

Aug. 15, 1961

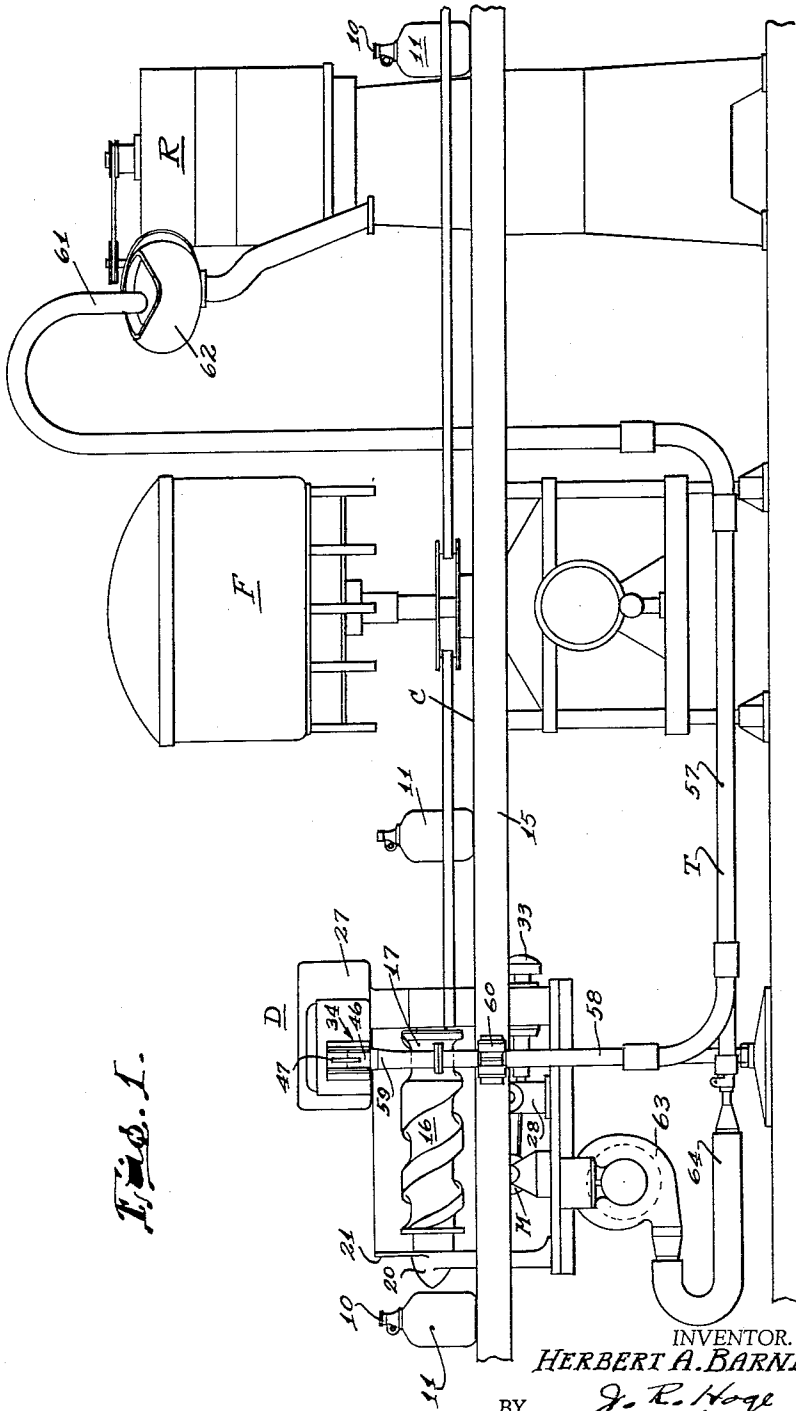
H. A. BARNBY

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CONTAINER CLOSING APPARATUS

Filed March 24, 1960

3 Sheets-Sheet 1



*H.A.B.*

INVENTOR.  
**HERBERT A. BARNBY**  
BY *J. R. Hoge*  
and  
*W. A. Schaich*  
ATTORNEYS

