C. HARTWIG.

BOTTLE CAPPING MACHINE.

APPLICATION FILED OCT. 8, 1912.

1,069,948.

Patented Aug. 12, 1913.

3 SHEETS—SHEET 1.

Fig. 1.

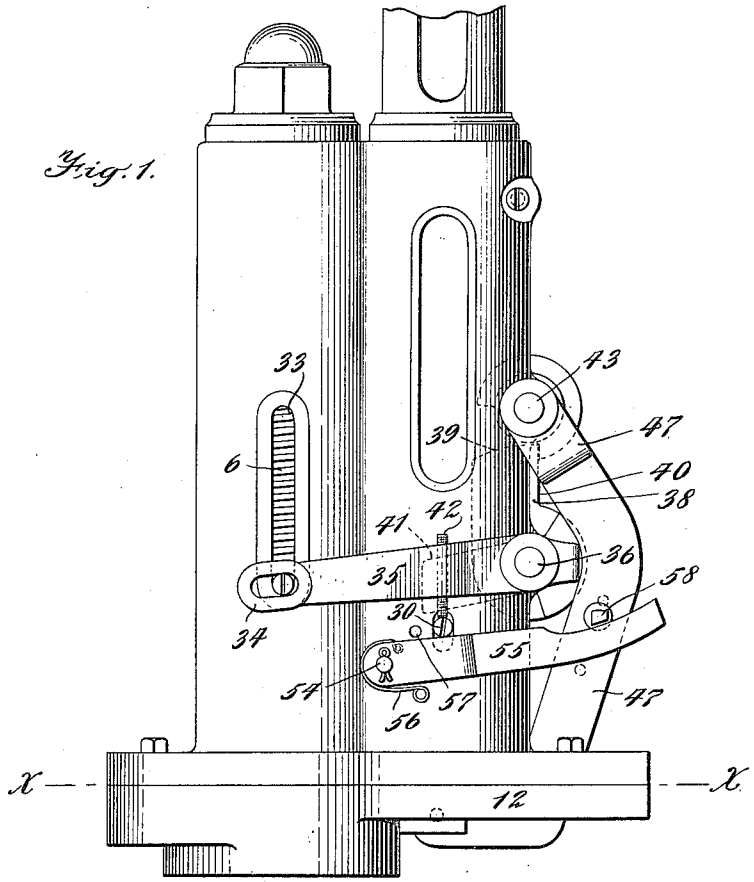
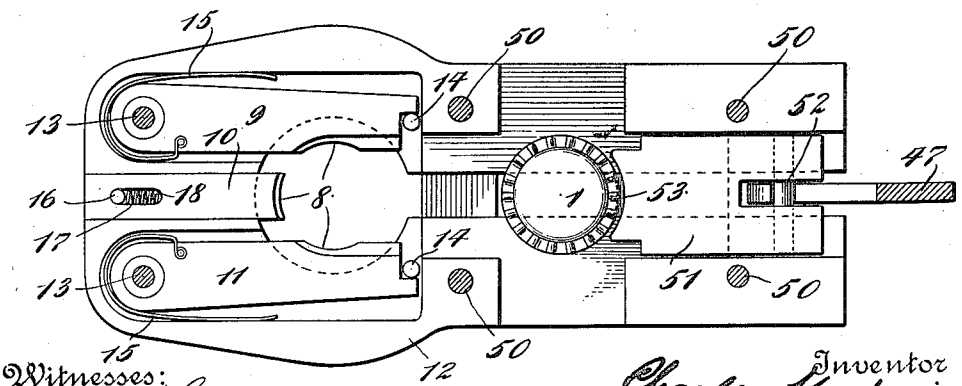


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 5.

