

Oct. 10, 1944.

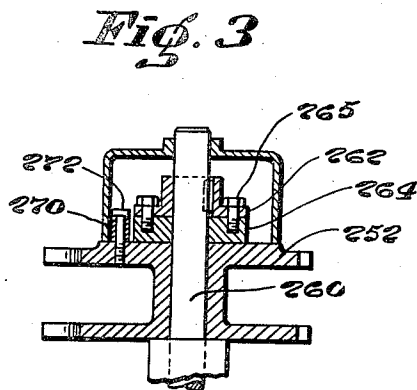
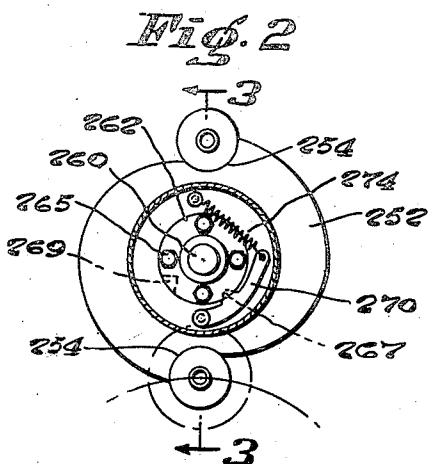
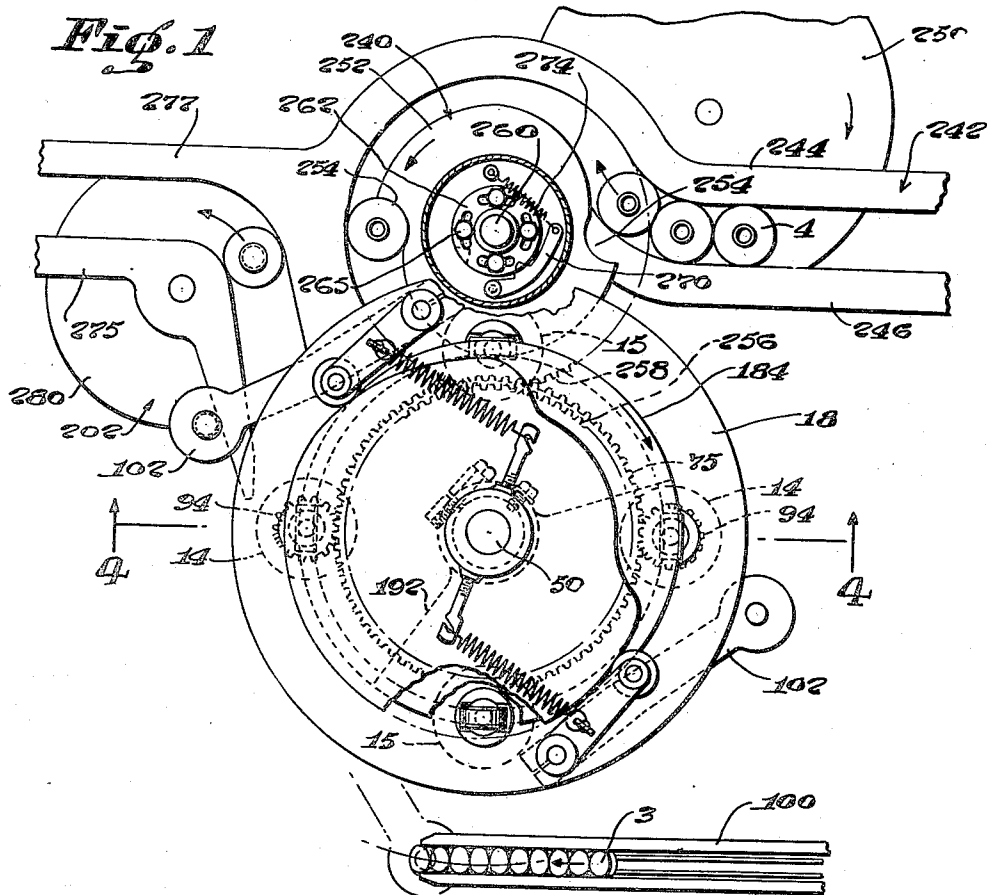
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2,359,932.

