United States Patent [19]

Morita

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[54] **JAR LID REMOVER**

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[52] **U.S. Cl.** **81/3.32**

[51] **Int. Cl.** **B67b 7/18**

[58] **Field of Search** ..... 81/3.2, 3.32, 3.31, 3.3 R, 81/3.42, 3.33, 3.36, 3.37, 3.4, 3.39; 269/202, 204, 218, 227

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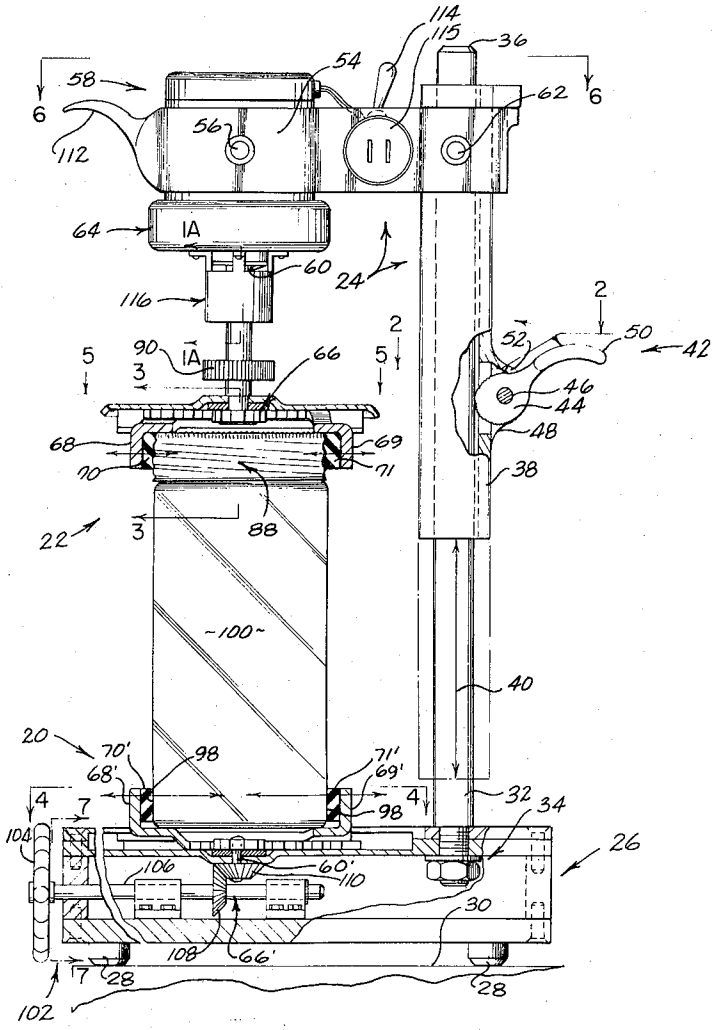
[57] **ABSTRACT**

A jar lid remover for relatively unscrewing and separating threadedly engaged jar lids and jars and comprising a jar base clamp adjustable into clamping relationship with respect to the base of a jar and a jar lid clamp adjustably positioned directly above the jar base clamp for vertical adjustment to accommodate jars of different heights and arranged to be controllably clamped on the periphery of a threaded jar lid and then to be power-driven in a jar-lid unscrewing direction and with the jar lid clamp means being of a type such that the forcible motorized application of lid-unscrewing torque actually increases the extent of the clamping engagement of the clamp means on the lid so as to positively prevent any torsional slippage during a jar lid unscrewing operation. In one preferred form, the jar base clamp means may be of the same type as that disclosed in connection with the jar lid engaging clamp means — that is, arranged to provide amplified clamp-engaging force as a result of the torque produced during a jar lid unscrewing operation.