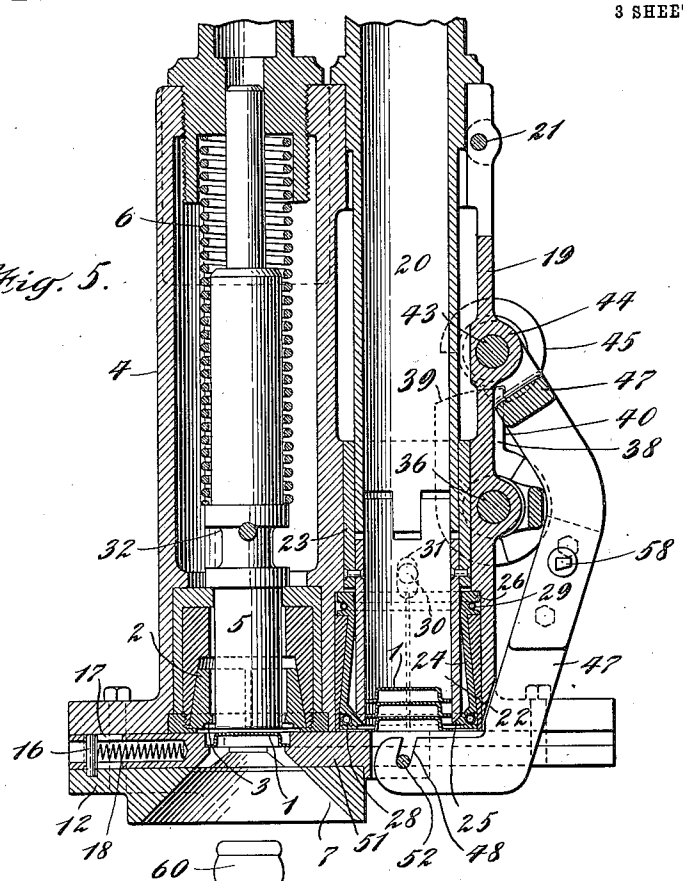
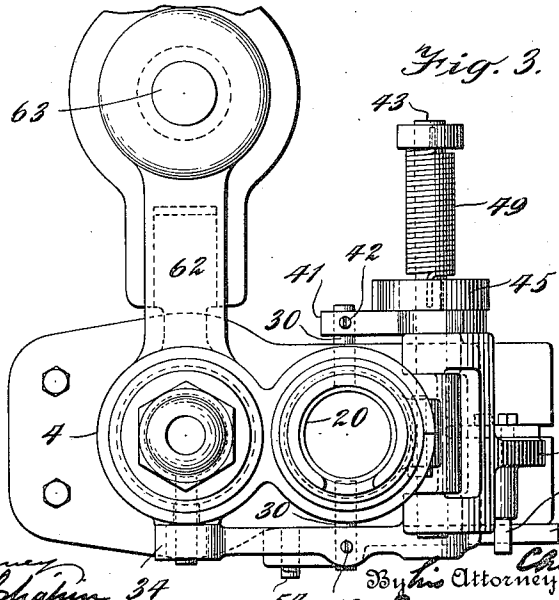


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 6.