CLOSURE APPLYING MACHINE

Filed July 30, 1940

3 Sheets-Sheet 1



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Fig. 4

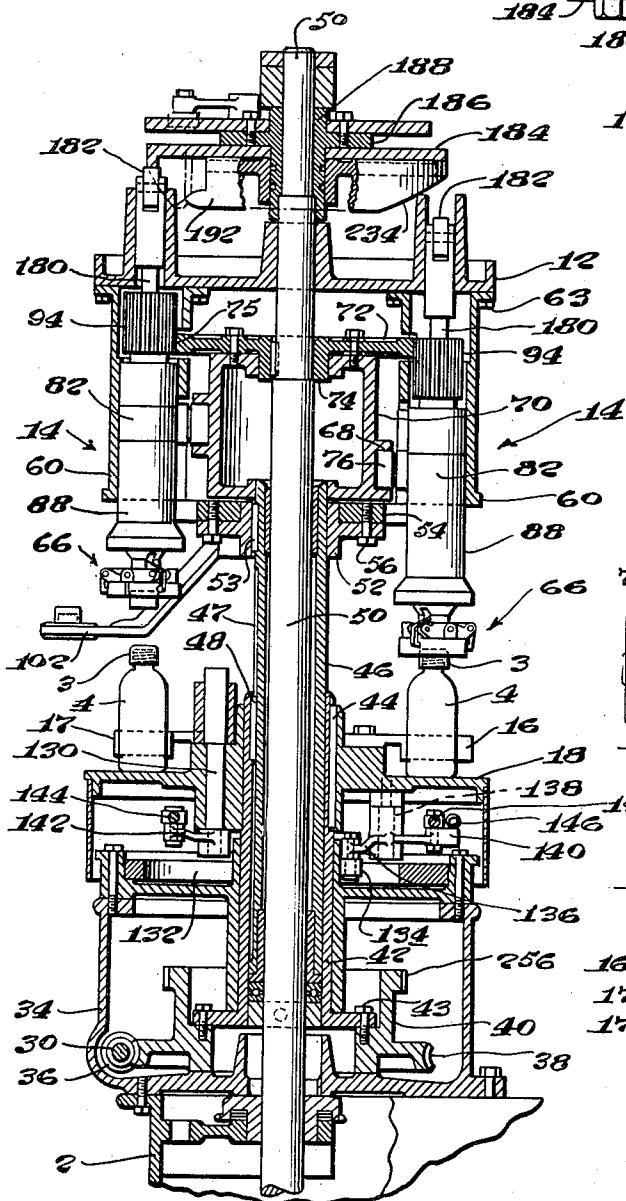


Fig. 5

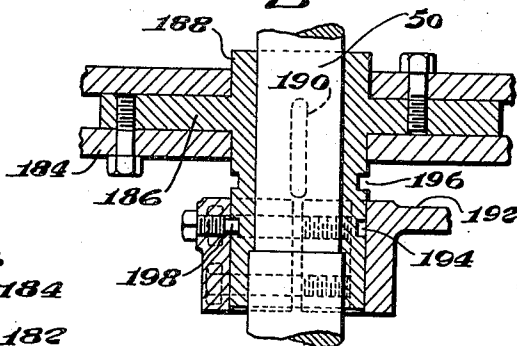
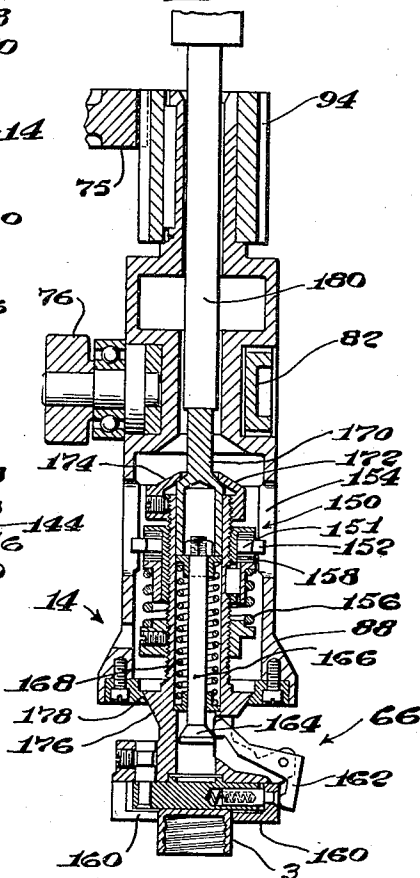


