July 4, 1944. H. E. GANTZER 2,352,949

CONTAINER HANDLING APPARATUS

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Fig. 1.

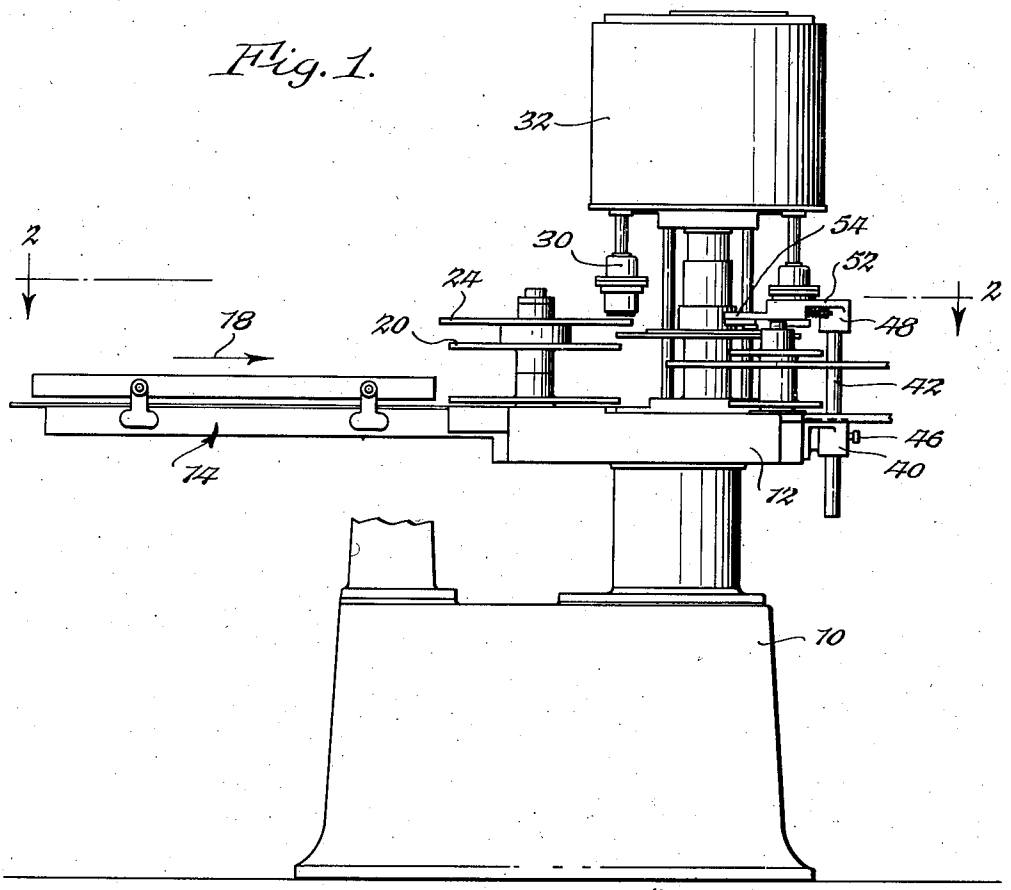
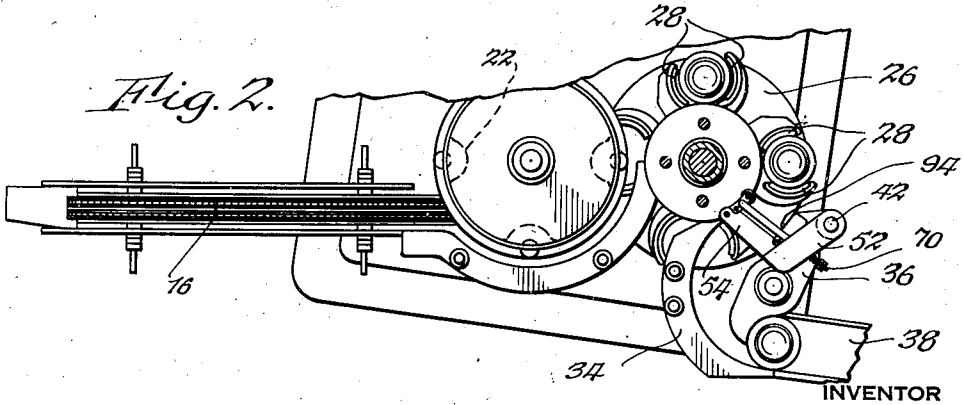


Fig. 2.



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Fig. 3.