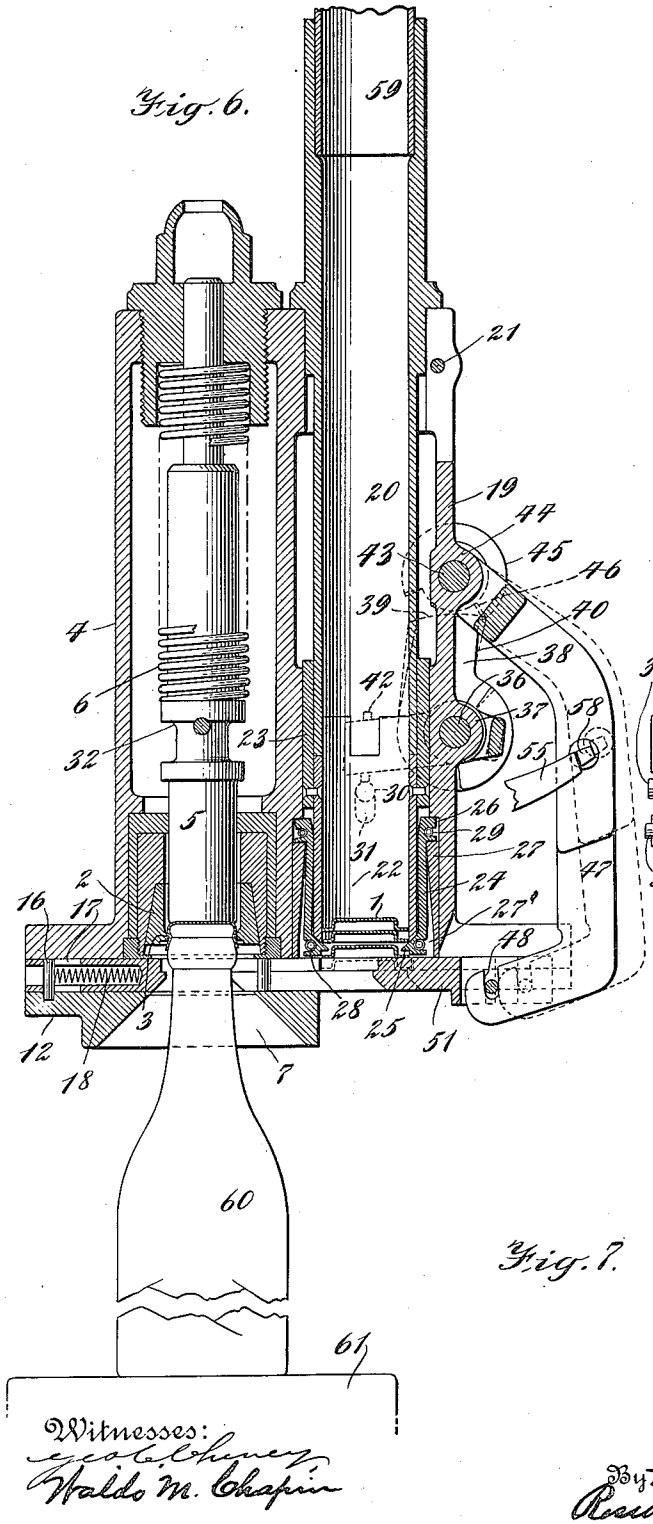


Fig. 4.

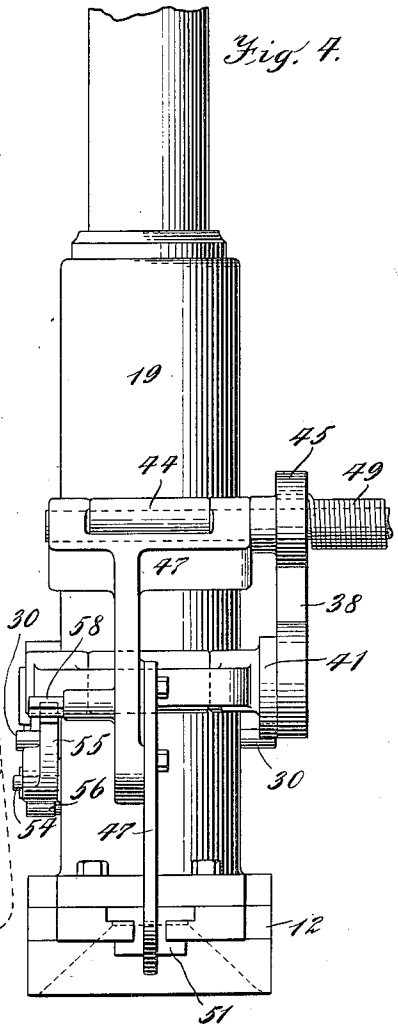
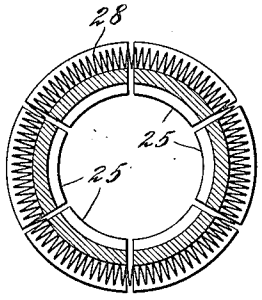


Fig. 7.



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UNITED STATES PATENT OFFICE.