9 Claims, 9 Drawing Figures



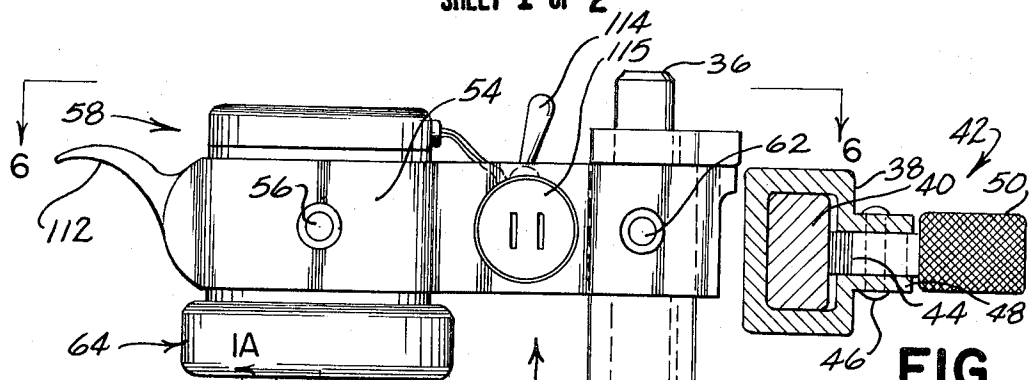


FIG. 2

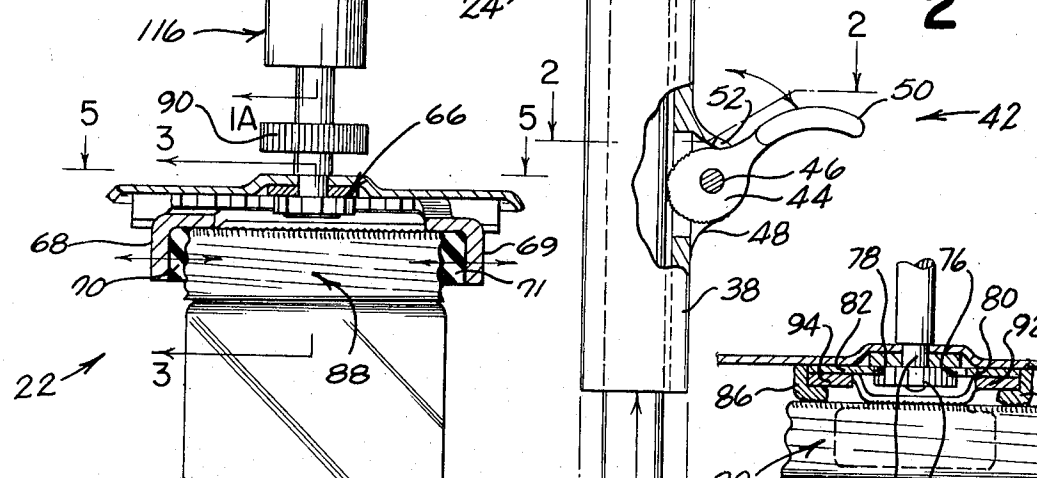


FIG. 1

FIG. 3

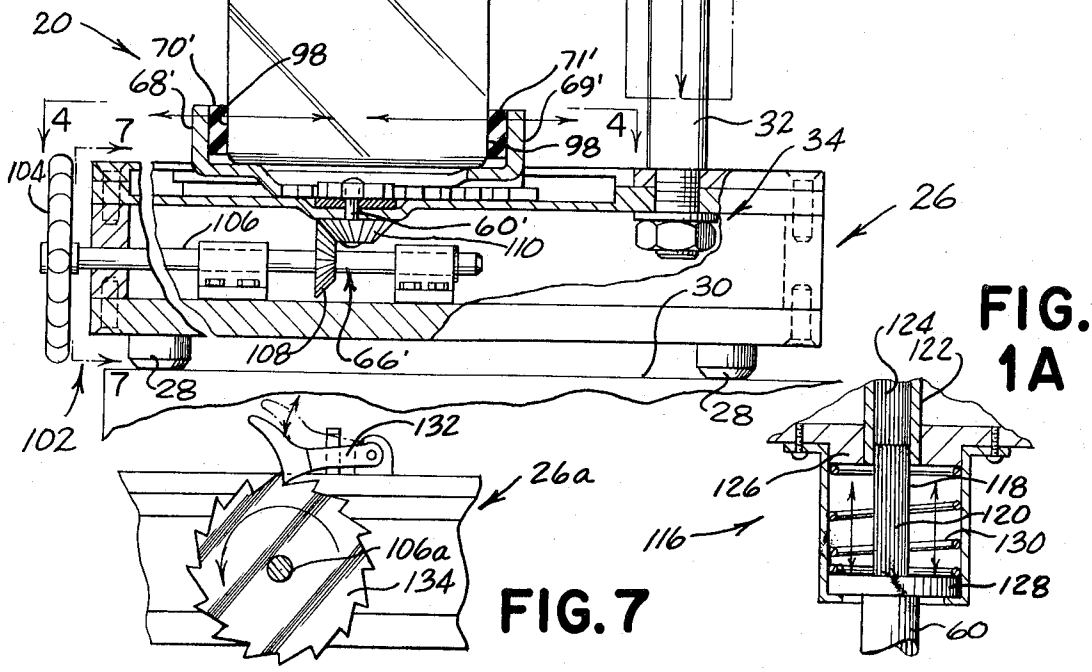


FIG. 1A

FIG. 7

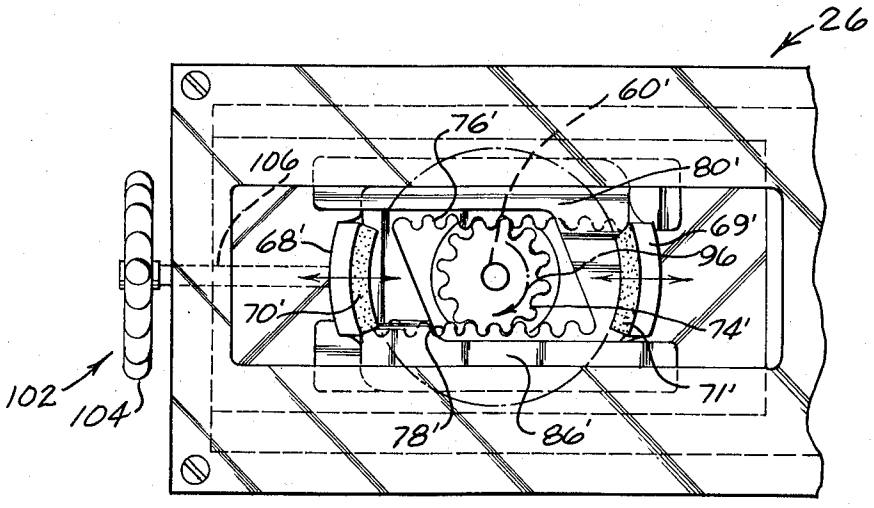


FIG. 4

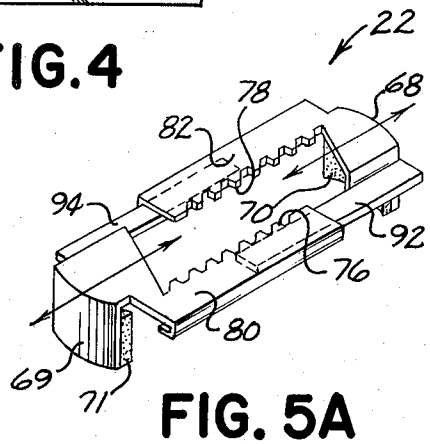
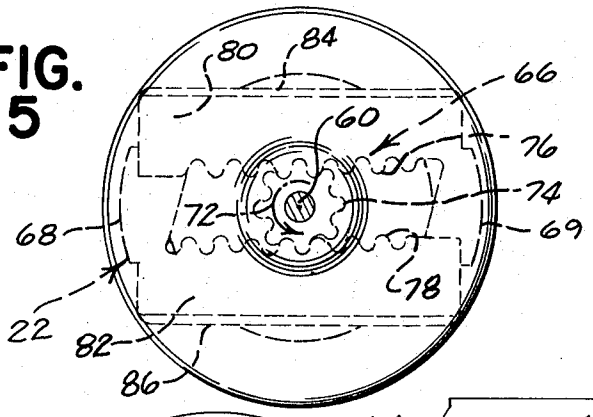