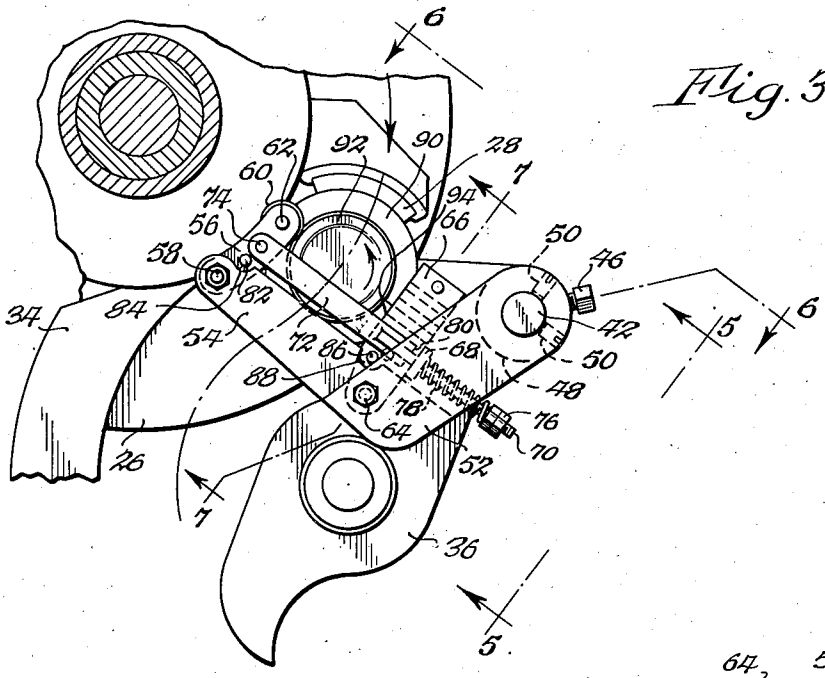


Fig. 4.

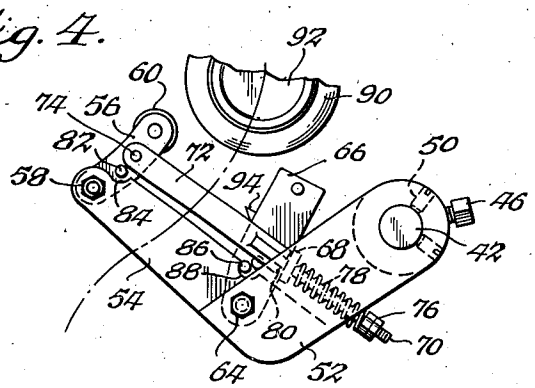
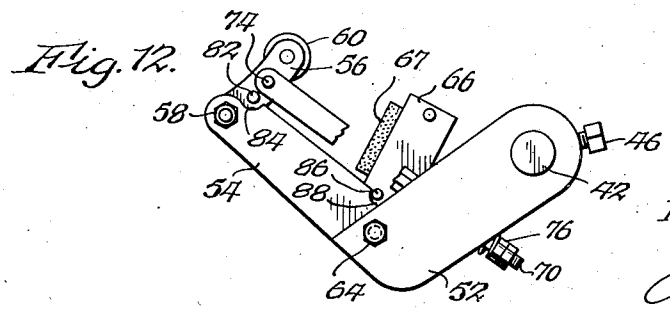


Fig. 12.



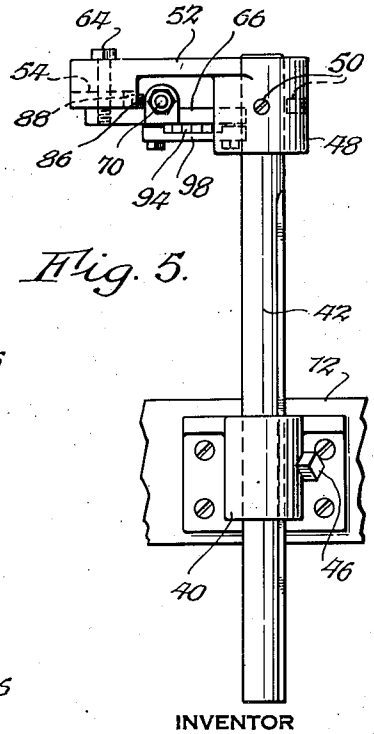


Fig. 5.

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CONTAINER HANDLING APPARATUS

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Fig. 6.

