

July 15, 1958

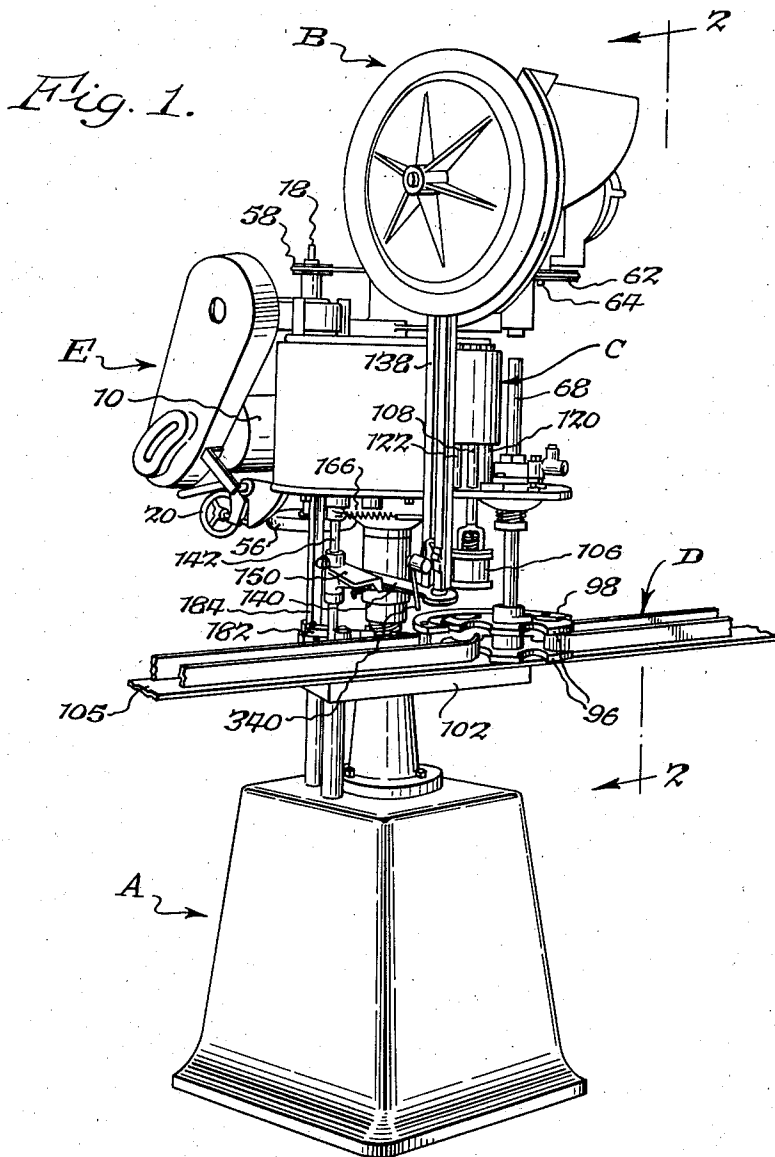
G. H. DIMOND

2,842,914

SINGLE STATION CAPPING MACHINE

Filed April 12, 1955

6 Sheets-Sheet 1



INVENTOR.
George H. Dimond
BY
John J. McEwen
Attorney.

July 15, 1958

G. H. DIMOND

2,842,914

SINGLE STATION CAPPING MACHINE

Filed April 12, 1955

6 Sheets-Sheet 2

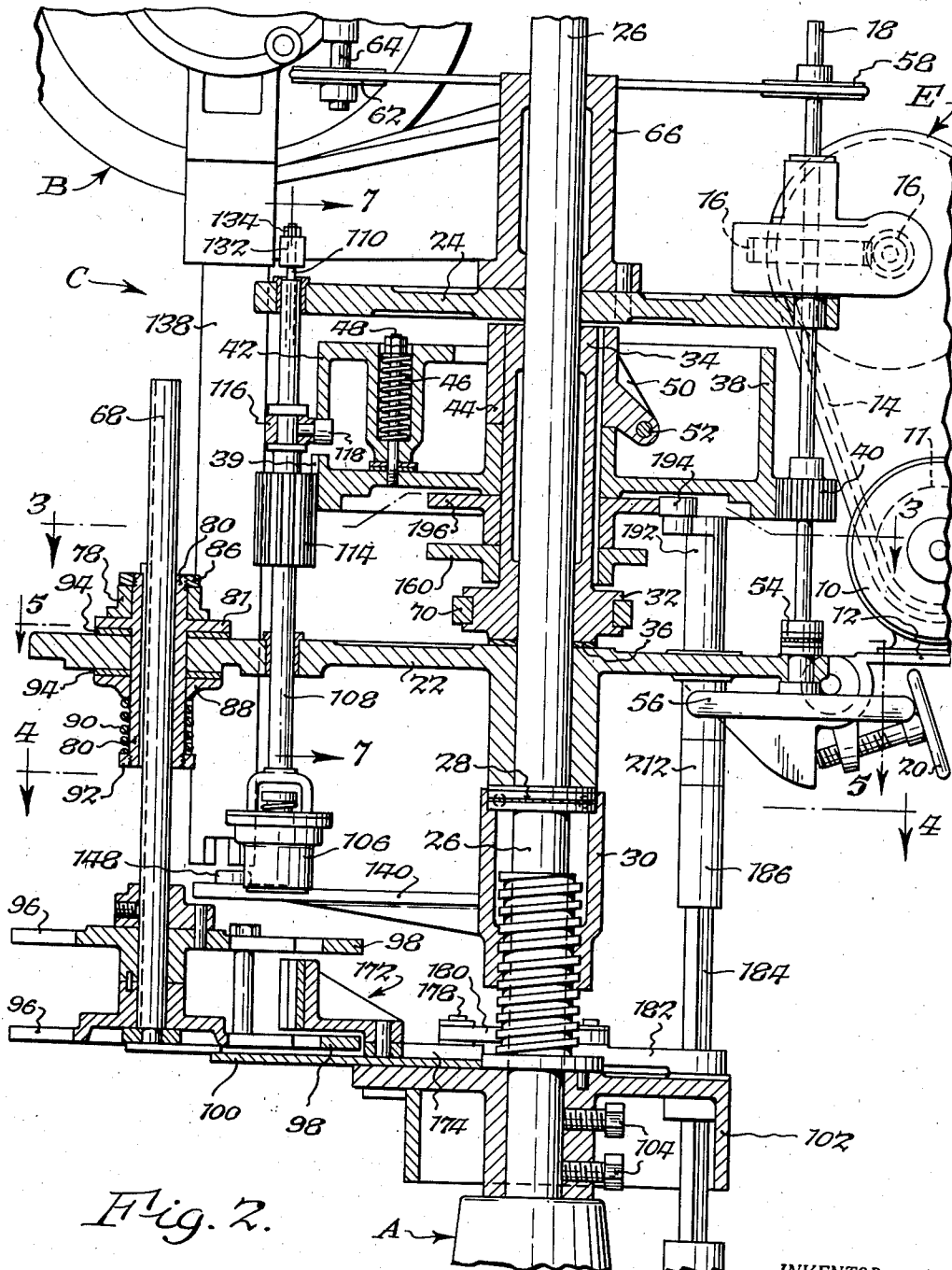


Fig. 2.

