

July 11, 1944.

C. HOBBS

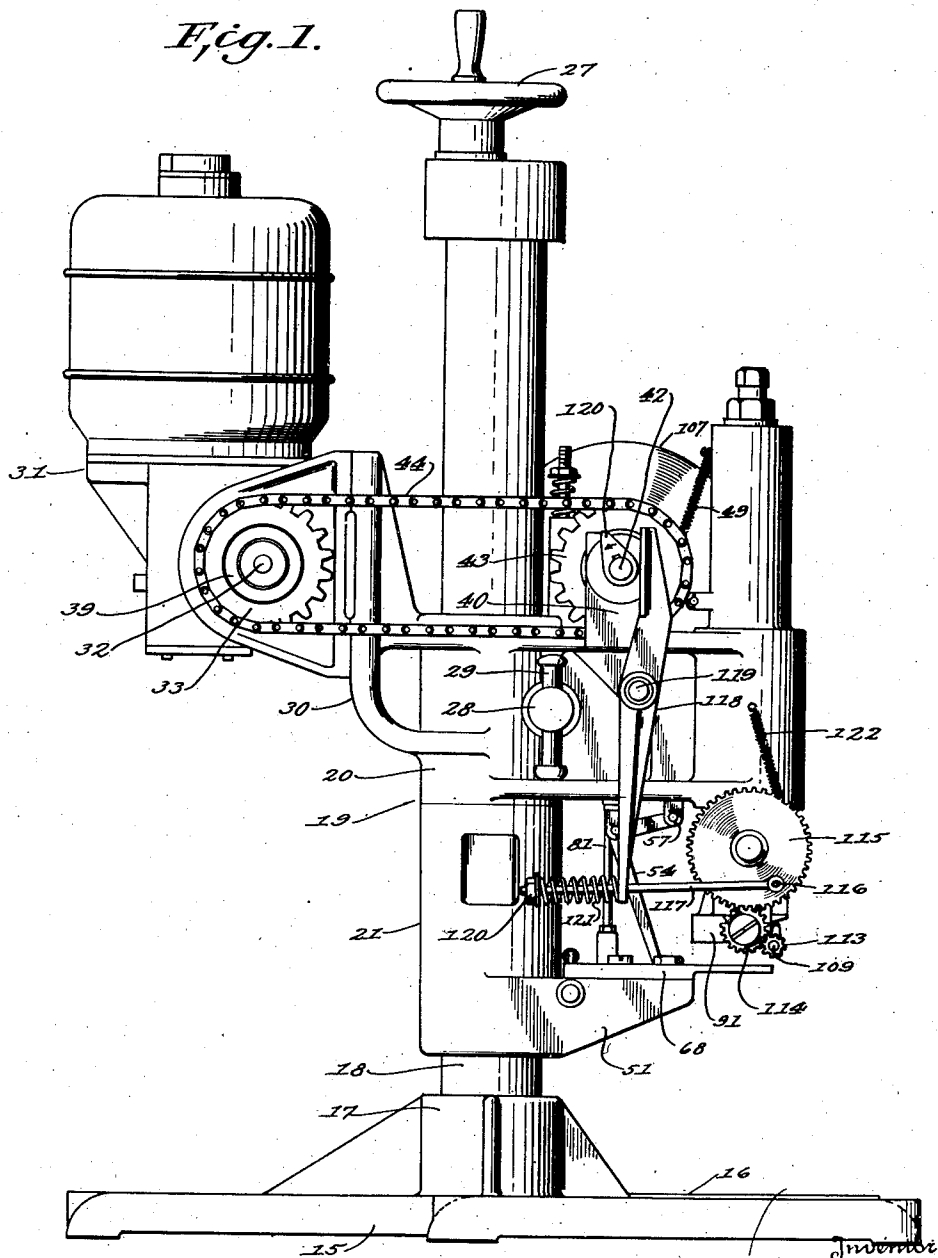
2,353,400

CAPPING APPARATUS

Filed Jan. 25, 1941

4 Sheets-Sheet 1

Fig. 1.