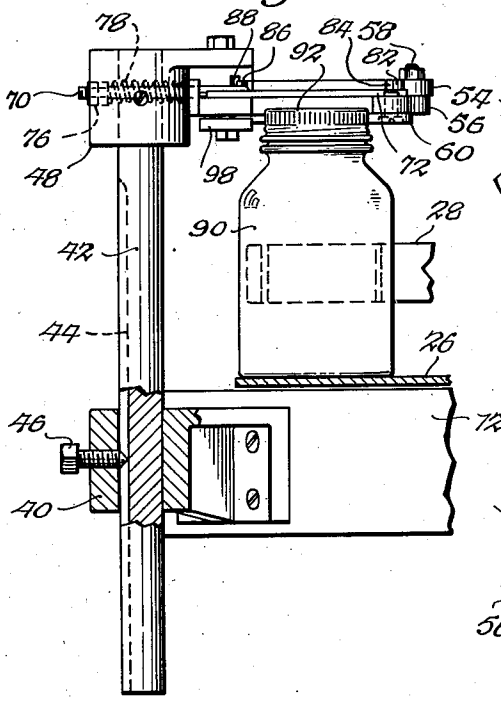


Fig. 9.

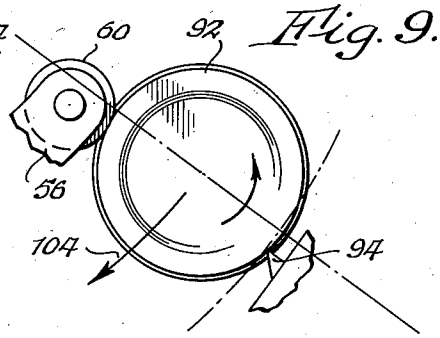


Fig. 10.

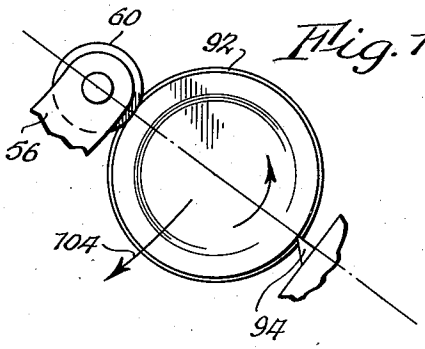
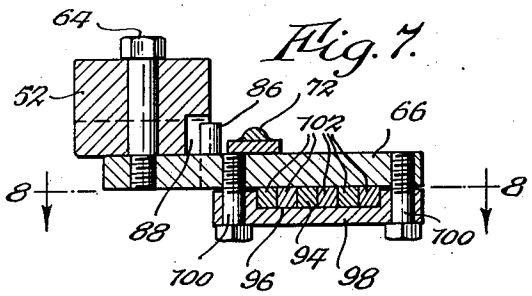


Fig. 7.



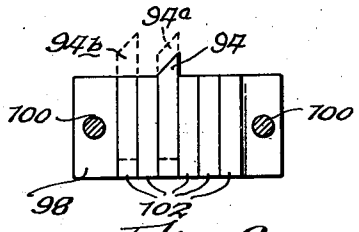
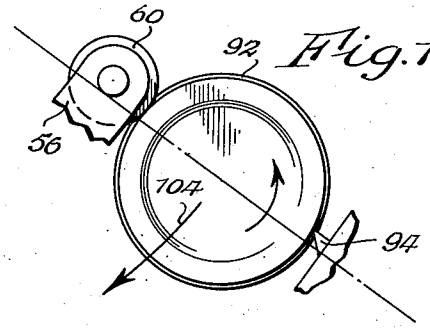


Fig. 8.

Fig. 11.



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Patented July 4, 1944

2,352,949

UNITED STATES PATENT OFFICE

2,352,949

CONTAINER HANDLING APPARATUS

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Application September 11, 1942, Serial No. 457,966

10 Claims. (Cl. 226—88)

The present invention relates to apparatus for applying closures to containers and, more particularly, relates to the provision of means for so relating the closures to the containers that the closures will be uniformly loosely applied thereto to permit of some further treatment of the contents of the container before the same is finally sealed.