Aug. 15, 1961

H. A. BARNEY

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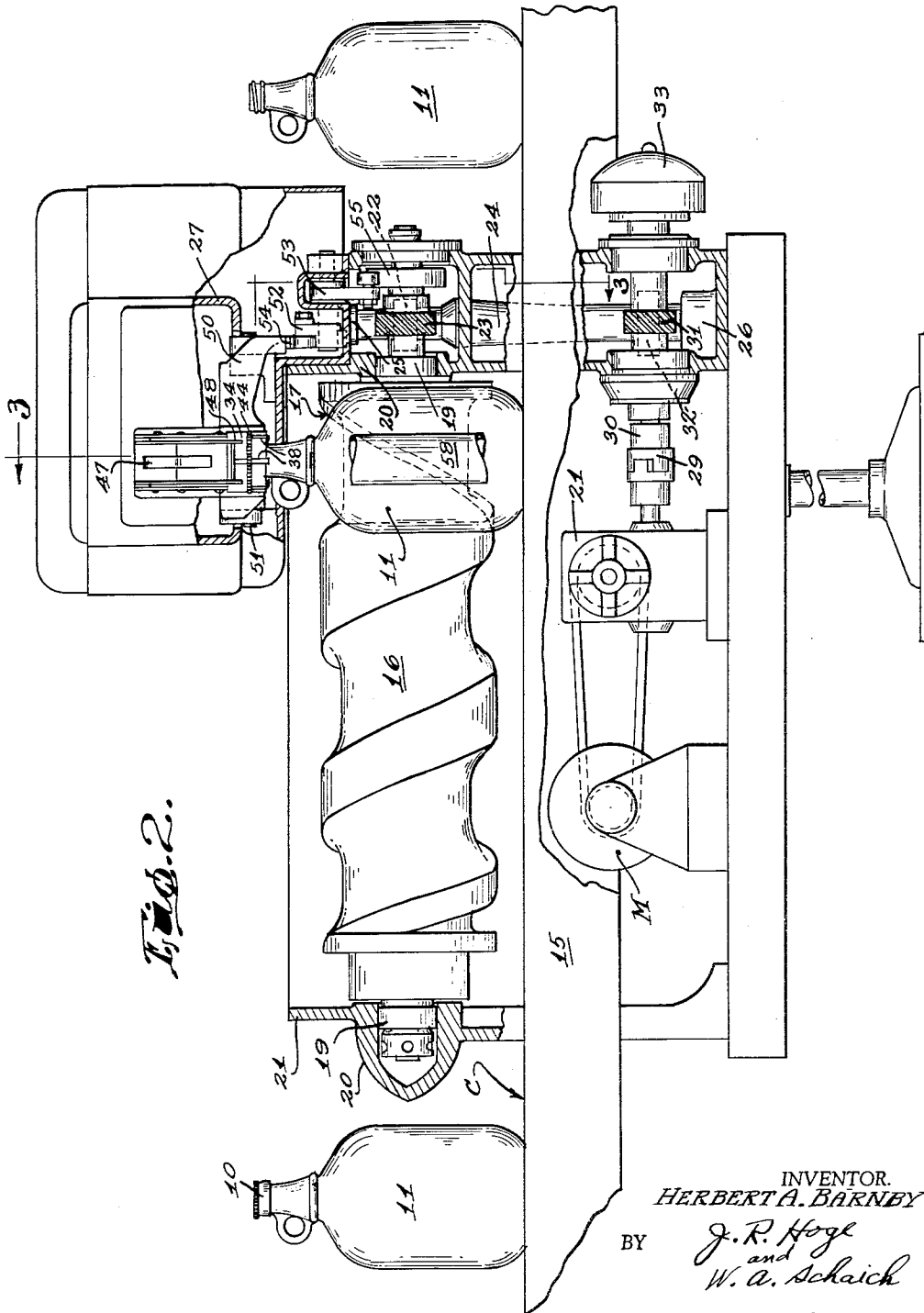


Fig. 2.

