March 21, 1950 E. G. BOUCHER 2,501,205

REMOVING TOOL FOR VACUUM JAR CAPS

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Fig. 1.

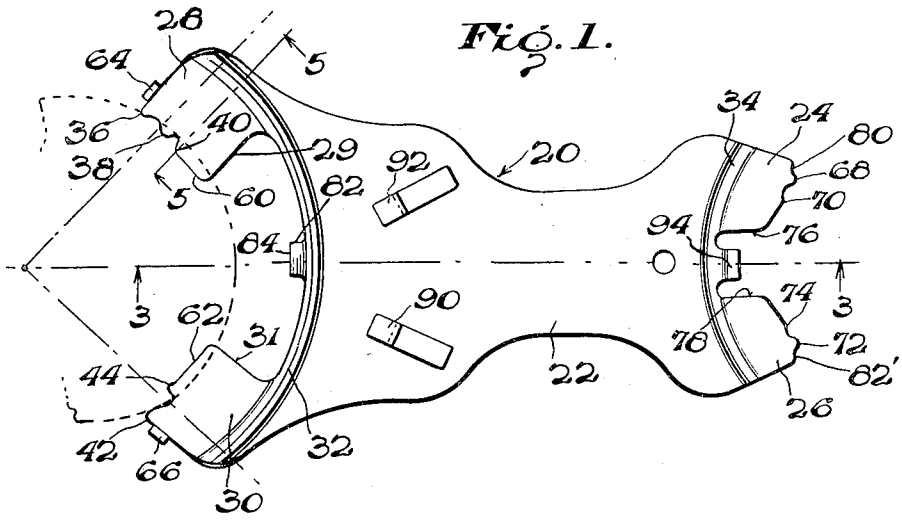



Fig. 5.

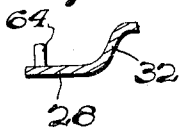
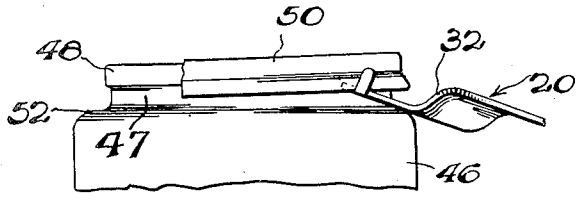



Fig. 4.



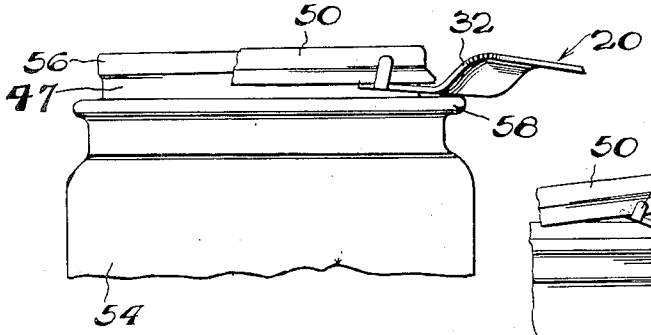
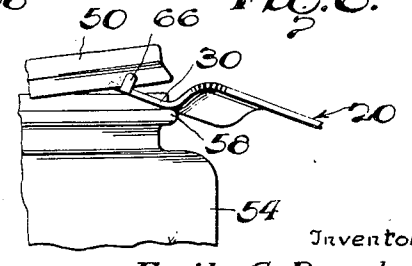




Fig. 4a.

Fig. 6.




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REMOVING TOOL FOR VACUUM JAR CAPS

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Fig. 2.

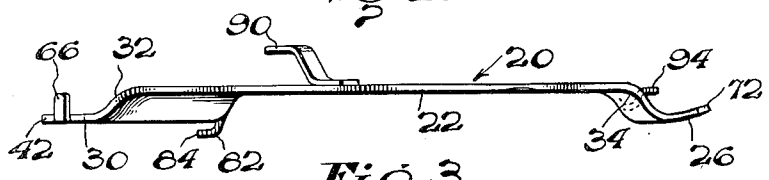



Fig. 3.

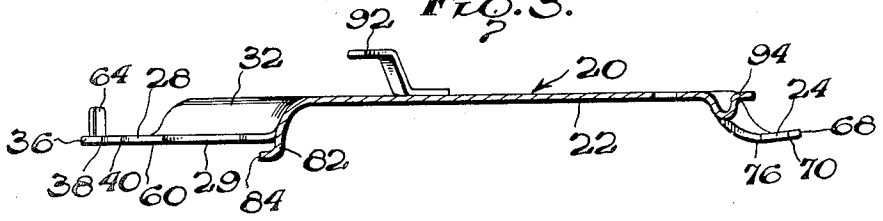



Fig. 7.

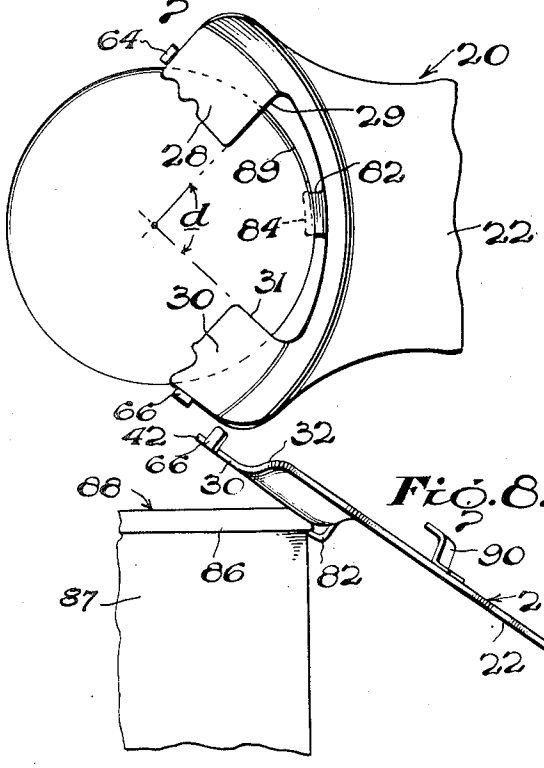



Fig. 9.

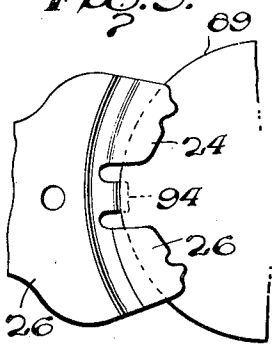
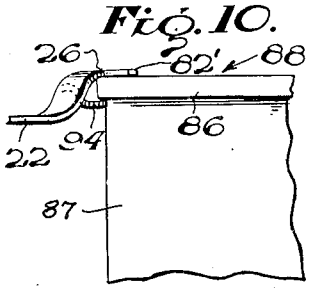



Fig. 8.




Fig. 10.




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REMOVING TOOL FOR VACUUM JAR CAPS

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Fig. 11.