In the packaging of many commodities such as food products and particularly such as coffee, it is frequently desired to assemble a closure device with a container and to leave the closure device in a somewhat loose condition whereby air may be evacuated from the interior of the container or whereby the air may be replaced by some inert gas, and while this condition persists the closure is finally sealed. In one typical packaging system involving the evacuation of a filled container, the container may comprise a glass jar adapted to hold a predetermined quantity of coffee to which is applied an ordinary screw cap. There are commercially available capping devices which are adapted to rapidly and efficiently position such caps upon such containers. These commercially available capping devices are relatively large and it is not altogether feasible to enclose the entire device within a vacuum chamber. It is therefore a normal procedure to employ a standard form of capping device and to conduct the capped containers to an evacuating station arranged in the production line beyond the capping device. It is apparent that the containers must not be finally sealed when they are operated upon by the vacuuming device because it is necessary for the interior of the container to be exposed to the action thereof. Various procedures to this end have been adopted with varying degrees of success. It is possible to adjust the capping device in such manner that it will apply the caps in a loose condition, but such procedure is not entirely satisfactory inasmuch as it is virtually impossible to secure a uniform degree of looseness in each of the successively capped containers. Minor variations occur in the containers themselves and in the caps, and a slight misshaping of the threaded portions of one or the other of these elements may result in termination of the capping operation while the cap has yet three or four revolutions before final sealing. Other cap and container combinations within the same group may result in such loose threaded relation that the cap may be inadvertently too tightly applied. In either of these events an imperfect package will be produced. The ordinary form of evacuating apparatus includes a chamber into which the containers are successively introduced and within which is located additional capping chucks which are caused to rotate when evacuation of the container is complete. The rotation of these additional chucks must be relied upon to effect final sealing of the containers. In order to simplify this type of apparatus and to speed the operation thereof, the additional chucks are given a very limited amount of rotation. It is clear therefore that the supply of containers whose caps uniformly need but a small fraction of a revolution for final sealing will lead to increased speed of operation and the production of perfect packages.

Accordingly, it has been found that the best procedure is to apply the caps in the original capping machine to a degree of tightness normally encountered in the final seal. The caps are then reversely rotated to a definite extent which experience has taught to be sufficient to permit evacuation and which is within the limitations of ordinary evacuating apparatus. The reverse rotation may be imparted to the caps by a carefully supervised hand operation, but the need for such careful supervision renders this procedure impractical. It has also been proposed to so construct the capping machine as to tightly apply the caps by rotation of the capping chucks in one direction and then to impart to the chucks a predetermined rotation in the opposite direction whereby to uniformly loosen the caps. This latter procedure is entirely satisfactory from an operational standpoint but it involves the necessity for construction of a special capping machine.

It is therefore an object of the present invention to provide a simple apparatus in the nature of an attachment which may be associated with a capping machine or with the evacuating apparatus or with the conveying and transferring apparatus lying between a capping machine and the evacuating apparatus, which attachment will impart to the caps upon tightly capped containers a predetermined reverse rotation sufficient to expose the interior of the container for subsequent treatment and absolutely uniform in extent.

It is a further object of the present invention to provide an attachment of the type set forth which may be simply adjusted to impart varying degrees of reverse rotation to the caps of tightly capped containers upon which it operates.

It is a further object of the present invention to provide an attachment of the type set forth which is exceedingly simple in construction, reliable in operation, and unlikely to need repair.

Other and further objects will become more ap-

parent upon a consideration of the following detailed description taken in conjunction with the drawings forming a part of the specification. In the drawings wherein similar characters of reference indicate similar parts throughout the several views, there is illustrated a preferred, but obviously not necessarily the only, embodiment of the present invention.

Referring to the drawings in detail:

Fig. 1 is an elevation of a capping machine embodying the present invention;

Fig. 2 is a horizontal cross-sectional view of the same taken along the line 2—2 of Fig. 1;

Fig. 3 is an enlarged detailed view similar to Fig. 2 but showing only a portion of the capping machine and the attachment thereto embodying the present invention;

Fig. 4 is a view similar to Fig. 3 showing the parts in a different position;

Fig. 5 is an elevational view taken from the line 5—5 in Fig. 3;

Fig. 6 is a section along the irregular line 6—6 in Fig. 3;

Fig. 7 is a section taken along the line 7—7 of Fig. 3;

Fig. 8 is a horizontal section taken along the line 8—8 of Fig. 7;

Figs. 9, 10 and 11 are detailed views showing the operation of the apparatus of the present invention; and

Fig. 12 shows a modified form of frictioning device which may be employed.

Each of the sectional views has been taken in the direction of the arrows associated with the respective section lines.

Referring now to Fig. 1, there is shown a capping machine of commercial form to which the present invention may conveniently be applied. In general, this machine comprises a base 10 containing the necessary motors and drive apparatus and upon which is supported a capping table 12. Containers are conducted to the capping table 12 by an intake conveyor indicated generally at 14 and upon which the containers are advanced by the movement of conveyor chains 16 in the direction of the arrow 18 into engagement with a star-shaped feeding wheel 20, rotatably supported upon the table 12. The feeding wheel 20 has notches 22 formed therein and within which the containers are adapted to be seated. It will be understood that the notches 22 are suitably shaped for reception of the particular container being operated upon. Above the feeding wheel 20 and driven for rotation therewith is a cap-positioning wheel 24 to which caps are fed by the discharge apparatus of suitable cap-sorting means not shown herein. It will be understood that the caps are furnished to the wheel 24 in such manner as to be conducted thereby in positions vertically aligned with each container seated within a notch 22 of the feeding wheel 20. Reference is here made to Patent 2,241,455 granted May 13, 1941, to Gantzer in which there is a detailed showing of one manner in which the caps may be associated with the containers and in which the following briefly described apparatus is shown in considerably greater detail.