Fig. 6



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Fig. 7

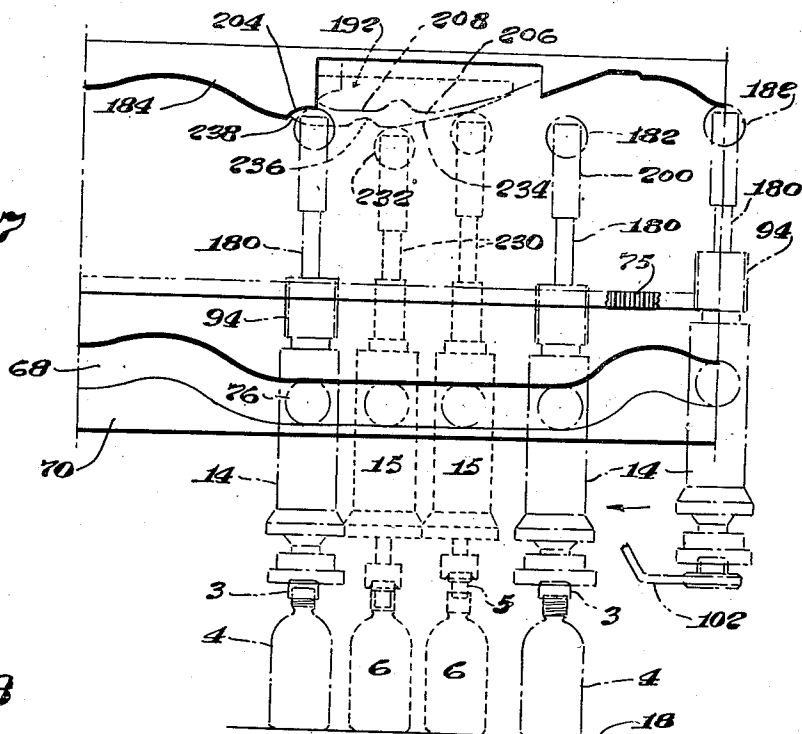


Fig. 8

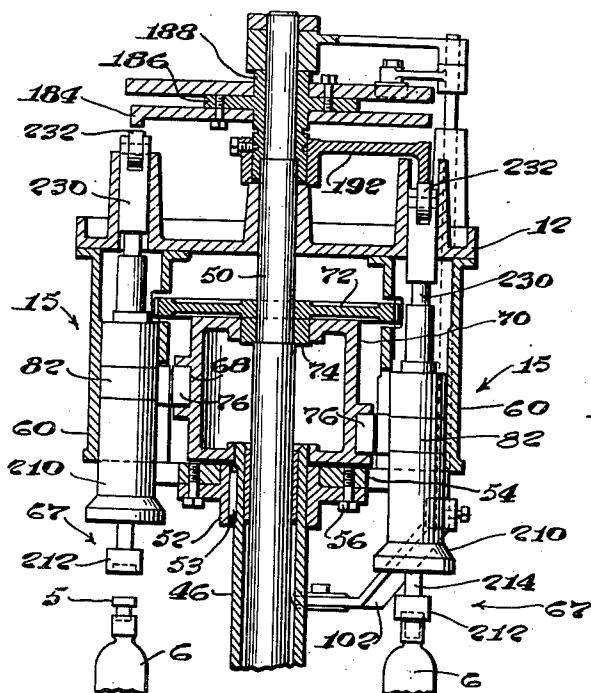
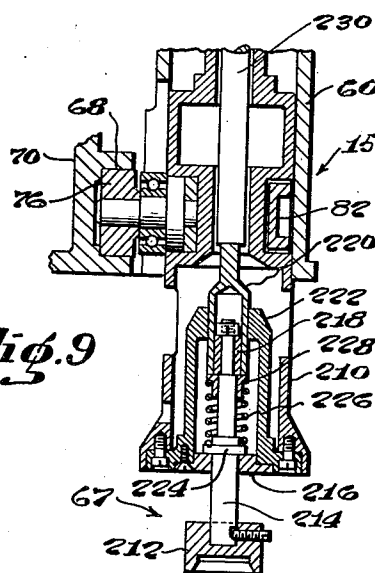


Fig. 9



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UNITED STATES PATENT OFFICE

2,359,932

CLOSURE APPLYING MACHINE

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Application July 30, 1940, Serial No. 348,375

8 Claims. (Cl. 226—80)

This invention relates to a closure applying machine.

The invention has for an object to provide a novel and improved closure applying machine in which provision is made for adapting the machine for operation as a capping machine to apply screw closures to a container or as a corking machine to firmly set previously inserted corks in the containers in a manner such as to necessitate a minimum of adjustments and changes to enable the machine to perform either operation.