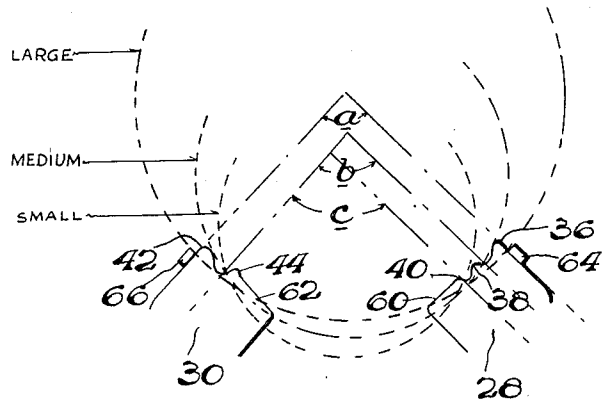



Fig. 12.

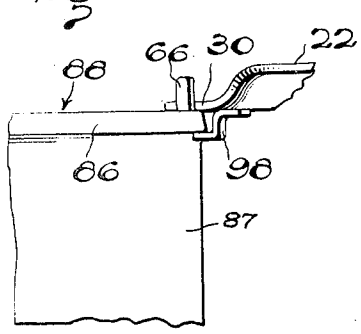
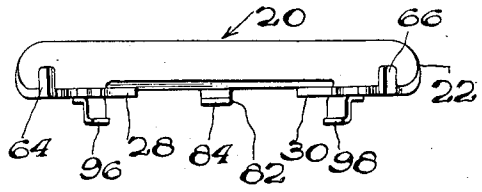



Fig. 13.




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Fig. 14.

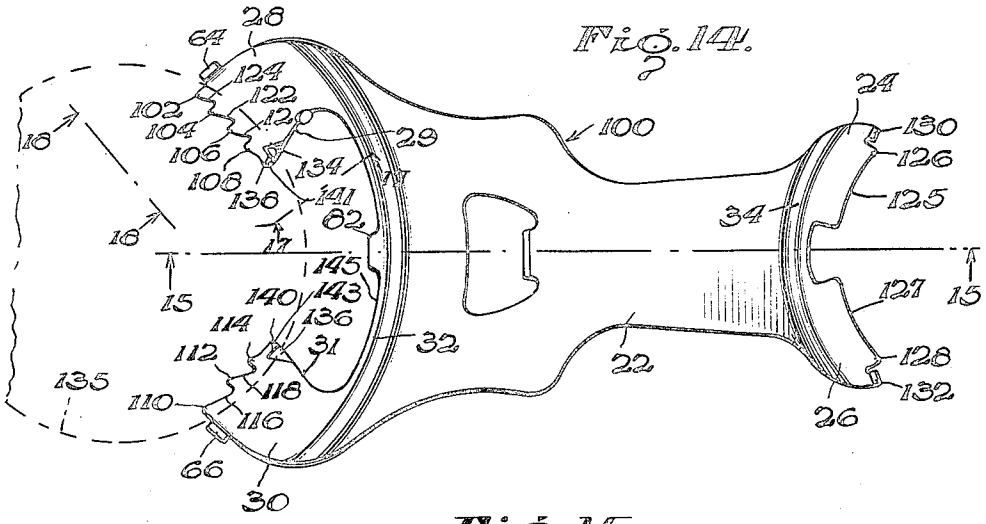



Fig. 15.

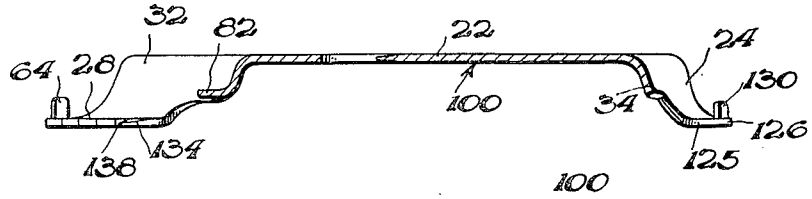



Fig. 16.

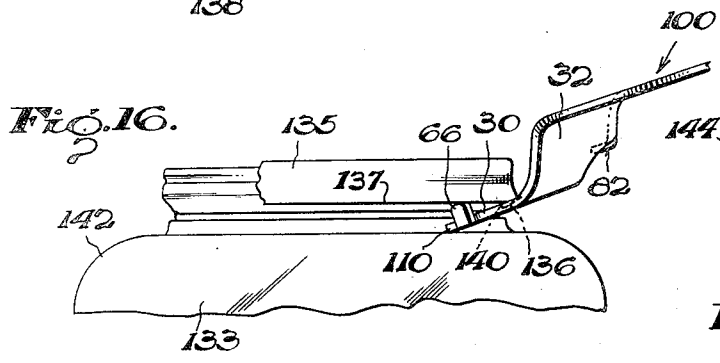



Fig. 17.




Fig. 18.

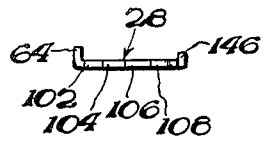
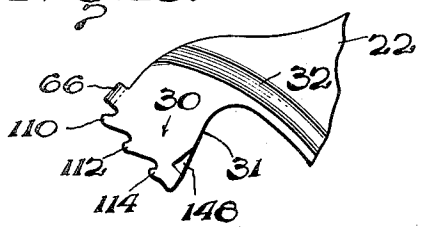



Fig. 19.




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REMOVING TOOL FOR VACUUM JAR CAPS

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Fig. 20.

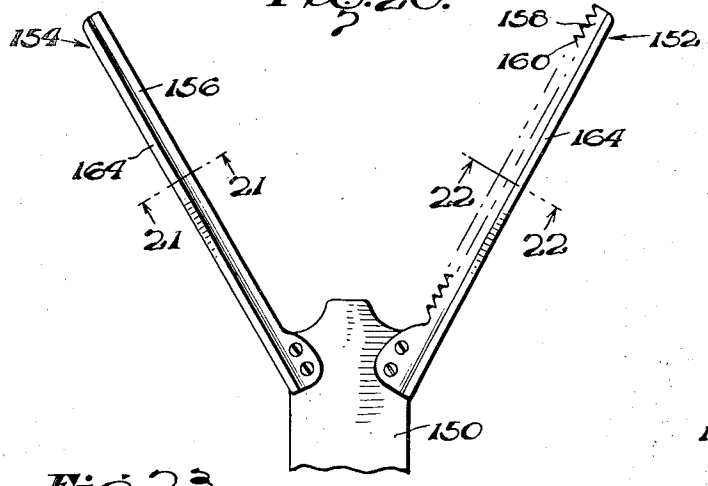



Fig. 21.

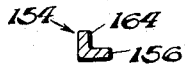



Fig. 22.

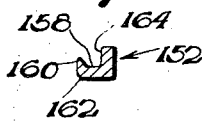



Fig. 23.