The containers and the caps aligned therewith are carried to the cap-applying station through the rotation of the wheels 20 and 24. In this station, the containers are transferred from the wheel 20 to a star wheel 26 which includes suitable automatically-operable gripping jaws 28 for engaging the containers and holding them against rotation relative to the wheel 26. In the meantime, the caps carried by the wheel 24 are picked up by cap-applying chucks 30 carried within the capping turret 32. The chucks 30 are arranged for suitable motions necessary to pick the caps from the wheel 24 and to lower them into engagement with the respective containers held by the jaws 28 of the wheel 26. When the caps have been thus lowered into engagement with the containers, the chucks 30 are rotated in proper direction to screw the caps upon the containers. Any suitable system of control of the chucks 30 may be employed and it will be clearly understood that any such system will result in the application of the caps to a suitable degree of tightness necessary for proper sealing of the container. Reference is here made to U. S. Patent 1,754,461 granted April 15, 1930, to Cundall and to U. S. Patent 1,773,960 granted August 26, 1930, to Cundall for illustrations of suitable chuck control systems.

When the capping operation is complete, the chucks 30 are raised from engagement with the caps and the capped containers are ready for discharge from the machine. Discharge may be effected by release of gripping engagement of the jaws 28 with the containers, as shown in said Patent 1,754,461 or in U. S. Patent 2,285,267 granted June 2, 1942, to Gantzer, and impact of the containers with a suitable curved guide 34 positioned upon the capping table 12. A rotary discharge wheel 36 may be provided for engaging each successively presented container and swinging it around the curved path defined by the guide 34 into a discharge chute 38. The discharge chute 38 may carry the containers to the next succeeding station by any suitable means not shown.

The apparatus of the present invention may be attached to the commercial capping machine above briefly described in such position as to operate upon the containers immediately that the caps have been tightly applied thereto. Thus, a convenient location is that illustrated in the drawings wherein this apparatus is positioned in the path of the containers as they move from the star wheel 26 into the curved path defined by the guide 34. At this particular point, the containers are still gripped by the jaws 28, and they will remain so gripped until the discharge wheel 36 is brought into contact therewith for the purpose of swinging the containers from the wheel 26. When the engagement between the discharge wheel 36 and the container is complete, the jaws 28 will be released in a manner fully disclosed in said Patents 1,754,461 or 2,285,267. Thus, the interval of time existing between the release of the capping chuck from the tightly applied cap to the release of the container from the jaws 28 is availed of in the present invention to reversely rotate the caps to a uniform predetermined extent sufficient to permit subsequent evacuation of each container.

To this end, a bracket 40 is secured to the capping table 12 and a vertical bore is formed therein adapted to receive a post 42. The post 42 is provided with a V-shaped groove 44 (see Fig. 6) adapted to receive the end of a set screw 46 threaded into the bracket 40. The post 42 may thus be vertically adjusted within the bracket 40 and secured in adjusted position by tightening of the set screw 46. The set screw 46 also serves to hold the post 42 against any rotation about its own longitudinal axis. At its upper end, the post 42 receives a hub 48 into which is threaded a pair of set screws 50 (see Fig. 3) adapted to se-

cure the hub in a rotated position of adjustment relative to the post 42. An arm 52 and an extension thereof 54 are secured to the hub 48 and they may be adjustably positioned across the path of the containers carried by the star wheel 26 (see Fig. 3). From the construction just described, it will be apparent that the arm 52 and its extension 54 may be positioned in horizontal and vertical planes suitable for operation upon the particular containers being handled by the capping machine.

At the inner end of the extension 54, there is mounted a strap 56 freely pivoted upon a stud 58 carried by the extension 54. The strap 56 carries at its free end a roller 60 which is freely rotatable upon a stud 62 secured to the strap 56. The roller 60 extends downwardly from the strap 56 and it is intended that the arm 52 be so vertically positioned that the roller 60 will engage the peripheral portion of the caps secured to containers passing through this device. A proper position of adjustment of the parts to this end is illustrated in Fig. 6.