INVENTOR.
George H. Dimond
BY
John J. McGlew
Attorney.

July 15, 1958

G. H. DIMOND

2,842,914

SINGLE STATION CAPPING MACHINE

Filed April 12, 1955

6 Sheets-Sheet 3

Fig. 3.

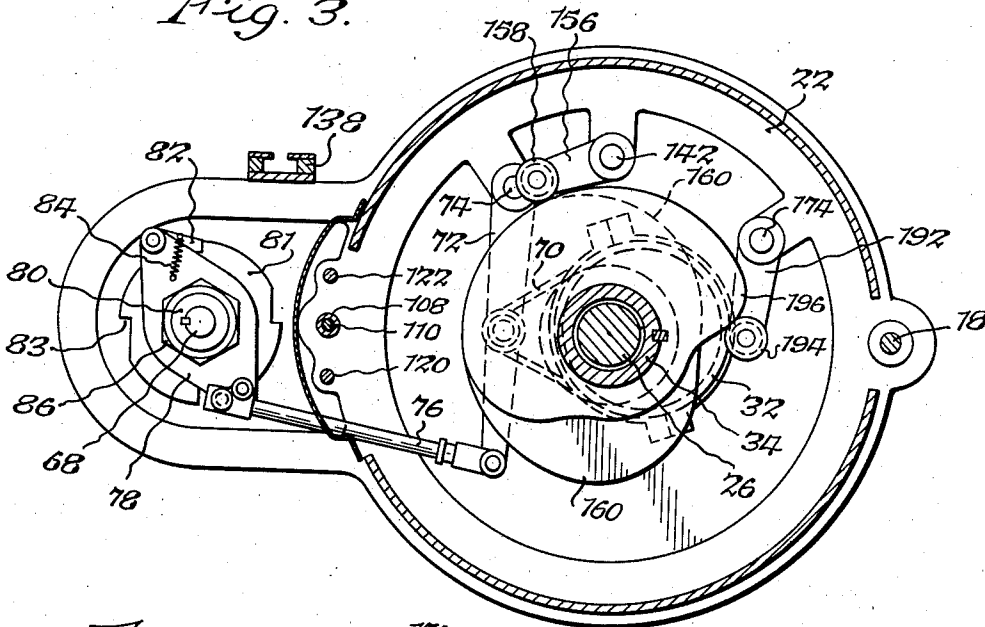
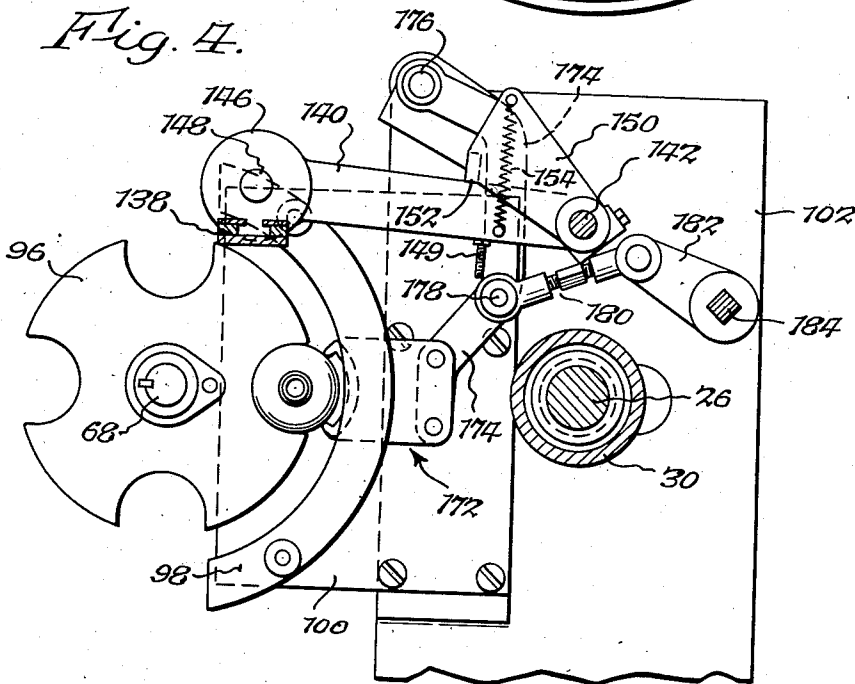


Fig. 4.



INVENTOR.
George H. Dimond
BY
John J. McGlew
Attorney.

July 15, 1958

G. H. DIMOND

2,842,914

SINGLE STATION CAPPING MACHINE

Filed April 12, 1955

6 Sheets-Sheet 4

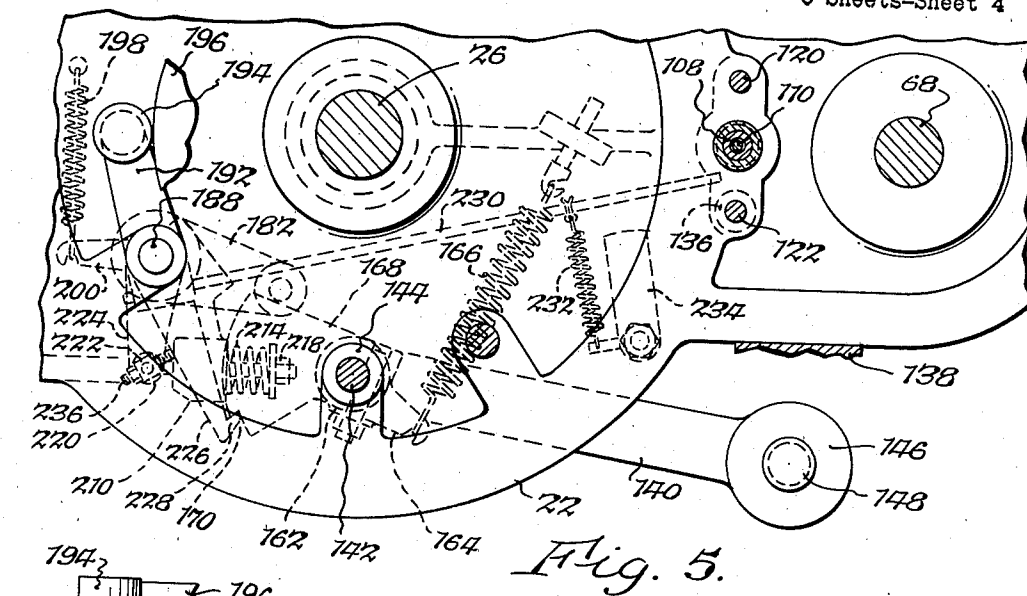


Fig. 5.

