pressure on the handle without changing the grip on the bottle neck. I also provide means for guiding the opener into operative position, removably locking it therein and holding the cap after it has been lifted.

Other advantages are set forth in my former patent as well as in the detailed description hereinafter.

Referring to the accompanying drawing:

Fig. 1 is a view in perspective of the preferred form of my opener.

Fig. 2 is a view in perspective of this opener and hand of the operator in operative position.

Fig. 3 is a view in perspective of the opener in the hand of the operator after the cap has been lifted clear of the bottle mouth.

Fig. 4 is a detail side view of the nib with a section of the flange.

Fig. 5 is a detail end view of nib.

Fig. 6 is a view in perspective of an alternative form of opener.

Fig. 7 is a view in perspective of this form with hand of the operator in operative position showing first fulcrum.

Fig. 8 is a view in perspective of the opener with the hand of the operator after the fulcrum has shifted.

Fig. 9 is a detail view in elevation of the nib of the opener in Fig. 6 with a section of the flange.

Fig. 10 is a section through 10—10 of Fig. 6.

Both types of my opener consist of an elongated head 1, which when in operative position crosses diametrically the top of the cap and is thickened adjacent its junction with the handle in the preferred type to withstand the increased strain at this point. Two arms of different lengths depend rigidly and downwardly from opposite ends of the head. The longer arm, extending along the bottle neck but spaced therefrom, forms the handle 2, on the outer face of which pressure to lift the cap is exerted by the hand gripping the bottle neck.

The shorter or nib arm 3 carries at its end the nib or hook 4, which engages under the lower edge of the cap flange.

Retentive means consisting of a slightly concaved spring 6 projects inwardly from the inner face of the handle to which the spring is attached approximately midway its length. The spring extends upward to within a short distance of the head. At such a distance below the end of the spring, as to lie just below the edge of the cap flange there is the transverse ridge 5. This

spring serves to guide and lock the head into operative position. By its pressure against that part of the cap flange which is diametrically opposite to the part engaged by the nib, it keeps the point of the nib in, holding the cap, after the cap has been lifted clear of the bottle mouth.

In my preferred form of opener shown in Figs. 1 to 5, the cap is lifted entirely by upward pressure of the nib on the lower edge of the cap flange. It is the bead on the bottle mouth which forces the crimped portion of the flange outwards as it is lifted upward.

To enable the nib to exert this upward pressure on the lower edge of the cap flange, the lifting arm must be as nearly horizontal as possible. This requires that the head of the opener fulcrums at the point **12** on top of the cap, removed from the nib and adjacent the handle over the bead.

The head (inside measurement) is longer than the diameter of the cap extending beyond its approximately ¼'' in order to provide the necessary clearance to permit of movement of the head on the cap as well as allow for the depth of the nib and thickness of the spring. The amount of this clearance and movement or play of the head and nib is limited to that necessary for the outward movement of the nib in order to enable its point to clear the retaining bead without chipping or jamming thereon. The amount of this free movement and play of the nib must be limited to less than the thickness of the crimp on the cap flange, as otherwise the nib would move away from under the edge of the flange and the opener would slip clear of the cap.

The nib arm **3** is rectangular in contour and extends perpendicularly downward from one end of the head at an angle of 90 degrees. The distance from the upper face of the nib to the under face of the head is slightly greater than the width of the cap flange, to insure that the fulcrum is on the opposite side of the cap from the nib arm and to facilitate hooking the opener in operative position on the cap. The nib or hook **4** projects inwards ⅛'' perpendicular to the nib arm and has a smooth, straight upper face **9** parallel to the lower face of the head. It has a broad inner edge at its end slightly convexed. Its under surface is rounded curving progressively toward the inner edge.

The handle is set at an angle of approximately 105 degrees with the head until midway its length it makes at **13** a decided further bend outwards making an angle of approximately 175 degrees.

The flat spring **6** is fastened at its lower end to the inner face of the handle less than half way down and extends to within a short distance of the head. The spring is slightly concaved at **7**. The concaved transverse ridge **5** is formed on the spring approximately ½'' below the under face of the head. The end of the spring projects outwards, approximately $\frac{3}{16}$''.

In operating the preferred type, the handle is lifted and the nib is hooked squarely under the edge of the cap flange. The head is then lowered diametrically across and on top of the cap being guided into position by the concaved end of the spring.