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BOTTLE-CAPPING MACHINE.

1,069,948. Specification of Letters Patent. Patented Aug. 12, 1913.

Application filed October 8, 1912. Serial No. 724,510.

To all whom it may concern:

Be it known that I, CHARLES HARTWIG, a citizen of the United States, residing at the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Bottle-Capping Machines, of which the following is a full, clear, and exact description.

This invention relates to bottle capping machinery of that character in which the bottle and the capping die or head reciprocate with respect to each other in order to apply a metal cap to the mouth of the bottle.

The features of improvement in my machine have to do with the means for automatically feeding the caps, one by one, from a reservoir containing the caps to the capping die. Heretofore the means for accomplishing this has comprised a reservoir for the caps and a chute or slide into which the caps are directed from the reservoir and by which they are conveyed, usually by gravity, to the capping die. The operation of this chute is not always satisfactory inasmuch as it is found that the caps sometimes become clogged therein and that the delivery from the exit of the chute to the capping die is not always regular and results in jamming the caps and stoppage of the machine.

By my invention I have eliminated the chute entirely and have located the reservoir in such relation to the capping die that the caps are delivered directly from the reservoir to the capping die by a mechanism so simple that there is little or no liability of derangement of the apparatus or delay in its operation.

My invention contemplates a reservoir for the caps in which the latter are arranged one above the other in the form of a column which stands parallel and closely adjacent to the axis of the capping head, the lowermost cap in said column being on a level with the throat of the capping die at which point is located a reciprocating slide which carries the bottle caps from the reservoir to the die, while other mechanism acts upon the column of caps to prevent its interference with the movement of the slide. Such an arrangement provides a compact and simple structure of few parts, certain and efficient in operation.

My invention will be described in detail with reference to the accompanying drawings, in which—

Figure 1 is a front elevation of the improved capping head and cap reservoir and mechanism coöperating therewith. Fig. 2 is a plan of the plate shown below the dotted line *x*—*x* in Fig. 1; Fig. 3 is a plan of the capping head and reservoir; Fig. 4 is a side elevation of the mechanism shown in Fig. 1; Fig. 5 is a vertical central section through the capping head and reservoir showing the slide in its forward position; Fig. 6 is a similar section of the same parts showing the slide in a partially withdrawn position; and Fig. 7 is a horizontal section through the lower end of the cap retainer at the foot of the cap reservoir.

The caps may be of the ordinary well known shallow cup-shape having inside thereof, if desired, a disk of packing material and being represented in the various figures by 1. Any suitable form of capping die may be used for applying and sealing these caps to the bottle, as the present invention does not specifically relate to the kind of die which is used for this purpose. As shown, however, the die consists of annular segmental jaws 2, provided with an internal bead 3 which wipes the flange of the cap downward around the mouth of the bottle while the latter is being forced axially through the die. This die 2 is contained in the casting 4 which is of cylindrical shape and provided with an axially arranged plunger 5 adapted to reciprocate vertically within the casting, it being forced upward by the pressure of the bottle against its lower end and returned downward by the pressure of a spring 6. Below the die is arranged a tapered passage 7 which directs the mouth of the bottle against the cap which has been previously seated in the throat of the die upon the annular segmental seats 8 formed on the edges of the yielding plates 9, 10 and 11 (Fig. 2), which plates are located in depressions formed in the bottom plate 12 secured to the die casting. The plates 9 and 11 are pivoted at 13—13 and normally held against stops 14—14 by springs 15—15, while plate 10 is held in a slideway in which it has a yielding limited movement by reason of the pin 16, slot 17, and spring 18. The purpose of these plates is primarily to temporarily sustain the cap centrally below the die just prior to the