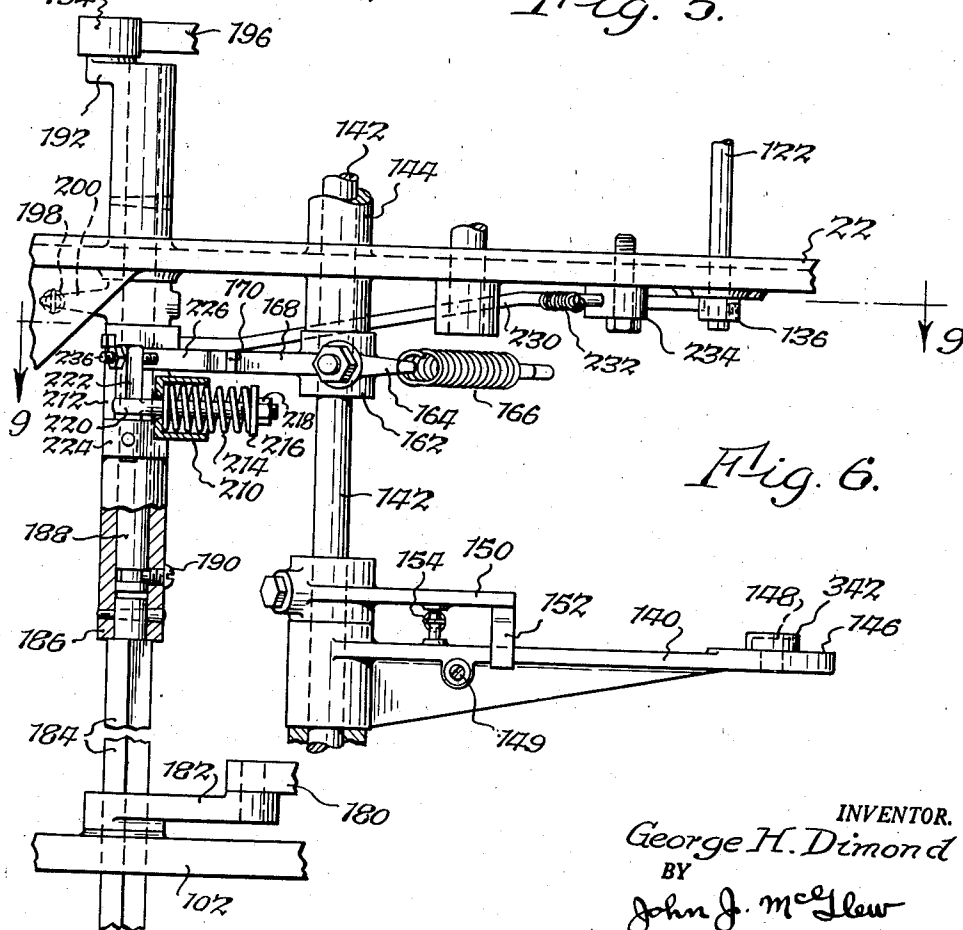


Fig. 6.

INVENTOR.
George H. Dimond
BY
John J. McGlew
Attorney.

July 15, 1958

G. H. DIMOND

2,842,914

SINGLE STATION CAPPING MACHINE

Filed April 12, 1955

6 Sheets-Sheet 5

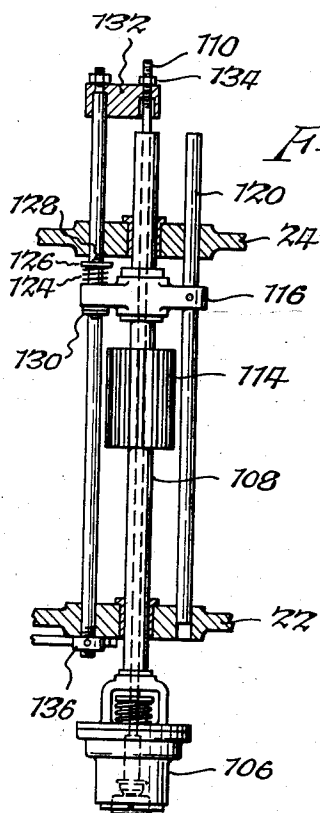


Fig. 7.

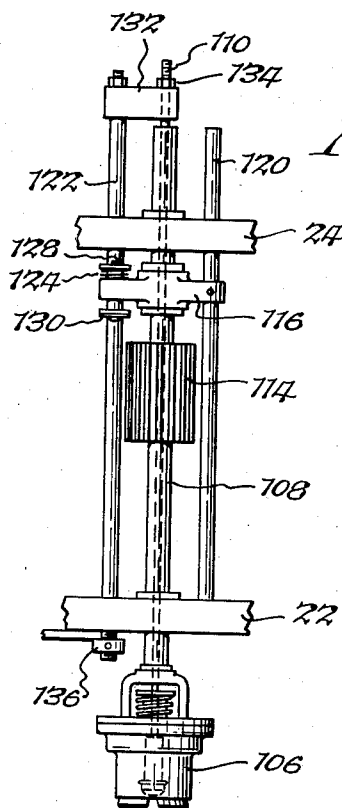


Fig. 8.

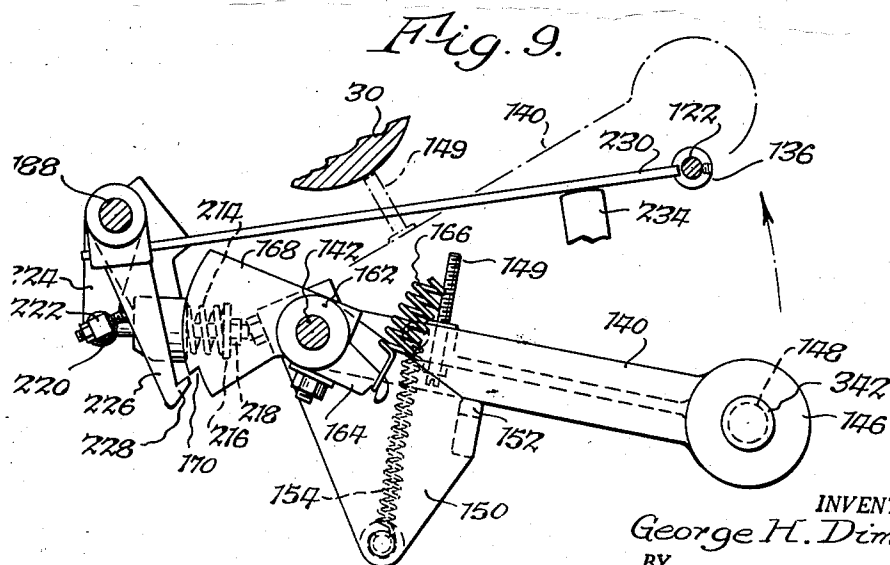


Fig. 9.

