July 2, 1935. J. J. GAYNOR 2,006,450

CAPPING MACHINE

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Fig. 2.

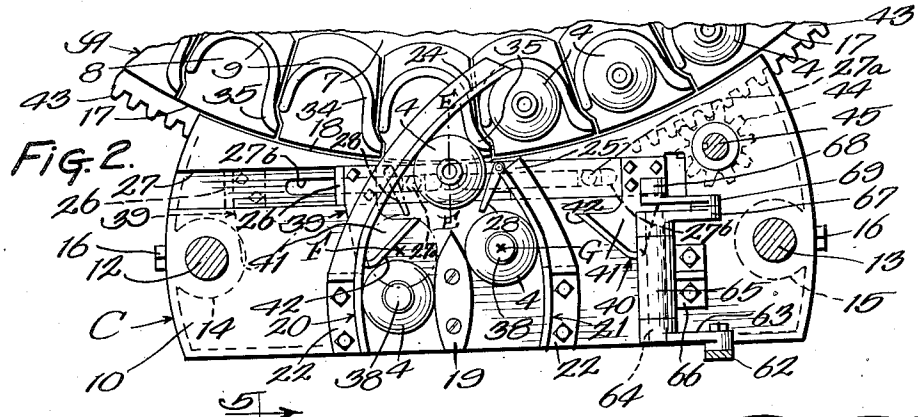
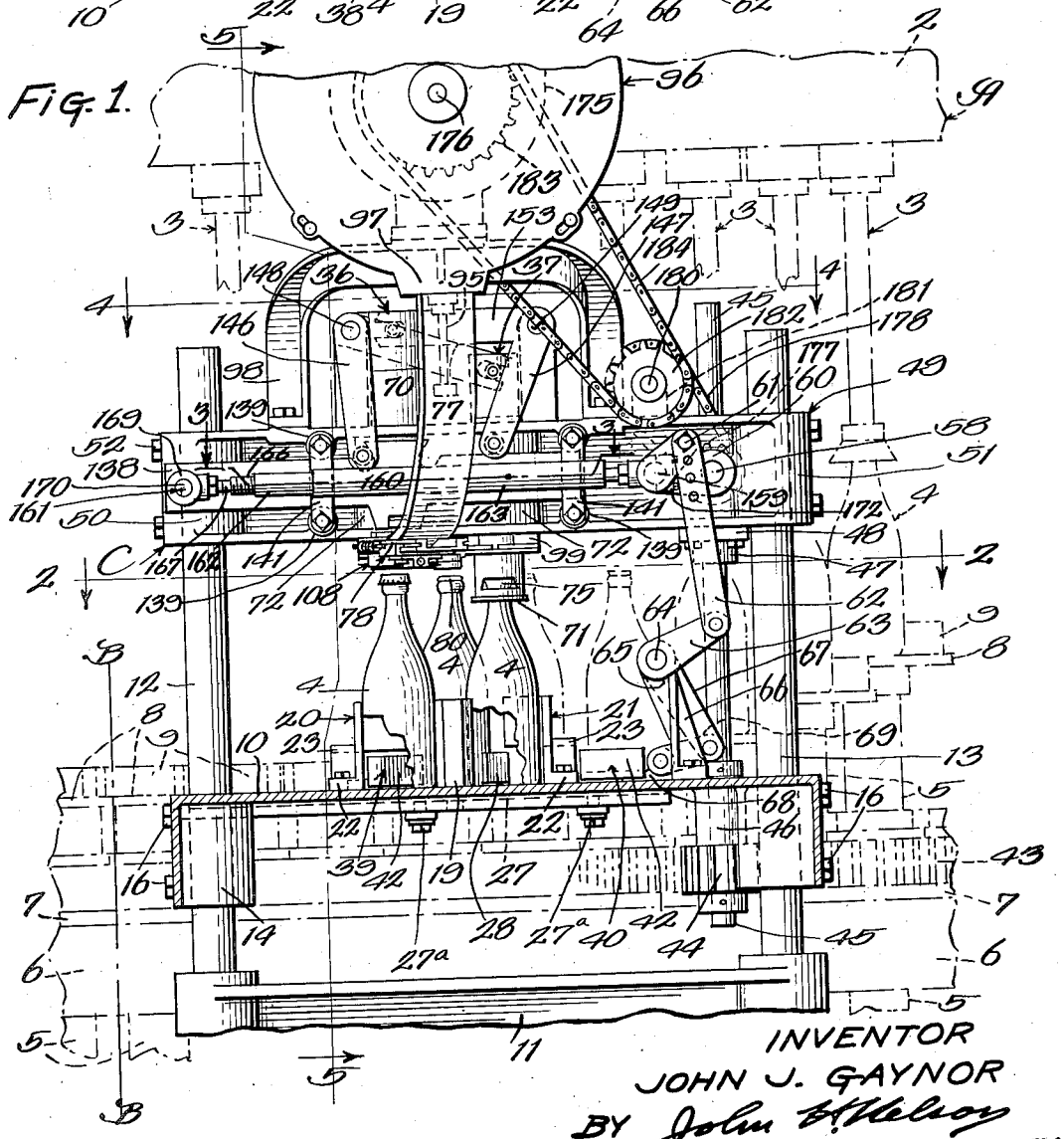


Fig. 1.



INVENTOR
JOHN J. GAYNOR
BY John B. Nelson
ATTY.

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Fig. 3.

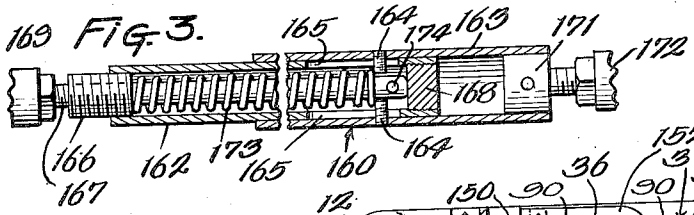


Fig. 4.

Fig. 5.