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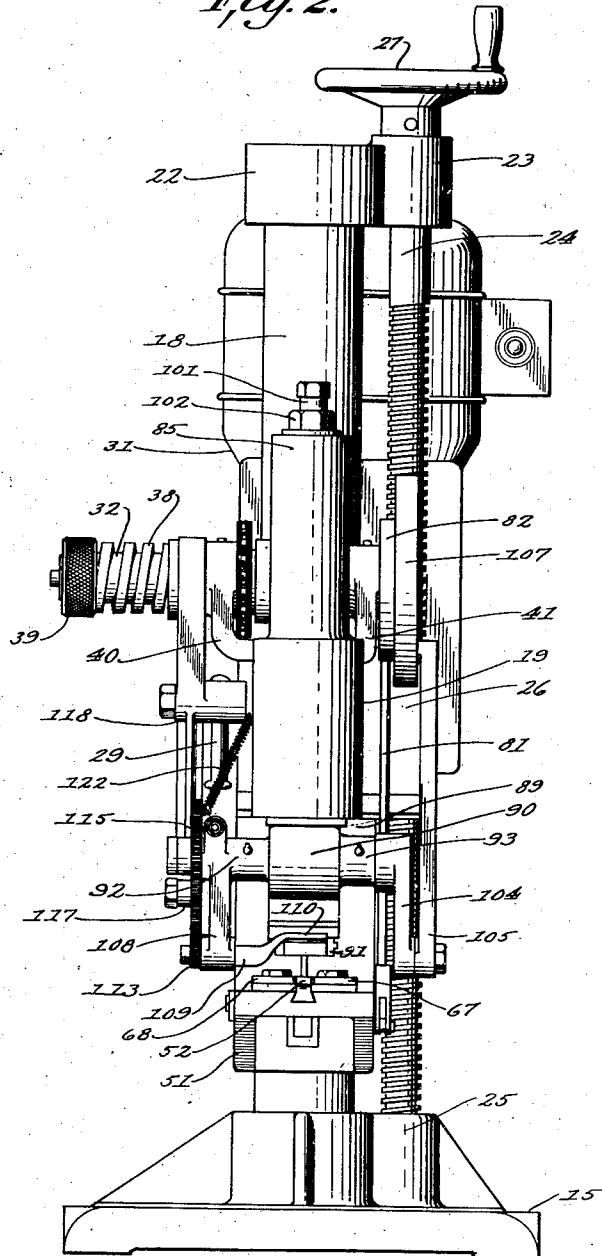
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Filed Jan. 25, 1941

4 Sheets-Sheet 2

Fig. 2.



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Fig. 3.

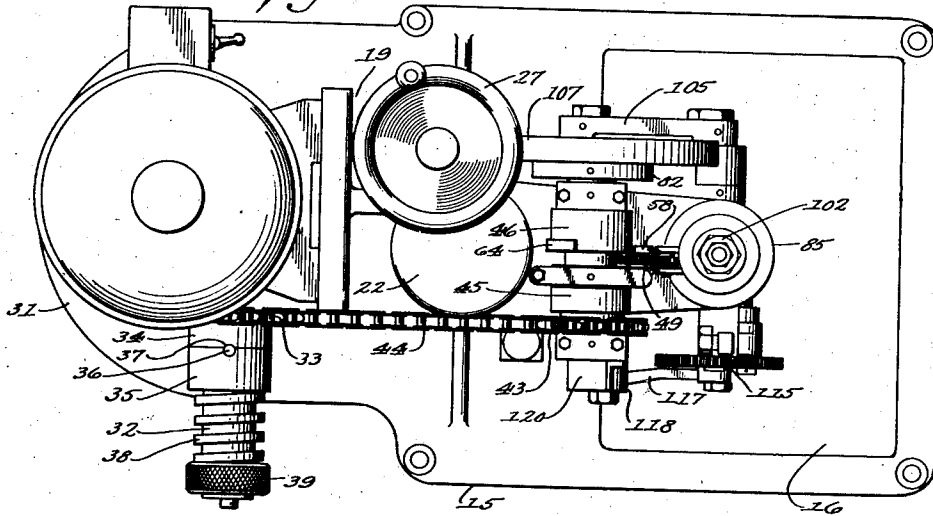
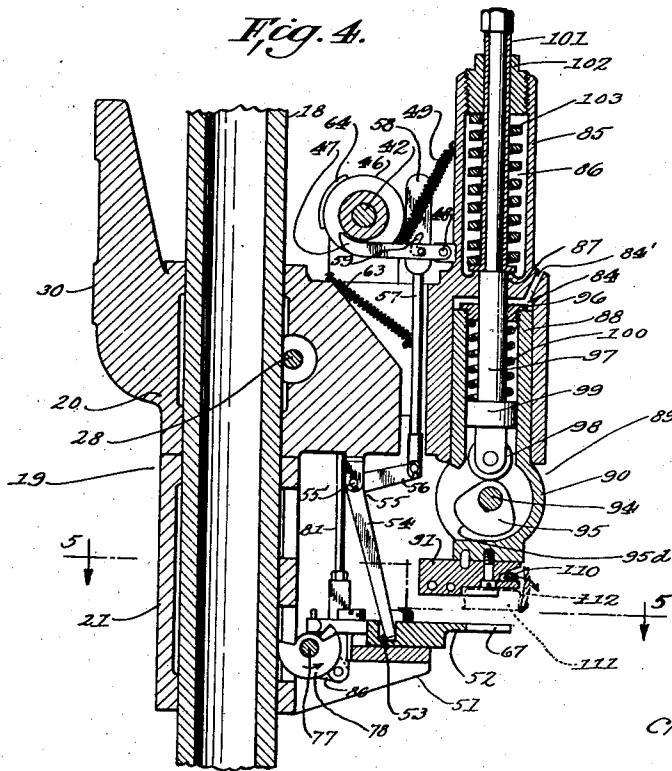