The head rests squarely on top of the cap fulcruming adjacent the handle at **12**, thus making the lifting lever arm nearly horizontal. The spring bears against the cap flange and its clearance with the inner face of the handle at **8** is reduced to approximately $\frac{1}{16}$ of an inch which limits the play of the head and nib to that amount. The end of the nib is pressed by the spring against the glass below the retaining bead or collar on the bottle neck. This insures that the nib is in operative position under the edge of the cap flanges. The ridge on the spring slipping below the edge of the flange detachably locks the opener in operative position.

Since the head fulcrums on the bottle cap on the peripheral edge opposite diametrically to the nib the movement of the nib when pressure is exerted on the handle is approximately vertical. So the close contact of the nib with the bottle neck necessitates sufficient play and free movement of the head and nib arm to enable the nib to move outward far enough to slide easily over the bead and thus prevent jamming, chipping or breaking the glass.

On grasping the bottle neck and applying inward pressure on the upper part of the handle the head takes up the clearance between the spring and handle, creeping along the cap, until the spring jams solidly between the flange and handle checking further outward movement, of the head and nib.

Thus any further outward movement of the nib arm is checked by the jamming of the handle which takes place before the outward movement of the nib arm is sufficient to dislodge the nib from under the edge of the cap flange. Though limited in amount, the nib arm has moved sufficiently outwards to enable the nib to slide easily past the bead on the bottle mouth.

As there is no upward hook on the nib to hold it from slipping from under the edge of the cap flange this outward movement or play must be limited to less than the thickness of the crimp on the lower edge of the flange; since otherwise the opener would slip, especially in case the head was not placed centrally on the cap. The thickness of this crimp is approximately one-tenth of an inch. The size of the bead around the bottle mouth varies, though the tolerance is not over one-hundredth of an inch. A play of the nib of approximately one-sixteenth of an inch is ample, provided the handle jams adjacent to the head against the cap flange or lower bead on the bottle neck. The breadth of the end of the nib and its round under surface and absence of sharp angles help the nib to slide smoothly and easily past the bead on the bottle mouth and to overcome the danger of chipping or breaking it or jamming thereon.

The play or free movement of the head and nib is not sufficient to provide for the necessary spread of the crimp on the flange to enable it to slip over the bulge on the bead as the cap is forced upward. Further clearance is provided the crimp on the flange by the depth of the nib. The upper face of the nib is sufficiently deep to enable the edge of the crimped flange as it is forced upwards over the bead to creep freely outwards over the smooth straight upper face, of the nib. The hold of the nib under the edge of the cap flange is rendered the more secure the more the edge of the flange moves outward on the upper face of the nib. This furnishes an additional safeguard against the nib slipping.

Not only do I thus provide this means to regulate the necessary outward free movement and play of the head and nib, but I provide further additional means which enables the crimp on the flange to expand amply as well as to guard against the nib slipping. This further means is the clearance provided between the nib arm and

the edge of the cap flange which is governed by the depth of the upper face of the nib.

After the clearance between the spring and the handle is taken up and the spring jams against the handle so that its further outward movement is checked before the nib is forced away from under the cap flange and further inward pressure on the handle becomes ineffective. The cap must then be lifted by downward pressure exerted on the end of the handle. The fulcrum for this downward pressure remains fixed on top of the cap, resting solidly over the bead on the bottle mouth, adjacent the handle, and the lifting lever arm remains practically horizontal. The outward bend of the lower part of the handle enables this down pressure to be exerted by the lower side of the hand without shifting the grip of the fingers around the bottle neck. I thus render the opener operative after the handle jams against the cap flange in order to prevent the nib from slipping.

After the cap has been lifted it is held against the nib arm by the pressure of the spring, until disoldged by side pressure of a finger, or thumb.

An alternative form of my opener having a shifting pivot is shown in Figs. 5 to 9.

In this form a portion of the crimped cap flange is first distended as at 14 Figure 8 by outward pressure of the nib on the lower part of the flange. The distended portion of the flange is then forced up by the pressure of the nib on the flange changing from outwards to upwards.

The direction of pressure on the flange by the nib depends on the direction of the lifting lever arm since pressure exerted on the flange must be perpendicular to this arm. The direction of the lifting lever arm depends on the part of the cap on which the lever fulcrums.