INVENTOR.
George H. Dimond
BY
John J. McGlew
Attorney.

July 15, 1958

G. H. DIMOND

2,842,914

SINGLE STATION CAPPING MACHINE

Filed April 12, 1955

6 Sheets-Sheet 6

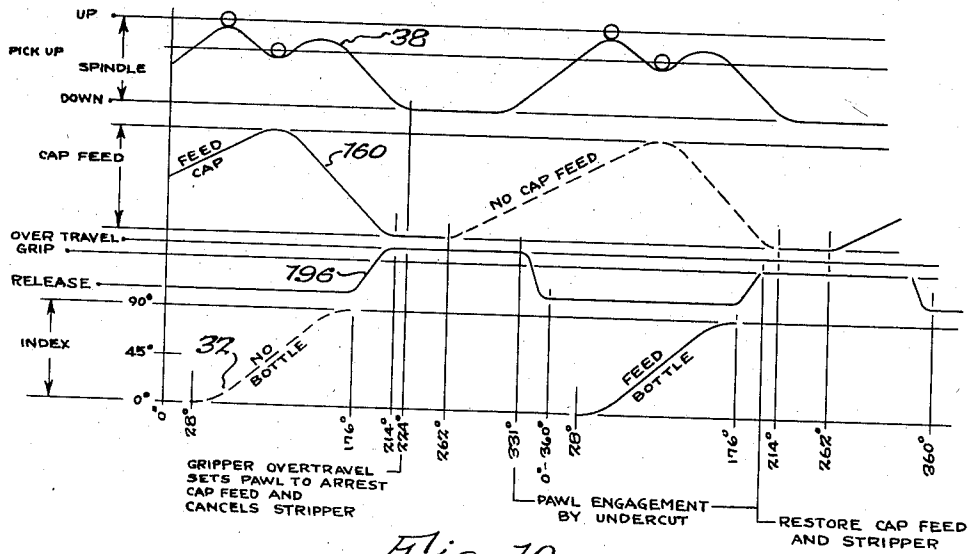


Fig. 10.

Fig. 11.

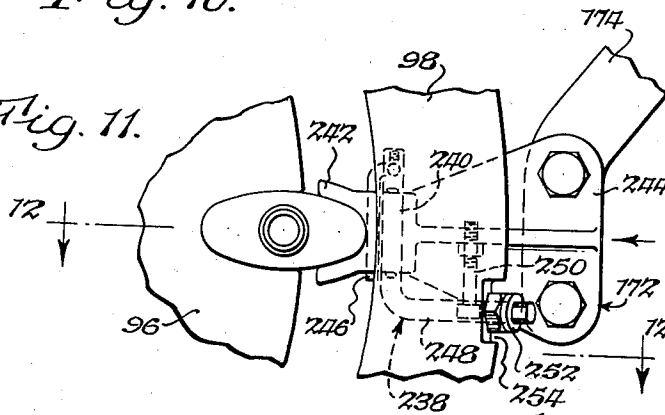


Fig. 13.

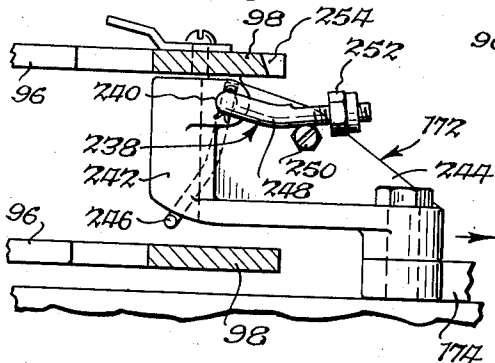
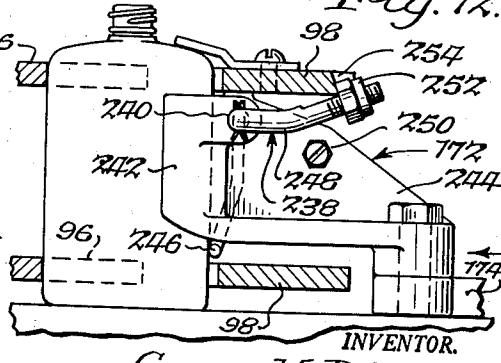


Fig. 12.



INVENTOR.
George H. Dimond
BY
John J. McSleu
Attorney.

1

2,842,914

SINGLE STATION CAPPING MACHINE

George H. Dimond, East Aurora, N. Y., assignor to Consolidated Packaging Machinery Corporation, Buffalo, N. Y., a corporation of New York

Application April 12, 1955, Serial No. 500,750

8 Claims. (Cl. 53—67)

This invention relates in general to capping machines and particularly to a new and useful single station capping machine or a capping machine having a stationary capping station with improved means for automatically discontinuing the feeding of caps whenever no container is present at a capping station.

A machine constructed in accordance with this invention is an improvement over stationary station machines of this nature heretofore proposed, particularly with respect to the provisions for presenting each cap in succession into operating engagement with a capping chuck and to the provisions for automatically discontinuing the feeding of caps and the ejection operation of the capping chuck when no container is present at a capping station.

Accordingly, it is an object of this invention to provide a capping machine including means for feeding and presenting caps in succession into operative engagement with a capping chuck for placement onto the necks of containers to effect capping thereof and for subsequent disengagement of the chuck from said cap, and novel means for discontinuing the feeding and presenting of caps to said chuck and for preventing ejection of any cap present in said chuck whenever no container is present at a capping station.

It is a further object to provide cap feeding means for a capping machine including a cam controlled oscillating transfer arm timed to receive caps periodically discharged in succession from a supply thereof and to move each of said caps into position for operative engagement with a capping chuck and then withdraw to permit the chuck to apply the cap to a container, and means for rendering said transfer arm inoperative whenever no container is present at the capping station.

A still further object is to provide a capping machine including a gripper normally engageable with a container positioned at the capping station to hold the container in place and to permit the cap-feeding and applying mechanisms to be activated and effective when no container is present to enter into said capping station to deactivate the cap feeding means and to prevent any cap held by the cap applying mechanisms from being ejected therefrom.

A further object of this invention is to provide a capping machine of the character stated which includes a gripper particularly adapted for use in connection with flexible containers of the squeeze type and so constructed that when a container is present at a capping station container-contacting motion of the gripper will be arrested prior to reaching the position at which the container would become squeezed thereby and at which the cap feeding and cap ejecting means would be rendered inoperative.

A further object is to provide a machine of the character described which is simple in design, rugged in construction and economical to manufacture.

With these and other objects in view, the nature of which will become more apparent, the invention will be

2

more fully understood by reference to the drawings, the accompanying detailed description and the appended claims.