Fig. 4.



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Fig. 5.

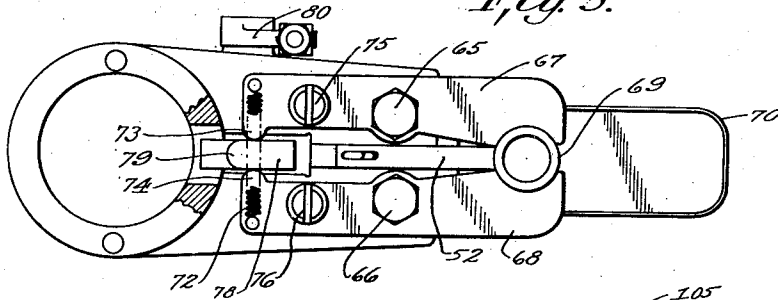


Fig. 6.

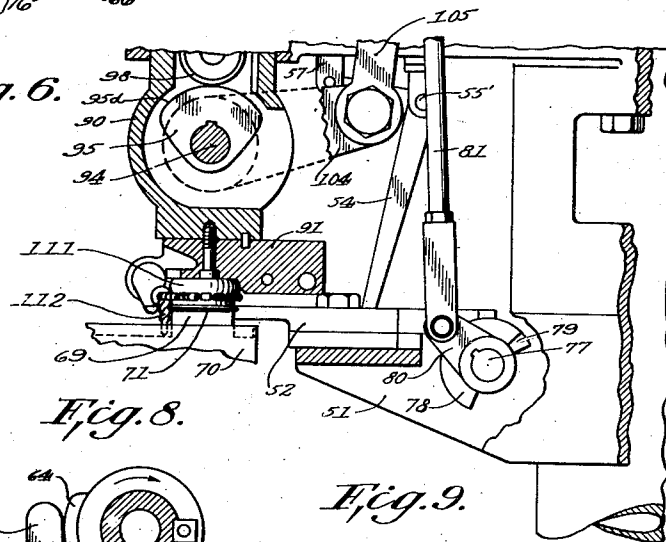


Fig. 7.

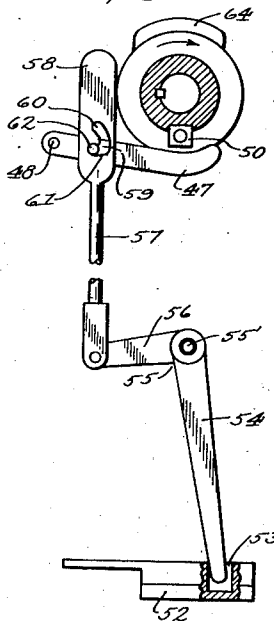


Fig. 8.

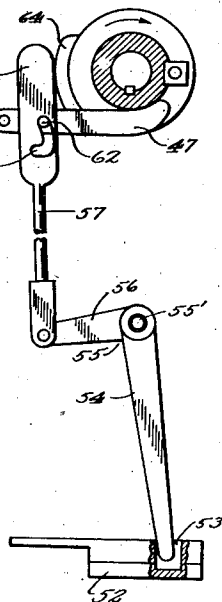
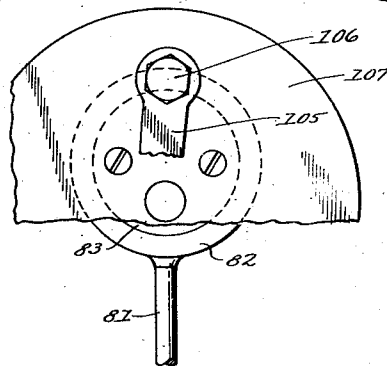


Fig. 9.