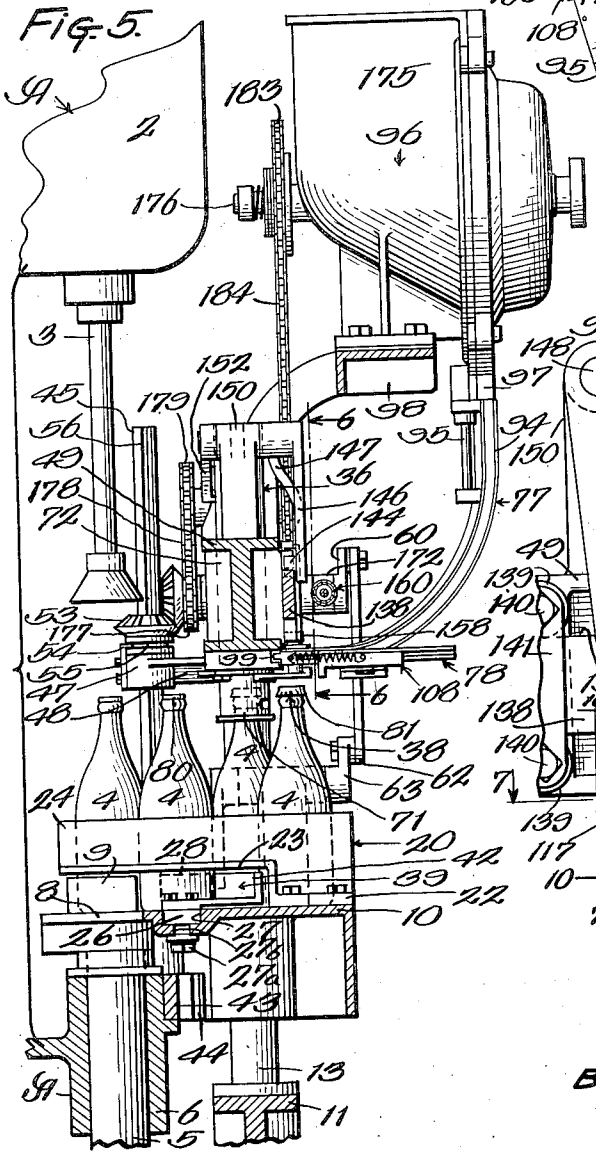
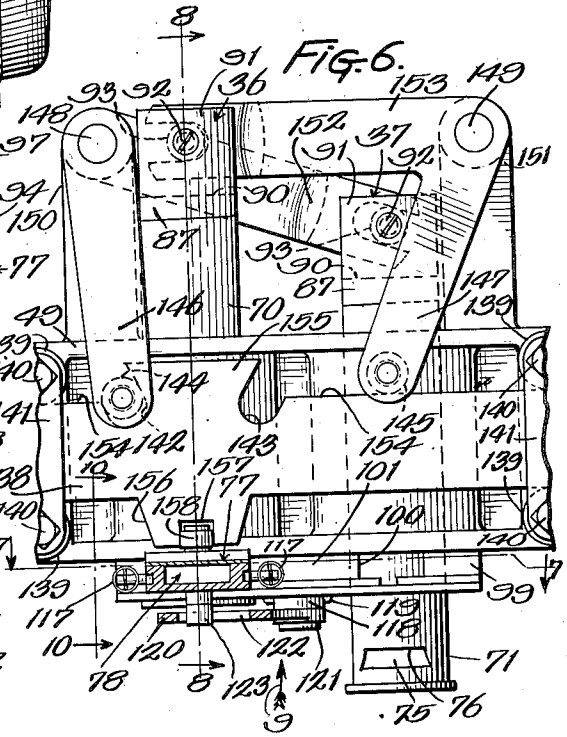


Fig. 6.



INVENTOR
JOHN J. GAYNOR
BY John J. Gaynor
ATTY.

July 2, 1935. J. J. GAYNOR 2,006,450

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Fig. 7.

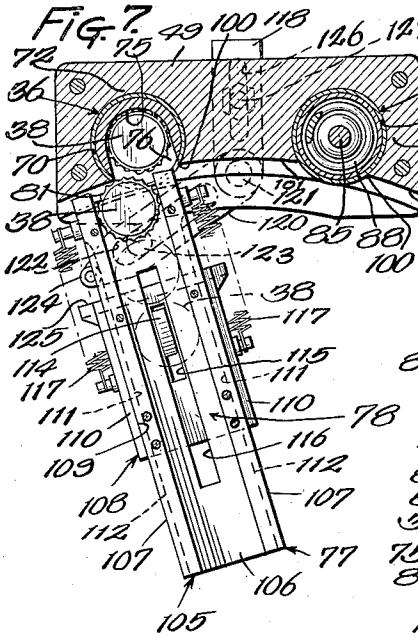


Fig. 8.

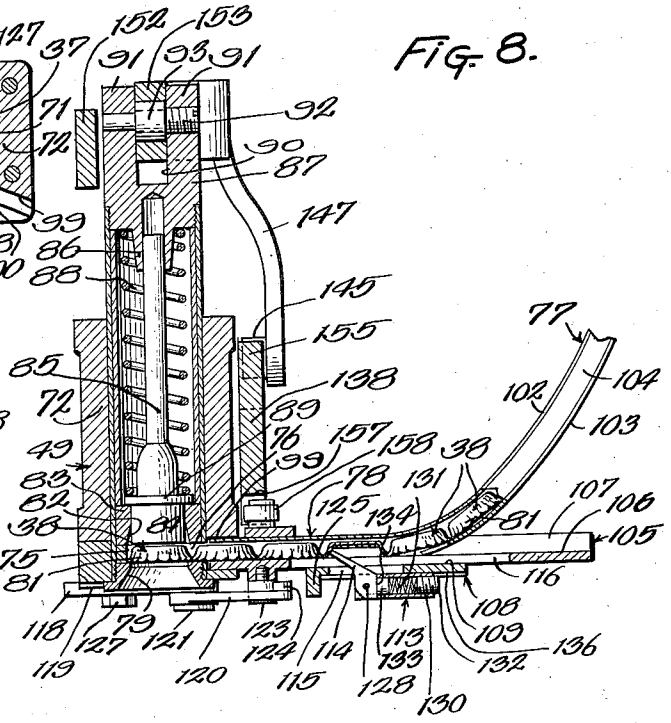


Fig. 9.

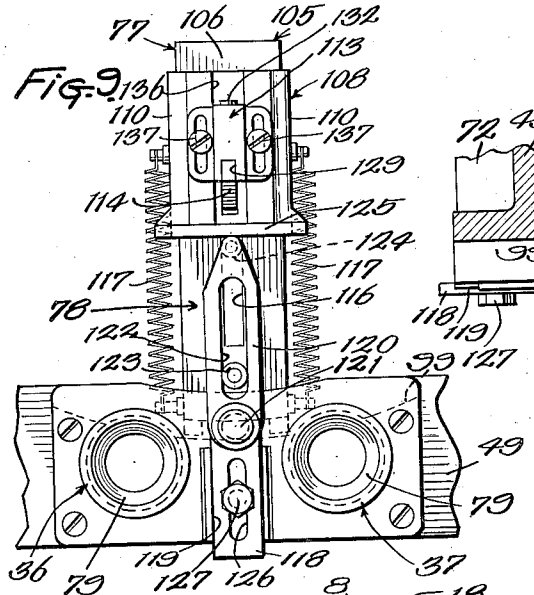


Fig. 10.