upward movement of the bottle or the downward movement of the die, as the case may be, for the capping operation; and secondarily, these plates are adapted to yield laterally in case the neck of the bottle which is thrust between them and some distance there-above in the capping operation, should be so large as to strike the flanges or lips 8. 19 indicates another cylindrical portion of the casting formed integrally with part 4 and arranged with its axis parallel to that of the part 4. Within this part 19 is fixed a tube 20 being clamped rigidly by the bolt 21 which draws together the upper split portions of the casting. The tube 20 has its lower end notched or crenelated and joins the upper end of another tube 22 similarly notched and movable in an axial direction with respect to tube 20 and casting 19. The tube 22 is fixed to a bushing 23 which has a bearing in the casting 19 giving stability to the tube 22 in its movements. The lower end of tube 22 is beveled inward as shown. 24 indicates a cylindrical segmental cap retainer which surrounds the lower portion of the tube 22 and projects slightly beyond the lower end of the same, being formed at its edge into an inwardly-directed annular wedge-shaped bead 25. The upper edge of this retainer is provided with a grooved outer flange 26 which rests upon the upper edge of a bushing 27, between which bushing and the outer surface of the tube 22 is a chamber 27′ in which the lower ends of the segments of the retainer may have a limited radial or lateral movement. Around the lower edge of the retainer is an external groove containing a spring 28 which tends to draw the segments radially inward, and a similar but lighter spring 29 occupies the groove in the flange 26 tending to draw the upper edges radially inward, these motions being permitted by the curved inner surface of the retainer rolling on the exterior surface of the tube. When the tube 22 is moved downward, its lower beveled edge presses against the inclined upper face of the bead 25 and forces the lower ends of the segments outward until said bead is outside of the bore of the tube. When the tube 22 is free to rise, the spring 28 forces the bead 25 inward until it enters the bore of the tube forming an annular shelf around the same, at the same time forcing the tube 22 upward by reason of the cam action of the bead upon the beveled edge of the tube. The chamber formed by the two tubes 20 and 22 constitutes the cap reservoir, its diameter being a trifle larger than that of the caps so that they easily feed downward therethrough, and the joint between the two tubes being crenelated as described to prevent the flanges of the caps from being obstructed by the abutting edges of the tubes when there is a separation between the ends of the tube due to the movement of the tube 22. It will be seen that when the tube 22 is in its elevated position the bead 25 on the retainer is projecting into the bore of the tube and prevents the downward movement of the column of caps above it.

The tube 22 is provided with two diametrically arranged pins 30—30 secured to the walls thereof and passing outward through slots 31 in the casing to be acted upon by external mechanism hereinafter described, for the purpose of lowering the tube.

The capping head plunger 5 is provided with a pin 32 which projects therefrom outward through a slot 33 in the casing 4 and enters the forked or slotted end 34 of a lever 35. This lever is fixed to a rock-shaft 36 mounted to turn in suitable bearings 37 in the casting 19, which shaft also carries a cam 38 which is provided with a concentric track 39 and a shoulder 40. On this same shaft 36 adjacent to the cam is a crank-arm 41 and in the end of this crank-arm as well as in an intermediate portion of the lever 35 is an adjustable screw 42—42 arranged to bear respectively upon the two pins 30 which are attached to the tube 22. Thus when the lever 35 is swung downward by the downward movement of the cap plunger 5, the tube 22 is forced downward and the bead 25 on the retainer is forced outside of the bore of tube 22. The screws 42 are adjustable in order to determine the exact moment in the downward stroke of the lever 35 when the pins 30 shall be moved. Above the shaft 36 there is mounted another shaft 43 in bearings 44 formed in the casting 19, which shaft carries a disk 45 having a shoulder 46 adapted to be engaged by the shoulder 40 on cam 38 in order to rotate shaft 43 when lever 35 is lifted. When the disk 45 has been rotated to the position shown in Fig. 6, cam 38 may thereafter continue to swing to the right without further rotating the disk since the concentric track 39 of the cam thereafter rides upon the end of shoulder 36. Shaft 43 also carries a bent arm 47 which reaches downward under the cap reservoir and is provided at its extremity with a hook 48. On the rearwardly-projecting end of shaft 43 is a torsion spring 49 connected at one end to the shaft and at the other end to the disk 45 for the purpose of rotating the shaft in a direction contrary to that in which it is rotated by the cam 38.