INVENTOR.  
HERBERT A. BARNEY

BY

J. R. Hoge  
and  
W. A. Schaich

ATTORNEYS

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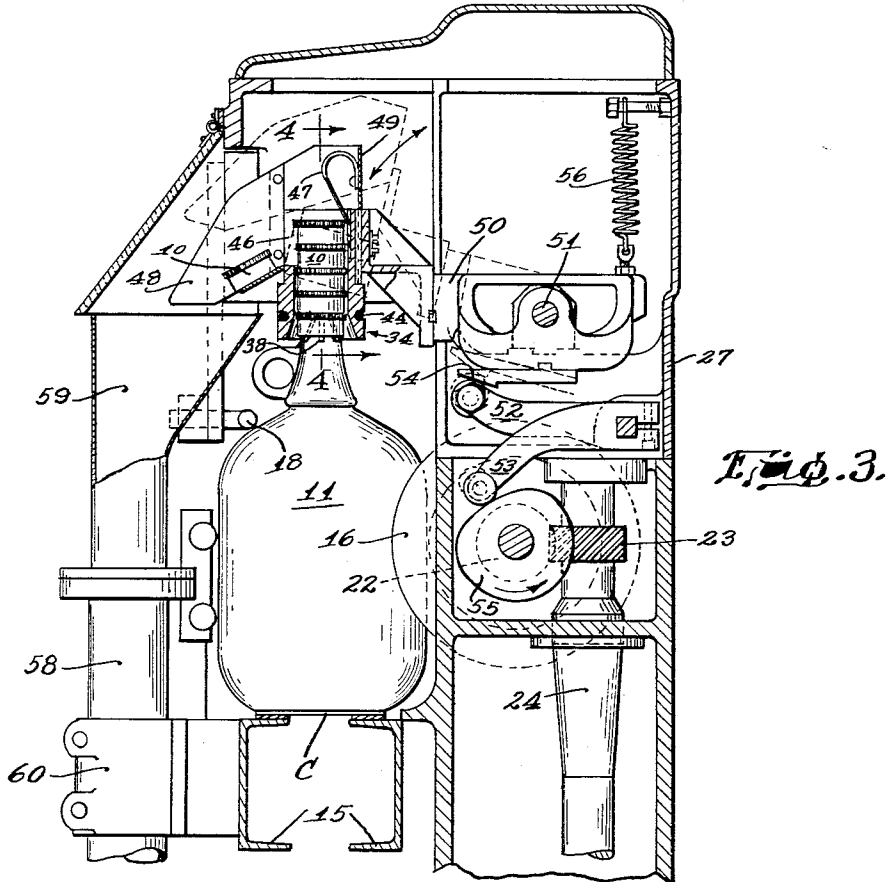
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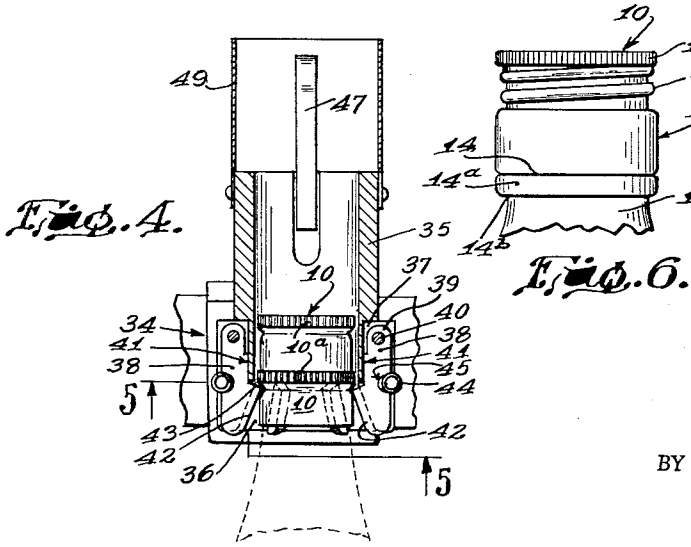
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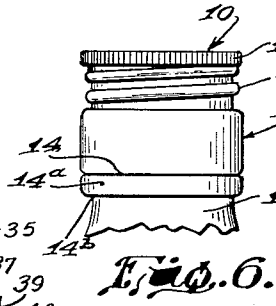
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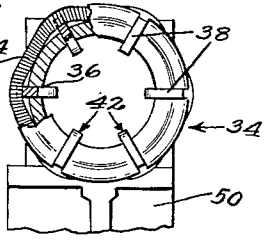
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



*Fig. 6.*

INVENTOR.  
HERBERT A. BARNBY

BY  
J. R. Hoag  
and  
W. A. Schaich

ATTORNEYS

1

2,995,882

**CONTAINER CLOSING APPARATUS**

Herbert A. Barnby, Toledo, Ohio, assignor to Owens-Illinois Glass Company, a corporation of Ohio

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12 Claims. (Cl. 53-266)

My invention is a bottle closing apparatus, which more particularly is concerned with the provision of novel and efficient automatic means for removing from empty new bottles partially completed skirted sheet metal closure caps which have functioned as individual temporary dust covers, filling the bottles with merchandise to be stored and/or shipped therein, and finally reusing the partially formed closure caps to hermetically seal the bottles, such hermetic sealing involving rolling screw threads into the cap skirts so that they holdingly engage threads on the bottles.