FIG. 5A

FIG. 5



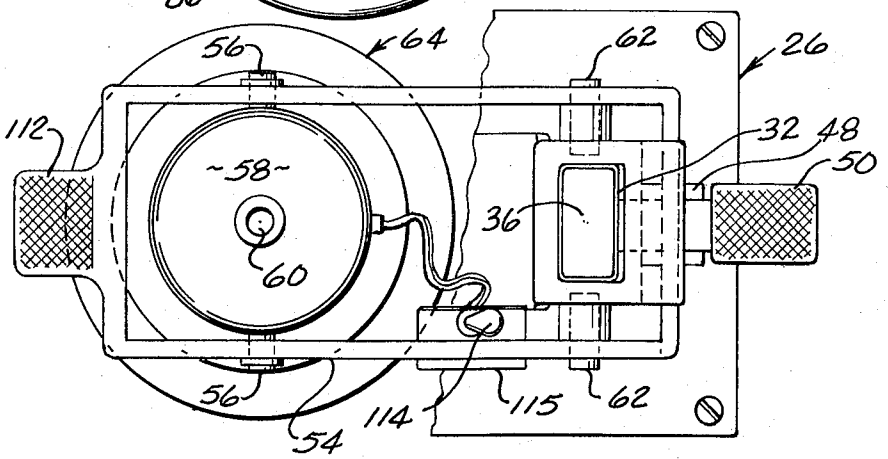


FIG. 6

JAR LID REMOVER

BACKGROUND OF THE INVENTION

A great many items or products are packaged in jars closed by threadedly engaged lids which require the unthreading or disengagement of the lid from the jar whenever it is to be opened. Sometimes this operation is relatively difficult to perform. This may occur for any of several reasons. such as the fact that the jar lid may be initially engaged and sealed so strongly at the factory or packing plant that it requires the manual application of a very considerable degree of torque (which may be beyond the capabilities of a woman or child) in order to initially remove the lid for the first time. Another reason may be the fact that some of the contents of the jar may have seeped into the interface zone or region between the threads of the jar lid and the periphery of the upper end of the jar and may have a binding effect upon the threaded engagement so as to require a very large amount of torque to, in effect, break loose the engagement of the threaded jar lid and of the upper end of the jar. Also, in some cases, the threads of the jar lid may have become slightly corroded and this may increase the frictional engagement of the opposed engaged threads to a degree such as to require excessive torque in order to remove the lid. Alternatively, after the lid has been removed for the first time and the contents of the jar have been partially removed and the lid has been re-engaged by rethreading it back onto the top of the jar, it may be found that some of the jar contents lie in the interface region between the engaged threads as a consequence of previously having poured some of the jar contents out of the open jar in a manner allowing it to drip down into the threads. After re-engagement of the jar lid, this material may harden and provide such a firm engagement between the jar lid and jar as to require excessive torque for subsequent disengagement thereof. It is obvious that some means for minimizing the manual torque required for removing jar lids would be desirable for any person, but particularly for women, children, or other persons who may not have the requisite manual strength and would be especially desirable where numerous jars are to be opened in this manner, and it is precisely this desirable objective which is achieved by the novel apparatus of the present invention, as more thoroughly detailed hereinafter.

SUMMARY OF THE INVENTION

The jar lid remover of the present invention in effect comprises a power tool to facilitate the forcible unscrewing of a jar lid from a jar with which it has been previously threadedly engaged. Of course, in certain cases the reverse operation may be accomplished, comprising the threaded re-engagement of a jar lid on a threaded jar, through the use of a modified form of the apparatus in a reverse manner and this should be understood throughout this present application. However, the remainder of the disclosure will be described primarily with respect to the jar lid removing aspect of the invention since this is the primary purpose of the apparatus, although, as pointed out above it is not limited to this particular usage, but may be employed for applying torque in either direction for either unscrewing cooperation with a jar and jar lid or for the opposite threaded engagement cooperation with respect to a jar and a jar lid, or any other threadedly engagable and disengagable objects, and what follows should be broadly construed in the light of the following statement.

In a preferred form, the jar lid remover includes a lower size-variable, jar base receiving downwardly recessed base clamp means adapted to receive, and be clamped in a torsional force exerting or resisting manner onto, a jar base of any size within a predetermined range of sizes. The apparatus also includes an upper size-variable, jar lid receiving upwardly recessed lid clamp means directly spaced above the previously mentioned base clamp means and arranged to receive, and be clamped in a torsional force applying or exerting manner onto, a jar lid of any size within a predetermined size range. In one preferred form, the upper and lower clamp means are relatively vertically adjustably mounted with respect to each other by mounting post means and sleeve means slidably vertically mounted thereon to allow the upper and lower clamp means to be vertically adjusted into any desired vertical spacing suitable for engaging a jar lid and a jar base of any vertical height within a predetermined size range. Also in one preferred form the vertically adjustable mounting means may be effectively provided with vertical locking means for locking same and the upper and lower clamp means in any selected vertically spaced adjusted position, and also adapted for use in unlocking the vertically adjustable mounting means to allow the vertical space between the upper and lower clamp means to be increased between successive jar lid removing operations in order to facilitate the positioning and removal of successive jars and jar lids therebetween. One of the two clamp means may be provided with power rotating, torque applying means, which in one preferred form, comprises torque applying motor and reduction gearing means having a vertically directed output shaft coupled by appropriate coupling means to one said two clamp means for forcibly applying torque thereto, while the other one of said two clamp means is rotatively immobilized and, therefore, resists the application of torque, which will effectively provide for disengagement of a jar lid from a jar (or conversely, effectively provide for re-engagement thereof).