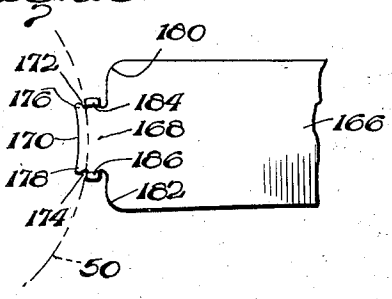



Fig. 24.

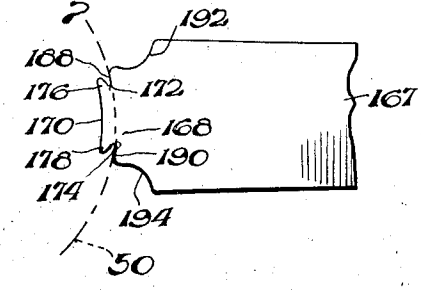
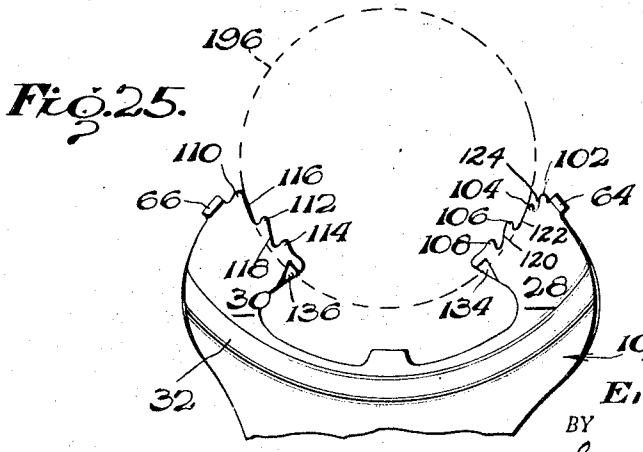



Fig. 25.




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# UNITED STATES PATENT OFFICE

2,501,205

## REMOVING TOOL FOR VACUUM JAR CAPS

Emile G. Boucher, Baltimore, Md.

Application June 21, 1946, Serial No. 678,435

6 Claims. (Cl. 81—3.46)

1

This invention relates to devices for removing caps and lids of jars and other containers and more particularly to a tool which is especially adapted to remove caps or closures of the pressed-on type from glass jars, tumblers and other types of containers.

In my prior application Serial Number 647,900, filed February 15, 1946, entitled Jar cap remover, there are disclosed several types of prying tools which are readily adaptable for the quick and efficient removal of jar caps or closures from jars of different sizes. The present invention constitutes an improvement over the inventions of the prior application and includes a novel construction which not only retains all of the desirable features of the prior inventions, but also adds an arrangement for efficiently removing caps or closures from jelly glasses and similar types of containers without marring and bending such caps or closures out of shape.

The principal object of the present invention is to provide a novel unitary tool which is capable of quickly removing caps and lids from jars, bottles, tumblers and other types of containers of various sizes, without marring or bending the cap or lid, and without chipping or cracking the container.

A further object is to provide a tool of the above character which includes a novel arm construction which is adapted to fit beneath the lower edge of the rim of the cap and which includes cam surfaces which cooperate with the shoulder or flange of the jar to secure a powerful camming action to remove the cap upon manipulation of the tool with a minimum of effort.

Another object is to provide a novel arrangement in a tool of the foregoing type which includes a tooth or hook which is adapted to fit beneath the skirt or flange of a cap of the jelly glass type, and which cooperates with the arms of the tool to quickly remove the cap with little effort and without bending the cap.

A still further object resides in providing a universal tool of integral and unitary construction which includes a number of cooperating parts for removing caps and lids of various sizes from glass or metal containers, the invention being particularly useful in connection with those containers wherein the caps are securely maintained in sealing position by partially evacuating the interior of the containers.

Another object is to provide a tool of the above type which is relatively simple in construction and which may be manufactured at a relatively low cost.

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Other objects and novel features of the invention will appear more fully hereinafter from a consideration of the following detailed description when taken in connection with the accompanying drawings. It is to be expressly understood however, that the drawings are utilized for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

Referring to the drawings wherein similar reference characters refer to similar parts throughout the several views:

Fig. 1 is a plan view of a tool constructed in accordance with the principles of the present invention;

Fig. 2 is a side view of the tool of Fig. 1;

Fig. 3 is a sectional view of the tool taken substantially along line 3—3 of Fig. 1;

Figs. 4 and 4*a* are side views of the tool associated with two different types of conventional glass jars;

Fig 5 is a partial sectional view of the arm 28 taken substantially along line 5—5 of Fig. 1;

Fig. 6 is a partial side view of one of the arms of the tool, when the cap of Fig. 4*a* has been partially removed;

Fig. 7 is a plan view of one end of the tool shown as being associated with the cap of a jar of the jelly glass type;

Fig. 8 is a partial side view of one of the arms of the tool of Fig. 7;

Fig. 9 is a plan view of the other end of the tool shown associated with the cap of a jelly glass type of container;

Fig. 10 is a partial side view of one of the arms of the tool of Fig. 9;

Fig. 11 is a diagrammatic view showing the relationship of the teeth on the arms of the tool for jars and caps of different sizes;

Fig. 12 is a partial side view of one of the arms showing a modified type of cap remover;

Fig. 13 is a front view of the tool of Fig. 12;

Fig. 14 is a plan view of a slightly modified form of cap removing tool;

Fig. 15 is a sectional view taken along line 15—15 of Fig. 14;

Fig. 16 is a side view of the modified tool associated with a conventional glass jar of the type having a rounded shoulder and used for packing coffee and other commodities;

Fig. 17 is a side view of a modified form of arm construction taken on line 17—17 of Fig. 14;

Fig. 18 is an end view of still another type of arm construction taken on line 18—18 of Fig. 14;

Fig. 19 is a plan view of the under side of one of the arms of the tool of Fig. 14;

Fig. 20 is a plan view of still another type of cap removing tool;

Figs. 21 and 22 are sectional views taken respectively along lines 21—21 and 22—22 of Fig. 20;

Figs. 23 and 24 are plan views of modified forms of single arm cap removing tools, and

Fig. 25 is a constructional view of the arms of the tool of Fig. 14.

Referring more particularly to Figs. 1, 2 and 3, a cap removing tool **20** embodying the principles of the present invention is illustrated therein as including a handle part **22** provided at its opposite ends with spaced-apart pairs of arms **24, 26** and **28, 30**, each of said arms being preferably formed integrally with the handle part **22**. As will appear more fully hereinafter, the arms **24** and **26** are adapted to remove caps of the pressed-on type from bottles of different sizes, such as those presently used for packaging chili sauce, fruit juices, etc. Arms **28** and **30**, on the other hand are employed for removing caps from conventional types of glass jars of different sizes used at the present time to package canned vegetables, fruits, etc.