In the drawings,

5 Fig. 1 is a perspective view of a single station capping machine constructed in accordance with this invention;

Fig. 2 is a fragmentary, vertical section taken along the line 2—2 of Fig. 1;

10 Fig. 3 is a horizontal section taken along the line 3—3 of Fig. 2;

Fig. 4 is a horizontal section taken along the line 4—4 of Fig. 2;

15 Fig. 5 is a fragmentary horizontal section taken along the line 5—5 of Fig. 2 and oppositely disposed with respect to Figs. 3 and 4;

Fig. 6 is a fragmentary side elevation of those portions of the mechanisms shown in Fig. 5;

20 Fig. 7 is a fragmentary vertical section taken along the line 7—7 of Fig. 2;

Fig. 8 is a view similar to Fig. 7 but showing the capping chuck in a cap discharge position;

Fig. 9 is a fragmentary horizontal section taken along the line 9—9 of Fig. 6;

25 Fig. 10 is a timing diagram of the machine;

Fig. 11 is a plan view showing a modification of the container gripper which is adapted for use with squeeze type soft bottles;

Fig. 12 is a vertical section taken on the line 12—12 of Fig. 11; and

30 Fig. 13 is a view similar to Fig. 12, but showing the parts when no bottle is present at the capping station.

Referring to the drawings in detail, the invention as illustrated is embodied in a capping machine having a stationary station for placing caps onto the necks of successively presented containers and includes a base A, cap sorting and feeding mechanism generally indicated at B, a turret assembly carrying the capping chuck and timing mechanisms generally indicated at C, a container intake and discharge conveyor generally indicated at D, and a driving mechanism generally indicated at E.

The driving mechanism E includes a motor 10 provided with a variable pitch drive pulley 11 and is mounted on a base 12 which is pivotally connected to the turret C. A belt drive 14 and spiral gears 16 transmit power from the motor to a drive shaft 18. The rotative speed of the shaft 18 may be changed by varying the angular position of the base 12 through the use of a hand wheel 20 provided for that purpose. The shaft 18 is mounted in suitable bearings on a lower spindle plate 22 and upper spindle plate 24 which in turn are adjustably affixed to a main spindle 26 mounted on the main base A and having its lower portion threaded. The lower spindle plate 22 has a depending hub which bears against a thrust bearing 28 slidably engaged on the spindle 26 and mounted in the upper end of a sleeve 30 which in turn is threaded on the lower portion of the main spindle 26 for vertical adjustment therealong. An eccentric 32 provided with an upstanding hub or sleeve 34 is rotatably mounted on the spindle 26 between the lower and upper spindle plates 22 and 24 and is spaced from the lower spindle plate 22 by a washer 36. The vertical position of the upper and lower spindle plates 22 and 24 and the sleeve 34 may be varied by adjusting the position of the sleeve 30 on the spindle 26.

A cylinder cam 38 is keyed to the sleeve 34 for rotation therewith and is provided with gear teeth 39 around the lower periphery thereof which mesh with a driving pinion 40 affixed to the shaft 18. An inverted cylindrical-segment presser or compression cam 42 is pivotally connected to a hub 44 which is keyed to the sleeve 34 immediately above the hub of the cylinder cam 38. The cam segment 42 is constantly biased downwardly by a spring 46 main-

tained in compression by means of a bolt and washer 48 affixed to the cylinder cam 38. The pivotal connection between the cam segment 42 and the hub 44 is effected through a yoke 50 formed integrally with the cam segment and a horizontally disposed pivot pin 52 extending there-through and through a lug on the hub.

The shaft 18 is provided with a thrust bearing 54 positioned above the lower spindle plate 22 and with a hand wheel 56 which is secured to the lower end of the shaft and which may be used to operate the machine manually for start-up or adjustment purposes. The upper end of the shaft 18 is provided with a driving pulley 58 affixed thereto and which is belt connected with a pulley 62 affixed to a main driving shaft 64 of the cap starting and feeding mechanism B for operation thereof.

A bracket 66 for the sorter B is positioned around the upper end of the spindle 26 and rests on the spindle plate 24 and is pin-connected to the latter.

The lower spindle plate 22 extends laterally and outwardly beyond the upper spindle plate 24 and is provided with an indexing shaft 68 mounted therein. The indexing shaft 68 is indexed or rotated 90° at intervals by means of an eccentric, pivot arm and ratchet arrangement. This arrangement includes a strap 70 secured around the eccentric 32 and pivotally connected to the medial portion of a lever arm 72 which in turn has one end pivoted on a stud 74 fastened to the lower spindle plate 22 and its other end pivotally connected to one end of a link 76. The link 76 has its opposite end pivotally connected to one end of a hubbed plate 78 which is oscillatably mounted on the upper portion of a ratchet sleeve 80 keyed to the shaft 68. The hubbed plate 78 is provided with a detent arm or pawl 82 at the end opposite the link 76 which is biased inwardly toward the shaft 68 by a spring 84. The pawl 82 is arranged to engage one of four equally-spaced teeth 83 along the periphery of a ratchet 81 formed integrally with the ratchet sleeve 80. The hubbed plate 78 is held by a nut 86 threadably engaged with the ratchet sleeve 80. The lever arm 72 is oscillated by the eccentric 32, resulting in reciprocation of the link 76 to cause the pawl 82 to index the shaft 68 through a 90° arc during each 360° rotation of the eccentric.

On the lower portion of the ratchet sleeve 80 is a friction-faced brake plate 88 which is biased upwardly by a spring 90, the tension on which may be increased or decreased by means of an adjustably positioned nut 92 which is threaded onto the lower portion of the ratchet sleeve 80. Friction washers 94 are interposed between the lower spindle plate 22 and the ratchet 81 and between the spindle plate 22 and the friction brake plate 88. The brake plate 88 and the ratchet 81 under the influence of the spring 90 together act as a brake to prevent rotation of the shaft 68 except when an indexing movement is taking place.

Intake star wheels 96, 96 are rigidly affixed to the lower end of the shaft 68 and are provided with four container-receiving pockets which receive containers in succession from the conveyor D and move them into operative association with the mechanism of the turret C. The containers are guided along their arcuate paths during intake and discharge from the turret C by two horizontally disposed vertically spaced arcuate guide plates 98, 98 which are supported by a plate 100 mounted on a hubbed plate 102 which is secured to the spindle 26 by set screws 104. The conveyor assembly includes an endless belt 105 (shown schematically in the drawings) which is continuously moving to advance containers to the star wheels 96, 96 at the intake end and to move them out of engagement therewith at the discharge end thereof.

A capping chuck 106 is mounted on the lower end of a hollow spindle 108 mounted for vertical reciprocation and rotation in the spindle plates 22 and 24 and is positioned at the capping station located midway around the guide plates 98. The capping chuck is of known design which includes a central stripper plunger or rod 110 extending upwardly inside the spindle 108 and which effects release

of the chuck jaws to disengage a cap held thereby. The capping chuck 106 operates in a known manner to engage a cap and thereupon thread it onto a container and then disengage the cap.