In one preferred form, at least one of the clamp means is of a type wherein the application of torque thereto in the manner referred to above effectively increases the force of the clamping engagement of the clamp means in an inwardly directed manner whereby to positively prevent slippage of the corresponding exterior portion of a jar or jar lid clamped therein during the forcible application of torque in effectively opposite directions to the jar lid and jar base respectively.

In another preferred form of the invention, both of the clamp means may be of the above clamp-force-increasing type responsive to the application of torque in a manner such as to more firmly grasp the jar lid or jar base portions received therewithin during a jar lid disengagement operation.

In one preferred version of the above grasp-enhancing form of clamp means, it comprises at least a pair of spacedly opposed jaw members provided with inwardly facing frictional abutment means adapted to frictionally engage opposed arcuate portions of the circumference of a jar lid or jar and with said opposed jaw members being provided centrally with rotary-to-linear-movement converter means coupled in oppositely directed senses with respect to each of said jaw

members and a central torque applying shaft of the complete clamp means (usually by way of a central spur gear or pinion driving oppositely directed racks) in a manner such that rotation of said central torque applying shaft in one direction (usually counterclockwise as viewed in a direction looking outwardly or away therefrom) will effectively convert the rotary movement thereof into oppositely directed motion of each of said opposed jaw members toward each other for enhancing the firm grip and engagement of the inwardly directed frictional abutment means thereof with engaged opposed arcuate portions of a jar lid or jar.

In one form of the invention, one of said vertically spaced receiving clamp means may be driven by said torque applying motor means (usually by way of reduction gearing means) while the other of said opposed receiving clamp means may be provided with manually controllable operable means for rotating the central input torque applying shaft thereof into any desired initial relationship thereof corresponding to any desired initial transverse spacing between opposed jaw members of that particular receiving clamp means and, in certain forms, may also be provided with locking means for controllably locking same in said adjusted position whereby to provide for torque-resisting engagement of that particular clamp means with respect to corresponding opposed arcuate portions of jar base or jar lid which is clamped and held whereby.

OBJECTS OF THE INVENTION

With the above points in mind, it is an object of the invention to provide a novel power tool for applying opposed torque to opposite ends of an object which is generally of substantially cylindrically shaped configuration and which, in one preferred form, may comprise a cylindrical jar threadedly carrying at one otherwise open end a threaded lid which is to be power-disengaged from the jar with no effort on the part of a user of the apparatus (and which, in certain forms, may also be employed for the reverse lid re-engagement operation if desired).

It is a further object of the present invention to provide a novel torque applying power tool of the character referred to herein, generically and/or specifically, which may include any or all of the features referred to herein, either individually or in combination, and which is of extremely simple, inexpensive, readily portable construction such as to facilitate the mass manufacture and distribution of the novel power tool of the present invention at a relatively low cost per unit, both as to initial tooling cost and as to the subsequent per unit manufacturing cost, whereby to be conducive to the manufacture, distribution, and use of the invention for the purposes outlined therein or for any substantially equivalent or similar purposes.

Further objects are implicit in the detailed description which follows hereinafter (which is to be considered as exemplary of, but not specifically limiting the present invention), and said objects will be apparent to persons skilled in the art after a careful study of the detailed description which follows.

For the purpose of clarifying the nature of the present invention, two exemplary embodiments of the invention, or of various portions of the invention, are illustrated in the hereinbelow-described figures of the accompanying two sheets of drawings and are described in detail hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a reduced-size, side view, partly in elevation and partly broken away into a vertical cross-sectional plane with respect to the base portion of the apparatus and with respect to both the upper and the lower receiving clamp means, and with respect to the locking means for the vertically adjustable mounting means — all for the purpose of maximizing the extent of the disclosure provided by FIG. **1.**

FIG. **1A** is an enlarged, somewhat diagrammatic and schematic view with portions removed for reasons of drawing simplicity and clarity illustrating the vertical displacement permitting means shown between the motor and the upper clamp means of FIG. **1** and illustrates one exemplary representative form thereof.

FIG. **2** is a fragmentary, cross-sectionally view taken substantially along the multiple planes and in the direction indicated by the arrow **2—2** of FIG. **1** and, thus, shows the representative vertically adjustable mounting means in cross-section and shows the locking means therefor substantially entirely in top plan view. All portions of the apparatus lying below the locking means are removed for reasons of drawing simplicity and clarity.

FIG. **3** is a fragmentary, partially broken away, view largely in vertical cross-section taken substantially along the plane and in the direction indicated by the arrows **3—3** of FIG. **1.** However, it should be noted that the threadedly engaged jar lid, and the jar carrying same, are shown in full elevation rather than in central-plane, cross-section in this view.

FIG. **4** is a fragmentary, partially broken away top plan view taken substantially along the plane and in the direction indicated by the arrows **4—4** of FIG. **1** and illustrates the detailed construction of the lower jar base engaging receiving clamp means, and the base structure of the complete apparatus carrying same, together with the manually operable adjusting means for adjusting the space between the opposed jaws of said clamp means.

FIG. **5** is a fragmentary top view, taken substantially along the plane and the direction indicated by the arrows **5—5** of FIG. **1,** and shows in broken lines the structure of the upper jar lid receiving clamp means which is similar to the lower jar base receiving clamp means of FIG. **4.** In this view all lower portions of the apparatus, including the lower clamp means and base supporting same, are removed for reasons of drawing simplicity and clarity.