With this general object in view, and such others as may hereinafter appear, the invention consists in the closure applying machine and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a plan view of a closure applying machine embodying the present invention; Fig. 2 is a detail plan view of the container feeding mechanism to be referred to; Fig. 3 is a cross sectional detail on the line 3—3 of Fig. 2; Fig. 4 is a vertical sectional view of the machine on the line 4—4 of Fig. 1 and illustrating the machine when employed as a screw closure applying machine; Fig. 5 is an enlarged detail in cross section of a cam adjustment to be referred to; Fig. 6 is an enlarged cross sectional view through a screw closure applying head; Fig. 7 is a developed view of the operating cams to be referred to; Fig. 8 is a cross sectional view similar to Fig. 4 illustrating the machine when employed as a corking machine; and Fig. 9 is an enlarged cross sectional view through one of the corking head units shown in Fig. 8.

In general, the present invention is illustrated as embodied in a closure applying machine of the type having provision for applying screw closures to containers, such as bottles or jars, and except as to such details as are hereinafter pointed out, the illustrated machine may comprise any of the usual forms of closure applying machines now upon the market. Reference is made to the patent to Arthur Clarence Everett, No. 2,082,048, dated June 1, 1937, as disclosing the details of construction and mode of operation of such prior art closure applying machines.

In the preferred embodiment of the present invention, alternate operating heads are provided with screw closure applying units and corking units respectively. When used as a capping machine, the container feeding mechanism

is adjusted to feed containers to the capping heads only, and conversely, when used as a corking machine, containers are fed only to the corking heads. Provision is also made in the preferred embodiment of the invention for enabling the same operating mechanism to be used for raising and lowering the capping and corking heads out of and into operative engagement with the containers and provision is also made for changing the cam surface of one operating cam from a position adapted to release the cap gripping jaws in one instance, to a position adapted to perform the corking operation in another instance.

Referring now to the drawings the illustrated machine is provided with a base 2 having mounted thereon a revoluble head 12 upon which is mounted to revolve therewith a plurality of and, as herein shown, four individual operating heads including two capping heads 14, arranged to apply screw closures such as threaded caps 3 to the threaded neck of containers such as bottles 4 supported therebeneath, and two corking heads 15, arranged to firmly set previously inserted corks 5 into the bottles 6. The containers are held by clamping members 16, 17 of a revoluble supporting table 18 which is arranged to revolve with the operating heads 14, 15, and provision is made for engaging and releasing the containers at different stations in the revolution of the container supporting table.

The revolution of the revoluble head 12 and also the container supporting table 18, is effected by a driving motor, not shown, arranged to drive a shaft 30 through the usual connections, such as a belt and pulleys, not shown. The driving shaft 30 is journaled in suitable bearings in a casing 34 secured to and supported by the base of the machine, and is provided with a worm 36 which cooperates with a worm wheel 38 formed on the lower portion of a cylindrical drum 40, see Fig. 4. A sleeve 42 is attached at its lower end to the inside of the cylindrical drum by the bolts 43, and at its upper end to the circular container supporting table 18, by a key 44. The clamping jaws 16, 17 above referred to for clamping the containers are mounted upon the revoluble table to rotate therewith.

Provision is made for effecting the revolution of the operating heads 14, 15 about a central supporting shaft 50 through connections between the operating heads and the sleeve 42, including, as shown in Fig. 4 an inner sleeve 46 having an elongated keyway 47 within which an elongated key 48 secured to the outer sleeve is slidably

fitted whereby to effect rotation of the inner sleeve while permitting the vertical adjustment of the sleeve for the purpose of adjusting the vertical position of the operating heads to accommodate the machine to different heights of containers.

The operating heads 14, 15 are mounted upon the top of the inner sleeve 46 by a supporting bracket 52 held by a key 53 to the upper end of the sleeve. The bracket 52 has attached to it a plate 54 which forms a supporting member for the individual operating head casings 60 and to which they are fastened at their lower ends by screws 56. The individual operating head casings 60 are secured at their upper ends to the revoluble head 12 by screws 63 so that the rotations of the inner sleeve 46 are transmitted directly to the operating head casings and head 12 to cause the casings 60 to revolve about the stationary shaft 50, as will be apparent from an inspection of Fig. 4.

Each capping head 14 is provided with a chuck unit indicated generally at 66 and each corking head 15 is provided with a plunging unit 67 and each unit is mounted to slide vertically within the casings 60. A vertical motion is imparted to each individual device from a cam path 68 in a cylindrical drum 70, the upper end of which is secured to a flange 72 of a sleeve 74 keyed to the stationary shaft 50, as illustrated in Figs. 4 and 8. Each operating unit is further provided with a cam roller 76 which rides in the cam path 68, and each cam roller 76 is rotatably mounted on a stud secured in an annular collar 82 as fully disclosed in the United States patent No. 2,082,048, above referred to, and as shown in detail in Fig. 6.