An important object of my invention is the provision of novel means for removing the dust covers at the decapping station and transferring them to means designed to rapidly conduct the covers to a recapping unit which positions them over the neck of filled bottles and rolls screw threads in the skirt portion so that they ultimately are tightly affixed to and hermetically seal the bottles.

A further object of my invention is the provision of a novel and efficient pneumatic conveyor for rapidly conducting the removed dust covers from the decapping unit to a cap feeder which is associated with the recapping unit.

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

In the drawings:

FIG. 1 is a front elevational view more or less diagrammatically showing apparatus embodying my invention;

FIG. 2 is an enlarged front elevational view with parts in section showing the decapper unit;

FIG. 3 is a transverse sectional elevational view taken substantially along the line 3-3 of FIG. 2;

FIG. 4 is a vertical sectional view partly in elevation with the bottle neck in dotted lines, taken along the line 4-4 of FIG. 3;

FIG. 5 is a sectional elevational view of the cap chuck taken substantially along the line 5-5 of FIG. 4; and

FIG. 6 is a fragmentary elevational view showing the closure cap screw-threaded and permanently secured to the bottle.

Briefly the apparatus comprising my invention includes a decapping unit D for removing dust covers in the form of partially completed unthreaded sheet metal closure caps 10 from empty bottles 11, a bottle filling unit F of conventional, or any preferred form, and a recapping unit R which both repositions the previously removed dust covers over threaded bottle necks and rolls threads 12 into a skirt 13 of the covers to thereby convert them into finished closure caps which hermetically seal the bottles. The recapper R is of conventional form, available in the open market. Associated with the above is dust cover transfer means T which rapidly carries the dust covers from the decapping unit D to the combined recapping and thread-rolling unit R. A horizontal continuously moving conveyor C advances the bottles in normal upright position to the above-identified units, such conveyor C being supported on a horizontal frame 15.

As indicated above, the bottles 11 when delivered to the decapper D are empty and internally sterile and as a consequence do not require the customary washing prior to filling. The dust covers 10, which as stated heretofore, are partially completed sheet metal closure caps devoid of the usual screw threads may be firmly held in bottle closing position by friction. At the decapping station

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the decapper D interrupts advance of the bottles 11 one at a time and removes the caps therefrom preparatory to transferring these caps to the recapper R and moving the bottles to the filler F and thence to said recapper. The decapper, as will be apparent presently, operates to bodily elevate the closure caps in a generally vertical direction for deposit in the receiving end of the transfer means T.

In its illustrated embodiment, the decapper D comprises a bottle advancing and spacing worm-feed screw 16 positioned alongside the conveyor C, said screw provided with a dwell section 17 which functions to momentarily hold a single bottle stationary in register with a cap removing element about to be described in detail. A hold-down finger 18 (FIG. 3) engages the bottle shoulder to secure the bottle against upward movement at this point. The feed screw has trunnions 19 at opposite ends journaled in bearings 20 provided in the frame 21. One of these trunnions 19 (FIG. 2) has an axial extension carrying a gear 22 running in mesh with and driven by a worm gear 23 which is mounted upon the upper end of a driven vertical shaft 24. This shaft 24 (FIGS. 2 and 3) is journaled at its upper end in a bearing 25 in a housing 27 and at its lower end in a bearing 26, both said bearings being a part of said frame 21. A motor M drives said vertical shaft 24 through conventional means including a gear unit 28, clutch 29, horizontal shaft 30 and a worm gear 31 which meshes with a gear 32 at the lower end of said vertical shaft 24. A conventional clutch throw-out device 33 is provided for obvious reasons.