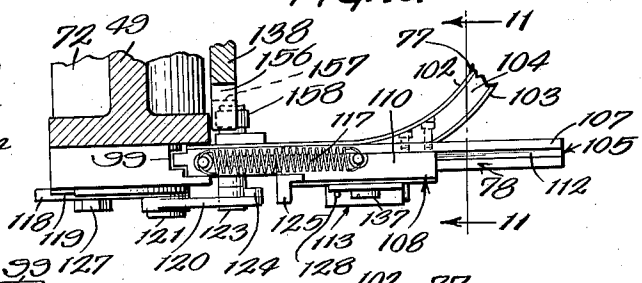


Fig. 11.

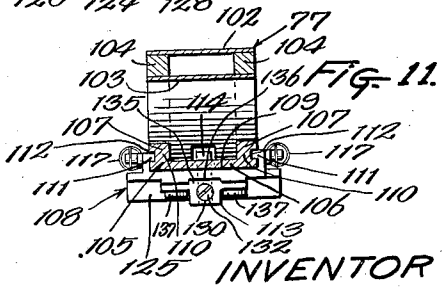
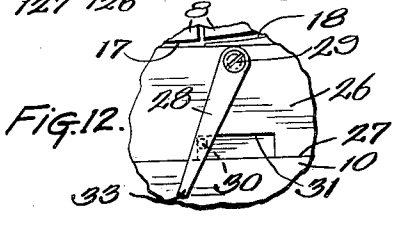


Fig. 12.



INVENTOR

JOHN J. GAYNOR

BY John B. Nelson

ATTY.

Patented July 2, 1935 2,006,450

UNITED STATES PATENT OFFICE

2,006,450

CAPPING MACHINE

John J. Gaynor, Delphi, Ind., assignor of one-half to Arthur I. Risser, Chicago, Ill.

Application May 24, 1934, Serial No. 727,292

26 Claims. (Cl. 226—84)

This invention relates to capping machines, or more particularly to bottle crowners of the double head type.

One of the objects of the invention is to provide such a machine of the simplest construction with a minimum number of actuating parts so as to promote compactness, and at the same time insuring reliability and effectiveness in operation; and whereby the caps as applied to containers by both capping heads will be uniform.

Another object of the invention is to provide such a capping machine that can be closely arranged in cooperative relation with the container conveying means of a rotary type container filling machine, so that the containers will be capped shortly after being transferred to the capping heads of the capping machine alternately. The type of filling machine referred to, includes a circular rotating container conveyor having peripherally arranged vertically reciprocable container supports in which the containers are placed to be raised into filling heads which depend from the circular liquid supply tank spaced above the conveyor and connected to rotate therewith. As a rule the tank is of greater diameter than the conveyor, which relation of parts presents the problem in arranging the capping mechanism in close cooperative relation with the conveyor.

The capping machine includes two movably mounted capping heads, each head having means for receiving a cap and applying same to a container upon pressure engagement therewith when moved in a given direction. A single driven actuator element is included, mounted to move back and forth and being operably connected with the heads to alternately move same in their said given directions upon its said movement. Cap supply means is employed, mounted to move back and forth and being operably connected with said actuator whereby it is moved into cooperative relation with and then slightly beyond the receiving means of the capping heads upon movement of the actuator. Means is employed for resiliently operating the actuator element in causing the heads to exert uniform capping pressure upon the containers. The cap supplying means is caused to move beyond the cap receiving means of the heads so as to insure cooperative relation therewith upon restricted back and forth movement of the actuator which is the result of the restricted movement of the heads caused by irregularity in sizes of containers capped thereby. Therefore, it is another object of the invention to provide means associated with the supplying means for forcibly feeding caps to the cap receiving means of the heads, because of the short interval of time of cooperative relation between said supply means and cap receiving means.

Other objects and advantages will become apparent by reference to the specification and the accompanying drawings, in which:

Fig. 1 is a front view of the capping machine embodying the invention with parts broken away, parts in section and showing diagrammatically in dot and dash lines a portion of the filling machine.

Fig. 2 is a plan section taken on the section line 2—2 of Fig. 1, with certain parts of the filling machine shown in full lines.

Fig. 3 is a sectional view of certain mechanism shown in Fig. 1, and as indicated by the section line 3—3 on said figure.

Fig. 4 is a plan section taken on the section line 4—4 of Fig. 1.

Fig. 5 is a vertical section of the capping machine and portions of the filling machine, the view being taken on the section line 5—5 of Fig. 1, with parts of the filling machine shown in full lines.

Fig. 6 is a sectional view in large scale showing the capping heads, the view being taken on the section line 6—6 of Fig. 5.

Fig. 7 is a plan section taken on the section line 7—7 of Fig. 6.

Fig. 8 is a vertical section taken on the section line 8—8 of Fig. 6.

Fig. 9 is a bottom view of the capping heads as looking in the direction of the arrow 9 in Fig. 6, and showing certain parts in changed position.

Fig. 10 is a vertical section of a portion of the parts shown in Fig. 6, as taken on the section line 10—10 of said figure, and showing certain parts in elevation.

Fig. 11 is a detail sectional view taken on the section line 11—11 of Fig. 10.

Fig. 12 is an enlarged detail view of certain parts of the mechanism shown in Fig. 2.

Referring to Figs. 1, 2 and 5, the filling machine A, a portion only of which is somewhat diagrammatically illustrated, is of a well known type in the rotary class, and as more clearly shown and described in my Patent No. 1,953,476, of May 15, 1934. The filling machine comprises a circular horizontally rotating filling tank 2, suitably mounted on a central pedestal, not shown. Arranged equally spaced about the axis of the tank and depending from the edge portion of the tank, are vertically reciprocably mounted filling heads 3, which are adapted to dispense liquid from the tank upon being raised therein. The filling machine has means for conveying containers or bot-

tles 4 under the filling heads in cooperative relation therewith. Said conveying means includes a plurality of vertically disposed plungers 5 equally spaced about the axis of the tank so that each plunger is below and coaxial with a filling head. The plungers 5 are reciprocably mounted in bearings 6 in the periphery of the circular lateral support extension 7 of the pedestal supporting the tank, whereby the plungers 5 rotate with the tank. Secured on the top end of each plunger 5 is a container support stirrup 8, having an outwardly open yoke 9 for receiving and positioning under its respective filling head, a container or bottle 4 to be filled.

