June 23, 1931. E. G. BAUM 1,811,344

CAP FEEDING MECHANISM FOR BOTTLE CAPPERS

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Fig. 1

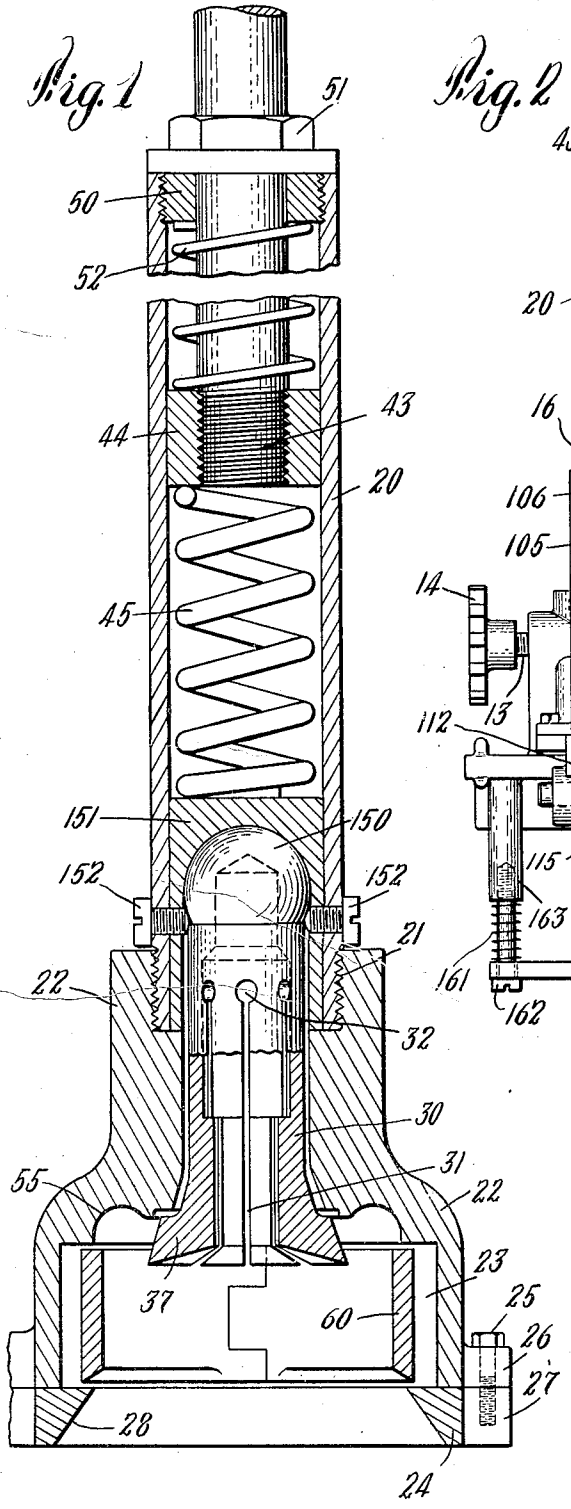
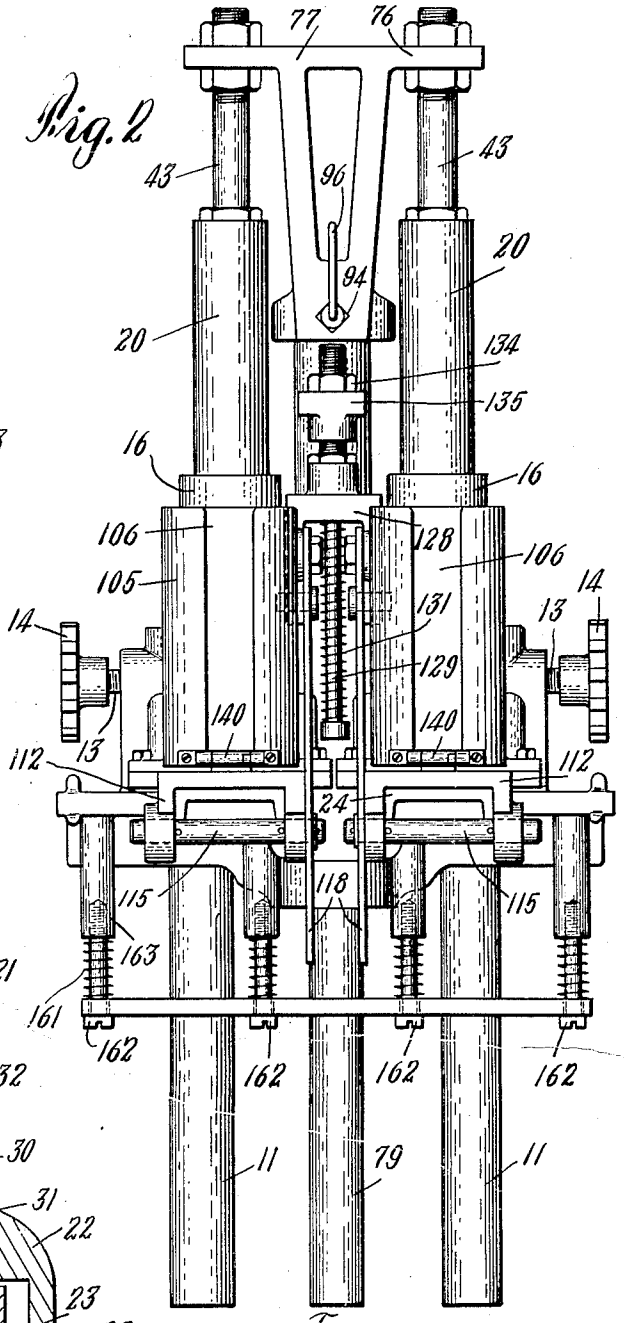