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UNITED STATES PATENT OFFICE

2,353,400

CAPPING APPARATUS

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Application January 25, 1941, Serial No. 375,987

9 Claims. (Cl. 226—81)

This invention relates to capping apparatus and in particular to apparatus designed to apply caps of the type having a locking lever, such a cap being shown for example in Patent No. 873,646, issued to G. A. Williams, December 10, 1907. An object of the invention is to provide apparatus wherein the proper positioning of the container to be capped will automatically set in motion the mechanism whereby the sealing is effected, the said mechanism coming to rest at the completion of the operation. With this arrangement speedier operation is possible since the operator is required to do nothing but position the containers and remove them. Another object of the invention is to reduce splashing of container contents by providing a fixed support for the container and a movable capping head. Another object of the invention is to obtain a controlled even pressure on the closure. Another object is to provide apparatus which will operate on containers of various sizes with various neck dispositions so long as the neck diameter is the same. These and other objects are attained by the apparatus shown by way of example in the accompanying drawings and with reference to which the invention will be explained.

In the drawings:

Figure 1 shows the new apparatus in side elevation.

Figure 2 shows the apparatus in front elevation.

Figure 3 is a plan view of the apparatus.

Figure 4 is a partial axial section of the apparatus on a fore and aft plane.

Figure 5 is a section substantially on line 5—5 of Figure 4.

Figure 6 is a partial section of the apparatus on the plane of Figure 4, but viewed from the opposite direction.

Figure 7 is a view partly in elevation and partly in section of certain clutch controlling mechanism.

Figure 8 shows the elements of Figure 7 in a different relation, and

Figure 9 is a fragmentary view of crank and eccentric elements from which certain operative movements are derived.

Referring to the drawings, reference numeral 15 designates a base, which may be mounted on a bench or table, having a forward flat receptacle supporting surface or platform 16 to the rear of which is a socket 17 receiving the lower end of a vertical post 18. A frame 19 has upper and lower united portions 20 and 21 which are bored to receive post 18. Fixed on top of post 18 is a

cap 22 providing a bearing 23 for the upper end of a screw shaft 24 whose lower end is journaled in a bearing 25 on the base. Shaft 24 is threaded in a nut portion 26 of the frame 20, and at its upper end is equipped with a crank and hand wheel 27 which is operable to adjust the frame vertically relative to the platform 16. The frame can be locked in adjusted position by means of a clamping screw 28 having an operating lever 29, Figures 1, 2 and 4.

Frame portion 20 has a rear bracket 30 to which is secured a motor and speed reducing unit 31 having a laterally projecting output shaft 32. A sprocket 33 has a hub portion 34 free on shaft 32. Outwardly of hub 34, Figure 3, a collar 35 is splined on shaft 32 and carries a pair of diametrically disposed pins as at 36 which are normally partly engaged in diametrical recesses as at 37 of hub 34. This relationship is yieldingly maintained by means of a compression spring 38 surrounding shaft 32 and bearing at one end against collar 35 and at the other end against an adjusting nut 39 threaded on the end of shaft 32, a suitable thrust bearing being disposed at the side of the sprocket 33 opposite collar 35. Rotation of shaft 32 is normally imparted to sprocket 33 through the pins as at 36, but upon the occurrence of extraordinary resistance to the drive of the sprocket, the pins as at 36 will be cammed out of the recesses as at 37 so that the drive of the sprocket will be interrupted.

Journaled in arms 40 and 41 rising from frame portion 20 is a shaft 42 parallel to shaft 32 and freely rotatable on this shaft is a sprocket 43 connected by a chain 44 with sprocket 33. Sprocket 43 has a hub portion 45 constituting the drive element of a one revolution clutch which includes a driven element 46, this clutch being controlled by a finger 47 pivoted at 48 to the frame. The finger 47 is normally yieldingly held against the bottom of an annular recess of the driven element 46 by a tension spring 49 and when in this position will engage a sliding key 50 to open the clutch. Downward swinging of the finger 47 will permit the clutch to close. A clutch of this nature is disclosed in Patent No. 1,332,279, issued March 2, 1920, to G. A. Williams et al.