More particularly, and referring to Figs. 2, 3 and 5, the tool **20** is preferably formed at one end with a downwardly curved portion **32** which includes the spaced-apart arms **28** and **30** which extend forwardly of the tool and which are arranged in a plane substantially parallel to but spaced below the plane of the handle part **22**. The opposite end of the tool is similarly formed with a downwardly curved portion **34** which includes the spaced-apart arms **24** and **26**, these latter preferably projecting slightly upwardly, as shown in Fig. 2, although they can be arranged in a plane parallel to but spaced below the plane of the handle part **22**, if desired.

In order to adapt the arms **28** and **30** for removing caps from different size jars, each of the arms are provided with one or more teeth, projections or prongs which are automatically and selectively operable depending upon the size of the cap to be removed. As illustrated, the arm **28**, for example, may be provided with three teeth **36, 38** and **40** which cooperate respectively with the lower rims of the flanges of the large, medium and small sizes of caps. Arm **30** on the other hand, may be provided with teeth **42** and **44**, the former being for use with the larger sizes of caps while the latter is employed for the intermediate and smaller sizes. In each instance, the teeth **38, 40** and **44** are formed by curved cut-away portions, as shown in Fig. 1 while the teeth **36** and **42** are formed on the remote corners of the arms. In this manner, the arms are readily adapted for the removal of different size caps without the necessity of making any adjustments whatever.

In using the tool for removing the caps, the arms are applied beneath the lower rim of the jar cap as illustrated in Figs. 4 and 4*a*. In these latter figures the jars shown are of conventional type. For example the jar **46** of Fig. 4 is provided with a reduced neck **47** having a beaded rim **48** for receiving the cap **50**, and a shoulder **52** with which the arms **28** and **30** cooperate. In Fig. 4*a*, the jar **54** is likewise provided with a reduced neck **47** having a beaded rim **56** for receiving the cap **50**, but is formed with an outwardly directed flange, shoulder or bead **58** with which the arms **28** and **30** cooperate. It is desired to point out that the front edges **60** and **62** of the arms **28** and **30** are generally curved, as shown in Fig. 1 and that when such edges are projected beneath the rim of the cap they come into contact with the neck of the jar. However, the curvature of the edges and the location of the teeth on said edges are such that irrespective of the size of the cap to be removed, the teeth will not project too far beneath the flange or skirt of the cap, during removal thereof, as to engage and become locked with the lower edges of the rims **48** or **56** of the jars. Preferably, a pair of stops **64** and **66** in the form of integral lugs are respectively formed on the remote edges of the arms **28** and **30** in order to limit the movement of the arms beneath the flange of the cap so as to likewise prevent the teeth from becoming locked with the lower edges of the rims **48** or **56** of the jars, when using the tool with the larger sizes of jars.



In operation, after application of the arms beneath the cap rim, as shown in Figs. 4 and 4*a*, it is only necessary to press the handle part **22** downwardly whereupon a powerful camming or levering action between the arms **28, 30** and the shoulders **58** or **52** will ensue. More particularly, as the handle is moved downwardly, the inner or adjacent edges **29** and **31** of the respective arms **28** and **30** will rest upon the shoulders **52** or **58** while certain of the teeth on the arms will project beneath the flange of the cap, depending upon the size cap to be removed. The cooperation between said adjacent edges and the jar, during the downward movement of the handle produces the camming action referred to, and the cap is removed with very little effort and without marring or bending the same. The action of the arms, in removing the cap is shown more particularly in the partial view of Fig. 6, and from this figure it will be readily seen that each of the arms pivots or fulcrums about either the innermost corners of the arms **28** and **30** or along the adjacent edges **29** or **31**, depending upon the size or type of jar from which the cap is being removed. This action causes an automatic effective twisting of each arm about its fulcrum in order to remove the cap with a powerful levering or camming force. During the above operation, it is pointed out that as the cap is removed, the operative teeth for the particular size of cap will move in toward the jar during the pivotal movement of the arms and this causes a firmer fulcrum to be secured between the adjacent edges of the arms **28** and **30** and the shoulders **52** or **58**. Such inward movement also compensates for the natural outward movement of the teeth due to the arc of travel of the arms **28** and **30**, and thus a firmer contact between the operative teeth and rim of the cap is secured. Moreover, the aforesaid inward movement achieves a substantially vertical camming lift of the cap to avoid any distortion of the cap skirt which would cause the skirt to be sprung out-of-round and which would prevent removal of the cap due to the binding of the distorted skirt of the cap around the mouth of the jar.

Referring to the arms **24** and **26** at the opposite end of the tool, it will be observed that the outer edges thereof are generally curved to approximate the curvature of the necks of jars of the smaller sizes as well as conventional bottles for packaging fruit juices, chili sauces, etc. In order to adapt the arms for different size jars and bottles, arm **24** is provided with a pair of teeth **68, 70** while arm **26** is formed with a pair of teeth **72** and **74**. In use, the arms are pro-

jected beneath the rim of the bottle cap and teeth 70 and 74 will become operative to remove caps from small necked bottles while teeth 68 and 72 will function to remove caps from jars and bottles of larger sizes. The camming action during operation is precisely the same as heretofore described, it being understood that conventional bottles having pressed-on caps are provided with beads or flanges similar to 58 of Fig. 4*a*, and that during the removal of the cap, the adjacent edges 76 and 78 of the arms fulcrum upon such bead or flange. It is desired to point out that the outer edges of the arms 24 and 26 are formed with curved cut-away portions 80 and 82' which function as stops when the teeth 68 and 72 are cooperating to remove a cap. More particularly, such portions engage the lower edge of the skirt of the cap and prevent the teeth 68 and 72 from projecting too far beneath the rim of the cap during the cap removing operation as to become locked beneath the lower edge of the beaded rim of the jar.

One of the features of the present invention is to locate the teeth 36, 38, 40, 42 and 44 in such position, that when they cooperate in removing caps of different sizes, a minimum of effort will be required. Referring more particularly to Fig. 11, there is disclosed therein, the angular relationship between the cooperative teeth for different size jars. For example, for large caps, denoted by the legend "Large," with teeth 42 and 36 cooperating, it is seen that the included angle therebetween is shown at *a*. On the other hand, with teeth 44 and 38 cooperating to remove caps of intermediate size, as shown by the legend, "Medium," the included angle between the teeth is represented by *b*. Also, with teeth 40 and 44 cooperating with caps of small size, denoted by the legend "Small," the included angle between the teeth is shown at *c*. It will be observed that angles *a*, *b*, and *c* are substantially equal and applicant has found that for the most efficient operation, this angle should be in the range of 80° to 90° and preferably about 85°. With such an angularity, a minimum of effort is required to remove the caps.

