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BOTTLE AND JAR CLOSING APPARATUS

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2 Sheets-Sheet 1

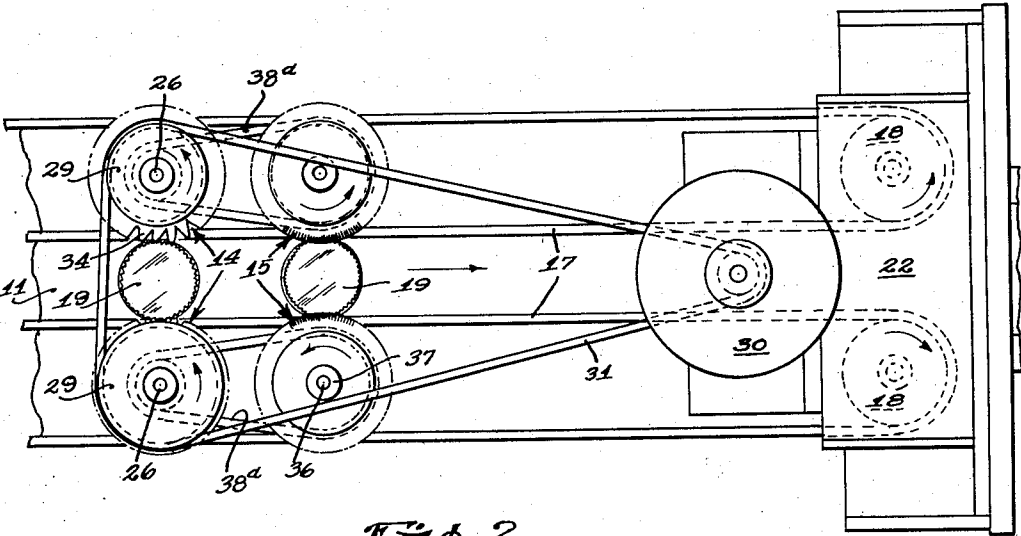


Fig. 2.

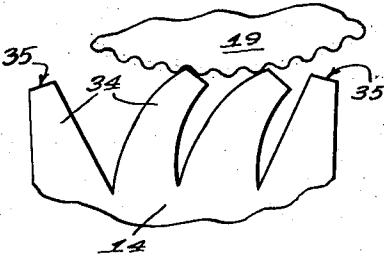


Fig. 4.

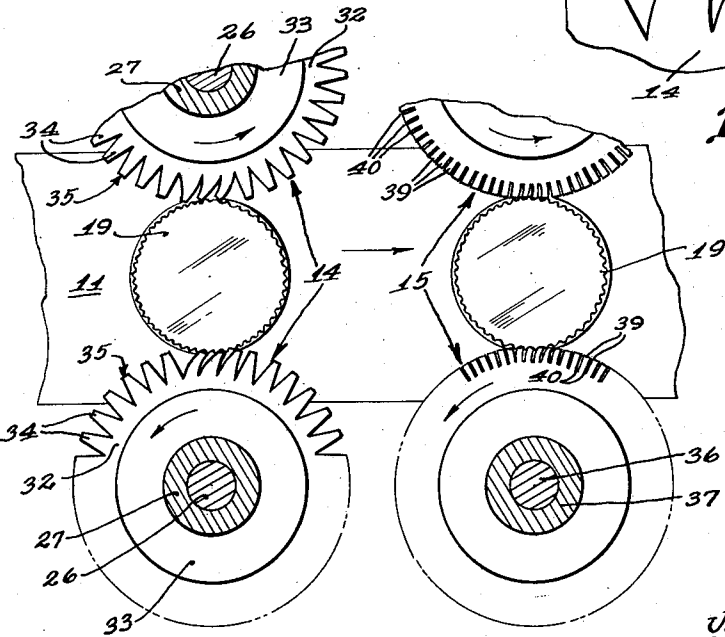


Fig. 3.