Slidable in a fore and aft keyway in the top of a forwardly projecting bracket 51 of frame portion 21 is a trip 52 whose forwardly projecting end is adapted to be engaged by the neck of a container. Trip 52 has a top recess 53 in which is engaged the extremity of one arm 54 of a bell crank lever 55 pivoted at 55' beneath frame por-

tion 20. The other arm 56 of the bell crank lever is pivoted to the lower end of a link 57, adjustable as to length, the link having an upper expanded portion 58 provided with a hook-shaped slot 59 having an upper portion 60 extending generally longitudinally of the link and a lower portion 61 extending generally transversely of the link. A pin 62 on finger 47 is normally engaged in slot portion 61 and yieldingly retained therein by a tension spring 63 which pulls link 57 to the left, Figure 4. Spring 49 acts to lift the link so that through the bell crank lever, trip 52 is held in the position of Figure 4 wherein its front end is engageable by the neck of a container moved on platform 16 into proper relation to the cap applying mechanism to be later described. When the trip 52 is thus moved, finger 47 is swung downwardly to the position of Figure 7 and key 50, which is carried by the driven element 46 of the clutch, is spring projected into engagement with drive element 45 and rotation of the latter is consequently imparted to shaft 42. As element 46 is driven in the direction of the arrows, Figures 7 and 8, a cam or knock-off portion 64 thereof engages portion 58 of link 57 and swings it to the left, Figure 8, so that pin 62 comes into slot portion 60, thus permitting finger 47 to return to clutch opening position under the action of spring 49 and the clutch will be opened after one revolution of the driven element. During this operation the container will have been sealed, as will be later described, and may be removed by the operator. However, it will be evident that due to the described connection between finger 47 and link 57, proper operation of the one revolution clutch is in no way dependent upon a timed removal of the container and consequent release of trip 52. The clutch opens at the proper point with the trip in the operated position of Figure 8.

In order to relieve the container body from capping pressures, I provide clamping means engageable under the circumferential beads customarily provided on the container necks. Pivoted on top of bracket 51 by means of cap screws 65 and 66, Figure 5, is a pair of jaws 67 and 68 having forwardly projecting portions arcuately recessed to close about the neck 69 of a container 70 beneath the bead 71, Figure 6. The jaws have extensions to the rear of the pivots yieldingly drawn together by a tension spring 72 and provided with opposed cam follower portions 73 and 74 whose movement together under the action of the spring is limited by stop screws 75 and 76 so that in the open position of the jaws they are symmetrical with the longitudinal axis of trip 52 and are sufficiently spread to receive the container neck.

A shaft 77 journaled transversely in bracket 51 has fixed thereon a cam 78 in the form of a major segment of a circle. The cam has parallel side faces and a substantially radial leading edge 79 rounded or tapered to constitute a wedge. The cam is centered on the central longitudinal axis of trip 52 and is cooperable with the follower portions 73 and 74 of the jaws. The rest position of the cam is shown in Figure 4 and its operated position in Figures 5 and 6.

Fixed on the right hand end of shaft 77, Figures 4 and 5, is an arm 80 to which is pivoted the lower end of a link 81, adjustable as to length, the upper end of the link being secured to a strap 82 engaging an eccentric 83, Figures 2, 3 and 9, fixed on shaft 42.

When shaft 42 is driven through one revolution, shaft 77 is rocked to bring cam 78 from the position of Figure 4 to that of Figure 6, the cam being then returned. While follower portions 73 and 74 are engaged with the cam faces the jaws are operatively closed about neck 69 so as to support the bead 71.

The forward portion of frame portion 20 is provided with a lower vertical bore 84 and thereabove with a coaxial hollow neck 85 which defines a spring pocket 86 separated from bore 84 by an annular flange or wall 87, Figure 4. Splined in bore 84 for guided vertical reciprocation is the sleeve portion 88 of a capping element 89 which includes a lower housing portion 90 open at the rear. An air opening 84' prevents compression and vacuum effects in the upper end of the bore. A chuck 91 is fixed against the flat lower face of housing 90 and this chuck may be of any suitable type designed to receive and center a cap and retain it against gravity. Housing 90 has laterally aligned bearing portions 92 and 93, Figure 2, in which is journaled a shaft 94 on which is fixed within the housing a segmental cam 95. The upper end of sleeve 88 is closed by a threaded plug 96 having a central opening in which is slidable a rod 97 which in its lower end carries an abutment in the form of a roller 98 cooperative with the periphery of cam 95. Just above the roller the rod 97 has a collar 99 slidably guided in sleeve portion 88 and maintained against turning in any suitable manner. The collar is axially notched or pierced to prevent vacuum and compression effects between it and plug 96. A compression spring 100 between the latter and the collar yieldingly holds cam 95 and roller 98 together.