A further important feature of the present invention resides in the incorporation in the tool heretofore described, of a novel construction for quickly and efficiently removing caps from containers of the jelly glass type without marring or bending the cap. Heretofore, caps of this type have been opened with a hook-type of opener, which frequently breaks the tumbler or so multilates the cap that replacement on the glass is impossible. This is quite undesirable since in the case of many commodities, such as jellies and jams, the entire contents are not used at once and in order to properly preserve the rest of the contents, it is necessary to transfer the same to a different type of container having a closable lid.

More particularly, and referring to Figs. 1, 2, 3, 7 and 8, the present invention includes a hook 82 of substantial breadth, which is preferably formed integrally with the tool 20 and is positioned between the arms 28 and 30. As shown in Fig. 1, the outer edge 84 of the hook 82 is slightly curved in plan, from one side to the other, and as shown in Fig. 3, may be projected slightly downwardly in order to more readily fit beneath the rim of a cap. It will also be understood that the hook 82 may be thicker where it joins the body of the tool and may be tapered toward its outer edge 84, so as to permit the hook 82 to enter



easily the space between the skirt or flange 86 of the cap and the outside of the tumbler.

In Figs. 7 and 8, the tool 20 is illustrated as applied to a cap 88 of a jelly glass or tumbler type of container 87, which, as is well known, is not provided with a neck or flange as in the case of the jars 46 or 54 of Figs. 4 and 4*a*. As will readily appear from these figures, when the tool is applied, the outer edge 84 of the hook 82 projects beneath the skirt or flange 86 of the cap 88 while the adjacent edges 29 and 31 of the arms 28 and 30 engage the upper peripheral portion or edge 89 of the cap, at spaced apart points, see particularly Fig. 7. With the parts in this position, it will be observed from Fig. 7, that the included angle *d* between the adjacent edges 29 and 31 is the same as the angles *a*, *b* and *c* of Fig. 11 and applicant has found that this angle is also such as to readily and quickly remove caps of the type of the cap 88, from different size containers with a minimum of effort.

In operation, and with the tool assembled as shown in Figs. 7 and 8, it is only necessary to raise the handle part 22 of the tool to effect removal of the cap. More particularly, as the tool is raised, the hook 82 springs the lower portion of the flange 86 outwardly, and the portion of the cap between the adjacent edges 29 and 31 of the arms is sprung upwardly. This action breaks the seal between the cap gasket and the rim of the container and consequently destroys the partial vacuum within the container. As this action takes place, the hook slides further between the flange of the cap and the wall of the jar and permits the edges 29 and 31 of the arms 28 and 30 respectively, to slide outwardly on the edge 89 of the cap 88. Continued movement of the tool removes the cap from the container and the sprung portion above referred to, springs back into its former shape and leaves the cap in its original condition for recapping the container.

It will be noted from the above explanation of the operation of the tool, that the edges 29 and 31 of the arms bear directly upon the edge 89 of the cap at spaced apart points. This action is highly advantageous since the force reaction is taken by the reinforced beaded rim of the container immediately beneath such points. A further advantage accrues from the operation of the hook 82 in springing out a portion of the flange 86 during removal of the cap. This action ensures that the edge 84 of the hook will not engage the reinforced beaded rim of the container or the surface of the container to scratch or crack the same. From the above it will readily be seen that the angularity of the arms 28 and 30 together with the shape and location of the hook 82 enables caps of different sizes to be quickly and readily removed with a minimum of effort and without damaging the cap or the rim of the container.

If desired, the tool 20 may be provided with a pair of spaced apart hooks 90 and 92 on its upper side, see Figs. 1 and 2, which may be used to remove caps from jelly, glass type containers, in lieu of the hook 82. In such event, the tool is turned over, when applied to the container cap 88 and the hooks 90 and 92 fitted beneath the lower edge of the flange 86 and with the upper portions of the arms 28 and 30, as viewed in Fig. 1, in contact with the top surface of the cap 88. Upward movement of the tool will again spring the flange 86 of the cap 88 outwardly and upwardly to break the seal and remove the cap. It will be understood that one hook may be used

in the manner of the two hooks 90 and 92, in which event, the single hook is positioned between the points where hooks 90 and 92 are positioned in Fig. 1.

A further type of cap remover for containers of the jelly glass type includes the provision of a hook 94 formed integrally with the opposite end of the tool and positioned intermediate the arms 24 and 26. In using this form of the invention, the hook 94 is placed beneath the rim 86 of the cap 88, with the arms resting on the top of the cap at the peripheral portion 89 thereof, see Figs. 9 and 10. Here again, upward movement of the handle part 22 will serve to spring the flange 86 outwardly and upwardly and the top may be readily removed without permanently bending the same out of shape.

A further form of the invention is illustrated in Figs. 12 and 13. In this form, each of the arms 28 and 30 are provided with hooks 96 and 98 which are directed forwardly and adapted to cooperate with the lower rim of the flange 86 in the manner shown in Fig. 12. In this case, due to the use of a pair of hooks, the flange is gripped and sprung at two spaced apart points, and the cover is readily removed.

Figs. 14 through 19 illustrate a further modified form of the invention wherein the arms 28 and 30 are provided with additional teeth in order to accommodate the tool to a wide variety of jar caps of different sizes, and wherein a novel construction is employed for effectively removing caps from jars of the type having a substantially wide shoulder spaced a substantial distance below the cap rim and which jars are at present utilized for packing coffee and like commodities. Here again, the construction is such that the caps are quickly removed with very little effort and with no damage to the rim of the cap or to the neck of the jar. Thus, in the event that only a portion of the contents of the jar are to be used, the cap may be readily pressed back on the jar and the freshness of the contents maintained.

More particularly, and referring to Figs. 14–16, the modified form of tool 100 includes the substantially wide and spaced-apart arms 28 and 30 at one end of the handle 22 and the substantially wide and spaced-apart arms, 24 and 26 positioned at the other end of the handle. Each of the arms 28 and 30 are provided with a plurality of teeth in order to adapt the tool for removing caps of different sizes, and for example, arm 28 may include teeth 102, 104, 106 and 108 while arm 30 may be formed with teeth 110, 112 and 114. Each of these teeth is preferably formed by cutting away a curved portion of the outer edge of the arms in order to provide a definite hooked tooth formation, as clearly illustrated. The teeth are moreover formed in such manner that the sides thereof, at 116, 118, 120, 122 and 124 limit the distance the teeth may project under the rims of caps of various sizes during the removal of the caps from the jars, as will appear more fully hereinafter.