At its outer end, the extension 54 has freely pivoted thereto upon a stud 64 a lever 66 extending in generally parallel relationship with the strap 56. The lever 66 has formed thereon a perforated ear 68 which loosely receives a reduced cylindrical extension 70 of a link 72 freely pivoted at 74 at its other end to the strap 56. The extension 70 is preferably threaded for the reception of lock nuts 76 between which and the perforated ear 68 is confined a compression spring 78. The compression spring 78 thus tends to draw the lever 66 and strap 56 toward one another. The extent of movement of the lever 66 and strap 56 toward one another is limited by abutment of the ear 68 against a shoulder 80 formed upon the link 72. The shoulder 80 is formed in such position as to permit the lever 66 and strap 56 to swing toward one another into a position wherein the distance therebetween is somewhat less than the diametral width of the caps upon the containers.

The strap 56 has formed thereon a stud 82 adapted to abut with a notch 84 formed on the extension 54. Similarly, the lever 66 has formed thereon a stud 86 adapted to abut with a notch 88, also formed upon the extension 54. The spacing between the notches 84 and 88 and the positioning of the studs 82 and 86 are such that abutment will not occur between both of the studs 82 and 86 and their respective notches when the lever 66 and strap 56 are moved toward one another to the greatest extent permitted by the shoulder 80. Thus, the lever 66 and strap 56 are yieldably urged toward one another by the spring 78 and they are freely floatable about their respective pivots 58 and 64 within the limitations of spacing between the studs 82, 86 and their respective notches 84, 88.

The lever 66 is provided with some suitable form of relatively stationary friction device for engagement with the periphery a rim of a cap carried by a container. This friction device is preferably so positioned as to engage the cap in non-slipping relation in a position generally diametrically opposite the engagement therewith of the roller 60. The friction device may comprise a block 67 of rubber or leather or metal having a knurled surface secured to the lever 66 as shown in Fig. 12. In its preferred form, the friction device comprises a single, relatively sharp tooth which is adapted to engage the knurls formed upon the rim of one standard form of screw cap. It will be understood that this particular friction device is suitable for that particular type of cap which is chosen for illustration herein and that other forms of friction devices such as those suggested above may be adopted for different forms of caps.

As shown in Fig. 6, a container 90 is engaged between the gripping jaws 28 of the star wheel 26 and it has tightly screwed thereon a cap 92 which is formed with a knurled periphery of familiar form. As stated above, the roller 60 engages one portion of this knurled periphery and the friction device upon the lever 66 engages the substantially diametrically opposite portion thereof. The adjustment of the device is such that the spacing between the roller 60 and the friction device of the lever 66 is somewhat less than the diametral width of the cap 92, and as the cap is brought between these elements they are forced apart thereby against the force of the spring 78. The friction device is relatively stationary, and since the container is gripped by the jaws 28 in its motion past this stationary friction device, the tendency will be for the friction device to hold the cap and cause it to rotate about the point of engagement between the cap and the friction device. Continued movement of the container will thus result in a relative rotation of the cap to the container in a direction opposite to that in which the container is moving. Assuming that the cap has been applied to the container by a clockwise rotation of the capping chucks 30, movement of the capped container past the friction device in the manner above described will result in a relatively counterclockwise rotation of the cap whereby to loosen it.

The action above described is generally a rolling of the cap upon the friction device. Thus, if the friction device is a block of rubber or other material presenting an extensive surface, the rim of the cap will roll thereupon and the cap itself will rotate relative to the container.

In the form of the device chosen for illustration with the particular cap 92, the friction device comprises a blade 94 extending from the lever 66 inwardly toward the roller 60. As shown in Figs. 7 and 8 the blade 94 is carried beneath the lever 66 within a channel 96 formed in a clamping plate 98 held to the lever 66 by screws 100. A suitable number of spacing blocks 102 similar in cross-section to that of the body of the blade 94 is positioned within the channel 96 and they are so proportioned as together with the blade 94 to fill this channel. For a purpose to be hereinafter described, the blade 94 may be moved into any of the positions occupied by the spacing blocks 102 and the blocks will, of course, be suitably rearranged.

While the operation of the device has been generally described as the detailed description progressed, it will be briefly reviewed with particular reference to Figs. 9, 10 and 11. In Fig. 9, the cap 92 has advanced to such position as to be brought into engagement between the roller 60 and blades 94. Further movement of the cap in the direction of arrow 104 will force the roller 60 and blade 94 apart against the spring 78 and will result in the blade 94 holding a single point in the periphery of the cap against rotation. Inasmuch as the container with which the cap is associated is still held by the jaws 28 a relatively counterclockwise rotation will occur between the cap 92 and its associated container. In Fig. 10, the cap has advanced to such position that the roller 60 and the blade 94 are diametrically opposite one another. In Fig. 11, the cap has pro-

ceeded to such position that the roller 60 and blade 94 have swung toward one another to the extent permitted by the shoulder 80 on the link 72. It will be apparent that when this latter position is reached no further force will be exerted upon the cap between the roller 60 and blade 94 by the action of the spring 78. The relative counterclockwise rotation of the cap and container will then cease.