The lifting lever arm is the line drawn from the fulcrum to the nib.

With the first fulcrum directly over the nib at 10 the lifting lever arm is approximately vertical and the pressure exerted on the crimped flange by the nib is outwards. This outward pressure changes to an upward one, when the lifting arm changes from vertical to approximately horizontal. This change in the pressure and direction of the lifting arm takes place when the fulcrum suddenly shifts, or jumps from over the nib to the diametrically opposite periphery.

It is this change in the fulcrum which changes the direction of the pressure exerted by the nib on the flange from outwards to upwards.

It is obvious that the further the crimped flange is bent outwards by the nib the easier the cap will lift over the bead; and the greater the danger that the nib will slip from the flange.

Before the nib can slip the fulcrum shifts from over the nib arm to a diametrically opposite point over the handle so that the pressure of the nib changes from outwards to upwards. As a further safeguard against slipping, the new fulcrum is not squarely on top of the cap but at the turn with the flange, though not far enough down the flange to jam the handle.

The change of pivot is dependent on the angle at which the nib arm is set with the head. The more this angle exceeds a right angle the more the head will slope above the cap when in its initial position on the cap. The obtuse angle of approximately 130 degrees has been found the largest at which the nib arm can safely be set without slipping. The head then slopes 40 degrees above the cap, and shifts the pivot over to the handle when the flange has been pressed out 40 degrees.

To enable the head to fit snugly the cap when lowered into place on the cap, the inside measurement of the head must equal the diameter of the cap. Its contour and that of the nib arm is trapezoidal varying in width with the strain on the lever arm.

The length of the nib arm (inside measurement) is approximately ¼ of an inch or no longer than the width of the cap flange. If longer than the width of the flange, the head will not rest on the cap over the nib and the nib will slip. The nib arm preferably hugs closely the flange. In this specific type of opener the nib or lifting arm lies closely along side the cap flange. No space or clearance is necessary in this type since the cap flange is forced outward by the nib arm and thus must move with it.

The nib projects approximately $\frac{1}{16}$'' upwards at an angle of 40 degrees so that it is parallel to the nib arm. It has a slightly rounded point and is thin and slightly concaved to enable it to slip up into the space between the crimped lower portion of the flange and the wide bead on the bottle neck. Its rounded turn at 14 is to allow for the thickness of the crimp and permit the edge of the flange to rest on its base. It will be seen that the nib nips the lower portion of the flange tightly thus providing another safeguard against slipping.

The handle is set at an equal angle to that of the nib arm of 130 degrees, and curves progressively outwards towards its end. The opener is made of strip steel preferably case hardened. The edges of the handle are flanged to make the form of the handle channel shaped as shown in section in Fig. 10, the flange on the head and handle being widest at the junction of the head and handle diminishing until it disappears at the nib arm and end of the heandle. The spring similar to that in the preferred type is housed between the flanges when inward pressure is applied on the handle.

To operate the nib is hooked on to nip the flange, the head fulcruming on the edge of the cap over the nib or lifting arm, and projecting upwards at an angle of forty degrees to the horizontal. The fingers then grasp the bottle neck, the palm of the hand resting against the outer face of the handle. On exerting downward and inward pressure on the handle, the handle is forced down until parallel to the bottle neck.

The nib and the adjacent portion of the flange, are forced outwards 40 degrees by the nib or lifting arm so that both nib and flange clear the bead on the bottle mouth. Thus all pressure of the nib against the bead is avoided, so there can be no chipping or breaking of the glass. This outward movement ceases when the head is brought down on to the top of the cap, the fulcrum jumping from over the nib arm to over the handle at the turn or bend of the periphery of the cap. This change of pivot is delayed until further outward movement of the flange might cause the nib to slip. The lifting arm is thus changed from vertical to approximately horizontal, and the pressure on the flange from outwards to upwards. The new fulcrum point is far enough down the flange to prevent further outward movement of the nib, but not far enough down the flange to render inward pressure ineffective. The cap is raised by inward pressure on the handle which takes against the bottle neck when the cap is clear of the bottle mouth.

It is obvious that the method used in the alternative type of jumping the pivot from over the nib to the diametrically opposite periphery is equally applicable on bottle openers of the usual lift up type.