FIG. **5A** is a fragmentary view in perspective, illustrating the detailed construction of the complete movable assembly, including each of the two opposed jaw members, such as is present in both the upper clamp means in an opposed set or pair thereof and in the lower clamp means in a generally similar but positionally reversed lower set or pair thereof. This view is somewhat simplified by the removal of all other portions of the apparatus so that the detailed construction of each of said movable jaw-connected assemblies can be best disclosed.

FIG. **6** is a fragmentary top plan view taken substantially along the plane and in the direction indicated by the arrows **6—6** of FIG. **1,** but with left portions of the underlying supporting base being broken away for reasons of drawing simplicity and clarity.

FIG. 7 is a view taken along a plane and in a direction such as indicated by the phantom or broken line arrows 7—7 of FIG. 1, although it should be clearly understood that this view illustrates a modification of the FIG. 1 form of the invention and, therefore, is not in actuality taken on the plane 7—7 of FIG. 1, but is taken on a similar plane of such a modified form of the invention wherein the manually controllably operable adjusting means for adjusting the transverse spacing between the opposed jaw members of the lower clamp means is also provided with manually operable locking means for locking said adjusting means and the opposed lower jaw members in any selected adjusted position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The exemplary form of the invention illustrated in FIGS. 1-6 includes a lower recessed clamp means, indicated generally at 20, and a similar but inverted upper recessed clamp means, such as is indicated generally at 22, in vertically spaced, oppositely directed, superimposed relationship and with the vertical spacing therebetween being controllably adjustable by means of the effective interconnection thereof by vertically adjustable mounting means, one form of which is generally designated by the reference numeral 24 in the exemplary first form of the invention illustrated.

In said exemplary first form of the invention, a lower base portion, indicated generally at 26, is normally substantially horizontally positioned and is provided with support foot means, such as is indicated at 28 adapted to position it on an auxiliary horizontal supporting surface such as a table top, kitchen counter top, or the like, which is indicated in fragmentary, broken-away form at 30 in FIG. 1. Said horizontal base portion 26 carries an upstanding mounting post member 32 which, in the example illustrated, is fastened thereto by threaded fastening means 34 and which extends upwardly to an upper terminus 36 of a selected or desired height. A longitudinal, vertically positioned hollow sleeve 38 is vertically slidably mounted on the mounting post member 32 for vertical, slidable, relative positional adjustment in either vertical direction as indicated by the double-headed arrow 40.

Also, in the example illustrated, vertical locking means, such as is generally indicated in one form at 42, is provided for the purpose of locking the complete vertically adjustable mounting means and, in particular, the relatively vertically slidable sleeve 38 and mounting post member 32 in any desired relatively vertically adjusted position.

In the example illustrated, said vertical locking means 42 comprises a cam member 44 rotated by means of a horizontal mounting pin 46 with respect to an outwardly slotted sleeve enlargement 48 and having an outer operating handle portion 50 extending outwardly through an arcuate slot 52. This makes it possible to unlock the locking means 42 by merely lifting the operating handle 50 and, conversely, to lock the locking means 42 by merely depressing the handle 50 so as to swing the enlarged portion of the cam 44 against the exterior of the mounting post member 32 in a snubbing manner.

The upper end of the sleeve 38 is provided with a horizontally directed mounting collar or frame 54 which is vertically apertured and which receives therethrough and has fastened thereto by appropriate fastening means 56 motor means such as is generally designated at 58, which has an output torque applying shaft 60 directed downwardly therefrom. The other end of the mounting collar 54 is attached, as indicated at 62, to the upper end of the mounting sleeve 38. The motor means 58 and the output shaft 60 are shown as being coupled by way of reduction gearing means, indicated at 64, in order to reduce the usual relatively high revolution rate of the output shaft of most motor means and to correspondingly increase the usual relatively low torque value thereof. However, in certain cases where the motor means 58 is of a slow revolution-per minute, but high-torque type, it is conceivable that it might be used with less reduction gearing means or perhaps none at all. In any case, the arrangement is such that the output shaft 60 is capable of being resolved at a very slow rate, but with extremely high torque sufficient to unscrew the lid from any conventional jar which might conventionally be encountered.

The output shaft 60 is appropriately coupled by coupling means indicated generally at 66 to the previously mentioned upper clamp means 22 for applying torque thereto in a desired direction of rotation which normally will be counterclockwise as viewed from above. If the motor means 58 is of a type which would normally produce output torque in an opposite direction, the direction of rotation thereof may be effectively reversed through the use of appropriate reversing gearing which may effectively comprise a part of the reduction gearing 64, if desired. The detailed structure of such gearing is not shown since such arrangements are well-known in the art and do not touch upon the real inventive concept of the present invention.

In the example illustrated, the upper clamp means 22 comprises a pair of spaced, opposed jaw members 68 and 69, each provided with inner frictional abutment means 70 and 71, such as rubber or elastomeric plastic gaskets or pad means or the like.

In the example illustrated, the coupling means 66 effectively coupling the driven output shaft 60 to the opposed jaw members 68 and 69 of the upper clamp means 22 comprises what might be termed rotary-to-linear movement converter means for converting rotary movement of the output shaft 60 in a counterclockwise direction as viewed from above, and as indicated by the arrow 72, into linear or translatory movement of each of the two opposed jaw members 68 and 69 toward each other. In the example illustrated, said rotary-to-linear movement converter means 66 takes the form of a centrally positioned pinion or spur gear 74 effectively connected to the driven output shaft 60 and in engagement with two sets of rack teeth as indicated at 76 and 78, respectively, carried by two corresponding longitudinal parallel rack or slide members 80 and 82, respectively, and each mounted in a corresponding shouldered slided carrier 84 and 86, respectively. It should be noted that the left jaw member 68 is connected to the rack or slide member 82, which is actually the near rack or slide member when the apparatus in the position shown in FIG. 1 and is the left rack or slide member when the apparatus is in the position shown in FIG. 3. On the other hand the opposite jaw member 69 is connected to the other rack or slide member 80, which is the most remote rack or slide member when the apparatus is in the position shown in FIG. 1 and is the right rack or slide member in the position of the apparatus shown in FIG. 3. Thus it will be