Fig. 2



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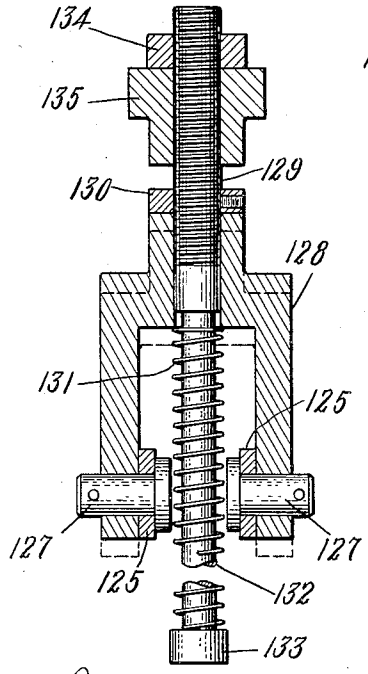


Fig. 3

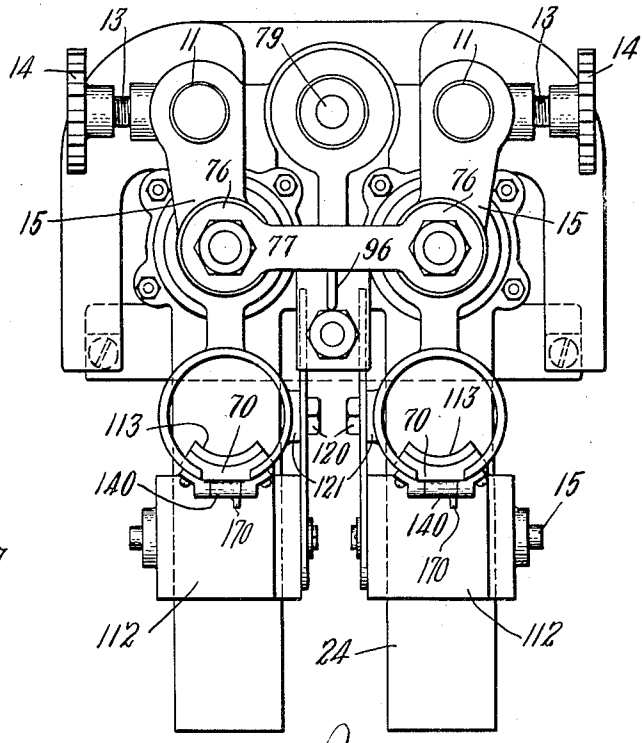


Fig. 4

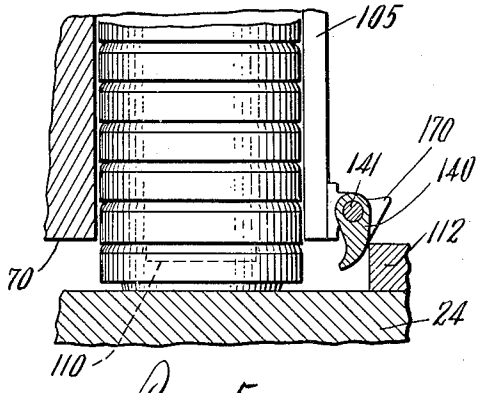


Fig. 5

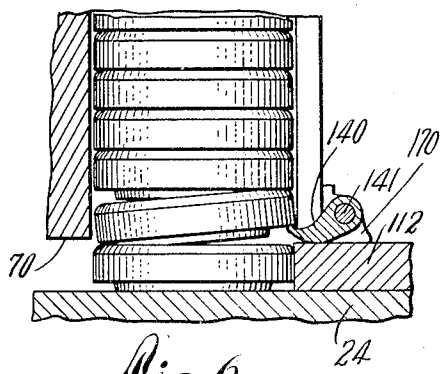


Fig. 6

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CAP FEEDING MECHANISM FOR BOTTLE CAPPERS

