April 10, 1934. J. D. McINTYRE 1,954,422

CAP APPLIER AND REMOVER

Filed Dec. 16, 1932

Fig. 1

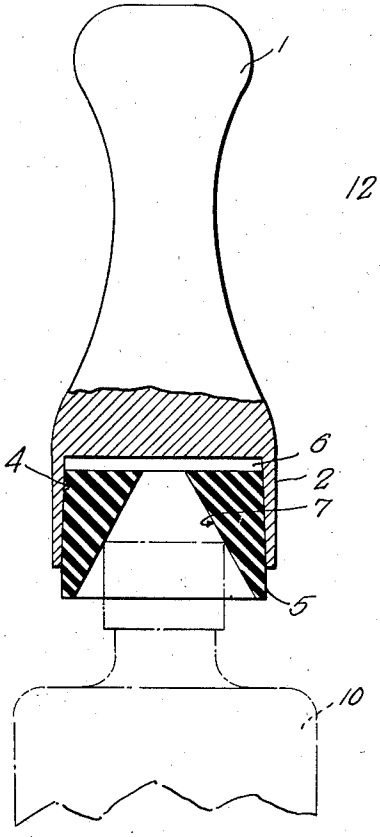


Fig. 2

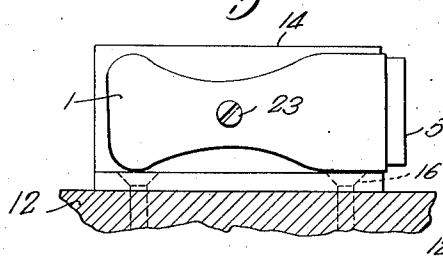


Fig. 3

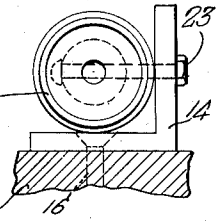


Fig. 4

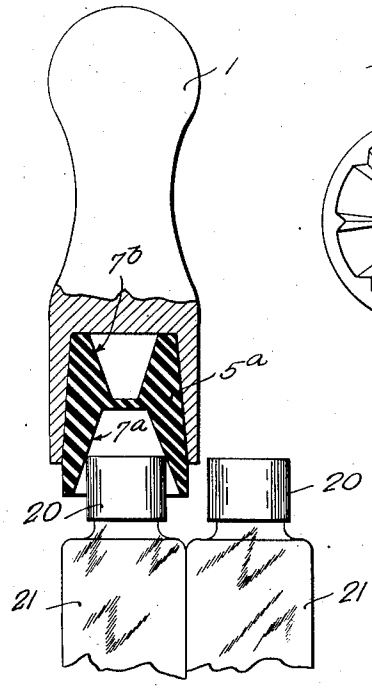


Fig. 5

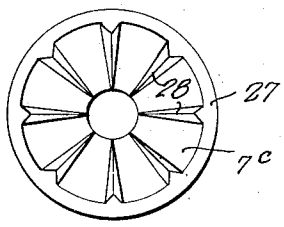
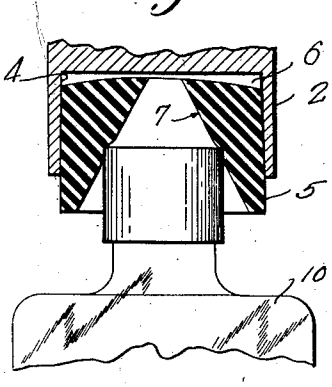


Fig. 6



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UNITED STATES PATENT OFFICE

1,954,422

CAP APPLIER AND REMOVER

John D. McIntyre, Roslindale, Mass.

Application December 16, 1932, Serial No. 647,655

1 Claim. (Cl. 81—3.1)

This invention relates to an improved cover remover and applier, particularly effective in facilitating the removal of screw-threaded caps on containers such as bottles, jars, cans or the like as well as other caps which are applied to the container by a rotary movement, such, for example, as duplex caps, Amerseal caps and the like.

It is often quite difficult tightly to apply caps of this character to containers and in many establishments where the containers are filled, as for example in bottling establishments, the hands of the workmen become sore or injured so that there is a tendency to screw on the caps without an especially firm grip; accordingly they may loosen and permit leakage of the contents of the containers in transit and consequent economic loss and troublesome adjustments. Furthermore, when caps of this type are tightly applied, it is often difficult for the receiver to loosen them and considerable trouble is often faced, for example, by a housewife attempting to open a container having a cap of this character.