understood that when the motor-driven output shaft **60** is rotated in a counterclockwise direction as viewed from above in the manner indicated by the directional arrow **72**, this will move the rack and slide member **82** and the attached jaw member **68** toward the right as viewed in both FIG. **1** and FIG. **5** and conversely will move the other rack and slide member **80** and the attached other jaw member **69** toward the left as viewed in both FIG. **1** and FIG. **5**, thus effectively moving the two opposed jaw members **68** and **69** toward each other in a manner which will cause the inner compressional abutment pads **70** and **71** to be forced into an even firmer engagement with the exterior of the jar lid, such as is indicated at **88**, than would be the case initially at the start of the jar lid removing operation. Thus during the entire application torque to the upper rotary-to-linear-movement converter means **66** the opposed upper jaws **68** and **69** will be caused to grip the jar lid **88** with such force as to prevent any slippage during the jar-lid-removing operation. Upon the removal of the torque applied by the motor **58** after a jar lid removing operation has been completed, it will be found that the opposed jaw members **68** and **69** can be readily separated to release a removed jar lid by merely manually rotating the output shaft **60** in a clockwise direction as viewed from above. This may be facilitated by the provision of a finger-engagable knurled, or otherwise roughened, portion as indicated at **90**.

In order to maintain proper slidable alignment of each rack and slide member, such as the two shown at **80** and **82** within the corresponding shouldered slide ways **84** and **86**, respectively, each is shown as being provided with an opposed guide and slide member carried by the opposite side of each jaw member from the attachment of the corresponding rack and slide member **80** or **82** thereto. Thus, in the case of the jaw member **68** which is attached to the rack and slide member **82**, an opposed guide and slide member **92** is connected to the other said jaw member **68** in a manner parallel to the rack and slide member **82** and on the opposite side of the spur gear **74** therefrom and slidably engaged within the opposite shouldered slideway **84**. The other jaw member **69** which is attached to the other rack and slide member **80** similarly has an opposed guide and slide member **94** connected to said jaw member **69** in a manner parallel to the rack and slide member **80** and on the opposite side of the pinion or spur gear **74** therefrom and slidably engaged within the opposite shouldered slideway **86**. This causes each opposite, slidably movable, structure comprising each rack and slide member, each guide and slide member and the particular jaw member connected between similar ends of each of said two just described members, to comprise a substantially U-shaped structure with the two different slide members, **82** and **92** in the case of the left jaw member **68**, to be vertically offset from each other so as to cause each of the opposed sets of rack teeth **76** and **78** to lie in the same horizontal plane, while each of the opposed guide and slide members such as the right one **92** shown in FIG. **3** and the left one **94** shown in FIG. **3** also lie in a common horizontal plane vertically displaced from, but immediately vertically adjacent to, the common plane of the opposed set of rack teeth **76** and **78**. This arrangement provides a mounting structure for the sets of rack teeth and the opposed jaw members which is stable and will prevent any tendency for wobble to occur. However, various other equivalent arrangements may be employed within the broad scope of the present invention.

The bottom clamp means **20** is generally similar in construction to the upper clamp means **22** as just described in detail except that the arrangement of the rotary-to-linear-movement converter means, which in the case is generally designated by the reference numeral **66'** is such as to produce exactly the opposite relationship between input torque applied by way of a central torque input shaft **60'** with respect to the direction of translatory movement of the left and right opposed lower jaw members **68'** and **69'** as viewed from above in the manner shown in FIG. **4** so that the direction of rotation of the input shaft **60'** as viewed from above will be clockwise, such as indicated by the directional arrow **96**, which will cause the pinion or spur gear **74'** to also rotate in a clockwise direction as viewed from above and which in turn will cause the rack and slide member **82'**, which in this case is connected to the right hand jaw member **69'** to move toward the left as viewed in FIG. **4**. At the same time the opposite rack and slide member **80'** and the left jaw member **68'**, which is connected thereto, will move toward the right in response to such clockwise rotation of the input shaft **60'** and the spur gear or pinion **74'** as viewed from above in the manner shown in FIG. **4**. This will cause the two lower jaw members **68'** and **69'** to be forcibly moved toward each other into even firmer engagement with respect to opposite arcuate side portions of a jar base, as indicated at **98**, so that counterclockwise forcible rotation of the upper clamp means **22** in the manner previously described and in the direction of the arrow **72** shown in FIG. **5** will be opposed by effective clockwise directed torque in the direction of the arrow **96** shown in FIG. **4**, while the jar base portions **98** are firmly gripped by the opposed lower jaw members **68'** and **69'**. This of course will result in the rapid unscrewing of the jar lid **88** from the threaded upper end of the jar which is generally designated by the reference numeral **100**.

In order to initially adjust the opposed bottom jaw members **68'** and **69'** into initial engagement with a jar base portions **98**, a controllably operable means is provided for rotating the bottom central input shaft **60'** whereby to adjust the initial spacing between the opposed bottom jaw members **68'** and **69'**. Such means is shown in one representative form in FIG. **1** where it is generally designated by the reference numeral **102** and comprises a manually rotatable knob **104** rotated a horizontal shaft **106** which drives a first bevel gear **108**, which in turn drives a second right-angle-positioned bevel gear **110** which drives the previously mentioned central input shaft **60'** of the lower rotary-to-linear-movement converter means **66'**. Thus it will be understood that counterclockwise rotation of the manually operable knob **104**, when viewed from the front thereof, will cause the opposed lower jaw member **68'** and **69'** to be moved toward each other into jar-base-gripping engagement in a manner similar to the relationship of said parts as shown in FIG. **1**. Then the manually operable locking means **42** is released and the entire vertically adjustable mounting means **24** is vertically shifted downwardly from a previous upper position, usually facilitated by the use of the gripping projection or handle **112**, until the upper clamp means **22** touches the jar lid **88**, at which time the locking means **42** may be again locked or the device may be merely