Fixed to the bottom of the casting 4—19 by means of bolts 50 is the plate 12 before mentioned. Located in a channel in the upper face of this plate is a slide 51 engaging with said plate by means of a dove-tailed connection as clearly shown in Fig. 4, the plate 12 being slotted so that it may be reached from below by the arm 47 and also to accommodate the swinging movements of the latter. The said arm 47 engages with

the slide 51 by means of a cross-pin 52 fixed in the slide, the hooked end of the arm 47 engaging directly with the said pin; thus the movements of the arm 47 are communicated to the slide. The forward end of the slide is provided with an arc-shaped face 53 which is adapted to impinge against the edge of a cap 1 to force the latter along the plate 12 into the throat of the capping head where it is deposited upon the lips 8 under the die.

Pivoted upon the front of the casting 19 upon a stud is a latch 55 which extends laterally under one of the pins 30 and is then off-set so that its extremity will extend alongside of the lever 47. A spring 56 acts upon the latch with a tendency to throw its free end upward, the stroke being limited by a pin 57. The lever 47 carries a lug 58 with which the end of latch 55 is adapted to engage when the latter is in its upper position in order to prevent movement of the lever 47 under the action of spring 49.

For the purposes of this machine the bottle caps are put up in capsules or paper tubes containing, say, 100 each, and these capsules are bodily inserted into the upper end of tube 20 as indicated at 59 in Fig. 6, the lower end of the capsule being first opened to allow the caps therein to drop downward into and fill the tubes 20 and 22. The bottle to be capped and which is indicated in the drawing by 60, may be placed upon a fixed table 61 and the capping head caused to move downward toward it to perform the capping operation, or, the bottle may be placed upon a movable table and the latter forced upward to the stationary capping head. As contemplated, however, and as shown in the drawing, it is intended that the table shall be stationary and the capping head movable, Fig. 3 showing a bracket 62 reaching rearwardly from the casting 4 and fixed to the upper end of a rod 63 to which a vertical reciprocatory movement may be imparted in any desired manner.

Referring now to Figs. 1 and 5, the parts are there shown in the position they occupy just before the capping head makes its downward stroke. It will be seen that cap 1 is in position upon the lips 8 in the throat of the capping die and that the slide 51 is in its extreme position to the left having just deposited the cap in the position described. The lowermost cap in the cap reservoir is resting upon the top of slide 51. The tube 22 is in its lowermost position and holding the bead 25 on the retainer outside of the bore of the tube. The plunger 5 is in its lowest position the latch 55 is out of engagement with the lug 58 and is in its lowest position while lever 35 is likewise in its lowest position with the cam shoulder 40 against the shoulder 46 on disk 45. The capping head now makes a stroke downward which brings the cap against the mouth of the bottle, and by a continuance of the motion, the bottle forces plunger 5 relatively upward while the flanges of the cap are being turned downward around the mouth of the bottle by the die 2. As the plunger rises, pin 32 thereon lifts lever 35, causing shoulder 40 on cam 38 to press against shoulder 46 on disk 45, rotating the latter and the shaft 43 and swinging lever 47 to the right, which carries with it the slide 51. As the levers 35 and 41 are thus lifted from the pins 30, freeing the tube 22, the spring 28 is permitted to force the segments of the cap retainer inward against the lower edge of the tube causing it to rise, and the bead 25 on the retainer, to enter the annular space between the flanges of the two lower caps in the reservoir. This occurs just before the slide completes its motion to the right or when it has reached substantially the position shown in Fig. 6. Just before the completion of the stroke of the lever 47 to the right, as seen in Fig. 6, the latch 55 is released by pin 30 and springs in front of the lug 58 to prevent the return movement of the lever. At the completion of the stroke of lever 47 to the dotted lines position shown in Fig. 6 and which is determined by the movement when the concentric cam track is presented to the end of shoulder 46, the lowermost cap in the reservoir drops down in front of the slide to the position shown in Fig. 2 while the remaining caps in the reservoir are retained therein by the inwardly-projecting bead 25. Any further movement of the lever 35, which may be more or less, dependent upon the length of the bottle, will occur without any response by the lever 47. On the return stroke, that is, when the capping head lifts, the plunger 5 relatively moves downward as the bottle passes out of the throat of the die under the action of spring 6, and levers 35 and 41 move downward until the concentric track 39 of the cam passes to the left beyond the end of shoulder 46 on disk 45. At this moment arm 47 commences to move to the left but is soon stopped by the latch 55. The adjustable screws 42 which in the meantime have been forcing the pins 30 downward, finally carry one of the latter against the latch 55, and forces it away from the lug 58 at the instant when the bottle neck has fully cleared the throat in the die. Lever 47 then being free, is quickly forced to the left by the torsion spring 49, and in making such movement carries the cap 1 with it and deposits the same upon the lips 8 in the throat of the die. By the time the latch 55 releases the lever 47 the tube 22 has moved downward sufficiently to force the cap retaining bead 25 outside of the bore of the tube, allowing the column of caps in the tube to feed downward onto the