The dust cover or closure cap removing device (FIGS. 2-5) comprises an expansible cap chuck 34 and cap accumulator or transfer tube 35. This device is a tube of internal diameter to freely accommodate a stack of several closure caps. The lower end of this tube (FIGS. 4 and 5) is provided with an annular series of longitudinal slots 36 and merging aligned channels 37. Chuck jaws 38 or fingers are mounted in these slots and channels. Each jaw or finger 38 is generally L-shape, normally being positioned with its length extending in the direction of the axis of the tube. The jaw has its narrow upper end portion 39 pivoted to a hinge pin 40 permitting it to move radially of the tube. This upper end portion is engageable with a stop 41 which is the bottom of the channel 37. Thus the innermost position of each jaw is predetermined. Just below the point of contact between the jaw and stop the former is enlarged and shaped to provide an inwardly upwardly inclined guide 42 or cam surface leading to an abutment or shoulder 43. This shoulder is intended to engage the underside of the knurled bead 10a of a closure cap or dust cover preparatory to removing it from a bottle. A ring-like coil spring 44 or garter encircles the set of jaws being seated in recesses 45 to normally urge the jaws to their innermost positions. It is apparent that with downward movement of the accumulator tube and chuck a given distance over a bottle neck the jaws expand as the guides slide over the marginal upper edge of the cap, such continuing until the abutments or shoulders 43 move past the knurl. There-upon the spring 44 quickly contracts the jaws into firm holding engagement with the cap. Repeated axial movement of the chuck gradually builds up a stack of caps in the accumulator tube, in that each additional cap removed from a bottle elevates the previously removed cap a distance equal to the height of one cap. When the stack has attained a predetermined height, each succeeding cap removing operation is accompanied by discharge of a cap from the upper end of this stack. To this end the tube 35 is formed with a longitudinal slot 46 and a kick-out spring 47 which together insure discharge of the topmost cap into a trough 48 and thence to the afore-

mentioned transfer means for conveyance to the recapping unit R. The kick-out spring is carried in part by a guard sleeve 49 rising from the accumulator tube 35.

Actuating means for moving the accumulator tube 35 and cap chuck device may comprise a carrier 50 to which the tube is separably connected. This carrier is mounted for oscillation upon a horizontal rod 51 and is movable about said rod to raise the chuck, by means of rockable levers 52 and 53, the former having a free roller carrying end contacting a cam surface 54 on the carrier and the latter lever carrying at its free end a roller engaging a rotary cam 55. This rotating cam is mounted upon the extension of one of the trunnions on feed screw 16. A coil spring 56 yieldingly urges the carrier to the position (FIG. 3) in which the cap chuck grasps a closure cap.

Closure caps discharged from the trough or chute 48 fall by gravity into the transfer means which (FIGS. 1 and 3) is a pneumatic tube 57 having a vertical inlet section 58 formed with a flared hopper-like upper end 59 directly beneath the trough 48. A clamp 60 may secure this section to the conveyor supporting frame 15. The opposite or discharge end 61 of the tube opens downwardly into a hopper and cap feeder 62 associated with the recapper R. This hopper 62 is conventional and obtainable in the open market. Near the lower end of the vertical inlet section 58 is a blower 63 which is connected through an inlet pipe 64 to the tube 57 at a point below said vertical section. Thus air under pressure is introduced into the tube causing delivery of caps from said vertical section to the horizontal section shown under the influence of suction and gravity and through the horizontal sections and points therebeyond by air under pressure.

In view of the foregoing the sequence of operations is understood to be as follows. Bottles or like containers immediately upon being completely formed and annealed, if formed of glass, are closed by means of partially completed closure caps identifiable as dust covers. These remain upon the bottles until the packer is ready to fill the bottles with his merchandise. Thereupon the bottles are placed upon the conveyor and without requiring any further attention they advance to the decapper D where the dust covers are removed and dropped into the pneumatic transfer means and quickly conveyed to the hopper and feeder associated with the recapper R. The open bottles then move on to the filler F and thence to the recapper where the dust covers again are slipped over the bottle necks. Now, however, conventional devices roll screw threads 13 into the skirt 12 and thereby secure the cap to the threaded neck of the bottle. The extended lower portion of the skirt has a circumferential score 14 defining the upper margin of a band 14a which is spun beneath a shoulder 14b on the bottle neck. Incident to cap removal the band and skirt separate along the score line leaving the band upon the neck to function as a "telltale." Thus the covers serve the two-fold purpose of protecting the bottles against entry thereinto of dust, etc., and as final hermetic seals.

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

I claim:

1. In combination, means for conveying bottles in normal upright position along a horizontal path past decapping, filling and recapping stations in that order, the bottles having readily removable partially formed skirted sheet metal closure caps closing them prior to reaching the decapping station, decapping means at said decapping station for momentarily interrupting the advance of the bottles and then removing the caps therefrom, means for depositing a commodity in the bottles at the filling station, transfer means for transferring closure caps removed at the decapping station to the recapping station, and a recapping unit at the latter station for positioning closure caps upon the bottles and rolling

threads into the skirts to secure said caps to the bottles and hermetically seal them.

2. In a combination as defined in claim 1, the transfer means comprising a tube having a receiving end adjacent said decapping means and a discharge end adjacent said recapping unit, and blower means adapted to introduce compressed air into said tube, intermediate said ends, for propelling said closure caps through said tubing.