As in the case of the tool of Fig. 1, it will be understood that in use, the tool 100 may be applied to the jars of Figs. 4 and 4a in substantially the same manner, that is, the forward edges of the arms are positioned in the space between the lower edge of the skirt or rim of the cap and the shoulders 52 or 58, following which the handle 22 is pressed downwardly to effect the camming action heretofore referred to and the ready removal of the cap. This action produces an effective twisting or pivotal movement of each arm about the edges 29 and 31 which latter rest upon the parts 52 or 58. It will be understood that the stops 64 and 66 prevent the teeth 102—110 from projecting too far beneath the rim of the cap, with certain of the larger sizes of jars, as to engage and become locked beneath the glass rim of the jar, but does not prevent the teeth 102—110 from positively hooking the lower edge of the cap, which these teeth do, so that the lower edge of the cap does not slide out of engagement with these teeth while the cap is being removed from the jar. With respect to jars having caps of a size which cooperate with the teeth 104, 106, 108, 112 and 114, the sides of such teeth serve to limit the distance the teeth may project under the rims of the caps when the latter are being removed. For example, when the teeth 104 and 112 engage the rim of a cap of a size for which they are designed, as the tool is pivoted in the manner indicated in Fig. 6, the sides 124 and 116 at first clear the outer periphery of the rim of the cap. As the tool is further pivoted and the outer edges of the arms are further fulcrumed or twisted about the inner edges 29 and 31, the sides 124 and 116 engage the outer periphery of the cap and thereby limit the distance the teeth 104, 106, 108, 112 and 114 project under the rim of the cap during the removal operation. Such limiting action is very important to the proper functioning of the tool inasmuch as catching or locking of the teeth beneath the rim or bead of the glass jar is prevented. It will also be understood that with the smaller sizes of jars, the corners 141 and 143 or the teeth 108 and 114 engage the neck of the jar and function as stops to prevent any of the remaining teeth of the arms 28 and 30 from projecting too far under the cap and locking under the rim of the jar when the cap is being removed.

The arms 28 and 30 are cut away at 29 and 31, respectively, so that the innermost corners 141 and 143 engage the shoulders of jars of certain types throughout substantially the entire lifting action of the tool and slide inwardly over the shoulder of the jar toward the neck of the jar as the handle is pivoted downwardly. That is, the arms 28 and 30 are cut away sufficiently and are curved sufficiently so that no other portions than the innermost corners 141 and 143 engage the jar shoulder at the start of the cap removing operation. Hence, the powerful starting leverage of the tool is not diminished at the start of the cap removing operation. However, the distance between the innermost corners 141 and 143 from the respective teeth 102 and 110 is sufficient to provide ample lifting movement of the teeth 102 and 110 to easily force the cap off the jar.

It will be noted from Fig. 14 that the forward portion of the tool between the arms 28 and 30 is cut away at 145 to provide sufficient clearance so that when the tool is in operation the pivoting movement of the tool will not be limited through contact with the shoulder of the jar.

With respect to the arms 24 and 26, it will be observed that they are provided with curved front edges 125 and 127 which generally approximate the curvature of the necks of jars of the smaller sizes as well as jars and bottles usually employed for bottling fruit juices, chili sauce and similar commodities. The arms however are provided with teeth 126 and 128 adjacent the outer or remote corners thereof while stops 130 and 132, preferably formed integrally with the arms and extending upwardly therefrom, see Fig. 15, are

provided for preventing movement of the teeth 126 and 128 too far beneath the rim of the cap when the tool is in use, in order to prevent catching the teeth under the rim or extended portion of the mouth of the jar or neck of the bottle. Such a construction enables ready removal of caps from jars of the smaller sizes while the edges 125 and 127 come into play when removing the relatively small caps from bottles of the type having a bead or shoulder upon which the under sides of the arms rest during the cap removal operation.

Novel means are provided in the modified form of tool in order to quickly and efficiently remove caps from jars of the type having a relatively large shoulder which is spaced a substantial distance below the rim of the cap. Jars of this type, at present used for packing coffee and like commodities, see jar 133 and cap 135, Fig. 16, lack the shoulder 52 or flange 58 of Figs. 4 and 4*a* which function as fulcrum supports for the arms of the tool in removing caps from jars of the type shown in these latter two figures. More particularly such novel means includes relatively wide bevelled notches 134 and 136 which are provided adjacent the inner corners of the arms 28 and 30 respectively. Preferably, these notches are formed by removing a slight amount of the upper surface of each arm, as shown in Figs. 14 and 15 in order to provide ledges or catches 138 and 140 which are adapted to positively engage the under side of the rim of the cap, without slipping, during the cap removal operation.

In using the tool 100 for removing caps from jars of the above type, the arms 28 and 30 are positioned so that the arms tend to straddle the jar neck beneath the cap 135, see Figs. 14 and 16. The handle 22 may then be raised in order to engage the bevelled notches 134 and 136 with the lower edge 137 of the rim of the cap and to bring the ledges 138 and 140 into contact with the inner periphery of the lower edge of the rim of the cap. At this time the outermost or most remote teeth 102 and 110 of the arms 28 and 30 rest upon the wide shoulder 142 of the jar 133. Thereafter, it is only necessary to raise the handle of the tool in order to pry off the cap, it being understood that during this operation, the teeth 102 and 110 will slide along the shoulder 142, the rim of the cap 135 being firmly held from slipping away from the arms 28 and 30 by the hooking action of the ledges 138 and 140. It will be observed from the above operation, that the outer teeth 102 and 110 function as fulcrum points while the ledges 138 and 140 are located sufficiently close to the fulcrum points, to get an exceedingly powerful camming action upon the cap when the handle is raised, and the arms 28 and 30 are pivoted or twisted about such fulcrum points. However, the ledges 138 and 140 are sufficiently far from these fulcrum points that the ledges are raised sufficiently to remove the cap from the jar when the handle is raised. In addition to the foregoing, the bevelled notches 134 and 136 have substantially wide surfaces which engage the lower rim of the cap. Such construction allows the lower rim of the cap to slide easily against the ledges 138, 140 and prevents any scarring of the rim during removal of the cap. Moreover, the ledges 138 and 140 are close enough to the inner corners 141 and 143 of the arms 28 and 30 respectively, to prevent the corners 141 and 143 from locking with the bead of the jar as the cap is removed.

If desired, other types of abutments or ledges may be positioned adjacent the inner corners 141 and 143 of the arms 28 and 30 for positively engaging the inner periphery of the cap rim in the same manner as the ledges 138 and 140. For example, the inner edges of the arms may be provided with short upstanding lugs or hooks 144 adjacent to the inner corners 141 and 143, see Fig. 17, or the outer edge of each arm may include a short upstanding lug 146 at the inner corner thereof, see Fig. 18. In all of these constructions, the ledge or lug is located at or closely adjacent the inner or adjacent corners of the arms 28 and 30 in order to obtain the powerful camming action heretofore referred to and to prevent the cap rim from slipping off such corners during removal of the cap.

In addition to the foregoing, the tool may if desired, be turned over and the under sides of the arms 28 and 30 employed for removing the cap 135, in which event, the under surfaces of each arm 28 and 30 may be provided with abutments similar to 144 or 146. Preferably a notch 148 similar to the notches 134 and 136 is cut out of the adjacent sides of the under surface of each arm 28 and 30 and located near the inner corners thereof, see Fig. 19, when the tool is to be used in this manner, such notches engaging the cap rim and preventing any slipping action during removal of the cap. It will be understood that when the tool is employed in such fashion the top surfaces of the lugs or stops 64 and 66 engage and slide along the shoulder 142 of the jar 133 during raising of the handle to pry off the cap. If desired, the stops 64 and 66 may be shortened, in which event the extreme outer portions or corners of the arms 28 and 30 or the teeth 102 and 110 will engage and slide along the shoulder 142 during operation of the tool in the above described manner.