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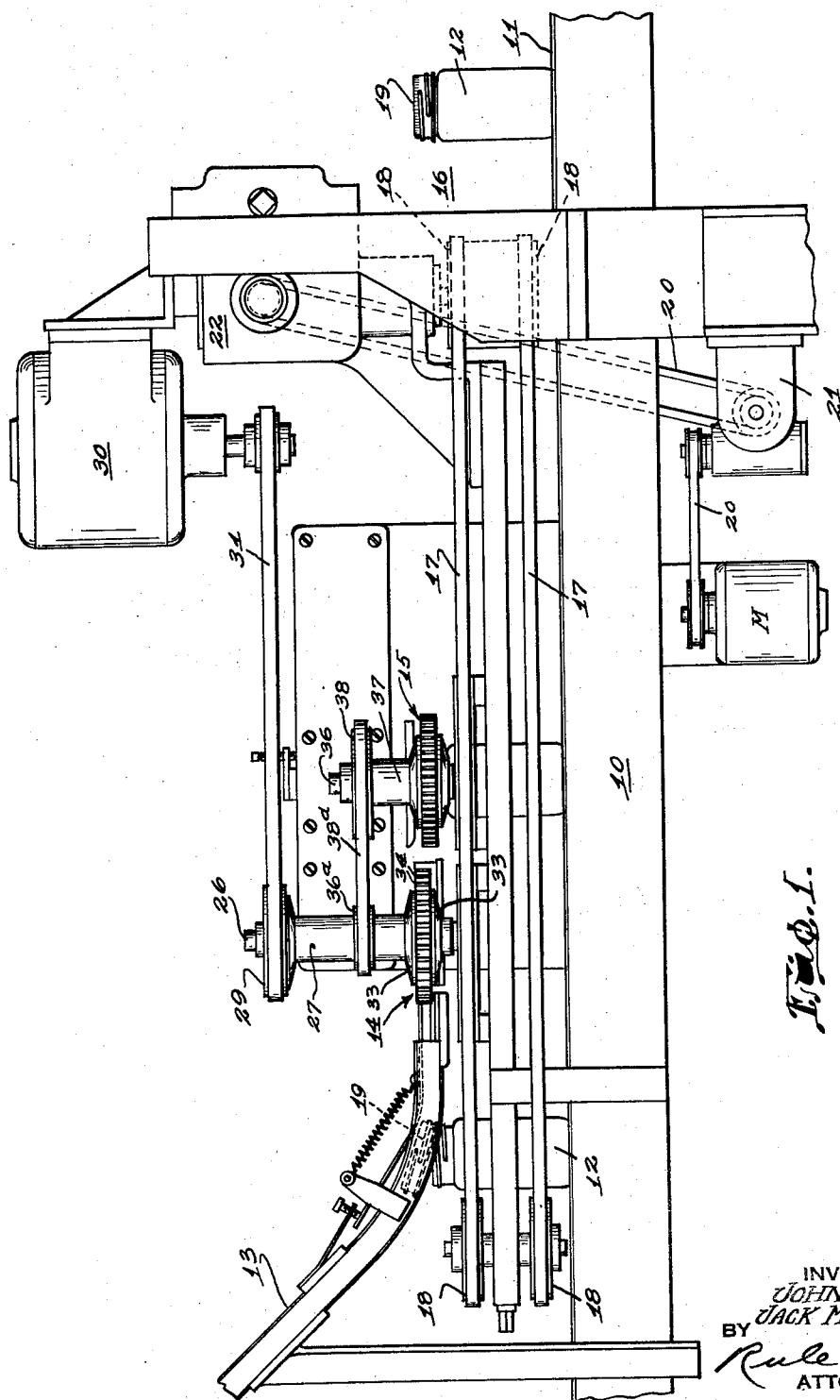
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## BOTTLE AND JAR CLOSING APPARATUS

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to Owens-Illinois Glass Company, a corporation of  
Ohio

Application April 28, 1958, Serial No. 731,276

4 Claims. (Cl. 53—331.5)

The present invention relates to bottle and jar closing apparatus and more particularly to means for applying screw-threaded closure caps to product-filled bottles.