The tank 2 and support extension 7 of the filling machine rotate continuously in clockwise direction, as viewed in plan, and as the filling machine plungers 5 cross the station, indicated by the dot and dash line B—B in Fig. 1, the bottles are placed in the stirrups by automatic means, not shown, and at which station the plungers are in lowered position with the filling heads thereover spaced above the bottles thereon. The plungers 5 are then moved to raised position, by suitable means, not shown, causing the bottles thereon to enter and raise the filling heads thereover into the filling tank, and in which position the plungers remain during considerable movement of the tank to effect the filling of the bottles. The filled bottles are then lowered by the plungers 5, actuated by suitable means, before reaching the receiving station B—B, and are then transferred to the capping machine C, embodying the invention.

After the plungers 5 reach their lowered position, the filled bottles thereon are transferred or deflected outward from the stirrups onto a bottle support in the form of a table 10 whose supporting surface is in the plane of the supporting surface of the stirrups in lowered position. The table is mounted upon a base or pedestal 11, extending upward from which are spaced apart uprights or rods 12 and 13 respectively extending through bosses 14 and 15 depending respectively from the left and right hand ends of the table. Any suitable means may be provided for holding the table in vertically adjusted positions on the uprights, such as the set bolts 16 passing through the bosses. The outer edges 17 of the stirrups are formed arcuate, concentric with the filling machine tank, and the adjacent edge 18 of the table is formed arcuate, concentric with the stirrup edges and in close relation therewith.

Upon being initially positioned on the table at the station indicated by the dot and dash line E—E, Fig. 2, the bottles are alternately transferred by feeding means to two separate stations on the table indicated by the crosses F and G, in cooperative relation with capping mechanism later described.

For feeding or transferring the bottles from the filling machine stirrups onto the table and directing or guiding same to said separate stations F and G, a central bottle guide member or partition 19 is mounted on the table, arranged inward of and in line with the initial station of a bottle on the table and the axis of the filling machine tank and support 7. Cooperating with said central partition on either side for directing bottles from said initial station to said separate stations F and G, and slightly therebeyond, are respectively arcuately formed directing members in the form of rails 20 and 21 converging from said separate stations to the initial station of the table. Each rail has a short base portion 22 for mounting on the table near its edge opposite its edge 18, and from which base the rail extends inward over the table with a bottom portion 23, in the form of a lateral reinforcing flange, spaced thereabove, to allow passage thereunder of mechanism later described. The guide rail 20 continues into an end portion 24 extending angularly beyond the initial or common station of the table to project over the path of the stirrups, for deflecting the containers or bottles from the stirrups and onto the table to be positioned at said initial station. The inner end 25 of the rail 21 is spaced from the rail end portion 24 so as to allow the bottles being deflected to pass therebetween.

For transferring the bottles from the common station E—E on the table to said separate stations F and G, alternately, a carrier member or slide in the form of a bar 26 is mounted to move back and forth, or reciprocate transversely under the path of the bottles in transport from the common station to said separate stations. The slide bar 26 is reciprocably mounted in a guide groove 27 in the table to intersect its edge 18 at the common station, the bar being retained in the groove flush with the table surface by bolts 27*a* secured under the bar and received in slots 27*b* in the groove bottom. The bar thus forms a support for the bottles being transferred from the stirrups to the table. Mounted on the slide bar 26 is a container pusher member in the form of a finger 28 pivotally mounted on a vertical pin 29 secured on the bar near the table edge 18 and to extend neutrally inward toward the table and at right angles to the bar. The finger 28 has limited oscillatable movement from either side of its neutral position, controlled by a pin projection 30 depending from the finger and received in an elongated slot 31 in the bar, which slot has end walls engaged by the pin 30 in limiting the movement of the finger.

The slide bar 26 has a throw a little greater than the distance between the axes of the separate bottle positioning stations F and G, and the finger 28 is so arranged on the bar whereby the bottles are initially placed on the table intermediate its limits of movement with the bar and in the path thereof. The bar 26 is so operated by operable connection with the filling machine whereby, when the finger is moved toward the left with the bar, (see Fig. 2) a bottle is placed in its path from a stirrup, whereupon the finger is caused to engage the bottle initially at its pivotal connection and in contact with the trailing side of the bottle. By this engagement with the bottle the finger is caused to be shifted about its pivot to extend away in angular relation with the bottle, whereby on continued movement of the bar the finger urges the bottle along the guide rail 20 by deflection, in that the bottle rides along the finger as well as the rail until the finger reaches its limit of movement with the bar 26, at which point the bottle is engaged by the end 33 of the finger in being positioned at the station F, in which position the parts are seen in dot and dash lines in Fig. 2.

Upon the return movement of the finger with the bar 26, and toward the right (see Fig. 2), a succeeding bottle has been placed in its path which is transferred to the station G, by the finger in a manner similar to that in transferring the preceding bottle to its station F, wherein the succeeding bottle is urged along the rail 21 to the station G.

Before the pivotal end of the finger engages a

bottle at the common station on the table, the bottle has been positioned so that its axis is beyond the path of said pivotal end so that the end will engage the trailing side of the bottle. Placing the bottle as stated, is effected by the trailing side 34 of the stirrup yokes being extended into an outwardly flaring end portion 35 which cooperates with the end portion 24 of the rail 20 in deflecting the bottles onto the table, and which end portion 35 passes very close to the outer edge of the slide bar 26. The end portion 35 also cooperates in directing a bottle, being urged by the finger toward the guide rail 21, into deflecting relation with the rail end portion 25 of said rail.

Above the capping stations F and G on the table are capping mechanisms or capping heads 36 and 37 respectively, hereinafter described, which heads are caused to apply caps or crowns 38 to bottles positioned in their respective stations and upon the initial return movement of the finger 28 with the slide bar.

To positively eject the capped bottles from the stations F and G, before succeeding bottles are positioned therein, bottle ejecting members or deflectors 39 and 40 are provided which are operably connected with the slide bar and which, upon a complete cycle of movement of the bar, are caused to respectively cooperate with the partition in deflecting the capped bottles from the said stations. Each deflector comprises a bracket portion 41 mounted on the bar 26 to extend over the table, the two brackets being arranged on the ends of the bar and equally spaced from the finger. Each bracket portion 41 has a cam portion or deflecting formation 42 extending toward the stations, whereupon, at the limits of movement of the bar toward the right and left, as seen in Fig. 2, the deflectors 39 and 40 respectively cooperate with the central partition 19 in ejecting the capped bottles from the stations F and G by engagement of the cam portions 42 with the bottles. By this arrangement of the deflectors, a capped bottle is ejected from one station upon the positioning of a bottle at the other station.