As in the case of Fig. 1, the tool 100 is provided with a hook 82 for removing caps from jars or containers of the tumbler or jelly glass type. This type of container is provided with a beaded rim and lacks any shoulder beneath the lower edge of the beaded rim. It will be noted from Fig. 15, that the hook projects outwardly from the curved portion or flange 32 and is arranged in a plane substantially parallel to the plane of the arms 28 and 30 and in a plane above the plane of said arms when the latter are positioned in a horizontal plane. This construction is important since when the tool is applied to a jar in the manner shown in Figs. 7 and 8, the hook will readily slip between the skirt of the cap and the exterior wall of the jar, and will occupy a plane closely approaching the vertical plane of the skirt 86 of the cap 88. Thus, as the handle 22 of the tool is moved upwardly to remove the cap, the hook 82 will spring the skirt 86 outwardly and the forward edge of the hook will readily clear the beaded rim of the jar. Hence, any danger of the hook interlocking beneath the bead rim of the jar is avoided.

A further form of the invention is illustrated in Figs. 20–22 and includes a handle 150 provided with a pair of diverging arms 152 and 154 having edges 156 and 158 respectively which are adapted to fit in the space between the rim of the cap and the flange or shoulder of jars of the general type shown in Figs. 4 and 4*a*. Preferably one of the edges, as for example, edge 158 is provided with saw teeth 160, although it will be understood that both edges of the arms may be saw-toothed if desired. As shown in Fig. 22, the saw teeth 160 are bent upwardly in order to ob-

tain a firm and non-slipping contact with the rim of the cap, and preferably the lower edges of the saw teeth are cut away at 162 to permit the lower edges to have a firm hold on the glass flange of the jar in removing the cap. Each arm is provided with a stop 164 which functions to prevent the edges 156 and 158 from projecting too far beneath the rim of the cap and locking with the rim 48 or 56 on the glass jar.

In operation, after the edges 156 and 158 are positioned between the rim of the cap and the bead or flange of the jar, the handle 150 may be either raised or lowered to easily and effectively pry off the cap. Should the handle be lowered, it will be understood that the stops 164 of the arms prevent the edges 156 and 158 from projecting too far beneath the rim of the caps as to interlock beneath the glass flange of the jar. However, if the handle is raised, it will be understood that the cap itself acts as a stop to prevent the edges and the saw teeth from projecting too far beneath the cap rim. The use of the upwardly projecting saw teeth 160 on one or both of the edges 156, 158 serves to secure a firm grip upon the cap rim so that during operation of the tool, there will be no danger of slipping.

Figs. 23 and 24 illustrate further modifications of the invention wherein the tools are provided with a single arm which is adapted to be twisted, raised, or lowered in order to remove jar and bottle caps of different sizes. For example, in Fig. 23, the tool 166, of flat metal stock, is provided with a single arm 168 having a curved front edge 170, to fit the neck of bottles to prevent the arm 168 slipping off the bottle when removing the cap and also to allow the opposite extremities which are provided with cutaway portions 172 and 174 defining corner teeth 176 and 178 to get deeper under the cap and getting a firm hold while removing the cap. Rounded shoulders 180 and 182 are also provided on the arm while upstanding lugs 184, 186, similar to the lugs 64 and 66 of Fig. 1, serve as stops to prevent the teeth from projecting too far beneath the cap rim.

In the case of the tool 167 of Fig. 24, the cutaway portions 172 may be deeper than in the case of the tool of Fig. 23, in order to define stop edges 188 and 190, which function in the same manner as the stops 184 and 186. The tool 167 is moreover provided with curved portions 192 and 194 for a purpose which will appear more fully hereinafter.

In using the tool 166, the edge 170 is placed between the lower edge of the skirt of the cap and the flange or shoulder of the jar or bottle and given a twisting motion whereupon the rim of the cap 50, see Figs. 4 and 4a, will be received within the cutaway portion 174, for example, while the tooth 176 will rest upon the flange or bead of the bottle or jar. The twisting motion referred to takes place about the longitudinal axis of the tool, and a continuance of this motion will readily remove the cap, it being noted that the stops 184 and 186 will prevent the teeth 176 and 178 from projecting too far beneath the cap rim.

The tool 167 of Fig. 24 is applied to the jar in like manner and when twisted, the cap rim will be received within the cutaway portion 174, for example, while the tooth 176 will rest upon the flange or shoulder of the jar. Further twisting movement will readily effect the removal of the cap, it being noted that during this operation the stop edges 188 and 190 function as stops to limit the distance the teeth 176 and 178 may project beneath the cap rim.

In using either the tool 166 or the tool 167 to remove caps from jars of the type shown in Fig. 16, it will be understood that after the front edge 170 is placed beneath the cap rim and the tool twisted, shoulders 180, 182, or the curved portions 192, 194 will rest upon the shoulder 142 of the jar in order to obtain a higher lift of the cap during the removal operation.

Referring to Fig. 25, the tool 100 is shown as being associated with one size of cap 196 for the purpose of illustrating the camming action of the camming portions defining the teeth. From this figure it will be readily observed that upon depressing of the handle of the tool to raise the arms 28 and 30 upwardly about the under curved portions 32 of the arms as fulcrums, the portion 116 will engage the rim of the cap and cam the rim upwardly. As downward movement of the handle is continued, the cap rim will slide downwardly on the surface 116 and finally rest within the cutaway portion where the portion 116 joins the tooth 112. Further downward movement of the handle will result in removal of the cap, it being understood that one of the appropriate teeth of the arm 28 also engages the cap rim. In like manner the portions 118, 120, 122 and 124 also function as camming portions, depending upon the size of the caps to be removed. It will also be seen from the above, that such camming portions effectively prevent the teeth of the arms from projecting too far beneath the cap rim as to engage and lock under the glass flange of the jar.

From the foregoing, it will be readily understood that the present invention provides a unitary prying type of tool, which is adapted to a variety of uses. For example, the tool may be used for effectively removing jar caps of different sizes from jars, bottles, and containers of the type having pressed-on caps and which jars and bottles possess a neck, flange or shoulder which functions as a fulcrum support for the camming action of the arms when the tool is in use. In operations of this character, the spacing of the teeth on the various arms insures complete and efficient adaptability to caps of different sizes, and removal thereof is easily effected without damaging the cap in any manner whatsoever and without breaking or chipping the glass. This is decidedly advantageous when only a portion of the contents of the container are used and it is desired to recap the container for future use.