The chuck 106 is constantly rotated by a gear 114 affixed to the hollow spindle 108 which meshes with the gear portion 39 of the constantly driven cylinder cam 38. The spindle 108 is provided with a cross head or yoke 116 having a projecting portion terminating in a roller cam follower 118. The roller follower 118 engages the cylinder cam 38 during the major portion of a capping cycle and moves into engagement with the presser cam segment 42 whenever downward movement of the capping chuck 106 is stopped by contact with a container which causes the roller follower to become disengaged from the cylinder cam 38. Each time this condition is reached the cam segment 42 becomes effective to apply and maintain proper capping pressure on the chuck during application of a cap to the container.

One end of the cross head 116 is pin-connected to a guide rod 120 and the other end is mounted for reciprocation within defined limits on a control rod 122. The guide rod 122 and the control rod 120 are free to reciprocate through holes in the spindle plates 22 and 24. The control rod 122 is provided with a compression spring 124 located around its intermediate portion. The compression spring 124 is biased between the top of the cross head 116 and an upper washer 126 held in position on the control rod 122 by a pin 128. A second washer 130 positioned below the same end of the cross head determines the lower position of the yoke 116 on the control rod 122. The yoke 116 may therefore reciprocate relative to the control rod an amount limited by the upper washer 126 and the lower washer 130 under the restraint of the spring 124. The upper end of the control rod 122 is provided with an arm 132 which extends outwardly therefrom and is provided with a hole into which the top of the stripper plunger 110 is threaded and secured as by a bolt 134. The lower end of the control rod 122 below the spindle plate 22 is provided with a collar 136 secured thereto. Since the stripper plunger 110 must extend downwardly into the capping chuck 106 a sufficient distance in order to actuate known mechanisms to disengage a cap from the jaws 112 and since the stripper rod is attached to the control rod 122 through the arm 132 it is easily seen that moving the control rod upwardly a sufficient distance will prevent the stripper rod 110 from operating the cap-disengaging mechanisms in the chuck 106. Automatic means are provided to prevent cap ejection when no container is present in the capping station by changing the position of the control rod 122 in a manner to be described more fully hereinafter.

In accordance with the invention there is provided means for transferring caps in succession from a discharge chute 138, arranged below the cap sorting and feeding mechanism B, to a position below the capping chuck 106 and in operative association therewith. The chuck is reciprocated under the influence of the cam 38 into engagement with the cap, and the cap transferring means is then withdrawn. The cap transferring means includes a cap transfer arm 140 freely mounted at one end on a rock shaft 142 which extends through a hollow bearing boss 144 in the spindle plate 22. The cap transfer arm 140 is provided at its other end with a cap-receiving circular portion 146 having a cap-centering stud 148 protruding from the top thereof. An adjustable screw stop 149 is provided on the side of the arm 140 and butts against the sleeve 30 when the arm is subjacent the capping chuck 106. A driving arm 150 is affixed to the shaft 142 and is provided with a depending abutment 152. The transfer arm 140 is biased by a spring 154 against the abutment of the driving arm 150 so that both normally move together as a unit. However, the spring 154 provides a give-away means in the event the transfer arm is restrained against return

movement as by engagement with the capping chuck 106. The upper end of the shaft 142 carries a crank arm 156 which is provided with a roller cam follower 158 at its outer end which engages a hubbed disc cam 160. The cam 160 is affixed to the sleeve 34 and actuates the roller follower 158, the shaft 142, and the driving arm 150 to oscillate the transfer arm between the discharge chute 138 and the capping chuck 106.

Rigidly affixed to the shaft 142 is a bell crank 162 having one arm 164 extending outwardly therefrom and connected to one end of a spring 166 which is secured at its other end to a stationary portion of the machine so as to constantly urge the shaft 142 in a counterclockwise direction as viewed from the top and maintain the cam follower 158 in contact with the cam 160. The other arm 168 of the bell crank 162 extends outwardly in the opposite direction and is provided with a curved outer surface having a notch 170 at one end thereof.

In accordance with the invention sensing means are provided which are responsive to the presence or absence of a container at the capping station and are effective both to discontinue the feeding of caps by the transfer arm 140 and to stop cap ejection from the chuck 106 whenever no container is present at the capping station.

The sensing means includes a gripper generally designated 172 which, in one embodiment, is generally rectangularly shaped in horizontal cross-section and is provided with a container-engaging front end shaped to permit holding of a container thereby during capping operations. The gripper is affixed at its rear end to one end of a long curved arm 174 which is pivotally connected at its opposite end to a stud 176 secured to the plate 102. Intermediate the length of the arm 174 is a pivot pin 178 to which is pivotally connected one end of a link 180. The link 180 is connected at its opposite end to a gripper toggle arm 182 rigidly mounted on a rock shaft 184.

The rock shaft 184 extends upwardly and is provided with a sleeve 186 positioned over the top end of the shaft and pin-connected thereto. The sleeve 186 carries a freely rotatable gripper-actuating rock shaft 188 which is restrained in the sleeve against vertical movement by a set screw 190 which rides in a groove on the rock shaft 188. The rock shaft 188 extends upwardly through the spindle plate 22 and is provided at its upper end with a crank arm 192. The crank arm 192 is provided with a roller cam follower 194 at its outer end which engages a disc cam 196 keyed to the sleeve 34 to oscillate the rock shaft 188. The cam follower 194 is urged against the cam 196 by a spring 198 fastened at one end to a stationary portion of the machine and at its other end to a crank arm 200 affixed to the shaft 188 subjacent the spindle plate 22.

A spring retaining cup 210 is mounted on a crank arm 212 affixed to the shaft 188 between the sleeve 186 and the crank arm 200. The cup 210 carries a compression spring 214 held at the open end of the cup by a washer 216 and a nut 218 threaded onto the threaded end of an eye bolt 220 which extends through the spring 214 and a hole in the cup 210 and is fitted around an upstanding stud 222 rigidly affixed to an arm 224 formed integral with and extending outwardly from the sleeve 186. Movement of the roller follower 194 to a high spot on the cam 196 results in the counterclockwise movement of the shaft 188 as viewed from the top and the similar movement of the arm 212 with the eye bolt 220. The eye bolt 220 is effective to pull the arm 224 in a similar direction through the medium of the stud 222. Since the stud is affixed to the arm 224 on the sleeve 186, the shaft 184 is similarly moved. The gripper 172 is thereby caused to move into engagement with a container. Once the gripper 172 contacts the container its forward movement is stopped thereby. The stopping of the gripper prevents further rotation of the shaft 184 and hence stops movement of the stud

222 which is affixed thereto. The cam 196 is arranged to cause slight additional rotation of the shaft 188 after the gripper arrives at the normal container contacting position. This movement of the shaft 188 is permitted by the spring 214 which is compressed after motion of the stud 222 is stopped.