3. In a combination as defined in claim 1, the transfer means comprising a length of tubing having a receiving end adjacent said decapping means for receiving closure caps and a discharge end adjacent said recapping unit for discharging said caps, said tubing also having a vertical inlet section depending from said receiving end, and blower means for introducing air under pressure into said tubing, adjacent the lower end of said vertical section, thereby causing delivery of the caps from said vertical section to said discharge end.

4. In a combination as defined in claim 1, the decapping means comprising a cap removing element for removing the caps from the bottles, holding means positioned adjacent said conveyor for interrupting advance of the bottles and momentarily holding them stationary one at a time in register with said cap removing element, said cap removing element comprising a substantially vertical accumulator tube having an expansible cap chuck at its lower end, said cap removing element being adapted to partially telescope over the neck of a bottle and contract to grasp and remove a closure cap therefrom, and means for supporting and oscillating said cap removing element in a generally vertical direction, in synchronism with operation of said holding means, to and away from a cap grasping position.

5. In a combination as defined in claim 4, wherein said holding means comprise a worm-feed screw having a dwell section, and means for rotating said screw.

6. In a combination as defined in claim 4, wherein said expansible cap chuck comprises an annular series of spring-loaded L-shaped fingers pivotally mounted to permit radial swinging movement with respect to said tube.

7. In a combination as defined in claim 4, wherein said means for moving the chuck and tube comprise a spring-loaded pivotally mounted carrier, a cam rotating in fixed relation to said holding means, and cam follower means riding in contact with said carrier and responsive to said cam, whereby radial variations in said cam will cause pivotal movement of said carrier.

8. Decapping apparatus for removing non-threaded, skirted, closure caps from containers being conveyed by a continuously moving conveyor, comprising a cap removing element for removing said caps from the containers, means for interrupting the progress of said containers and momentarily holding the containers one at a time in register with said cap removing element, said cap removing element being a substantially vertical open-ended accumulator tube and an expansible cap grasping chuck at the lower end of said tube, and means for moving said chuck and tube in a generally vertical direction, in synchronism with operation of said holding means to bring said chuck into a position to grasp and remove a cap from a container when the latter is held in register with said element and means whereby each cap chucking operation moves any previously chucked cap upwardly in the tube.

9. Decapping apparatus for removing non-threaded, skirted, closure caps having a circumferential radial bead forming an abutment from upright bottles being advanced by a continuously moving conveyor, comprising a cap removing element including a generally vertical accumulator tube, a cap chuck comprising an annular series of spring-loaded, horizontally pivoted, generally L shaped cap grasping chuck jaws at the lower end of the tube, said chuck jaws being adapted to move radially of said tube, and each having an upwardly and inwardly inclined surface extending from its lower end and termi-

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nating in a shoulder, said surfaces when in sliding contact with a cap incident to being telescoped over a cap adapted to spread said jaws radially outwardly and position said shoulder portions to engage the abutment, holding means for momentarily holding a container in register with said cap removing element, and actuating means for oscillating said cap removing element in a generally vertical direction, in synchronism with operation of said holding means when a bottle is in register with said element, whereby said element will telescope over, grasp, and remove a cap.

10. Decapping apparatus for removing closure caps from upright containers being advanced by a continuously moving horizontal conveyor, comprising a cap removing element, a rotatably mounted worm-feed screw having a dwell section positioned adjacent said conveyor for momentarily holding a container in register with said cap removing element, said cap removing element comprising a substantially vertical accumulator tube having an expansible cap grasping chuck at its lower end, actuating means for supporting and oscillating said element between upper and lower positions, including a carrier to support said element in said positions, cam means

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mounted for rotation with said screw, and means actuated by said cam means for oscillating said carrier, to bring said element to a position to remove a cap from a container when the latter is held in register with said element.

11. Bottle decapping apparatus comprising a generally vertical closure cap accumulator tube having a cap inlet at its lower end and a cap discharge opening at its upper end, a cap grasping chuck at said lower end coaxial with the latter, said chuck operable to telescope over and releasably grasp one cap at a time while on a bottle, and means whereby telescoping of the chuck over a closure cap preparatory to removing it from a bottle causes axial upward movement of a previously removed cap in said tube.

12. In apparatus as defined in claim 11, the chuck being an annular series of radially swingable jaws, spring means normally urging the jaws inwardly to grasp a closure cap skirt and each jaw having a shoulder facing the tube and operable to support a cap only against axially downward movement.

No references cited.