In addition to the foregoing, the tool is also capable of efficient operation in removing caps from containers of the jelly glass type which are not provided with a flange or neck which could function as a fulcrum support for the camming arms of the tool. For such use, several different arrangements have been provided, all of them involving one or more hooks or projections which are adapted to fit beneath the rim of the flange of the cap. The action of the hook or hooks, in springing the flange and edge of the cap without marring the top surface of the cap is decidedly advantageous in that the cap is removed with entire absence of permanent bends or folds. Hence the container may be readily recapped for subsequent use.

While several forms of the invention have been illustrated and described herein, with considerable particularity, it will be readily understood by those skilled in the art that various changes and modifications may be made therein, without

departing from the spirit of the invention. For example, while the tool has been referred to as being especially adaptable for removing caps from containers of the jelly glass type, it will be understood that this latter term includes all those containers having no flange or shoulder beneath the rim of the cap. Thus containers popularly known as Mason, Ball, Kerr, Atlas and other types of preserving jars are included in this category. It is also intended to include such containers for packaging cheese, fish and other commodities where no shoulder or flange is provided. While it is preferred to depress or lower the tool in removing caps from jars of the type shown in Figs. 4 and 4*a*, it will be understood that the caps may be removed by raising the tool if desired. Also, if desired, the tool may be lowered instead of raised, in removing caps from jars of the type shown in Fig. 16. Reference will therefore be had to the appended claims for a definition of the limits of the invention.

This application is a continuation in part of my application, Serial Number 658,802, filed April 1, 1946, issued January 3, 1950, as Patent No. 2,493,438, for Jar cap removing tool.

What is claimed is:

1. A tool for removing jar caps from jars of the type having an annular shoulder, and wherein the cap is vacuum sealed and is provided with an annular rim, the lower edge of which is spaced above said shoulder, comprising a substantially flat handle member formed at one end thereof with a pair of spaced apart, substantially flat arms projecting outwardly from one end of the handle in a plane offset with respect to the plane of the handle, the handle being also formed at said end with a curved flange having opposite ends thereof connecting the arms with the handle, said arms being provided with forward edges lying at symmetrical acute angles to the axis of the handle member so as to be substantially tangent to the neck of a jar when said arms are inserted between the lower edge of the rim of a cap and the jar shoulder in cap removal position, and being also provided with adjacent side edges lying at symmetrical acute angles to the axis of the handle member so that prolongations of said side edges would meet at a point within the confines of the jar, and the lower edge of said flange and the adjacent side edges of said arms defining the boundaries of an open space to allow the tool to clear the jar shoulder as the tool is moved downwardly to remove the cap.

2. A tool for removing jar caps from jars of the type having an annular shoulder, and wherein the cap is vacuum sealed and is provided with an annular rim the lower edge of which is spaced above said shoulder, comprising a handle member having a pair of spaced apart arms projecting outwardly from one end thereof for insertion between said shoulder and the lower edge of the cap rim, to occupy an initial position, said arms being provided with front edges, outer edges and inner or adjacent edges defining inner and outer corners at the opposite ends of each front edge, said outer corners engaging the jar shoulder and forming fulcrums about which each arm is pivoted when the handle member is raised from its initial position to remove the cap, the front edges of the arms lying at symmetrical acute angles with respect to the handle axis so as to be substantially tangential to the neck of the jar when the arms occupy said initial position, and a notch formed on each arm adjacent the inner corners thereof for positively engaging the lower edge of the cap rim and for positively preventing disengagement of the rim edge from the notch when the handle member is raised to remove the cap.

3. A tool for removing jar caps from jars of the type having a beaded rim at the top of the jar, an annular shoulder spaced below said rim, and wherein the cap is vacuum sealed and is provided with an annular rim having its lower edge spaced above said shoulder, comprising a handle member formed at one end thereof with a pair of spaced apart, substantially flat arms projecting outwardly and forwardly from said end, each arm being provided with a front edge which lies at an acute angle to the axis of the handle member and is substantially tangential to the neck of a jar when said arms are projected between the jar shoulder and the lower edge of the cap rim in cap removal position, and being also provided with adjacent side edges to engage the jar shoulder and serve as fulcrums about which the arms are pivoted as the handle member is moved downwardly to remove the cap, and stop means formed on each arm for limiting the distance the arms may project between said edge of the rim and said shoulder during pivotal movement of each of the arms, to prevent the front edges from interlocking with the beaded rim of the jar as the cap is removed.

4. A tool for removing jar caps from jars of the type having a beaded rim at the top of the jar, an annular shoulder spaced below said rim, and wherein the cap is vacuum sealed and is provided with an annular rim having its lower edge spaced above said shoulder, comprising a handle member formed at one end thereof with a pair of spaced apart, substantially flat arms projecting outwardly and forwardly from said end, each arm being provided with front, and outer and inner or adjacent side edges, said side edges forming inner and outer corners with each front edge, each front edge lying at an acute angle to the axis of the handle member so as to be substantially tangential to the neck of a jar when said arms are projected between the jar shoulder and the lower edge of the cap rim in cap removal position, and the adjacent side edges serving as fulcrums about which the arms are pivoted as the handle member is moved downwardly to remove the cap, each of said front edges being formed between the inner and outer corners with a projecting tooth positioned beneath the edge of the cap rim when the tool is placed in said cap removal position, the portions of the front edges between the teeth and the outer corners of the arms engaging the lower edge of the cap rim to limit the distance the teeth may project beneath said rim edge during pivotal movement of each of the arms, to prevent the teeth from interlocking with the beaded rim of the jar as the cap is removed.

5. A tool for removing jar caps from jars of the type having a beaded rim at the top of the jar, an annular shoulder spaced below said rim, and wherein the cap is vacuum sealed and is provided with an annular rim having its lower edge spaced above said shoulder, comprising a handle member formed at one end thereof with a pair of spaced apart, substantially flat arms projecting outwardly and forwardly from said end, each arm being provided with front, and outer and inner or adjacent side edges, said side edges forming inner and outer corners with each

front edge, each front edge lying at an acute angle to the axis of the handle member so as to be substantially tangential to the neck of a jar when said arms are projected between the jar shoulder and the lower edge of the cap rim in cap removal position, and the adjacent side edges serving as fulcrums about which the arms are pivoted as the handle member is moved downwardly to remove the cap, each of said front edges being formed between the inner and outer corners with a pair of projecting teeth lying in the plane of each respective arm, the adjacent teeth being positioned beneath the edge of the cap rim when the tool is placed in said cap removal position, and the adjacent sides of the remote teeth engaging the lower edge of the cap rim to limit the distance the adjacent teeth may project beneath said rim edge during pivotal movement of each of the arms to prevent the adjacent teeth from interlocking with the beaded rim of the jar as the cap is removed.

6. A tool as defined in claim 5 wherein said adjacent side edges lie at acute angles to the axis of the handle member so that prolongations of said side edges would meet at a point within the confines of the jar.

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