Heretofore, various devices have been provided for this general purpose, but have involved certain disadvantages which have precluded their general use. Many of these devices have been relatively complicated and have involved the employment of metal clamping surfaces that were likely to damage the finish of the caps upon which they were used, thus making them particularly objectionable in a bottling establishment or the like. Other devices for this purpose have compressed distortable elements to be disposed between the hand of the operator to the cap, serving somewhat to increase the effective coefficient of friction between the hand and the cap, but necessitating the same general type of gripping action by the hand as is required in ordinary manual application of the cap.

The present invention is particularly effective in avoiding these deficiencies in cap removers and tighteners as heretofore known and in affording a simple device adapted to receive and properly engage caps of a wide variety of sizes and to permit the simple manual tightening or loosening of these caps without necessitating a firm gripping engagement by the hand of the operator upon a limited surface. Accordingly, the hand of the operator is protected against injury.

To permit these desirable results, a handle is provided having a relatively large surface so that it may be gripped by the operator without undue pressure upon any localized area of the hand and a gripping element of compressible material is so associated with the handle that a wedge-like action occurs to afford a firm gripping pressure so that the cover or cap may be readily rotated. For this purpose the handle is preferably provided with an extension having a socket in which the gripping element of compressible, distortable material having a relatively high coefficient of friction is inserted. This element preferably has a gradually tapered conical or frusto-conical recess so shaped that it may engage caps of a wide variety of sizes, the tapered shape of the recess facilitating the original insertion of the cap into working engagement with the gripping element. The gripping element and the socket which receives the same are preferably so shaped that the material of the element is normally somewhat compressed and is further compressed with a wedge-like action when the cap is inserted in the recess and the device is in its operating position. Thus, the pressure imparted to the handle may not only be effective in imparting a rotary movement to the handle, but also a pressure directed downwardly or toward the cap is applied which is effective in compressing the material of the gripping element thus to afford an unusually firm gripping action.

The retaining element is readily removable from the handle so that it may be replaced when desired and in certain cases the retaining element may be provided with two oppositely disposed sockets so that it may be removed and reversed to afford a lengthened working life or to permit its employment with a wider range of sizes of caps.

A device of this character may be effectively employed in applying caps to small containers such as small bottles which are disposed in close juxtaposition as for example in a retaining tray so that there is a relatively small distance between the caps of adjoining bottles. If desired, a device of this character may be disposed upon a suitable holder secured to a bench or the like, and the bottle or container may be held by the operator and rotated to insure application of the cap. Also, a device of this character may be employed with a mechanically rotatable tool or holder rather than being manually operated if desired.

In the accompanying drawing,

Fig. 1 is a view partly in section and partly in elevation of my improved cap remover and applier, a portion of a container being illustrated in dot and dash lines in the position it will occupy

as it is being initially engaged with the cap removing and applying device;

Fig. 2 is a side elevation of a retainer of this character secured to a fixed fastening support;

Fig. 3 is an end elevation of the assembly shown in Fig. 2;

Fig. 4 is a view similar to Fig. 1, but showing a device of the same general character having a reversible gripping element and showing the manner in which such a device may be employed in applying caps to small containers such as bottles which have their cap portions disposed relatively close to each other;

Fig. 5 is an elevational view of an optional form of gripping element; and

Fig. 6 is a central sectional view of the device showing how the gripping element is distorted when in use.

In the accompanying drawing, the numeral 1 designates a handle which may be formed of any suitable relatively strong material such as hard wood, aluminum or the like and which has such a height and diameter that it is conveniently engageable by the palm and fingers of the hand of the operator. The handle preferably has a smooth, rounded upper end which may receive the thumb or a portion of the hand of the operator so that a downward pressure may readily be applied to the handle. An extension of the handle, indicated by numeral 2, affords a retainer having a recess or socket 4 therein which may be disposed concentrically in relation to the handle. As shown, this socket preferably increases in diameter toward its open lower end so that its thin circumferential wall is slightly tapered inwardly in the direction of the handle.

A gripping element 5 of rubber is disposed within the recess; this element preferably is normally of cylindrical form so that its inner end is compressed as it is forced within the socket 4. As shown in Fig. 1, the degree of compression which occurs may be such that there is normally a clearance 6 between the inner end of the gripping element and the inner wall of the socket 4. The gripping element preferably is provided with a tapered central recess 7 of frusto-conical form having its larger open end disposed slightly below the end of the retainer 2. The inclination of the wall of the recess 7 of the gripping element may be varied as desired, for example, between 10° and 45°, but I preferably provide an angle of inclination between 10° and 30° in relation to the central axis of the gripping element. The inner wall of the recess may have a relatively smooth surface, or suitable corrugations, ribs or the like may be employed upon this surface if desired.