The action of the blade 94 is very similar to the action of an extensive rolling surface as described above. The blade engages the periphery of the cap as shown in Fig. 9, retracts against the spring 78 as shown in Fig. 10, and advances under pressure of the spring 78 as shown in Fig. 11. Thus, in effect, the single blade 94 is equivalent to an extended surface.

It will be recalled that the lever 66 and the strap 56 may approach one another only to the extent permitted by abutment of the ear 38 with the shoulder 80. Thus in the event it is desired to impart a greater or lesser amount of counterclockwise movement to the cap of a container the blade 94 may be moved lengthwise of itself to vary the distance between its edge and the periphery of the roller 60. When the edge of the blade 94 is close to the roller 60 the cap will be engaged earlier and will remain engaged longer than it will when the blade is farther away.

The adjustment of the blade 94 may be effected by temporarily loosening the screws 100 whereupon the blade 94 may be moved lengthwise of itself to desired position. An example of a position in which the blade is relatively closer to the roller 60 is shown in broken lines in Fig. 8 at 94a.

It will be understood that the lengthwise adjustment of the blade 94 aforesaid will result in a change in the angle of approach of the edge of the blade 94 to the periphery of a cap. Such change in the angle of approach may not cause any difficulty, particularly in the event caps with knurled peripheries are involved. However, in other instances it may be advisable in order to insure proper gripping action to make a compensatory adjustment of the angle of approach when a lengthwise adjustment of the blade has been made. To this end the blade 94 may be moved to one or the other of the positions occupied by the spacer blocks 102 at the same time that a lengthwise adjustment of the blade is made. An example of such a movement is illustrated in Fig. 8 wherein the blade 94 may be moved to a position shown in broken lines at 94b. In this position the blade has been moved lengthwise of itself whereby to bring its edge closer to the roller 60 than it is in the position shown in full lines. The blade has also been moved into a position formerly occupied by one of the spacer blocks 102 closer to the pivot 64 of the lever 66 to approximately compensate for the change in angle of approach resulting from the lengthwise movement of the blade.

From the above detailed description, it will be apparent that there is provided a structural embodiment capable of accomplishing the objects of the present invention. This structure has been shown as an attachment applied to a capping machine. It is obvious that the attachment may be applied at any suitable point within a production line, the only requirement being that the container body be held against rotation about the point of engagement between the friction device and the periphery of the cap for a suitable period of time to permit of the operation of this attachment. Modifications and variations will occur to those skilled in the art, and it is the intention that the above detailed description shall be taken in an illustrative rather than a limiting sense whereby any such modifications and variations falling within the scope of the appended claims are intended to be covered thereby.

I claim:

1. In apparatus for handling containers having screw caps tightly applied thereto, the combination of cap-unscrewing means; and means for moving capped containers through a predetermined path of travel relative to said cap-unscrewing means; said cap-unscrewing means being positioned in the path of travel of the caps carried by said containers and comprising, friction means adapted to engage the rim of a cap in non-slipping relation, anti-friction means, and means to urge said last two means, respectively, into engagement with generally diametrically opposed regions of the rim of each cap as each of said caps passes between said friction means and said anti-friction means during movement of each container through a definite portion of said path of travel to cause a predetermined amount of rotation of each of said caps relative to its associated container.

2. In apparatus for handling containers having screw caps tightly applied thereto, the combination of cap-unscrewing means; and means for moving capped containers through a predetermined path of travel relative to said cap-unscrewing means; said cap-unscrewing means being positioned in the path of travel of the caps carried by said containers and comprising, friction means adapted to engage the rim of a cap in non-slipping relation, anti-friction means spaced from said friction means in a direction substantially transverse of the path of travel of said caps, means to urge said friction means and said anti-friction means, respectively, into engagement with generally diametrically opposed regions of the rim of each cap as each of said caps passes between said friction means and said anti-friction means during movement of each container through a definite portion of said path of travel to cause a predetermined amount of rotation of each of said caps relative to its associated container, and means for varying the spacing between said friction means and said anti-friction means for changing the predetermined amount of rotation of each of said caps.