top of the slide at the instant when the slide is traveling to the left.

It will be seen that while the capping die is adapted to cap bottles of varying length as they are presented to it by reason of the fact that the plunger 5 yields upward to any required extent, the feeding of the caps which is controlled by the stroke of the plunger is nevertheless timed so that a cap will never be presented to the throat of the die until the bottle has withdrawn therefrom. This is accomplished by means of the cam 38 provided with the concentric track which limits the movement of the slide to the right, regardless of the length of stroke of plunger 5, and by the latch 55 which releases lever 47 only at the instant when the plunger 5 reaches its lowest position, as seen in Fig. 5, and the bottle neck has passed out of the throat of the die.

Having described my invention, I claim:

1. In a bottle capping machine, the combination of a die provided with a reciprocating plunger having a variable stroke, a cap reservoir, feeding mechanism for delivering caps from said reservoir to the die, means whereby said plunger will actuate said feeding mechanism, and lost motion mechanism whereby the stroke of the feeding mechanism will be uniform notwithstanding that the stroke of the plunger may vary.

2. In a bottle capping machine, comprising a cap reservoir consisting of an axially movable tube in combination with a cap retainer adapted to enter the bore of the tube and thereby move the tube in one direction and be forced out of the bore of the tube by the movement of the latter in the opposite direction, for the purpose set forth.

3. In a bottle capping machine, a tubular cap reservoir adapted to receive a column of caps, said tube being adapted to reciprocate, an annular cap retainer surrounding said tube and provided with a bead adapted to enter the bore thereof, a spring adapted to force said bead inward and another spring acting upon said tube to force the bead of the cap retainer outward, for the purpose set forth.

4. In a bottle capping machine, a cap reservoir in the form of a tube, a cap retainer having a cam surface adapted to engage said tube, means for moving the cap retainer to a position where it will engage the caps of the tube and at the same time bodily move the tube, and means for moving the tube in the opposite direction to alter the position of the cap retainer.

5. In a bottle capping machine, a cap reservoir comprising a tube through which the caps feed, said tube being movable in an axial direction, in combination with a cap retainer adapted to be moved in one direction by the movement of the tube, and by its own movement in one direction adapted to move the tube, for the purpose of clearing and obstructing respectively the passage through the tube.

6. In a bottle capping machine, the combination of a capping head provided with a plunger having a stroke depending upon the length of the bottle operated upon, a cap reservoir, a reciprocating slide for conveying caps from the reservoir to the head, a pivoted lever adapted to be moved by said plunger, a cam moved by said lever, and a swinging arm connected with said slide, the cam being adapted to actuate the swinging arm during a predetermined part of the stroke of the plunger.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

CHARLES HARTWIG.

Witnesses:
WALDO M. CHAPIN,
WILLIAM C. LARY.