During the operation of the machine, the containers are supported on the table 18 and are firmly gripped and held from rotation by the clamping members 16 and 17. The clamping members are arranged to engage and release the containers at the different stations in the revolution of the table 18 and as herein shown, each set of clamping members comprises a stationary jaw 16 and a movable jaw 17. The stationary jaw is secured directly to the table and the movable jaw is fastened to a vertical stud 130 pivotally mounted in the table 18. The movable jaw is arranged to be moved by an inner cam surface 132 through a roller 134 on a lever 136 pivoted on a pin 138 secured to the under side of the table 18. A second arm 140 of the lever 136 is connected to a lever 142 secured to the lower end of the vertical stud 130 by a connecting rod 144. The roller 134 is held against the cam 132 by a spring 146 which is connected at its other end to a stud extending from the underside of the table. In operation, as the table 18 revolves, the cam roller 134 acting on the cam 132 causes the movable gripping jaw 17 to close and yieldingly hold the container in position to permit the closure applying operation to be performed during one portion of the revolution of the table and to release the containers so that they may be discharged during another portion of the revolution of the table.

When the machine is used as a capping machine, mechanism for feeding the closures to the closure applying units 14 may be provided and such mechanism may include a supply hopper, not shown, for storing a bulk supply of caps and from which successive caps are selected and delivered right side up through a feed chute 100. The mechanism for feeding the closures may

comprise any suitable or known form of cap feeding mechanism, reference being made to the United States patent to R. N. Doble, No. 1,801,721, as illustrating one form of such cap feeding mechanism.

The mechanism for transferring the caps 3 from the cap feeding mechanism to the cap applying chucks 66 while the latter are revolving may comprise the transferring mechanism disclosed in the Everett patent hereinbefore referred to and, as illustrated in said patent, each capping head is provided with an oscillatory transferring arm 102 mounted to revolve about the central shaft 50 with the capping head units 14 as the latter revolve. Provision is made for effecting the oscillations of the closure transferring arms during the revolution of the capping head units about the shaft 50 so as to enable the successive caps or closures to be withdrawn from the end of the closure feeding chute 100 and to be transferred to a position under the chuck 66 to be engaged by the later during the revolution of the capping head units.

As clearly disclosed and fully described in the aforesaid United States patent to Arthur Clarence Everett, each capping head unit 14 comprises a housing 88 slidably and rotatably mounted in the casing 60 and the chuck unit 66 which is supported within the housing 88. Provision is made for rotating the housing 88 about its own axis during the revolution of the capping head unit about the shaft 50 in order to effect the application of the caps to the containers, and as herein shown, each housing 88 is provided at its upper end with a pinion 94 arranged to mesh with a gear 75 formed integrally with the sleeve 74. In operation, as the capping head units revolve about the stationary shaft 50, the pinions 94 roll about the stationary gear 75 to effect rotation of the housings 88 on their own axes. The pinion 94 is made of sufficient length to permit the gear and pinion to remain in mesh in the various vertical positions into which the pinion and chuck housing are moved during the operation of the machine.

As illustrated in Fig. 6, the connections between the housing 88 and the chuck unit 66 include a friction clutch 150 having a driving member 151 provided with pins 153 which extend into slots 154 in the housing 88 to permit independent vertical movement of the chuck unit movement of the chuck unit in the housing while being rotated thereby. A coil spring 156 is adjustably mounted in the unit to effect frictional engagement of the disk 158 with the driving member 151. The capping chuck 66 includes gripping jaws 160 mounted to be actuated to grip or release a cap by pivoted fingers 162. The pivotal fingers 162 are arranged to be engaged by conical surfaces 164 of a spindle 166 vertically mounted in the chuck unit. The spindle 166 is normally held in its raised position relative to the fingers 162 by a spring 168, being limited in its upward movement by an intermediate member 170 having conical surfaces 172 which bear against similarly shaped surfaces of an adjustable nut 174. It will be observed that the unit 66 is floatingly mounted in the housing 88, being supported therein by the conical shaped portion 176 seated against the similarly shaped opening 178 in the housing 88. In operation, when the unit 88 is lowered to present the chuck unit 66 with its cap 3 into operative position with a container, by the cam 68, the whole unit 66 is free to rise bodily in the housing 88 out of its seat 178,

so that when the cap is screwed down during the rotary movement of the capping head, the chuck unit 66 may move downwardly with the cap, thus providing in effect, a floating relationship between the chuck unit 66 and the housing 88.