3. In apparatus for handling containers having screw caps tightly applied thereto, the combination of cap-unscrewing means; and means for moving capped containers through a predetermined path of travel relative to said cap-unscrewing means; said cap-unscrewing means being positioned in the path of travel of the caps carried by said containers and comprising, a blade having an edge located in the path of travel of said caps, and means to urge the edge of said blade into non-slipping engagement with the rim of each cap during movement of each cap through a definite portion of said path of travel to cause a predetermined amount of rotation of each of said caps relative to its associated container.

4. In apparatus for handling containers having screw caps tightly applied thereto, the combination of cap-unscrewing means; and means for moving capped containers through a predetermined path of travel relative to said cap-unscrewing means; said cap-unscrewing means being positioned in the path of travel of the caps carried by said containers and comprising, a blade having an edge located in the path of travel

of said caps, anti-friction means, and means to urge the edge of said blade and said anti-friction means, respectively, into engagement with generally diametrically opposed regions of the rim of each cap as each of said caps passes between said edge of said blade and said anti-friction means during movement of each container through a definite portion of said path of travel to cause a predetermined amount of rotation of each of said caps relative to its associated container.

5. Apparatus for uniformly loosening screw caps tightly applied to containers, comprising means for moving a container having a cap thereon through a predetermined path of travel, a blade having an edge located in said path of travel in such position as to engage in non-slipping relation the rim of said cap during movement of said cap through a definite portion of said path, and means for adjusting the position of said blade with respect to the path of the center of said cap whereby to vary the amount of rotation imparted to said cap.

6. Apparatus for uniformly loosening screw caps tightly applied to containers, comprising means for moving a container having a cap thereon through a predetermined path of travel, a blade having an edge located in said path of travel in such position as to engage in non-slipping relation the rim of said cap during movement of said cap through a definite portion of said path, and means for holding said container to insure rotation of the cap with respect thereto.

7. Apparatus for uniformly loosening screw caps tightly applied to containers, comprising means for moving a container having a cap thereon through a predetermined path of travel, a blade having an edge located in said path of travel in such position as to engage in non-slipping relation the rim of said cap during movement of said cap through a definite portion of said path, means for holding said container to insure rotation of the cap with respect thereto, and means for adjusting the position of said blade with respect to the path of the center of said cap whereby to vary the amount of rotation imparted to said cap.

8. Apparatus for uniformly loosening screw caps tightly applied to containers, comprising means for moving a series of containers having caps thereon through a predetermined path of travel, a first lever, a blade carried by said lever and having an edge located within said path in such position as to engage in non-slipping relation the rim of each cap moving through a definite portion of said path, a second lever, anti-friction means carried by said second lever in such position as to engage the rim of each cap in a region generally diametrically opposite the point of engagement between said rim and said blade, spring means yieldably urging said blade and said anti-friction means into tight engagement with the rim of each cap during movement of said cap through said definite portion of said path, and means for holding said containers to insure rotation of the caps with respect thereto.

9. Apparatus for uniformly loosening screw caps tightly applied to containers, comprising means for moving a series of containers having caps thereon through a predetermined path of travel, a first lever, a blade carried by said lever and having an edge located within said path in such position as to engage in non-slipping relation the rim of each cap moving through a definite portion of said path, a second lever, anti-friction means carried by said second lever in such position as to engage the rim of each cap in a region generally diametrically opposite the point of engagement between said rim and said blade, spring means yieldably urging said blade and said anti-friction means into tight engagement with the rim of each cap during movement of each cap through said definite portion of said path, means for holding said containers against rotation to insure rotation of the caps with respect thereto, and means for varying the spacing between the edge of said blade and said anti-friction means to change the amount of rotation imparted to said caps.

10. Apparatus for uniformly unscrewing screw caps tightly applied to containers, comprising means for moving a series of containers having caps thereon through a predetermined path of travel, a first lever, a blade carried by said lever and having an edge located within said path in such position as to engage the rim of each cap moving through a definite portion of said path, a second lever, anti-friction means carried by said second lever in such position as to engage the rim of each cap in a region generally diametrically opposite the point of engagement between said rim and said blade, spring means yieldably urging said first and second levers toward one another into positions in which said blade edge and said anti-friction means are spaced apart a distance less than the diameter of said caps, and means connecting said first and second levers for joint pivotal movement independent of said spring means whereby upon engagement by the rim of a cap with either said blade or said anti-friction means said first and second levers may be shifted jointly to bring said blade and said anti-friction means into simultaneous engagement with the rim of said cap and upon continued movement of said cap between said blade and said anti-friction means said first and second levers will be moved apart against said spring means, said spring means thereupon acting to press said blade into non-slipping engagement with the rim of said cap.

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