In the two types the arms are set at different angles with the head, the length of head and nib arms differ, as well as the shape of the nibs and handles.

It is essential to use the shape and size of nib best adapted to the specific type of opener. The nib must be shaped so as to enable the flange to expand without danger of slipping, to avoid such contact of the point with the bead on the bottle mouth as to avoid chipping and breaking it, and to be sufficiently easy to hook under or nip the edge of the cap flange.

Though the size of both the crimped caps and beads on the bottle mouth vary somewhat, the greatest variation takes place in the bottle necks. For this reason the handles are set so as to be sufficiently away from the bottle to function for all bottles sealed with crown caps.

Though the angles and dimensions are approximate, too much variation is liable to render the opener inoperative. Thus in the first type, greater play of the head and nib arm than the limits set forth would cause the opener to slip, while less play than that described would cause the nib to come into contact with the lower portion of the retaining bead on the mouth and thus cause so much danger of chipping as to render the bottle opener useless and hence inoperative.

The means provided to prevent undue contact of the nib arm with the bottle bead in lifting the cap is an essential feature of the invention. This means varies with the specific type of opener.

In the first or preferred type, it is gained by the play allowed the arm. This play is essential since in this type the opener fulcrums on the edge of the cap diametrically removed from the nib or lifting arm. Thus the movement of the nib is so nearly vertically upwards that it is essential to provide sufficient outward movement or play to insure the nib against such contact with the lower portion of the retaining bead as to jam or break the glass. As a further precaution, the nib is so shaped as to slide easily over the bead.

In the second type, contact of the nib with the bead is avoided by first fulcruming on the bottle cap at a point directly over the nib arm. Thus pressure on the handle tends to throw the nib and the adjacent portion of the cap flange outward sufficiently to enable them to clear the bead.

In the first preferred type, since the action of the lever arm is vertically upward and not outward, space or clearance between this arm and the cap flange must be provided to permit the cap flange to spread outwards freely in order to enable it to clear the bead on the bottle mouth.

In this type, the lower half of the handle is bent outwards until approximately horizontal when the opener is in operative position on the bottle cap. This is another important feature of my invention. It has been seen that to prevent the nib from slipping from under the edge of the cap flange, the handle must take against the opposite portion of the cap flange or bottle neck and thus jam the opener against further outward movement. Further inward pressure on the handle, therefore, would become ineffective and the cap must be lifted by downward pressure on the lower outwardly bent portion of the handle.

Moreover the outward bend of the lower part of the handle enables it to function on stubby bottles and those used for Coca-Cola equally as well as on the usual long neck type.

The angle that the arms make with the head varies with the special type of opener, as set forth hereafter. Thus in the preferred type, the inside measurement of the nib arm is at least as long as the cap flange is wide to ensure ease in hooking on and to ensure fulcruming on the opposite side of the cap. In the second type the inside measurement of the nib arm must be slightly shorter than the width of the cap flange in order to ensure that the fulcrum rests directly over it.

In the second type the nib arm must be set at an obtuse angle to the head instead of perpendicular to it as in the preferred type.

It is essential that the nib be adapted to the special type of opener. Thus in the preferred type, the upper face of the nib is perpendicular to the nib arm and is smooth and deep to facilitate the outward movement of the cap flange over it. In the second type of opener a different form of nib is required. This form has a sharp upward hook or end, the base or crown resting against the edge of the cap flange, the nib thus nipping the lower portion of the crimp.

Both types make provision to insure sufficient free outer movement of the nib to prevent chipping; and for similar movement of the flange sufficient to enable it to slip over the nib. They also make provision against slipping and for a spring to hold the cap, as well as shape the handle to place it in such angular relation to the bottle neck that the hand without loosening the hold of the fingers round the bottle neck, can successively change the direction of the pressure exerted on the handle.

I claim as my invention:

1. A hand bottle opener for lifting crown caps from bottle mouths comprising a head shaped and disposed to extend diametrically across the top and center of the bottle cap when in operative position thereon and two oppositely disposed arms carried by opposite ends of the head, one forming a handle and the other extending downward along the cap flange and carrying an inwardly disposed nib for engaging under the edge thereof, the head and two arms constituting a rigid integral unit, and a spring attached to and projecting therefrom to engage that portion of the cap flange diametrically opposite to the nib arm and for yieldingly holding the cap after it has been lifted from the bottle mouth.