As illustrated in Figs. 4 through 7, provision is made for opening and closing the gripping jaws 160 at predetermined intervals in the operation of the machine to enable the jaws to pick up a cap, apply it to a container, and thereafter release the cap to permit the closed container to be delivered from the machine. As hereinbefore described, the jaws are normally held in their closed position by the spring 168 which holds the spindle 166 in its raised position, as illustrated in Fig. 6. In order to lower the spindle 166 to permit the jaws 160 to be opened, a plunger 180 slidably mounted in the housing 88, and provided with a cam roll 182 at its upper end, is arranged to be engaged by a stationary cam 184. As shown in Figs. 4 and 5, the cam 184 is attached to a flange 186 of a hub 188 secured to the central shaft 50 by a key 190. As best shown in Fig. 7, the cam 184 is provided with an adjustable portion 192 arranged to be moved from one position of operation for performing the corking operation, as will be described, to an upward position. As herein shown, the cam piece 192 is arranged to be clamped on the hub 188 and is arranged to be adjusted vertically on the hub by the provision of grooves 194, 196 in the hub arranged to receive a set screw 198 provided in the cam piece. When the cam piece 192 is adjusted to its lowered position, the cam surface is presented in a position adapted to perform the corking operation, as will be described, and when in its upper position, the cam piece is arranged to present a surface operative to release the gripping jaws from the cap at the end of the capping operation.

In the operation of the machine, when employed as a capping machine, the floatingly mounted chuck unit 66 is rotated to effect the application of the cap, and when the cap has been fully seated on its container, the friction clutch 150 is permitted to slip, as fully described in the aforesaid Everett patent. During this time the plunger 180 and roller 182 merely rest on top of the intermediate member 170 with the roller 182 away from the cam 184, as shown in the broken line position 200 in Fig. 7. When the capping head unit arrives at the discharge station, indicated generally at 202 in Fig. 1, provision is made for quickly opening the jaws 160 to release the cap and permit the container to be discharged. For this purpose, the surface of the cam 184 is provided with a relatively sharp drop 204 as illustrated in Fig. 7, to press the plunger 180 down. It will be observed that when the cam piece 192 is adjusted in its up position as indicated by broken lines 206 in Fig. 7, the quick drop 204 of the cam 184 is exposed to enable the gripping jaws 160 to be opened as described.

Referring now to Figs. 1, 8 and 9, when the machine is employed as a corking machine, the cam piece 192 is adjusted to its lowered position as indicated by dotted lines 208 in Fig. 8, in which position a cam surface is presented adapted to cooperate with the corking heads 15 to perform the corking operation. As shown in Fig. 8, each corking head unit 15 comprises a housing 210 mounted to slide vertically in the casing 60 and the plunger unit 67 carried by the housing

210 is arranged to engage a previously loosely inserted cork in the container and to press the cork down firmly therein. The housing 210 is arranged to be raised and lowered to present the plunging unit 67 into and out of operative engagement with the container by the cam 68 cooperating with a roller 76 carried by an annular member 82, the construction and operation being similar to the capping head unit, as hereinbefore described. Since rotation of the corking units is not required, the pinions 94 are left off the housing 210 of the corking heads.

As illustrated in detail in Fig. 9, each plunger unit 67 includes a cap engaging member 212 mounted on the end of a vertical rod 214 slidably mounted in an end or cover member 216 in the bottom of the housing 210. The upper end of the rod 214 is provided with a bushing 218 slidably received within an intermediate member 220 arranged to slide vertically in an elongated bearing member 222 secured to the housing 210. The rod 214 is provided with a collar 224 formed integrally therewith which is arranged to bear against the bottom piece 216 to support the rod vertically when the plunger unit is at rest. A coil spring 226 is extended between the collar 224 and a spring socket 228 slidably mounted on the rod 214. The spring socket 228 is arranged to bear against the shoulder formed by the bushing 218 and also to support the intermediate plunger member 220 vertically. A plunger rod 230 having a roll 232 mounted on the top thereof, rests on top of the intermediate member 220 as clearly illustrated in Figs. 8 and 9. The roll 232 cooperates with the cam 184 and cam piece 192 in its lowered position, to perform the corking operation.