During most operations a container is present at the capping station to arrest movement of the gripper 172. However, in the event no container is present it is desirable to stop cap feeding and in addition prevent the ejection of a cap already in the chuck 106 and which might fall into and clog the operating mechanism. For this purpose a pawl or detent arm 226, provided with a tooth or hook 228 at its outer end, is freely mounted on the shaft 188. A long rod 230 is secured to the pawl 226 at a position near the shaft 188 and extends outwardly therefrom to a normal operating position between the collar 136 and the spindle plate 22. The rod 230 is biased by a spring 232 against a stop 234 which depends from the spindle plate 22. The stud 222 is provided with an adjustable set screw 236 which is adjusted to contact the pawl 226 at a position of the stud 222 corresponding to a container-engaging position of the gripper 172. However, when no container is present to stop the movement of the gripper and it is moved beyond its normal container-engaging position, the stud 222 will be moved further by the eye bolt 220 under the influence of the cam 196 so that the set screw 236 will push the pawl 226 against the tension of its associated spring 232 and cause the hook 228 to engage the notch 170 on the arm 168. This engagement stops the rotation of the shaft 142 and the movement of the transfer arm 140. It is timed to occur when the transfer arm 140 is subjacent the capping chute 138, so that no additional caps are fed therefrom. The cam follower 158 is held in a position equivalent to the high lift of the cam 160 so that it will not be disturbed in this position by the rotation of the cam.

In addition to discontinuing the feed of caps the sensing means is effective to stop cap ejection of the chuck 106. This is accomplished when the rod 230 is moved out of position between the collar 136 and the spindle plate 22 and this occurs whenever the pawl 226 is moved into engagement with the notch 170 since the rod is attached thereto. In the operating position the rod 230 holds the control rod 122 downwardly a distance sufficient to move the stripper rod 110 which is movable therewith into position to effect cap ejection from the capping chuck 106. However, when the rod 230 is moved out from between the collar 136 and the spindle plate 22, the stripper rod 110 is moved upwardly a distance sufficient to discontinue its ejecting actuation on the capping chuck.

The rod 230 is returned to a position between the collar 136 and the spindle plate 22 by the tension of the spring 232 whenever the gripper again contacts a container and the pawl 226 is released. The collar 136 is moved downwardly from the spindle plate 22 to permit the entrance of the rod 230 therebetween during the portion of the capping cycle at which the spindle 108 is moved downwardly sufficiently to bring the cross head 116 to bear against the washer 130 and move the control rod 122 and the collar 136 downwardly.

A modified embodiment of the gripper 172 particularly adaptable for squeeze type bottles of containers is shown in the drawings in Figs. 11 to 13. The gripper is provided with means to stop its forward movement before it can move far enough after container engagement to squeeze the container and to stop the cap feeding and cap ejecting mechanism. These means include an offset bell crank generally designated 238 which is pivotally mounted on the forward part of the gripper 172 and includes an offset pivot portion 240 arranged to extend horizontally through the gripper. The gripper 172 in this embodiment is made with a generally U-shaped container-engaging forward portion 242 and a rear bracket

portion 244. The pivot 240 extends through the solid part of the U-shaped portion 242, and an arm 246 extends from the pivot 240 downwardly to a position in front of the U-shaped portion of the gripper. An upper arm 248 extends from the pivot 240 backwardly and normally rests on a nut stop 250 on the bracket portion 244 of the gripper. The arm 248 is provided with a heavy holding nut 252 which weighs the arm 248 down against the stop 250 and causes the arm 246 to be lifted in the container-engaging recess in front of the gripper 172. The upper guide plate 98 is provided with an abutment notch 254 arranged to permit holding contact of the nut 252 with the notch whenever the arm 248 is elevated sufficiently. Thus when the gripper is moved toward a container in the capping station the container will be gently contacted by the arm 246 which will be moved backwardly by the container as the gripper advances. Movement of the gripper will be stopped as soon as the arm 246 moves sufficiently to rotate the bell crank 238 and raise the arm 248 to bring the nut 252 to a position in horizontal alignment with the notch 254 and thereafter further gripper movement brings it into locking contact against the abutment notch 254 to stop further forward movement of the gripper.

The operation of the machine is as follows: Caps are dumped into a hopper at the top of the cap sorting and feeding mechanism B wherein they are oriented in a common facing direction and passed downwardly into the discharge chute 138. At the same time containers are fed along the intake portion of the conveyor D to the star wheels 96, 96, whereupon they are rotated 90° to a capping station below the capping chuck 106. The cap transfer arm 140 as it moves backwardly from the previous cycle under the influence of the cam 160 trips a cap ejection lever 240 which operates in a known manner to permit a single cap 242 to move downwardly in the chute 138 into engagement with the side of the stud 148 of the cap transfer arm 140. Thereupon oscillation of the transfer arm 140 completely withdraws a cap from the discharge chute and transfers it to a position subjacent the capping chuck 106. The capping chuck 106, under the influence of the cam 38, is reciprocated into operative engagement with the cap and thereupon lifts the cap slightly as the cap transfer arm 140 is moved backwardly again by the driving arm 150 through the medium of the spring 152. Fig. 10 of the drawings shows the timing of the spindle cam 38, cap feed cam 160 and indexing cam 196 and the eccentric 32.

When the cap is in position in the capping chuck 106 a container has been moved into the capping station. Thereupon the capping chuck is reciprocated downwardly over the container to execute complete capping of the container. The container is held in position in the capping station by the gripper 172 which is operating under the control of the cam 196 to move inwardly a distance sufficient to contact a container.

In the event that no container is present in the capping station the gripper will move inwardly further than if a container were present. This additional inward movement causes the set screw 236 to push against the pawl 226 so that the tooth 228 falls into the notch 170 on the arm 168 and stops oscillation of the transfer arm 140 after the latter has moved backward to a position underneath the chute 138. In addition the rod 230 attached to the pawl 226 is moved out of its normal position between the disc washer 136 and the spindle plate 22. The movement of the long rod 230 permits the control rod 122 and the stripper rod 110 to move upwardly and prevents the latter from extending downwardly into the chuck 106 far enough to effect cap ejection during the cycling of the chuck.

Thus it is seen that this invention provides a capping machine with simple means to discontinue the feeding of caps from a chute supply to the capping chuck and to dis-

continue cap ejection from a chuck when for any reason no container is fed through the machine to the capping station. These improved devices permit the machine to operate satisfactorily at all times and eliminate the possibility of jamming which would result if either the caps or containers were not in proper position for capping. In addition, the improved gripper of applicant provides an excellent means to handle soft containers such as the squeeze type without compressing them and ejecting the contents therefrom or otherwise damaging them.

It is, of course, to be understood that various details of arrangements and proportions of parts may be modified within the scope of the appended claims.

I claim:

1. In a capping machine the combination of means for advancing a series of containers to a capping station, capping means effective to seat each cap operatively engaged thereby onto each successively advanced container, means to feed individual caps in succession into operative association with said capping means, means to control the operation of said capping means and said feeding means, and sensing means movable into and out of the path of travel of said containers and operably connected to said control means and being effective to cause said control means to stop said cap-feeding means and to effect retention of a cap by said capping means whenever no container is present at said capping station.