In the packaging of certain kinds of goods, bottles or jars are filled and closure caps threaded thereon only sufficiently tight to prevent premature loosening and possible consequent loss of the goods during subsequent handling and transfer of the containers to a vacuumizing machine. Preparatory to vacuumizing the filled, capped, containers, the closure caps must be loosened sufficiently to allow removal of air from the bottles around the screw threads of the latter and the caps while retaining the closure caps partially applied. Such loosening is effected automatically by a so-called back-off mechanism. If perchance the closure caps have been applied with excessive torque, this back-off mechanism may be unable to loosen the caps at all, or in any event the loosening is insufficient to allow exhaust of enough air to produce the essential degree of vacuum. Thus it is apparent that threading of the caps by the application of uniformly low torque is most important as the initial step in closing bottles which later are to be vacuumized.

Another problem in the food packaging industry where screw-threaded closure caps are used is that of insuring effective final application of the caps to create the necessary seal without resorting to such high torque as to seriously complicate cap removal. Too often the housewife encounters great difficulty in removing screw closure caps and must resort to hammering or water heating the closure before removal can be effected. Thus the ease or difficulty of cap removal clearly is related directly to the application torque.

An important object of our invention is the provision of novel, effective and reliable means for overcoming the above noted objections.

Another object of our invention is the provision of closure cap spinning rolls in which the peripheral cap engaging surface comprise a multiplicity of relatively soft resilient fingers which exert only sufficient radial pressure upon the closure cap skirt to insure rotation of the cap and sealing contact between the glass sealing surface and a liner or sealing element carried by the cap. Such initial application, as stated above, must be uniform as to tightness for the simple reason that the automatic back-off mechanism necessarily is adjusted to properly loosen only closure caps that have been secured with a degree of tightness, within relatively narrow limits.

A further object of our invention is the provision of spinning rolls of the above character which are formed of rubber or rubber-like composition and provided peripherally with an annular series of resilient radial fingers for engagement with the closure cap skirt.

Other objects will be in part apparent and in part pointed out hereinafter.

In the drawings:

Fig. 1 is a side elevational view of a closing machine incorporating our invention.

2

Fig. 2 is a fragmentary top plan view showing the driving means for the spinning rolls.

Fig. 3 is a fragmentary plan view showing the manner in which the fingered spinning rolls engage closure caps.

Fig. 4 is a fragmentary detail view showing in top plan driving contact between a spinning roll and closure cap.

In the illustrated embodiment of our invention, it is being used to apply sheet metal closure caps to so-called "wide-mouth" ware or jars and these caps are shown formed with knurled attaching skirts. We, however, wish it understood that the invention is quite well adapted to use in attaching smaller diameter, unknurled closure caps to narrow-neck containers and irrespective of whether these caps are intended to be loosened for a vacuumizing operation or remain as initially applied until removed by the customers.

Our invention is shown as part of a machine of the type forming the subject matter of a co-pending allowed application of S. L. Harmon and John Hohl serial number 653,955 filed April 19, 1957, now U.S. Patent No. 2,855,736, titled "Method of and Apparatus for Closing Bottles and Jars," which is owned by the assignee of the present application.

The machine comprises an elongated horizontal base 10 supporting a continuously moving horizontal conveyor 11 for carrying filled bottles or jars 12 in normal upright position past the lower end of a cap delivery chute 13 and pairs of primary and secondary cap applying rolls 14 and 15 respectively to a discharge end 16 from which the closed containers may be removed and placed in shipping cartons or transferred to a vacuumizing apparatus (not shown). At each side of the conveyor is a pair of upper and lower endless steadying belts 17 trained over pulleys 18, said belts primarily functioning to hold the jars against rotation so that the closure caps 19 may be threaded onto the containers. These belts firmly grip the sides of the jars and travel at the same lineal speed as the conveyor 11, being driven by a motor M which operates through drive belts 20, a speed reducer unit 21, and a gear unit 22 suitably connected to a pair of the steadying belt carrying pulleys near the discharge end 16 of the machine.

At the inlet end of the machine an inclined closure cap chute 13 is mounted with its lower discharge end overlying the conveyor 11. The elevation of this cap chute is such that closure caps 19 upon arrival at the discharge end will have a portion projecting downwardly for engagement with the mouth portion or rim of a jar 12. Advancing movement of the jar pulls the closure cap out of the chute whereupon gravity causes the cap to partially telescope over the threaded neck of the container. The jar with the closure cap thereon then moves into the cap threading zone where spinning rolls incorporating our invention perform their intended function as explained heretofore.