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Fig. 7

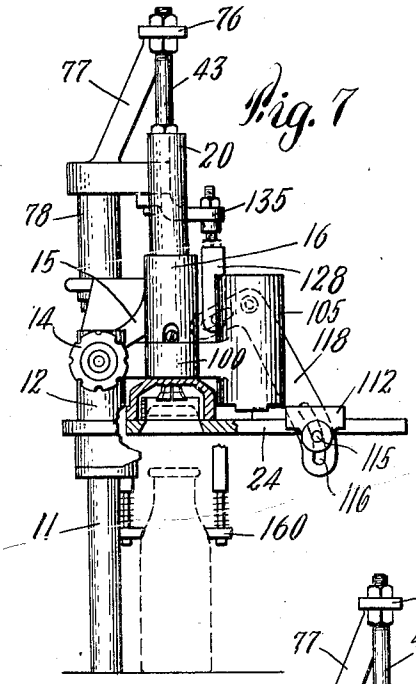


Fig. 9

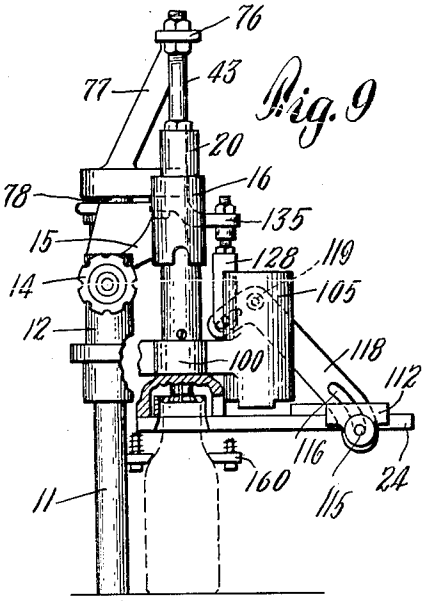


Fig. 8

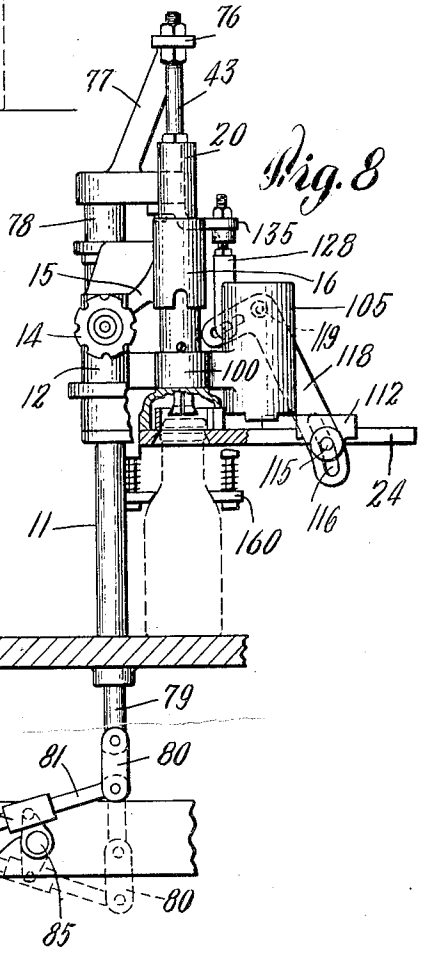
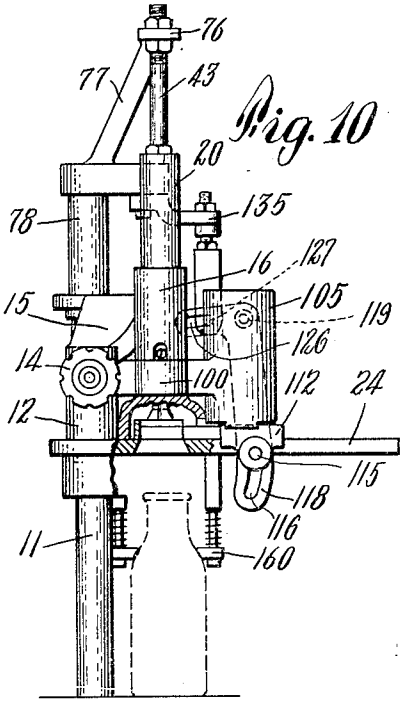


Fig. 10



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Patented June 23, 1931

1,811,344

UNITED STATES PATENT OFFICE

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CAP FEEDING MECHANISM FOR BOTTLE CAPPERS

Application filed June 19, 1929. Serial No. 372,205.

This application is a continuation in part of my copending application Serial No. 40,807, filed July 1, 1925, for bottle capping mechanism, upon which application Patent No. 1,747,343 was granted February 18, 1930. The invention herein described relates more particularly to the feeding of caps to mechanism for capping bottles, particularly designed to apply caps of a special form to milk bottles and as a unit mechanism applicable as the capping portion of a milk bottle filling and capping machine. While in certain respects not limited thereto, it has been designed more particularly for application to machines of the well known Milwaukee type.

The bottle cap is preferably formed in two sections assembled together and applied to the bottle as a unit, one of these sections comprising a substantially cup-shaped member, the base of which is adapted to be seated on the usual disk-receiving ledge of the milk bottle, the upstanding marginal wall of this member engaging the inner wall of the bottle neck above this ledge and its edge portion being turned over the pouring lip at the top of the bottle and engaging its exterior to form a housing for this lip. The other section comprises a disk seated on the marginal portion of the base of the cup-shaped member and in close engagement with its upstanding wall portion.

The cap applying member is designed to place the cap in position with the base of the cup-shaped portion resting on and having seating engagement with the inner edge of the usual disk supporting ledge and to expand the upstanding margin against the inner wall of the bottle. Mechanism for feeding the caps to this member is also provided, the presence of a bottle in position to be capped being necessary to cause a cap to be presented.

For a more complete understanding of this invention, reference may be had to the accompanying drawings in which,—

Figure 1 is a vertical section through a cap-applying plunger.

Figure 2 is a front elevation of capping mechanism including a pair of plungers.

Figure 3 is an enlarged detail partly in section of parts shown in Figure 2.

Figure 4 is a top plan view of the mechanism shown in Figure 2.

Figures 5 and 6 are detail sectional views of a portion of the cap magazine and feeding device, showing different positions of operation.

Figures 7, 8, 9 and 10 are elevations of the capping mechanism in successive positions of operation.

As indicated in Figure 6, the cap to be applied comprises a central cup-shaped portion adapted to enter a short distance into the mouth of the bottle, and a skirt around the rim of the cup-shaped portion to extend over the lip of the bottle and to fit over the outer surface of the bottle mouth.