The slide bar 26 is in driven connection with the filling machine, so as to be in the timed relation as outlined, by means of a ring gear 43 mounted on the periphery of the lateral extension 7 outside of the bearings 6 of the extension, and which gear meshes with a pinion 44 disposed below the table and mounted on the lower end of a vertical drive shaft 45 rotatably mounted in a bearing 46 in the table at said end and extending upward of the table to be rotatably mounted in a bearing 47 on a bracket 48 mounted on a horizontal capping mechanism support member 49 mounted for vertical adjustment on the uprights 12 and 13 which pass through supporting bearings 50 and 51 respectively at the ends of the support, there being set bolts 52 threaded into the bearings for holding the support on the uprights in adjusted positions. On the drive shaft 45 is a bevel gear 53 connected for vertical adjustment thereon with the support member 49 by means of a key 54 mounted on the bearing 47 of the bracket 48, which key is received in a peripheral groove 55 in the hub of the gear. The gear 53 is connected to rotate with the drive shaft by means of key connection with the elongated keyway 56 in the shaft. Meshing with the bevel gear 53 is a bevel gear 57 mounted on the rear end of a horizontal driven shaft 58 rotatably mounted centrally in a bearing 59 in the horizontal support member 49 to extend transversely therethrough. On the outer end of the driven shaft 58 is mounted a double crank member 60 having an outer crank pin 61 for pivotal connection with one end of a connecting link 62 whose other end is pivotally connected to the free end of an oscillating arm 63 mounted on the outer end of a rock shaft 64 rotatably mounted centrally in the bearing 65 of a bracket 66 mounted on the table. On the inner end of the rock shaft is a depending rocker arm 67 in pivotal connection with a lug 68 on the deflector bracket 40 through a connecting link 69, for reciprocating the slide bar. The said gears, cranks and arms are so proportioned as to effect the proper timed relation of the filling machine and transferring mechanism, wherein the slide bar 26 completes its movement in either direction as the filling machine bottle supports are moved an amount equal to their spacing. It may be stated that the ring gear 43 also serves as an operable connection with gear driving means (not shown) for rotating the filling machine conveyor, the tank thereover and capping mechanism which will be hereinafter described.

The capping heads 36 and 37 comprise respectively, similar hollow cylindrical plungers 70 and 71 vertically disposed above the table and respectively positioned coaxial with the separate bottle capping stations, F and G. Each plunger of the heads extends through and is reciprocably mounted in a bearing 72 in the support member 49. The capping heads are of the type disclosed in my Patent No. 1,953,476, and which are adapted to apply the caps or crowns to the containers.

Near the bottom of each capping head plunger is a cap receiving recess 75 for positioning a crown 38 central with the plunger so that the open side of the cap faces downward. The recess of each head has an inlet opening 76 extending laterally forward of the head in converging relation with the recess of the other head. Each capping head plunger is so operated that upon the positioning of a bottle under one head, said head is lowered to apply the crown on the bottle, during which time the other capping head is held in raised position with its recess opening in cooperative register with cap supplying means in the form of a magazine 77 of the gravity fed type. The magazine is mounted to oscillate and arranged to contain a supply of crowns in uniform single order which are fed alternately from the discharge end portion 78 of the magazine to the recesses of the heads upon oscillation of the magazine.

Upon the return movement of the slide bar after positioning a bottle at a station F or G, the capping head over the bottle thus positioned has been initially lowered over the bottle, the neck of the bottle entering the capping head plunger through its outwardly flared bottom opening 79 and engaging the crown in the recess of the head so that the bead 80 about the bottle mouth is surrounded by the flared contractible skirt 81 of the crown. As the capping head plunger is lowered further, the crown skirt becomes engaged within the conical bore 82 of a constricting ring 83 secured in the plunger above its recess, and which ring effects the constriction of the crown skirt about the bead 80 on the bottle mouth as the plunger is forced resiliently downward by means later described. As a crown is about to enter the constricting ring 83, it engages a spring pressed ejecting plunger head 84 slidably mounted in the ring and which holds the crown square with the bottle mouth, and which also effects ejection of the bottle from the capping head upon the raising thereof. The ejecting plunger head

84 has a stem 85 extending upward into a bearing 86 in a plug portion 87 secured at the top end of the capping head plunger, and a coiled spring 88 surrounds the stem and is interposed between the plug end and the ejecting plunger head, which head is thereby normally held in lowered position with its bottom end forming the top wall of the cap recess, by the annular shoulder 89 of the ejecting head engaging the top end portion of the constricting ring. The plug 87 on the top end of each capping head plunger is formed with a central vertical slot 90 providing spaced fork portions 91 through which is mounted a pivot pin 92 on which is rotatably mounted a roller 93 for providing an operable connection with means for operating the capping head, later described.

The magazine 77 is in the form of a chute with the crowns or caps guided therein in edgewise single order, and the chute being arcuately formed with a top vertical end portion 94 pivotally mounted for horizontal movement on a pivot pin 95 depending from a cap sorting device 96, said top end of the chute being arranged to be in constant register with the lower discharge end 97 of said device. The sorting device is mounted on a bracket 98 mounted on the horizontal support 49, which bracket extends upward on both sides of the capping heads and thereover. The chute or magazine extends arcuately downward and inward toward the capping heads and terminates in its discharge end portion 78 which is mounted, so as to be guided in the plane of the capping head recesses when the heads are in raised position, to project into an arcuate lateral groove 99 concentric with the pivotal axis of the magazine, and formed in the lower part of the support 49. In the bottom of the groove 99 are crown passage-ways 100 through which the crowns pass from the magazine discharge end and into the recesses of the capping heads. The bottom portion 101 of the groove 99 serves to hold the crowns in the magazine discharge end upon movement of said end between the capping heads.