In use, the handle 1 of a device of this character is clasped in the hand of the user and a container indicated by numeral 10 and shown in dot and dash lines in Fig. 1 is held by the other hand of the operator or is disposed in any suitable holder to prevent rotation. The cap upon the container which is to be removed or applied by rotation is then inserted into the recess 7 and the handle 1 is pressed in the direction of the container to compress and distort the material of element 7 (Fig. 6). This results in the gripping of surface portions of the cap adjoining its upper circumferential corner by the distortable material of the gripping element and results in a wedge-like action and in the intermediate part of the gripping element bulging upwardly slightly into the clearance space 6. The handle 1 is then rotated to turn the cap either to loosen or tighten the same as is desired.

Figs. 2 and 3 illustrate the manner in which a device such as shown in Fig. 1 may be secured to a supporting surface such as a bench 12. For this purpose a supporting bracket 14 of right-angular form has a horizontal flange or leg secured by fastening elements such as screws or bolts 16 to the bench and has its upstanding leg secured by a bolt 23 to the handle 1 of the device. It is thus evident that the device is disposed with its axis substantially horizontal and the bottle or container may be held in both hands of the operator and its cap inserted into the recess of the rubber gripping element 5, compressing the latter against the rigid wall of the retainer or socket 2 with the wedge-like action previously described; the container is then rotated to loosen or tighten the cap.

Fig. 4 illustrates an optional development of the invention disclosed in Fig. 1, wherein the gripping element 5^a may be reversible, being provided with oppositely disposed tapered recesses 7^a and 7^b which may be of somewhat different sizes. Obviously in this form of the invention, it is not desirable to make the element 5^a of such a diameter that a clearance space 6 will normally result, since the inner recess 7^b results in the spacing of the central part of the recess 7^a from the inner wall of the socket so that distortion of the central portion of the element may take place in response to pressure imposed in the general direction of the cap. Fig. 4 also illustrates the manner in which a device of this character may be employed to apply caps 20 to bottles 21 of relatively small size disposed in a suitable retaining tray for filling and capping. The relatively small size of the device permits its employment between the caps 20 although they are relatively closely spaced from each other.

Fig. 5 is a view showing an optional form of gripping element 27 having a plurality of ribs 28 extending upwardly along the surface of its recessed portion 7^c, these gripping elements being molded into the rubber of the gripping element 27 to facilitate its gripping action.

It is evident that the gripping elements 5 or 5^a may be provided in a plurality of sizes, and that a gripping element of any selected size provides a tapered recess adapted effectively to grip a plurality of different sizes of caps, so that the device may be readily adapted for employment with practically any commercial size of cap. Obviously the shape of the handle may be varied to suit the particular requirements of the user, although ordinarily a large, smooth, gradually curved handle of the type disclosed has been found desirable.

A device of this character is inexpensive to manufacture and will last for a relatively long time before it is necessary to replace the rubber gripping element. The device is particularly easy upon the hands of the user and has been found especially advantageous where a workman is engaged all day in tightening screw threaded caps or the like on containers, for example, in establishments for manufacturing and bottling drugs, chemicals, and the like, as well as establishments where paint, varnish, and the like are prepared and put in suitable containers. The low cost of this device also makes it adaptable for use in the home, i. e., by the individual receiver or user of containers having screw threaded caps or the like.

The arrangement of the rubber gripping ele-

ment in the retainer or socket with its relatively rigid wall results in a wedge-like compression of the distortable material of the gripping element so that the cap is subjected to a firm grip in response to pressure imposed upon the handle in the general direction of the cap and so that gripping engagement of the hand with the cap or with a distortable element disposed about the cap is not necessary. Accordingly, a relatively light pressure distributed over the whole surface of the palm of the hand and the inner surfaces of the fingers may be employed and concentrated upon the cap due to the wedge-like action of the distortable gripping element to insure a firm grip upon the cap and make ready tightening or loosening thereof possible.

I claim:

A device of the class described comprising a retainer affording a socket having an open end and a thin, substantially rigid wall surrounding the socket and gradually increasing in thickness from the open end thereof so that the diameter of the inner end of the socket is less than the diameter of the open end thereof, a gripping element of distortable material having a high coefficient of friction, said element having a normal substantially cylindrical shape and being pressed into the socket so that its inner portion is compressed and distorted due to the smaller diameter of the inner portion of the socket, the element having a central recess of tapered, generally conical form, the inclination of the wall of said recess being substantially greater than the inclination of the inner wall of the socket so that the material of the element may engage a container cap with a wedge-like action when the cap is inserted in said recess, and an extension of said retainer affording a handle having a convexly curved surface to engage the hand of a user and to permit pressure effectively to be imposed in the direction of the axis of the substantially cylindrical gripping element.

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