As shown best in Figures 2 and 8, the machine to which the mechanism of the invention is attached is provided with a platform 10 on which the bottles to be capped may be supported, this platform being a portion of the machine frame within which is housed certain operative mechanisms of the machine. Extending upwardly from this platform 10 are a pair of spaced bars 11. Adjustable vertically on these bars are a pair of sleeves 12 which may be clamped at the desired height above the platform 10 corresponding to the heights of the bottles to be capped by any suitable means such as set screws 13 having hand wheels 14 at their outer ends, these set screws being threaded through the sleeves 12 and their inner ends engaging in any of a plurality of depressions in the bars 11. These sleeves 12 have forwardly projecting portions 15 which carry at their forward ends sleeves 16 through which are vertically slidable portions 20 of the cap applying devices. The portions 20 comprise tubular elements or hollow cylinders, as shown best in Figure 1, the lower ends of which are fixed as by being threaded thereinto as at 21 to capping heads 22. Each of these heads 22 has an opening or socket portion 23 which may take over the upper end of a bottle to be capped. Each of the heads 22 is fixed to a platform 24 therebeneath as by means of bolts 25 extending through lugs 26 on the heads and threaded

into lugs 27 on the platforms, these platforms having tapering perforations 28 therethrough in axial alinement with the socket 23 of the heads.

Within each of the heads 22 is positioned a cap-applying and expanding plunger 30. As shown in Figure 1 this plunger may be formed as a sleeve split upwardly from its lower end as by means of the kerfs 31 which terminate in enlarged perforations 32 adjacent to its upper end. The upper end of the plunger may be formed with a ball-head 150 to fit into a socket in a block 151 positioned within the cylinder 20. The ball-head may be retained in position within its socket as by set screws 152 passing through the side walls of the cylinder 20 and the block 151 and having their ends projecting beneath the bulge of the ball-head 150. Clearance between the plunger 30 and the head 22 is provided to permit a certain amount of radial expansion of the former. The ball-head 150 permits a limited centering motion on the part of the fingers 37 formed by the kerfs so that they may automatically adjust themselves to the mouth of a bottle presented to be capped.

The cylinder 20 together with the parts attached thereto is resiliently supported by a rod or tube 43 which enters the upper end of the cylinder 20 and carries a nut or piston 44 secured to its lower end, the piston being slidably fitted within the bore of the cylinder 20. A stiff spring 45 is located below the piston 44, its upper end bearing on the piston while its lower end bears on the block 151. Thus when the cylinder 20 is lowered over a bottle so as to cause the plunger 30 to push a cap into a bottle mouth the lip of which is thereupon engaged by the capping head 22, the resistance offered by the cap and the bottle lip is opposed by increasing pressure of the spring 45. The supporting and lifting action of the tube 43 on the cylinder 20 is effected through a spring 52 which is contained in the upper portion of the cylinder 20 and bears at one end on the upper face of the piston 44 and at its other end on the lower face of a plug 50 which is screw-threaded in the upper end of the cylinder 20 and which is centrally perforated to receive the tube 43 with a sliding fit. The plug 50 may be provided with a polygonal head 51 to facilitate tight setting up in its place.

Within the socket 23 of the capping head 22 is positioned a device for holding a cap in position beneath the plunger 30. This cap holder comprises a pair of arcuate arms 60 hinged together at one end and normally pressed toward each other a limited extent by means of a spring (not shown). This holder receives caps successively from a cap feeder and holds each one until applied to a bottle.

Each of the tubes 43 by which the heads and plungers are given their vertical movement is threaded at its upper end and passes through a laterally extending portion 76 of a member 77. This member 77 is carried at the upper end of a sleeve 78 which is axially adjustable on a vertically reciprocating rod 79 which extends through the platform 10 and has pivoted at its lower end a link 80 which connects it to the outer end of a lever arm 81 fulcrumed at 82 (see Figure 8). Slidable on this arm 81 is a sleeve 83 which is pivotally connected to the outer end of a crank 84 fixed to a shaft 85. This shaft 85 is driven in time with the various other mechanisms of the filling machine and by its rotation effects a rocking movement of the arm 81 as shown in full and dotted lines in Figure 8, thus giving a vertical reciprocatory motion to the rod 79. It will be seen from this description that the rod 79 acts to impart the vertical reciprocations to the head 22 and the cap applying plunger in order to apply caps to the bottles and then retract them therefrom to permit the removal of the bottles and the positioning of others to be capped.