As best seen in Figs. 7 to 11 inclusive, the magazine is somewhat flat and rectangular in cross-section to snugly position the crowns in single order therein. The wide sides of the magazine are formed of thin strips 102 and 103 which are connected at their edges by bars 104 forming the narrow sides of the magazine. The bottom discharge end portion of the magazine comprises a horizontally disposed channel section 105 in line with the magazine main portion and having a flat bottom 106 with raised sides 107 upon whose tops the bars 104 are connected suitably to form a gradual upwardly curved continuation of the discharge end. The strip 102 continues over the channel section to its outer end to form a closed guideway for the crowns therewith. The other magazine side strip portion 103 continues arcuately downward into an end portion engaging the bottom of the channel section in substantially tangential relation intermediate its ends. Thus the channel section forms the discharge end continuation of the magazine chute portion proper.

For a purpose later disclosed, the magazine has a normal range of oscillation which causes its discharge end to be brought into register with the cap recesses of the capping heads and then continue slightly therebeyond. To insure the feeding of a crown into the recess of a capping head as the magazine discharge end is passing thereby, means are provided to resiliently urge the end cap in said discharge end into the recess. Said means includes a cap feeder head 108 in the form of a cross-head mounted for reciprocation under the magazine discharge end or channel section 105. To this end the cross-head comprises a rectangular block having a central guide groove 109 within which the channel section is received, and the sides 110 of the cross-head have inwardly projecting shoulders 111 slidably received in guideways 112 in the sides 107 of the channel section. Mounted under the cross-head is a bracket 113 on which is movably or pivotally mounted a cap pusher element 114 in the form of a spring pressed finger, which finger extends upward through elongated slots 115 and 116 in the cross-head and channel section respectively, to project into the path of the crowns in the cap guideway of the magazine discharge end portion to feed a cap therefrom upon outward movement of the cross-head. Upon movement of the magazine to neutral position between the capping heads, the cross-head is positively retracted, whereupon the cap pusher finger rides under the crowns to engage the third one from the discharge end of the magazine in urging the end crown into the recess of a head upon continued movement of the discharge end theretoward. The cross-head is moved forward in feeding a crown by resilient means so that the crowns will snap into the recesses of the capping heads as the magazine discharge end is passing thereby. The resilient means includes two light coiled tension springs 117 disposed on either side of the channel section 105 with their outer ends anchored thereto and their inner ends secured to the sides of the cross-head.

For positively retracting the cross-head upon movement of the magazine to neutral position, the following means is provided. Mounted under the support member 49 and disposed between the bottom ends of the capping head plungers, is an adjustable cap feeder head operator support in the form of a bar 118 extending toward the pivotal axis of the magazine and adjustably received within a guideway 119 under the support 49. On the inner end of the bar 118 is movably mounted a cap feeder head operator 120 in the form of a lever having pivotal connection as at 121 with said bar at one end thereof. The lever 120 has an elongated longitudinal slot 122 within which is slidably received a roller 123 pivotally mounted centrally under the magazine channel section 105 near its outer end, whereupon the lever is oscillated with the magazine. At the free end of the operator lever 120 is a roller 124 for engagement with the depending strike plate portion 125 of the cross-head 108 for operating the head. Thus as the magazine is moved to neutral position, the operator lever is positioned in line with same, whereupon the cross-head is moved by the lever to its extreme retracted position. The amount of movement of the cross-head is about one and one-half times that of the diameter of a crown so as to insure engagement of the cap pusher finger with a cap in the magazine.

For regulating the throw of the cap feeder cross-head 108 in accommodating various sizes of crowns, the bar 118 is adjusted toward or away from the magazine which respectively increases and decreases the throw of the head in respectively handling large and small crowns. For holding the bar 118 in adjusted positions, it has a central longitudinal slot 126 through which a bolt 127 extends and secured in the support 49.

The cap pusher finger 114 is pivotally mount-

ed on the bracket 113, as at 128, within a vertical slot 129 in the inner end of the bracket for limited movement, and which bracket has a horizontal bore 130 within which is disposed a compression spring 131 interposed between a plug 132 threaded in the outer end of the bracket bore and a sliding plug 133 engaging a flat portion 134 of the finger for resiliently holding the finger projected into the path of the crowns in the magazine. The bracket 113 is mounted on the cross-head 106 for longitudinal adjustment for regulating the position of the pusher finger with respect to various sizes of crowns and also in controlling the amount of tension of the springs 117 required to eject the crowns from the magazine. For instance the farther back the bracket with its finger is adjusted on the cross-head, less tension or force will be exerted by the springs in moving the cross-head to eject the caps or crowns. To this end the bracket 113 has a guide ridge portion 135 received in a guideway 136 in the bottom of the cross-head and being held in adjusted positions by means of the screws 137.

The capping heads and magazine are so operated that when a head is in raised position, the magazine discharge end is moved into register with its cap recess and then slightly therebeyond, and whereupon the other capping head is moved to lowered position in applying a crown to a bottle thereunder. The means for operating the capping heads and magazine includes an actuator bar 138 extending alongside the front of the support 49 and mounted for longitudinal reciprocation between rollers 139 of two spaced pairs thereof, which rollers are mounted on bolts 140 secured on the support 49 and which also support strips 141 outside the rollers of the pairs for holding the actuator bar on the rollers. The actuator bar 138 is operably connected with the capping heads for operating same in the manner described, by means of cam formations in the form of downwardly converging cam slots 142 and 143 formed in the top portion of the bar, and which are adapted to respectively alternately receive rollers 144 and 145 at the lower ends of depending rocker arms 146 and 147 respectively, for operating the capping heads through operation of the arms, and upon a complete cycle of reciprocation of the bar. The rocker arms are respectively mounted on the front ends of horizontal shafts 148 and 149 which are respectively mounted in bearings 150 and 151 in upward extensions of the support 49 between which the capping heads are disposed. On the rear end of the shaft 148 is an arm 152 whose free end is forked for pivotal connection with the roller 93 at the top end of the capping head 37 for operating the head upon oscillation of the arm 146. Extending from the hub of the rocker arm 147 is an arm extension 153 whose free end is forked for pivotal connection with the roller 93 on top of the capping head 36 for operating the head upon oscillation of the arm 147. The cam slots 142 and 143 are so spaced that when the actuator bar is in neutral position, both rocker arms are depending in converging relation with their rollers resting on cam dwell portions 154 comprising the top surface of the bar extending away from the cam slots, whereby the heads are held in raised position. The portion 155 of the bar between the cam slots extends upward into the path of the rocker arm rollers to enable engagement of the rollers in their respective cam slots upon reciprocation of the actuator bar.

Under the actuator bar 138 and directly below the portion 155 thereof, is a depending portion 156, in the bottom of which is a notch 157 for pivotal sliding connection with a roller 158 on the top portion of the discharge end of the magazine, for operating the magazine in timed relation with the capping heads.