manually held in said position without the use of the locking means 42. The knurled adjustment member 90 is rotated until opposed upper jaws 68 and 69 come together and touch opposed peripheral portions of the jar lid 88, at which time the motor energizing switch 114 may be moved to "on" position, or a foot operated, remotely positioned, energizing switch generally equivalent thereto may be operated to energize the motor 58 temporarily, which will cause it to exert torque in a lid-unscrewing direction on the jar lid 88 which, in turn, will cause a resisting torque to be applied by the lower clamp means 20 to the jar base portions 98 until such time as the lid 88 has been unscrewed from the threaded top of the jar 100, at which time the movable upper portion of the vertically adjustable mounting means 24 carrying the motor 58 and the upper clamp means 22 may be moved upwardly away from the now open jar 100 and the knurled portion 90 may be moved into a jaw-opening position to cause the release of the now removed jar lid 88.

Of course, in the above-described mode of operation, the manually operable handle 104 must remain in the adjusted position, holding the opposed bottom jaw portions 68′ and 69′ in firm engagement with the jar base portions 98 during the jar-lid-unscrewing operation. This may be done manually, or may be done by providing various types of controllably operable locking means for temporarily rotatively immobilizing and locking the handle 104, the shaft 106, either of the bevel gears 108 and 110, the central input shaft 60′ or the opposed lower jaw member 68′ and 69′, until completion of the jar-lid-moving operation. A frictional, or other type, of locking means similar in principle to the previously described locking means shown at 42, a vise type of locking means, ratchet and pawl, or multiple detent locking means, or any other functional equivalent thereof, may be employed for this purpose, all within the broad scope of the present invention since such an arrangement are all well known in the art.

Since the motor 58 in the example illustrated, is an electric motor (although it is not specifically so limited in all forms of the invention), an input connector or plug, such as is indicated at 115 in FIG. 1, is provided on the upper collar or supporting frame 54 which carries the motor 58 and is connected to the motor and is adapted to have an electrical connector or plug inserted thereinto which, of course, will have its opposite end connected by way of an extension cord, to a suitable source of electrical power for operating the motor means when energized by closure of the switch means 114.

In order to facilitate a jar-lid-unscrewing operation, it should be understood that some means should be provided for allowing a relatively small vertical movement of the jar lid 88 with respect to the jar 100 to occur during a jar-lid-unscrewing operation. This may be provided through the use of various types of resilient means providing for the requisite small degree of relative vertical movement of the jar lid 88 and jar 100 and may comprise horizontal compressible abutment or pad means positioned within the flat portions of either or both of the upper and/or lower camp means 20 and 22, or such relative vertical-displacement-providing means may be positioned either above the upper clamp means 22 or below the lower clamp means 20 or in both such locations, if desired. One exemplary representative, but non-specifically limiting, form of such vertical-displacement-providing means is generally indicated in somewhat diagrammatic form at 116 in FIG. 1 and may take a form such as is shown in enlarged, fragmentary, partly-broken-away, somewhat over simplified detail in FIG. 1A, where it is shown as comprising an inner-shaft portion 118 exteriorly splined as indicated at 120 and vertically slidably mounting within hollow sleeve portion 122 having an interior spline as indicated at 124 vertically slidably but non-rotatively engaging the exteriorly splined shaft portion 120 and with the sleeve 122 having an abutment shoulder 126 spaced from a lower abutment shoulder 128 carried by the lower shaft 60, with resilient or spring means such as indicated at 130, interposed between the two shoulders 126 and 128. Of course the lower shaft portion 60 is connected to the spur gear or pinion 74 as previously described, while the upper hollow sleeve portion 122 is connected to the output of the reduction gearing 64 and is the driving shaft portion. It is clear that the arrangement just described will provide positive torque transmission, but will allow the required vertical shifting movement mentioned above, which is needed when the jar lid 88 is vertically unscrewed from the jar 100. Of course it should be understood that the same type of arrangement may be provided below the lower clamp means 20 instead of at the upper location shown if desired, and that the arrangement shown is merely representative of many different forms which said vertical-displacement-providing means 116 may take within the broad scope of the present invention.

One arrangement of the type mentioned hereinbefore, having one particular, exemplary, representative, but non-specifically limiting, form of such locking means for positively locking the controllably operable bottom-shaft-rotating means, indicated generally at 102 in the first form of the invention described hereinbefore, is illustrated fragmentarily in FIG. 7 and, therefore, parts identical to, similar to, or functionally equivalent to corresponding parts of the first form of the invention are designated in FIG. 7 by similar reference numerals followed by the letter *a*, however. In this modification, it should be noted that the front end of the base 26*a* carries a finger-operating pawl member 132 which cooperates with a ratchet portion 134 carried by the shaft 106*a* and arranged to freely allow counterclockwise rotation of said shaft 106*a*, but to prevent clockwise rotation thereof until finger operation of the pawl 132 releases same. Thus, it will be understood that it will be possible to initially adjust the opposed lower jaw members by rotating the shaft 106*a* in a counterclockwise direction, which will cause the lower jaw members to move toward each other into gripping engagement with the jar base portion in a manner similar to that previously described in connection with FIG. 1 of the first form of the invention and that release of the handle (such as that shown at 104 in FIG. 1) will cause the pawl 132 to prevent any reverse or clockwise rotation of the shaft 106*a*, thus in effect holding the opposed lower jaw members in firm engagement with opposite arcuate portions of the jar base, similar to those shown at 98 in FIG. 1. After completion of a jar-lid-unscrewing operation in the manner previously described, the finger-operated-pawl 132 may be moved into disengaged position with respect to the ratchet portion 134 so that the lower jaws will be released and can be opened to release the jar base for removal therefrom.