We have shown these rolls as consisting of primary and secondary pairs 14 and 15, respectively. The primary rolls 14 are arranged one at each side of the conveyor 11 substantially in the horizontal plane of the discharge end of the cap chute 13. These rolls are supported at the lower end of vertical shafts 26 which are journaled in bearings 27. Pulleys 29 at the upper end of the shafts are driven by a motor 30 which operates through a power transmitting belt 31.

Each of these spinning rolls is a flat ring or collar 32 formed of rubber or some rubber-like composition secured between a pair of clamping rings 33 upon one of the shafts 26. The thickness of each such roll is approximately equal to the height of the closure cap skirt or attaching flange.

The ring forming each primary spinning roll has a deep-ly serrated periphery resulting in the creation of an annular

series of radial fingers 34 each tapering radially outward to a relatively flat free end 35. These fingers have a more or less brush bristle action in contact with the closure cap skirt as perhaps is best shown in Figs. 3 and 4. Both the rubber hardness and transverse spaced relationship of the rolls are factors determining the effectiveness of these rolls in rotating the closure caps. Such is deemed apparent for obvious reasons. It is also equally apparent that the closely controlled gentle gripping of the closure cap skirt not only permits uniformly low torque application of the caps allowing for ready loosening or complete removal later on but also practically eliminates any possibility of marring the lacquer coating.

The secondary spinning rolls 15 are arranged one on each side of the conveyor at a level slightly below the plane of the primary rolls. These secondary rolls are carried by vertical shafts 36 which are journaled in bearings 37. Pulleys 38 at the upper end of the shafts 36 are in alignment with pulleys 36<sup>a</sup> the shafts carrying the primary spinning rolls 14. Power transmitting belts 38<sup>a</sup> connect the pulleys so that all spinning rolls rotate simultaneously. Although these secondary rolls which, except for the peripheral portions, are identical with the primary rolls, may be provided with fingers such as those on the primary rolls, we have shown an annular series of radial fingers 39 produced by radial saw-slot-like spaces 40 which permit a degree of flexing of said fingers. Here again the extent of spacing apart of the rolls is a factor in determining the torque applied to the closure caps by the rolls. Any suitable means (not shown) may be utilized in varying the transverse spacing of both the primary and secondary spinning rolls. The secondary rolls may be utilized as shown, or may possibly be dispensed with in some situations.

In summary, applicants wish to point out that with conventional rolls having an uninterrupted peripheral surface much difficulty is experienced in applying caps uniformly tight, particularly where the caps have become wet because of ambient steam or other moisture. In such situations "roll skidding" occurs with consequent inadequate securing of the closure cap on the containers. The finger-type rolls herein revealed overcome that difficulty and are particularly helpful in applying unknurled narrow-mouth closure caps. It is also of value in applying

closure caps in an atmosphere of steam which tends to soften the cap sealing gasket material, such condition requiring less application torque to obtain a good seal.

Modifications may be resorted to within the spirit and scope of the appended claims.

We claim:

1. In apparatus for applying screw-threaded closure caps to product-filled containers having threaded necks to accommodate the closure caps, means for moving containers in upright position with closure caps partially telescoped thereover along a horizontal path through a closure cap applying zone, and spinning rolls in said zone for peripheral engagement with diametrically opposed portions of the closure cap skirt to impart rotary movement to the cap and thread it onto a container, at least certain of the rolls being formed with an annular series of radially outwardly extending resilient fingers along the periphery.

2. In apparatus for applying screw-threaded closure caps to product-filled containers having threaded necks to accommodate the closure caps, means for moving containers in upright position with closure caps partially telescoped thereover along a horizontal path through a closure cap applying zone, and spinning rolls in said zone for peripheral engagement with diametrically opposed portions of the closure cap skirt to impart rotary movement to the cap and thread it onto a container; the improvement which comprises an annular series of circumferentially flexible resilient fingers projecting radially outward at the periphery of at least certain of said rolls.

3. The combination defined in claim 2, the fingers tapering and narrowing radially outwardly and having relatively flattened outer ends.

4. The combination defined in claim 2, the fingers extending radially outward at the periphery of and formed as integral parts of the rolls, each finger being spaced a distance less than its own width from the adjacent fingers and of substantially uniform width throughout its length.

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