The actuator bar 138 is so operated whereby, as a bottle is being positioned at one of the capping stations F or G, the capping head thereover is being lowered to apply a crown to the bottle. To this end the actuator bar is reciprocated by the double crank arm or member 60, on whose central crank pin 159 is pivotally connected one end of a resilient link 160 whose other end is in pivotal connection with the outer end of the actuator bar, as at 161.

The resilient link is employed to maintain uniformity of pressure of the capping heads upon the bottles being capped, as well as preventing breakage of the bottles in the event same become dispositioned under the heads as they are lowered. It is preferable to employ the resilient link as disclosed in my application Ser. No. 684,236. Referring to Fig. 3, the resilient link 160 includes respectively inner and outer tubular telescoping sections 162 and 163, having limited slidable movement with respect to each other by means of two opposed pins 164 mounted in the outer tube section to extend therein, and which pins pass through elongated slots 165 in opposed wall portions of the inner tube section. Threaded into the outer end of the inner tube section is a threaded collar 166 through which is slidable a rod 167 extending into the tube to normally engage at its free end with a plug 168 secured in the inner end of said tube. The outer end of the rod 167 is in pivotal connection with the bar 138 by means of a bearing member 169 mounted on the end of the rod and fulcrumed on a pin 170 extending from the outer end of the bar, to form the pivotal connection 161. In the outer end of the outer tube 163 is a plug 171 secured thereto and having at the end thereof a split bearing member 172 fulcrumed on the central pivot pin 159 of the double crank arm to provide the pivotal connection therewith. Disposed in the inner tube is a compression spring, of the coiled type, 173 surrounding the rod, with one end engaging the collar 166 and the other end engaging the pins 164 which project into the inner tube. At the inner end of the rod are opposed laterally extended pins 174 which are also adapted to be engaged by the inner end of the spring normally. Thus the tube sections of the link are normally resiliently held in extended relation, in which relation they are urged by the spring under stress, and likewise the inner tube and the rod are held in retracted relation.

The resilient link is so arranged that when the operating central crank pin 159 is in dead center relation with the link and axis of the double crank arm, with the arm extending toward the link in causing the operation of the capping head 37, as seen in Fig. 1, the pressure exerted on the head in constricting a crown on a bottle, is taken up in the spring 173 by the compression thereof, which is effected by the contraction of the tube sections, in which position the parts of the link are seen in Fig. 3. Likewise, when the crank pin 159 is in dead center relation with the link and axis of the double crank, with the crank extending away from the link in causing the operation of the capping head 36, the pressure exerted on the head in causing the constriction of

a crown on a bottle is also taken up in the spring 173 by being compressed, which is effected by the extension of the inner tube section and rod assembly.

The resilient link may be said to be resiliently locked in a neutral length, from which it is capable of extension or contraction by the same stressing action of a single spring. This construction promotes uniformity of caps as applied to the bottles by both heads.

During the operation of the capping heads in capping bottles, the throw of the actuator bar 138 is slightly decreased from that when bottles are not passing through the machine for capping, because of the limited reciprocating action of the heads which is determined by the height of the bottles in controlling the amount of capping pressure exerted upon the bottle by the head, as effected by the resilient link, in applying a crown on the bottle. To insure registration of the magazine discharge end with the recesses of the heads, in the event over-sized bottles are passed through the machine, which would tend to reduce the oscillatory movement of the magazine because of its positive driven connection with the actuator bar 138, the magazine is arranged so that its discharge end will oscillate slightly beyond the recesses of the capping heads so that the caps will be discharged from the magazine and into the recesses as the discharge end is passing thereby, during the capping of bottles.

Although other means may be employed for feeding crowns to the magazine 77, the sorting device shown includes a crown hopper 175 in which is contained crown sorting and feeding mechanism operated by a horizontal shaft 176 mounted to extend through the hopper. The shaft 176 is driven by the shaft 58, on which is a sprocket gear 177 for driving an endless sprocket chain 178, which drives a sprocket gear 179 secured on one end of a jack shaft 180 centrally mounted in a bearing 181 on the support 49. On the other end of the jack shaft 180 is a sprocket gear 182 in driving connection with a sprocket gear 183 on the shaft 176 through the intermediation of an endless sprocket chain 184.

Certain organizations of the structure herein disclosed forms generally certain subject matter of my Patent No. 1,958,476, in which said organizations are broadly claimed. The structure is also more similarly disclosed in my prior copending application Ser. No. 722,882, for Container feeding mechanism, filed April 28, 1934, in which the container feeding mechanism is broadly and specifically claimed.

Having thus described my invention, I claim:

1. In a container capping machine, two devices, each device mounted movably and having means for applying a cap to a container upon pressure engagement therewith when moved in a given direction, cap feeding means, said feeding means and devices arranged to have relative movement back and forth whereby cooperative relation is established alternately between the means and devices, driven operator means operably connected to the devices to move same in their said given directions in alternation, and being arranged to effect the relative movement of the devices and said means, and means for resiliently driving said operator means.

2. In a container capping machine, two devices, each device mounted movably and having means for applying a cap to a container when moved in a given direction, cap supplying means mounted movable back and forth adapted to be brought alternately into cooperative relation with the devices, an operator element mounted movable back and forth in positive operable connection with the supply means for operating same and in operable connection with the devices for alternately moving same in their said given directions.

3. The structure as defined in claim 2, wherein the cap applying means of the devices is arranged for pressure engagement with containers in applying caps, and means for resiliently operating the operator element.

4. The structure as defined in claim 2, wherein the devices each comprises a capping head having means for receiving a cap from the supplying means when in cooperative relation therewith so as to position the cap in cooperative relation with the applying means of the head.

5. The structure as defined in claim 2, wherein the devices each comprises a capping head having means for receiving a cap from the supplying means when in cooperative relation therewith so as to position the cap in cooperative relation with the applying means of the head, wherein the cap applying means of the heads is arranged for pressure engagement with containers in applying caps, and means for resiliently operating the operator element.

6. In a container capping machine, two capping heads, each head mounted vertically reciprocable, being laterally spaced from the other head and having means for receiving a cap and adapted to apply same upon being reciprocated, a cap supplying member mounted for back and forth horizontal movement and adapted to be alternately brought into cooperative relation with the cap receiving means of the heads, an operating member disposed to one side of the heads and mounted for back and forth horizontal movement and being operably connected with the heads to reciprocate same alternately and being positively operably connected with the cap supplying member for moving same into cooperative relation with the cap receiving means of one head upon the reciprocation of the other head.