Rod 97 extends upwardly through wall 87 and therebeyond is reduced to provide a shoulder against which is seated the outwardly flanged lower end of a sleeve 101 whose upper end is engaged by a nut threaded on the extremity of rod 97. Sleeve 101 is slidable in the bore of a plug 102 threaded in the upper end of neck 85 and a compression spring 103 surrounding sleeve 101 bears at its upper end against plug 102 and at its lower end against the sleeve flange, thereby normally yieldingly holding the latter against flange 87.

Fixed on the right hand end of the shaft 94 is an arm 104 whose free end is pivoted to a link 105 having its upper end pivoted on a crank pin 106 projecting from a disc 107, serving as a hand wheel, fixed on shaft 42. The throw of the crank in relation to the arm 104 is such that during each revolution of shaft 42 shaft 94 is rocked to bring cam 95 from the position of Figure 4 to that of Figure 6 and then to return the same. As the cam moves from the position of Figure 4, the capping element 89 is moved downwardly against the action of spring 100 until the dwell 95d is reached, the application of the cap being effected during this downward movement against the force of spring 103. When the cam returns, element 89 is lifted by spring 100. While the cam dwell is in engagement with roller 98 the locking lever of the cap is swung to locking position by means which will now be described.

Referring in particular to Figures 1, 2, 3, 4 and 6, reference numeral 108 designates a bracket projecting generally downwardly from bearing portion 93 and providing a bearing for a shaft 109 having an eccentric finger 110 which in the rest position of the apparatus lies in a recess of

chuck 91 as shown in Figures 2 and 4. With the cap 111 properly positioned in the chuck, its locking lever 112 projects upwardly in front of the finger 110. The outer end of shaft 109 has fixed thereon a pinion 113 which engages an idler 114 rotatably mounted on a portion of bracket 108 and in turn engaging a gear 115 likewise rotatably supported on the bracket. A crank pin 116 on the lower forward portion of the outer face of gear 115 is engaged in an eye at one end of a rearwardly extending link 117, the latter being passed loosely through an opening in the end of the lower arm of a lever 118 pivoted on frame portion 20 at 119, Figure 1. The rear end of link 117 has threaded thereon an abutment nut 120 and a compression spring 121 is engaged between the nut and the lever arm. Lever 118 has an upwardly extending arm constituted as a follower for a cam 120 fixed on shaft 42, being at all times held against the cam by spring 121. While the dwell 95d of cam 95 is in engagement with follower 98 the rise of cam 120 engages the follower portion of lever 118 and swings the lever in a clockwise direction, Figure 1, so that gear 115, through spring 121 and link 117 is rotated in a clockwise direction, thereby causing finger 110 to be swung downwardly from the position of Figure 4 to that of Figure 6 so that locking lever 112 is swung to locking position. When the point of cam 120 moves away from the follower portion of lever 118, the parts are returned to rest position by a tension spring 122 connected between frame portion 20 and gear 115, Figures 1 and 2.

It will thus be seen that by moving a container into proper position on the platform 16, drive is automatically initiated, the jaws are closed about the container neck, the cap is applied, and the locking lever is moved to locking position. Upon return of the parts, drive is automatically interrupted. Since drive is initiated by a trip which cooperates with the container neck, it will be evident that with a neck which is off the center of the receptacle, the trip will be operated regardless of the position of the receptacle body with respect to the axis of the neck. Furthermore, the container body can be of any size which can be accommodated on the platform 16 and within the vertical range of adjustment of the capping head so long as the necks are of the same size. Necks of different size can, of course, be accommodated by appropriately proportioning the chuck, the jaws and the trip. Once the container is positioned on the platform it remains stationary until removed and there is a consequent avoidance of splashing such as occurs when the container is moved relative to the head in the capping operation.

The invention is, of course, susceptible of varied embodiment and, accordingly, I do not limit myself to the herein disclosed details of construction except as in the following claims.