It should be understood that the figures and the specific description thereof set forth in this application are for the purpose of illustrating the present invention and are not to be construed as limiting the present invention to the precise and detailed specific structure shown in the figures and specifically described hereinbefore. Rather, the real invention is intended to include substantially equivalent constructions employing the basic teachings and inventive concept of the present invention.

What is claimed is:

1. A jar lid remover for relatively unscrewing and separating threadedly engaged jar lids and jars, comprising: a lower size-variable jar base receiving, downwardly recessed base clamp means for receiving and clamping in a self-tightening, torsional force-exerting manner a substantially cylindrical jar base of any size within a size range lying between a predetermined minimum size and a predetermined maximum size; an upper size-variable jar lid receiving, upwardly recessed lid clamp means for receiving and clamping in a self-tightening torsional force-exerting manner a substantially cylindrical jar lid of any size within a size range lying between a predetermined minimum size and a predetermined maximum size; controllably operable, clamp-adjusting means for varying the size of each of said upper and lower clamp means; relative torque-applying means cooperable with respect to said clamp means for producing relatively oppositely directed torque between said upper and lower clamp means and a jar lid adapted to be clamped and engaged within said upper clamp means and a jar base adapted to be engaged and clamped within said lower clamp means for power-unscrewing such a jar lid from such a jar; said relative torque-applying means including a torque-applying motor means provided with and driving a vertically directed input shaft connected to one of said upper and lower clamp means and torque-resisting means provided with and driving a vertically directed input shaft controllably coupled to said other one of said upper and lower clamp means; and means mounting each of said upper and lower clamp means for rotation around a common, vertically directed axis of rotation on which such a jar lid and jar base are adapted to be vertically spacedly similarly centered, said relative torque-applying means being cooperable with respect to each of said clamp means in a manner such that relative reverse rotation of either of said upper or lower clamp means with respect to the corresponding input shaft in a relatively reverse direction from the driving direction of forward rotation of said corresponding input shaft during the production of said relatively oppositely directed torque between said upper and lower clamp means, causes a corresponding, self-tightening action of said corresponding upper or lower clamp means with respect to such a jar lid or jar base, respectively, adapted to be engaged and clamped therewithin.

2. Apparatus as defined in claim 1, wherein each of said receiving clamp means comprises a pair of spacedly opposed jaw members provided with frictional abutment means on inner surfaces thereof adapted to frictionally engage opposed arcuate portions of the circumference of a jar lid and jar base, respectively, with each set of said opposed jaw members being provided with corresponding upper and lower rotary-to-linear-movement converter means coupled in oppositely directed senses with respect to each jaw member of the corresponding one of the two different sets of jaw members and with the corresponding input shaft of the corresponding set of jaw members in a manner such that the application of torque by way of said input shaft in a counterclockwise direction as viewed from above with respect to said upper clamp means and in a clockwise direction as viewed from above with respect to said lower clamp means will convert said relative oppositely directed torque of said two input shafts into similar inwardly directed motion of the two opposed jaw members of both the upper and lower sets of said jaw members toward each other and such that relatively reverse rotation of said upper clamp means in a clockwise direction as viewed from above with respect to said upper input shaft and such that relatively reverse rotation of said lower clamp means in a counter-clockwise direction as viewed from above with respect to said lower input shaft will, in each case, convert such reverse relative rotation of said upper or lower clamp means with respect to said upper or lower input shafts into inwardly directed, self-tightening clamping motion of the two opposed jaw members of said upper or lower sets of said jaw members, respectively, toward each other for enhancing the transmission of oppositely directed torque to corresponding jar lid and jar base portions of a jar adapted to be engaged between said upper and lower clamp means.

3. Apparatus as defined in claim 2, wherein said torque-applying motor means is positioned above said upper clamp means and is provided with reduction gearing means connected in driving relationship with respect to the upper one of said input shafts connected to the upper clamp means, and wherein said oppositely positioned torque-resisting means controlling the operation of the other one of said two clamp means is positioned below the lower clamp means and is coupled to the lower input shaft comprising the input member to said lower clamp means.

4. Apparatus as defined in claim 3, wherein said torque applying motor means is provided with a positionally vertically adjustable mounting collar receiving and mounting said motor means in vertically superimposed and spaced relationship above said upper clamp means which is above said lower clamp means with the input shaft to said upper clamp means extending downwardly from said motor means and being directly vertically superimposed but vertically spaced above the lower input shaft to the lower clamp means.

5. Apparatus as defined in claim 3, wherein said upper jaw lid receiving clamp means is downwardly directed and provided with and mounted on vertically adjustable mounting means including vertical mounting post means and slidable sleeve means cooperable for vertical movement downwardly until said jar lid receiving clamp means engages a jar lid which is to be removed.

6. Apparatus as defined in claim 5, wherein said motor means is provided with a mounting collar receiving and mounting said motor means with said input shaft vertically downwardly directed in laterally offset, substantially parallel spaced relationship with respect to said vertical mounting post means and directly superimposed above said upper and lower clamp means.

7. Apparatus as defined in claim 6, wherein said mounting collar is laterally connected to said slidable sleeve means which is vertically downwardly directed

in encompassing relationship along a portion of said vertical mounting post means.

8. Apparatus as defined in claim **7,** including vertical locking means for locking said vertically adjustable mounting means in any selected vertical position with said jar lid receiving clamp means in engagement with a jar lid which is to be removed and for subsequently locking said jar lid receiving clamp means in an upper inoperative position during periods of non-use and between successive use periods.

9. Apparatus as defined in claim **8,** wherein said vertical locking means comprises a controllably operable locking cam carried by one of said two relatively vertically slidable members comprising said sleeve means and said mounting post means and forcibly engageable and cooperable with the other of said two relatively vertically slidable members for temporarily vertically immobilizing same.

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