2. A hand bottle opener for lifting crown caps from bottle mouths comprising a head a nib carrying arm and a handle both depending downwards from opposite ends of the head, and a spring attached to and projecting from the inner face of the handle to engage yieldingly the cap flange.

3. A hand bottle opener for lifting crown caps from bottle mouths constituting a lever of the first order comprising a central longitudinal head member extending beyond the periphery of the cap, a nib arm extending downward from one end of the head member perpendicular thereto and of slightly greater length than the width of the cap flange, a broad deep nib projecting inwardly from the end of said nib arm and having a smooth upper face and a handle extending downward at the opposite end of the head member at an obtuse angle of approximately 105 degrees, its midway portion bending abruptly outward through a further angle of approximately 70 degrees until nearly parallel to said head member.

4. A hand bottle opener for lifting crown caps

from bottle mouths constituting a lever of the first order comprising a central head member an arm carrying a nib and a handle depending from opposite ends thereof and a spring attached to the inner face of the handle and spaced therefrom to press on the cap flange and cooperate with the nib in yieldingly holding the cap after it had been lifted from the bottle mouth, the spring having a transverse ridge positioned to slip under the edge of the cap flange.

5. A bottle opener for lifting with one hand crown caps from bottle mouths consisting of a central longitudinal head member resting on and extending diametrically across and slightly beyond the cap and fulcruming on its periphery, a nib arm rigidly depending downwards from that end of the head member removed from the fulcrum, having an inwardly disposed nib with its end normally contacting the bottle adjacent thereto and an outwardly sloping handle rigidly depending downwards from the opposite end of the head member adjacent to the fulcrum, the upper portion of the handle adjacent to the head member being spaced therefrom to form a clearance and to provide a predetermined limited amount of play on the application of inward pressure on the handle to facilitate the passage of the nib end over the bulge on the bead surrounding the bottle mouth whereby chipping or jamming on the bead is prevented, the clearance being so small and the upper part of the handle so close as to jam and prevent further outward movement of the nib before the nib loses its hold under the edge of the cap flange, whereby the bottle opener is prevented from slipping off the crown cap, the remainder of the handle being spaced from the bottle neck sufficiently to contact therewith only after the cap has been lifted from the bottle mouth.

6. A bottle opener for lifting with one hand crown caps from bottle mouths comprising a central longitudinal head member resting on and extending diametrically across the cap from edge to edge thereof and fulcruming on and extending only slightly beyond its periphery, a nib arm rigidly depending downwards from that end of the head member removed from the fulcrum having an inwardly disposed nib with its end sufficiently broad to extend under the edge of an entire crimp of the cap flange and normally contacting the bottle adjacent thereto and an outwardly sloping handle rigidly depending downwards from the opposite end of the head member adjacent to the fulcrum, the upper portion of the handle adjacent to the cap flange being spaced normally less than the distance of the outer edge of the crimp from the bottle neck to permit of outward movement of the nib of an equal amount whereby the handle by means of the play prevents chipping or jamming of the nib on the bulge of the head around the bottle mouth by facilitating the passage of the nib end thereover and by means of limiting the play prevents the opener from slipping off the bottle cap by the handle adjacent to head member jamming and checking further outward movement of the nib end before it loses its hold under the edge of the crimp on the cap flange, the remainder of the handle being spaced from the bottle neck to contact therewith only after the cap is lifted.

7. A bottle opener for lifting with one hand crown caps from bottle mouths comprising a central longitudinal head member resting squarely on top of the crown cork and extending diametrically across the crown cap from edge to edge thereof and fulcruming on and extending only slightly beyond the periphery, a nib arm rigidly depending perpendicularly downwards from the end of the head member removed from the fulcrum, having an inwardly disposed nib with a smooth flat upper face and with its end at least one-fifth of an inch broad, and an outwardly sloping handle rigidly depending downwards at an obtuse angle from the opposite end of the head member adjacent to the fulcrum the upper portion of the handle adjacent to the cap flange being spaced normally therefrom slightly less than one-sixteenth of an inch the remainder of the handle being spaced sufficiently clear of the bottle neck to contact therewith only after the cap has been lifted.

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