I claim:

1. Capping apparatus comprising a fixed support for a container to be capped, a capping head including a portion movable toward and away from said support; and means for moving said movable portion including a shaft journaled in said portion, a cam on said shaft, an abutment for said cam, means for rocking said shaft including an arm on said shaft, a rotary crank supported on a fixed axis, and a link connecting said crank and arm.

2. Capping apparatus comprising a fixed support for a container to be capped, a frame above

said support, a capping element guided in said frame for reciprocation toward and away from said support, a shaft journaled in said capping element in parallel relation to said support, a cam on said shaft, an abutment for said cam supported from said frame, a shaft journaled on said frame parallel to said cam shaft, means for rotating the last-named shaft, a crank on said last-named shaft, an arm fixed on said crank shaft and a link connecting said crank and arm, the arrangement being such that rotation of the crank causes oscillation of said arm.

3. Capping apparatus comprising a fixed support for a container to be capped, a frame above said support, said frame having vertical guide means above said support and a spring pocket above said guide means, a flange between said guide means and said pocket, a capping element having a neck portion guided by said guide means, a shaft journaled in said capping element, a cam on said shaft, an abutment for said cam having a stem portion projecting upwardly through said neck and said spring pocket, a spring in said pocket surrounding said stem, a fixed abutment against which the upper end of said spring bears, an abutment on said stem against which the lower end of said spring bears, said spring abutment being normally held against said flange, spring means acting between said neck portion and said cam abutment whereby the latter is held against said cam, and means for oscillating said shaft.

4. Apparatus for applying a cap of the type having a locking lever, said apparatus including a fixed support for a container to be capped, a capping head including a portion movable toward and away from said support, means for reciprocating said movable portion, a rock shaft carried by said movable portion and provided with a finger for swinging said locking lever to locking position, a shaft rotatable on a fixed axis externally of said movable portion, transmission means operatively connecting said shafts, said transmission means including gearing on said movable portion, a lever mounted on a fixed axis externally of said movable portion, a link connecting said lever and a member of said gearing eccentrically of said member, and means driven by said external shaft for rocking said lever.

5. Apparatus for applying a cap of the type having a locking lever, said apparatus including a fixed support for a container to be capped, a frame above said support, a capping element guided in said frame for reciprocation toward and away from said support, pivoted jaws adapted to grip a container on said support beneath said capping element, a finger on said capping element for swinging said locking lever to locking position, a shaft journaled on said frame, a clutch comprising a drive element rotatable on said shaft and a driven element fixed on said shaft; and means operated when said clutch is closed to close said jaws on a container, to move said capping element toward the support to press the cap on the container, and to move said finger to swing said locking lever to lock the cap on the container.

6. Capping apparatus comprising a capping head, drive means for said capping head including a clutch having drive and driven members, a control finger normally holding said clutch open, a trip operated by a container positioned for capping, a link longitudinally displaced upon operation of said trip, and a pin and slot con-

nection between said link and finger of which the slot has a portion extending longitudinally of the link and a portion extending transversely of the link, the pin being normally in the transverse portion of the slot so that upon movement of said trip by the container said finger is moved and the clutch closes, a knock off cam on said driven member which strikes said link whereby engagement of said pin in said longitudinal slot portion is effected, and means thereupon effective to return said finger to clutch opening position while said link is still in operated position.

7. Capping apparatus comprising a flat support for supporting in upright position a necked container to be capped, a capping head above said support including a portion movable toward and away from said support, means for relatively vertically adjusting said head and said support so that containers of different heights are positionable on said support beneath said movable portion for capping, drive means for moving said movable portion toward said support to apply a cap to a container on said support beneath said movable portion, a normally open clutch in said

5 drive means, a trip positioned in front of a container slid to capping position on said support and at a height to be engaged and moved by the container neck, and means between said trip and clutch operated to close the latter when the trip is moved.

8. Structure according to claim 7 wherein jaws are provided at the sides of said trip for gripping the container neck, and wherein means are provided driven from said clutch to close said jaws on the container neck prior to the capping action of the head.

9. Capping apparatus comprising a fixed support for a container to be capped, a capping head including a portion movable toward and away from said support; and means for moving said movable portion including a shaft journaled in said portion, means between said shaft and head effective to displace the latter in capping direction upon rocking of said shaft; and means for rocking said shaft including an arm on said shaft, a rotary crank supported on a fixed axis, and a link connecting said crank and arm.

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