In the operation of the machine, when adjusted to perform the corking operations, as the housing 210 is lowered by the cam 68 to present the cork engaging member 212 into operative engagement with the cork, the rod 214, intermediate plunger member 220, and the plunger 230 are permitted to rise in the housing unit so that the collar 224 is raised above the bottom piece 216, the cam 184 being designed so as not to engage the roll 232 at this time. Thus, upon initial engagement of the plunging unit 67 with the cork and the container, the unit is free to adjust itself vertically in accordance with the height of the loosely inserted cork in the container, and providing, in effect, a floating relationship between the cork unit 67 and the housing 210. Shortly thereafter, the roll 232 engages the inclined surface 234 of the cam piece 192 to effect a gradual downward movement of the plunger 230, and, through the connections described, the container engaging member 212 is yieldingly pressed to force the cork down into the container. In practice, and as herein illustrated, the cam piece 192 is also provided with a sharp rise and drop as indicated at 236 by which the plunger is momentarily relieved or permitted to rise to let some of the air compressed in the bottles by the initial plunging stroke to escape, whereupon the plunger is again depressed to complete the corking operation. It will be observed that when the cam piece 192 is in its lowered or corking position, it is moved forwardly or to the left, with relation to its up position, as viewed in Fig. 7, thus covering that portion of the cam 184 provided with the relatively sharp drop 204 and providing instead a relatively sharp rise 238 coinciding with the cam 184 to permit the corking unit to leave the container when it arrives at the discharge station.

As hereinbefore stated, the container feeding mechanism indicated generally at 240 in Fig. 1 is capable of adjustment to permit containers to be received beneath capping heads 14 only, in one instance, and beneath corking heads 15 only, in another instance. In the illustrated machine, the containers are carried into the machine on a conveyer 242 of any suitable construction, such as parallel chains running over sprockets, not shown, and as the containers are received by the machine, provision is made for delivering successive containers to alternate clamping jaws 16, 17 as the latter are moved into a receiving position. As herein shown, see Fig. 1, the containers are delivered between guide rails 244, 246 onto a rotating disk 250 and thence conveyed by a rotary member 252 provided with container receiving openings 254 to a position to be delivered onto the revoluble table 18 and to be received by the clamping jaws 16, 17 which have previously been opened ready to receive a container.

The rotary container feeding member 252 is arranged to be driven through connections including a gear 256 formed integrally with the drum 40, see Fig. 4, which meshes with a gear 258 fast on a vertical shaft 260, see Fig. 1. The upper end of the vertical shaft 260 is provided with a flanged member 262 keyed thereto and a rotary driving disk 264 is attached to the flanged member 262 by bolts 265. As illustrated in detail in Figs. 2 and 3, the driving disk 264 is provided with a pair of sockets 267, 269 formed in the side thereof either of which is arranged to receive a driven member 270 pivoted on a stud 272 secured to the container feeding member 252. The driven member or dog 270 is retained in driving engagement with the disk 264 by a spring 274 as shown in Figs. 1 and 2. The sockets 267, 269 are arranged ninety degrees apart, and with the above construction, it will be seen that the position of the container feeding member relative to its driving member 264 may be easily and quickly changed by merely moving the dog 270 from one socket to the other.

In operation, the relative speed of the feeding disk 252 and the revoluble heads 14, 15 is such that the bottles fed by the disk 252 are delivered in register with alternate heads. Thus, when the machine is used as a capping machine, the feeding disk 252 is disposed in the position shown in Fig. 1 so that the bottles will be delivered to the capping heads 14 only. Conversely, when the machine is used as a corking machine, the feeding disk 252 is moved ninety degrees with relation to its driving member 264, and when thus disposed, is enabled to feed bottles to the corking heads 15 only.

Upon completion of the bottle closing operation, when used as either a capping or corking machine, the completed bottles are delivered between rails 275, 277 onto a rotary disk 280 by which they are discharged from the machine.

From the above description, it will be observed that the construction of the present closure applying machine is such as to enable the machine to be used either as a capping machine or a corking machine with a minimum of changes and adjustments required when changing the machine over to permit one operation or the other.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In a closure applying machine, in combination, a plurality of revolubly mounted closure applying devices arranged in spaced relation, alternate of said devices being adapted for the application of different types of closures, a plurality of revoluble container holding members arranged in vertical alignment with said closure applying devices, means for conveying containers into operative position with said devices including a conveyor upon which a plurality of containers are fed in a line and in contiguous relation, and a rotatable bottle transferring member cooperating with said conveyor and said container holding means, said transferring member being provided with spaced openings for the reception of successive containers in the line, means for driving said transferring member in timed relation to said holding members to move successive containers into register with alternate of said holding members, and means for adjusting the angular position of said rotary transfer member with respect to its driving means to selectively register the containers with a different set of alternate container holding members.