Mechanism is also provided for automatically feeding caps from a magazine to each of the applying heads and plungers and this mechanism is so constructed that should a bottle not be present at the descent of the head and plunger at any time, the cap in position to be applied will not be ejected from the head and no new cap will be fed into position prior to the succeeding capping movement thereof. Surrounding the head 22 above its socket portion is a member 100 which projects forwardly of the sleeve 16 and is formed as a cap magazine 105 which is preferably slotted at its outer end as at 106 so that the positions of the caps therein may be readily ascertained. If desired the upper portion of this magazine may be formed to permit the insertion therein of a tubular container in which caps may be assembled and placed in position to feed into the magazine 105, the tubular container thus serving merely as an extension to increase the capacity of the supply. The lower end of the magazine is positioned sufficiently above the upper face of the platform as at 70 so that a single cap may be moved therefrom along the platform 24 through the slot 70 and into the socket 23 of the head 22. Preferably side wall portions 110 are extended downwardly somewhat to serve as guide means to insure the correct lateral positioning of the caps as they are moved from the magazine to the applying head.

Means for moving the caps from each magazine to the corresponding head comprises a feed slide 112 having, as shown best in Figure 4, a curved forward end 113 shaped for engagement with the side of the cap. This slide is movable over the face of the platform 24 and extends down on either side

thereof so that it is guided for longitudinal motion. The downwardly extending side portions of each slide 112 are perforated for the reception of a pivot pin 115 which passes beneath the platform 24, and one end of this pivot pin passes through a slot 116 in the long arm of a bell crank lever 118 fulcrumed at 119 on a bolt 120 threaded into a lug 121 adjacent to the upper end of the magazine. The short arm 125 of this bell crank lever is slotted as at 126 and through this slot extends a pin 127 carried at the lower end of one of the branches of a bifurcated block 128 (see Figures 2 and 3). This block is slidable on the lower portion of a rod 129 on which is adjustably fixed a collar 130 with which the block 128 is normally held in engagement by means of a spring 131 surrounding the lower reduced portion 132 of the rod 129 and bearing at its upper end against the block and at its lower end against a head 133 of the rod 129. The upper end of the rod 129 is threaded through the forward end of a bracket 135 which is fixed to the member 77. The rod 129 may have a lock nut 134 applied to its upper end. By this construction as the member 77 is moved downwardly carrying therewith the head 22, the plunger, the cap magazine and the platform 24, the short arm 125 and the fulcrum of each of the bell crank levers 118 are correspondingly moved so that there is no rocking motion imparted to the bell crank levers and consequently no sliding motion to the feed slide 112.

If now a bottle be in position beneath the head 22, downward motion of this head is after a predetermined extent of motion arrested by the bottle and at the same time downward motion of the magazine and the platform 24 is also arrested. The downward movement of the member 77 still continues, however, thus causing a positive downward motion to be imparted to the short arm of the bell crank lever 125, retracting the slide 112 into the position shown in Figure 9, whereupon the caps in the magazine are permitted to drop down so that the lowest cap therein rests on the upper face of the table 24. When the slide is in this retracted position, a cap lifting element 140 pivoted at 141 adjacent to the open side of the magazine is permitted to drop downwardly into the position shown in Figure 5. After the cap has been applied to the bottle and the member 77 starts to rise therefrom, the head 22, and together with it, the magazine and the table 24, are held downwardly due to the tension of the spring 45 until the piston 44 resumes its normal position relative to the cylinder 20. During this initial retracting movement of the member 77, the bell crank lever 118 is rocked resiliently in the opposite direction through its spring connection 131 with the member 77 to bring the slide 112 toward the lowest cap of the stack in the magazine. Before it reaches this, however, it impinges on the lifting member 140 which is pushed into position between the two lowest caps in the stack to engage beneath the edge of the cap above that which is next to be fed, as shown in Figure 6, thus raising the superposed caps sufficiently from the cap to be fed so that this cap is free to be slid out from beneath the stack and into the socket 23 of the head. The lifting member 140 may be supplied with a stop 170 which as shown may comprise a rearwardly extending fin. This limits the swing of the member 140 to the position shown in Figure 6 when it is struck by the advancing slide 112. The feeding movement of the slide 112 continues during the expansion of the spring 45 until the parts of the machine reach the positions shown in Figure 8. Further upward movement of the member 77 and tube 43 carries the platform 24 and magazine upwardly therewith to the position shown in Figure 7, at which point the member 100 brings up against the fixed sleeve 16 and stops the upward movement of the head 22. During this elevation of the platform 24 to clear the top of the capped bottle, there is no appreciable relative movement between fulcra 119 and the pins 127 since both are moving upwardly together. Hence during this portion of the operation, there is a dwell in the feeding movement of the slide 112, this dwell occurring when the forward end of the slide is part way across the magazine. When the member 100 engages the fixed sleeve 16, as in Figure 7, further upward movement of the magazine 105 and fulcra 119 is stopped. The member 77, however, continues to rise against the pressure of the spring 52 to the position shown in Figure 10, continuing the upward movement of the pins 127 and rocking the bell crank 118 to continue the feeding movement of the slide 112 sufficiently to push the next cap into place in the socket 23 between the holding arms 60. On subsequent downward motion of the member 77, the first action is to retract the slide 112 from the socket 23 of the head 22 as shown in Figure 7, so that the parts are in proper position for the head to descend upon the bottle top and apply the cap thereto, and during the last portion of the downward stroke from the position shown in Figure 8 the slide retracts completely as shown in Figure 9, preparatory to a succeeding feed motion as previously described. If the bottle is not positioned beneath either one of the heads 22, this head is not stopped in its descent with the member 77, whereupon the corresponding feed slide fails to be actuated and no cap is delivered.