7. The structure as defined in claim 6, wherein each head includes means operable upon pressure engagement with a container when the head is reciprocated for applying the cap, and means for resiliently driving said operating member.

8. The structure as defined in claim 6, wherein the operating member has two cam formations for cooperating in providing separate operable connections with the heads for alternately operating the heads.

9. The structure as defined in claim 6, wherein the operating member has two cam formations for cooperating in providing separate operable connections with the heads for alternately operating the heads, wherein each head includes means operable upon pressure engagement with a container when the head is reciprocated for applying the cap, and means for resiliently driving said operating member.

10. The structure as defined in claim 6, wherein the operating member has two cam dwell formations each cooperating to hold a head stationary upon the reciprocation of the other head.

11. The structure as defined in claim 6, wherein the operating member has two cam formations for cooperating in providing separate operable connections with the heads for alternately operating same, and wherein the operating member has two cam dwell formations each arranged in association with one of the aforesaid cam forma-

tions for cooperating to hold a head stationary upon the reciprocation of the other head.

12. The structure as defined in claim 6, wherein the cap supplying member is pivotally mounted so as to oscillate, wherein the operating member comprises a bar, and wherein the supplying member and bar have portions formed to provide a slidable pivotal connection therebetween.

13. In a container capping machine, having two capping heads and a cap supply magazine, said heads and magazine arranged to have relative reciprocatory movement back and forth between limits whereby cooperative relation is established alternately between the heads and magazine, means operable upon said relative movement of the magazine, into cooperative relation with a head for urging so as to snap a cap from the magazine in feeding same to the head.

14. The structure as defined in claim 13, wherein the means includes a cap feeder means reciprocably mounted on the magazine being operably arranged to complete a cycle of reciprocation upon relative movement of the magazine from one limit to the other and adapted to have cooperative engagement with an end cap in the magazine for feeding same when moved in one direction.

15. The structure as defined in claim 13, wherein the means includes a feeder head reciprocably mounted on the magazine and operably arranged to complete a cycle of reciprocation upon relative movement of the magazine from one capping head to the other, and spring pressed cap pusher means mounted on the feeder head adapted to have cooperative engagement with an end cap in the magazine for ejecting same upon forward movement of the feeder head.

16. The structure as defined in claim 13, wherein the means includes a cap feeder head mounted movably back and forth on the magazine and adapted to have cooperative engagement with an end cap in the magazine for feeding same upon its forward movement, and means for causing the feeder head to complete a cycle of its back and forth movement upon said relative movement of magazine from one limit to the other.

17. In a container capping machine, two capping heads, a pivotally mounted gravity urged cap supply magazine having a horizontal discharge end portion adapted to oscillate alternately into cooperative relation with the heads to feed caps thereto, cap feeder means mounted for longitudinal back and forth movement on said discharge end portion and operably arranged with the magazine whereby upon its movement from one head to the other the means completes its said movement for forcibly feeding a cap from said discharge end.

18. The structure as defined in claim 17, wherein the cap feeder means includes a cap feeder head reciprocably mounted on said discharge end and a spring pressed cap pusher finger mounted on the feeder head adapted to project into the path of the caps in the discharge end so as to feed same upon forward movement of the feeder head.

19. The structure as defined in claim 17, wherein the cap feeder means includes a cap feeder head reciprocably mounted on said discharge end, a spring pressed cap pusher finger mounted on the feeder head adapted to project into the path of the caps in the discharge end so as to feed same upon forward movement of the feeder head, and means for resiliently moving the feeder head forward.

20. The structure as defined in claim 17, wherein the cap feeder means includes a cap feeder head reciprocably mounted on the discharge end, spring pressed means mounted on the feeder head adapted to engage a cap in said discharge end so as to feed same upon forward movement of the feeder head, means for resiliently moving the feeder head forward, and a pivotally mounted lever in driven operable connection with the magazine and in driving connection with the feeder head for positively retracting the head upon movement of the discharge end to neutral position between the capping heads.

21. In a container capping machine, two movably mounted capping heads each having means for receiving a cap and applying same to a container upon pressure engagement therewith when moved in a given direction, cap supplying means, said capping heads and supplying means arranged to have relative movement back and forth whereby cooperative relation is established alternately between said supplying means and the cap receiving means of the heads intermediate the limits of said relative movement of said means and heads, a unitary driven actuator element mounted to move back and forth being operably connected with the heads to alternately move same in their said given directions and operably arranged to effect the relative movement between the heads and said supply means, means for resiliently driving said actuator element, and means for forcibly transferring caps from the supplying means to the receiving means of the heads when same are in cooperative relation.

22. In a container capping machine, two movably mounted capping heads each having means for receiving a cap and applying same to a container upon pressure engagement therewith when moved in a given direction, a unitary driven actuator element mounted to move back and forth being operably connected with the heads to alternately move same in their said given directions upon its said movement, cap supplying means mounted to move back and forth and in driven connection with said actuator element whereby it is moved alternately into cooperative relation with and then slightly beyond the receiving means of the heads upon said movement of the actuator, means for resiliently driving said actuator, and actuated means for forcibly transferring caps from the supplying means to the cap receiving means of the heads when same are in cooperative relation.

23. In a machine of the class described, two capping heads each having a cap receiving recess, a cap supply magazine having a discharge end, said heads and magazine arranged to have relative reciprocatory movement back and forth between limits whereby substantially at each limit cooperative registration is established between the discharge end and a recess, and means operable when said registration is established for forcibly feeding a cap from the discharge end into the recess.

24. In a machine of the class described, a cap supply magazine having a discharge end, a member at said end and having a portion for blocking passage of caps from the magazine, said magazine and member arranged to have relative movement back and forth between limits whereby said portion intermittently blocks the discharge end intermediate the limits of its relative movement for allowing intermittent discharge of the caps, and

cap feeding means mounted for limited back and forth movement, being operatively connected with the member and magazine whereby it completes its cycle of movement during relative movement of the member and magazine from one limit to the other and arranged to have cooperative engagement with a cap in the magazine during its forward movement.

25. The structure as defined in claim 24 wherein the feeding means comprises a feeder head reciprocably mounted on the magazine, and a lever in cooperative connection with the member and magazine whereby it oscillates in timed relation with the relative movement thereof for operating the feeder head.

26. The structure as defined in claim 24, wherein the feeding means comprises a feeder head reciprocably mounted on the magazine, and means for causing the feeder head to resiliently move forward in urging a cap from the magazine.

JOHN J. GAYNOR.