2. In a closure applying machine, in combination, a plurality of revolubly mounted closure applying devices arranged in spaced relation, alternate of said devices being adapted for the application of different types of closures, a plurality of revoluble container holding members arranged in vertical alignment with said closure applying devices, means for conveying containers into operative position with said devices including a conveyor upon which a plurality of containers are fed in a line and in contiguous relation, and a rotatable bottle transferring member cooperating with said conveyor and said container holding means, said transferring member being provided with spaced openings for the reception of successive containers in the line, means for driving said transferring member in timed relation to said holding members to move successive containers into register with alternate of said holding members, and means for adjusting the angular position of said rotary transfer member with respect to its driving means to selectively register the containers with a different set of alternate container holding members, said adjusting means including a dog carried by said transferring member and removably engageable with different portions of said driving means.

3. In a closure applying machine, in combination, a plurality of revolubly mounted closure applying devices arranged in spaced relation, alternate of said devices being adapted for the application of different types of closures, a plurality of revoluble container holding members arranged in vertical alignment with said closure applying devices, means for conveying containers into operative position with said devices including a conveyor upon which a plurality of containers are fed in a line and in contiguous relation, and a rotatable bottle transferring member cooperating with said conveyor and said container holding means, said transferring member being provided with spaced openings for the reception of successive containers in the line, means for driving said transferring member in timed relation to said holding members to move successive containers into register with alternate of said holding members, and means for adjusting the angular position of said rotary transfer member with respect to its driving means to

selectively register the containers with a different set of alternate container holding members, means including a cam for operating said closure applying devices arranged to effect operation of alternate of said closure applying devices only, and means for adjusting said cam to effect operation of a different set of alternate closure applying devices only.

4. The combination with a rotary closure applying machine having a plurality of revolubly mounted closure applying devices arranged in spaced relation, alternate of said devices being adapted for the application of different types of closures, of means for feeding containers into register with alternate of said closure applying devices only, means for adjusting said feeding means to register the containers with a different set of alternate closure applying devices only means including a cam for operating said closure applying devices, said cam having its major portion shaped for cooperation with all of said closure applying devices and provided with a portion operative to effect operation of one set only of alternate closure applying devices, and an adjustable member for said cam arranged to block out said last named portion and to present a surface for cooperation with a different set of closure applying devices.

5. The combination with a closure applying machine having a plurality of revolubly mounted closure applying devices arranged in spaced relation, alternate of said devices being adapted for the application of different types of closures, of a rotatable transfer member arranged to present successive containers delivered thereto into register with alternate of said closure applying devices, means for driving said transfer member in timed relation to said closure applying devices, and means for adjusting the angular position of said rotatable transfer member with respect to said driving means whereby to effect registration of said containers with a different set of closure applying devices.

6. The combination with a closure applying machine having a plurality of revolubly mounted closure applying devices arranged in spaced relation, one set of non-adjacent devices being adapted for the application of one type of closure and a second set of devices disposed intermediate the first set of devices being adapted for the application of a different type of closure, of a rotatable transfer member arranged to present successive containers delivered thereto into register with alternate of said closure applying devices, means for driving said transfer member in timed relation to said closure applying devices,

and means for adjusting the angular position of said rotatable transfer member with respect to said driving means whereby to effect registration of said containers with a different set of closure applying devices.

7. The combination with a closure applying machine having a plurality of revolubly mounted closure applying devices arranged in spaced relation, one set of non-adjacent devices being adapted for the application of one type of closure and a second set of devices disposed intermediate the first set of devices being adapted for the application of a different type of closure, of a rotatable transfer member arranged to present successive containers delivered thereto into register with alternate of said closure applying devices only, means for driving said transfer member in timed relation to said closure applying devices, and means for adjusting the angular position of said rotatable transfer member with respect to said driving means whereby to effect registration of said containers with a different set of closure applying devices only, and means including a cam for operating said closure applying devices, said cam having its major portion shaped for cooperation with all of said closure applying devices and provided with a portion operative to effect operation of the first set of closure applying devices only, and an adjustable member for said cam arranged to block out said last named portion and to present a surface for cooperation with the second set of closure applying devices only.

8. The combination with a rotary closure applying machine having a plurality of revolubly mounted closure applying devices arranged in spaced relation, one set of non-adjacent devices being adapted for the application of screw closures and a second set of devices disposed intermediate the first set being adapted for the application of a different type of closure, of means for feeding containers into register with one set of closure applying devices only, means for adjusting the container feeding means to effect registration of the containers with the second set of closure applying devices only, said screw closure applying devices including gripping jaws and means for yieldingly urging said jaws into closed position, a cam cooperating with said closure applying devices and provided with a portion arranged to open said jaws, and an adjustable member for said cam arranged to block out said last named portion and to present a surface for cooperation with the second set of closure applying devices only.

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