It is sometimes found desirable to provide means for holding the bottle firmly on the platform 10 during the capping operation. One form of mechanism by which this may be accomplished comprises hold down bars

160 normally urged downwardly by springs 161 surrounding screws 162 threaded into posts 163 projecting downwardly from the platform 24.

An embodiment of this invention having thus been described, it should be evident to those skilled in the art that various changes and modifications might be made therein without departing from its spirit or scope as defined by the appended claims.

I claim:

1. In a capping mechanism, a vertically movable head having an opening engaging over and around the mouth of a bottle to be capped, a vertically reciprocable support member connected with said head, means resiliently maintaining said head and its support member in an intermediate position relative to each other, a cap magazine rigidly attached to said head, a cap feeding slide horizontally reciprocable beneath said magazine, and means actuable by relative movement between said head and its supporting means from said intermediate relative position to reciprocate said slide to either end of its stroke.

2. In a capping machine, a vertically movable head having an opening engaging over and around the neck of a bottle to be capped, a cap-applying plunger secured to said head for vertical motion therewith, a vertically reciprocating member, a resilient operating connection between said head and said member, a cap magazine attached to said head for vertical motion therewith, a feed slide carried by said magazine and slidable therebeneath, a bell crank having one arm connected with said slide and its fulcrum on said magazine, and means connecting the bell crank with the reciprocating member for positive actuation of said crank on the down stroke of the member and resilient actuation of the crank on the up stroke of the member.

3. In a capping mechanism, a vertically reciprocable head having a cylindrical portion extending upwardly and closed at its upper end, means for supporting and reciprocating said head including a vertical rod extending into the upper end of said cylinder, a vertically reciprocating member connected to said rod, a piston secured to said rod and slidably fitted within said cylinder, a pair of springs in said cylinder above and below said piston, the remote ends of said springs bearing respectively on the opposite ends of said cylinder whereby said cylinder and head are resiliently supported against upward or downward motion relative to said piston and rod, a cap magazine rigidly secured to said head and vertically reciprocable therewith, a cap feeding slide horizontally reciprocable beneath said magazine, a bell crank pivotally mounted on said magazine, said bell crank having an arm connected to said slide and the other arm connected to said vertically reciprocating member, means for stopping the upward movement of said head before the end of the upward stroke of said piston, and means for supporting a bottle beneath said head in a position to stop the downward motion of said head before the end of the downward stroke of said piston, whereby the cap feeding slide is actuated by relative motion between said head and piston.

4. In a capping mechanism, a cap magazine, a cap applying device, a slide for moving caps successively from the lower end of said magazine to said device, and a pivoted element arranged to be struck and rocked upwardly by said slide in advance of its engagement with a cap, said element engaging between the two lowest caps in said magazine and lifting the superposed caps to free the lowest cap for movement by said slide.

In testimony whereof I have affixed my signature.

EWALD GEORGE BAUM.