2. In a capping machine the combination of means for advancing a series of containers to a capping station, capping means effective to seat each cap operatively engaged thereby onto each successively advanced container, means to feed individual caps in succession into operative association with said capping means, means to control the operation of said capping means and said feeding means, and a cam-actuated gripper effective to move into and out of engagement with each container advanced to said capping station below said capping means and effective when no container is present at said capping station to move beyond its normal container-engaging position to cause said control means to stop said cap-feeding means and to effect retention of any cap held by said capping means.

3. A capping machine comprising, a main base, means for advancing a series of containers, capping means effective to seat each cap operatively engaged thereby onto each successively advanced container and to effect disengagement of a cap from said capping means, a cap discharge chute, means for supplying caps to said cap discharge chute, an oscillatable cap transfer arm positioned above said main base for oscillation between said cap discharge chute and said capping chuck and being effective during oscillation in one direction to withdraw a cap from said chute and to transport said cap into operative alignment with said capping means, means to oscillate said cap transfer arm, a cam-actuated container gripper effective to move into engagement with each container as it is advanced to a position in registry with said capping means and to move beyond the normal container-engaging position when no container is present, and control means connected with said gripper and responsive when the gripper advances beyond said normal container-engaging position to render said transfer arm inoperative and to prevent ejection of a cap from said capping means.

4. A capping machine comprising, a main base, means for advancing a series of containers, capping means effective to seat each cap operatively engaged thereby onto each successively advanced container and to effect disengagement of a cap from said capping means, a cap discharge chute, means for supplying caps to said cap discharge chute, an oscillatable cap transfer arm positioned above said main base for oscillation between said cap discharge chute and said capping chuck and being effective during oscillation in one direction to withdraw a cap from said chute and transport said cap into oper-

ative alignment with said capping means, means to oscillate said cap transfer arm, a cam-actuated container gripper having a container-engaging portion and effective to move into and out of engagement with each container as it is advanced to a position in registry with said capping means and to move beyond the normal container-engaging position when no container is present, a stationary abutment mounted on said base adjacent said gripper, and a bell crank pivotally mounted on the container-engaging portion of said container gripper and having a first arm projecting ahead of the container-engaging portion of said gripper and a second arm having a detent thereon, the first arm being effective upon contacting a container to rotate said bell crank and move the second arm thereof into position for holding engagement with said abutment to thereby stop the forward movement of said gripper.

5. A capping machine comprising, a main base, means for advancing a series of containers, a rotatable and reciprocable capping chuck having cap-retaining jaws therein and supported over said main base, means for rotating and cyclically reciprocating said capping chuck, a stripper rod adjustably positioned in said chuck and effective upon upward movement of said capping chuck when said stripper rod is in a downward position to open the retaining jaws of said capping chuck and when in an upward position to permit the retaining jaws of said capping chuck to remain closed, means to control the positioning of said stripper rod and sensing means moveable along a path intersecting the path of said advancing containers and connected to said control means and being effective to hold said stripper rod in an upward position whenever no container is present.

6. A capping machine comprising, a main base, means for advancing a series of containers, capping means effective to seat caps operatively engaged thereby in succession onto each successively advanced container and to effect disengagement of a cap from said capping means, a capping station on said main base immediately below said capping means, means for transferring individual containers from said advancing means to said capping station, a cap-discharge chute, means for supplying caps to said discharge chute, a cap transfer arm mounted above said main base for oscillation between said chute and said capping chuck and being effective to transport each cap in succession from said chute into operative alignment with said capping means, means responsive to the movement of said cap transfer arm to strip a cap from said chute onto said transfer arm, means to oscillate said cap transfer arm, a cam-actuated container gripper effective to move into and out of engagement with each container advanced to said capping station, means to stop forward movement of said gripper upon the latter contacting a container, said means permitting the continued forward movement of said gripper when no container is present in said capping station, and means responsive to the continued forward motion of said gripper when no container is present to prevent oscillation of said transfer arm.

7. A capping machine comprising, a main base, means for advancing a series of containers, a rotatable and reciprocable capping chuck having cap-retaining jaws therein and supported over said main base, means for rotating and cyclically reciprocating said capping chuck, a stripper rod adjustably positioned in said chuck and effective upon upward movement of said capping chuck when said stripper rod is in a downward position to open the retaining jaws of said capping chuck and when in an upward position to permit the retaining jaws of said capping chuck to remain closed, means to control the positioning of said stripper rod, a capping station on

said main base immediately below said capping means, means for transferring individual containers from said advancing means to said capping station, a cap discharge chute, means for supplying caps to said discharge chute, a cap transfer arm mounted above said main base for oscillation between said chute and said capping chuck and being effective to transport each cap in succession from said chute into operative alignment with said capping means, means responsive to the movement of said cap transfer arm to withdraw a cap from said chute onto said transfer arm, means to oscillate said cap transfer arm, a cam-actuated container gripper effective to move into and out of engagement with each container advanced to said capping station, means to stop forward movement of said container gripper upon the latter contacting a container and to permit the continued forward movement of said gripper when no container is present in said capping station, and means responsive to the continued forward movement of said gripper when no container is present to prevent oscillation of said transfer arm and to hold said stripper rod in an upward position.

8. A capping machine comprising, a main base, means for advancing a series of containers, a rotatable and reciprocable capping chuck having cap-retaining jaws therein and supported over said main base, means for rotating and cyclically reciprocating said capping chuck, a stripper rod adjustably positioned in said chuck and effective upon upward movement of said capping chuck when said stripper rod is in a downward position to open the retaining jaws of said capping chuck and when in an upward position to permit the retaining jaws of said capping chuck to remain closed, means to control the positioning of said stripper rod, a capping station on said main base immediately below said capping means, means for transferring individual containers from said advancing means to said capping station, a cap discharge chute, means for supplying caps to said discharge chute, a cap transfer arm mounted above said main base for oscillation between said chute and said capping chuck and being effective during oscillation in one direction to withdraw a cap from said chute and transport said cap into operative alignment with said capping means, means to oscillate said cap transfer arm, a cam-actuated container gripper having a container-engaging portion and effective to move into and out of engagement with each container advanced to said capping station and to move beyond the normal container-engaging position when no container is present at said capping station, a stationary abutment mounted on said base adjacent said gripper, a bell crank pivotally mounted on the container-engaging portion of said gripper and having a first arm projecting ahead of the container-engaging portion of said gripper and a second arm having a detent thereon, the first arm being effective upon contacting a container to rotate said bell crank and move the second arm thereof into a position for holding engagement with said abutment to thereby stop the forward movement of said gripper, and means responsive to the continued forward movement of said gripper when no container is present to prevent oscillation of said transfer arm and to hold said stripper rod in an upward position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,775,255	Risser	Sept. 9, 1930
2,066,259	Everett	Dec. 29, 1936
2,106,365	Tiano	Jan. 25, 1938
2,434,053	Resina	Jan. 6, 1948