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AUTOMATIC CAPPING MACHINE

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Fig. 3.

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AUTOMATIC CAPPING MACHINE

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My invention relates to capping machines.

My invention relates more particularly to a capping machine for applying two-piece caps or closures to the open end of a container adapted to receive the same.

Caps or closures of the type to which I refer are shown and described in my previously issued United States Patent No. 2,556,765. The cap consists of two pieces, a cover having a circular peripheral ridge, the ridge having a plurality of down wardly depending finger members which embrace the open end of a container, and a retainer ring which telescopes over the finger members of the cover. It has a rolled over top edge to engage on top of the cover and a rolled up lower edge to reinforce the retainer ring at this point. The closure is so constructed that it may be used and reused for hermetically sealing containers.

In commercial use today where containers are filled on a rapidly operating filling machine, it is desirable to affix closures at the same rate of speed at which the containers are being filled. Machines have been made and are now in use which separate a cover from a stack, drop it on a container and then proceed to frictionally fasten the cover to the container. All of these machines, however, handle only one-piece covers which are either frictionally attached to the container, or, as in the case of screw covers, are threaded on the neck of the container.

In attaching the two-piece closure, shown in the above mentioned patent, to a container built to receive the same, it is necessary to first separate the two parts of the closure, then place the cover on the container and then place the retainer ring over the cover to lock the cover in place. This, obviously, is considerably more difficult than merely dropping a one-piece cover in place and pressing it down to close the container.

The principal object of the present invention is to provide a capping machine for affixing a two-piece closure to a container in a sealing position.

A further object of the invention is to provide a machine of this type that will separate the cover and the retainer ring, place the cover over the open end of a container, and then place the retainer ring over the cover and seal the cap on the container, all in the downward stroke of the capping machine.

A further object of the invention is to provide a machine of the type described which may be manually operated, semi-automatic, or completely automatic in operation.

A further object of the invention is to provide a machine which automatically separates the cover and retainer ring, holds the retainer ring in place while other mechanism moves the cover down over the open end of a container, and then moves the retainer ring down over the cover and end of the container thereby completing the capping of the container.

A further object of the invention is to provide a machine of the type described which is capable of performing the above operations in timed synchronism with the operation of filling machines.

Other objects and advantages will be more apparent from the following description wherein reference is had to the accompanying drawings, upon which:

Fig. 1 is a fragmentary plan view of my improved machine;
Fig. 2 is an enlarged vertical sectional view thereof taken on the line 2—2 of Fig. 1;
Fig. 2-A is a perspective view of one of the retainer jaws;
Fig. 3 is a fragmentary plan sectional view above the centering or retaining jaws and cover support platform, taken generally on the line 3—3 of Fig. 2;
Fig. 4 is a fragmentary cross-sectional view through the centering or retaining jaws and the plunger and associated parts, taken generally on the line 4—4 of Fig. 3, showing the plunger beginning the first step of its operation; operated in timed synchronism with the operation of filling machines.

Fig. 5 is a similar view but in a changed position showing the cover separated from the retainer ring and dropped on the container with the peripheral fingers of the cover in a spread position;
Fig. 6 is a similar view in a further changed position showing the plunger pressing the retainer ring down to seal the closure on the container;
Fig. 7 is a cross-sectional view taken on line 7—7 of Fig. 3, showing the manner in which the platform stops the downward movement of the second plunger.

In the embodiment of the invention which I have chosen to illustrate and describe the same, I have shown a rotatable turret 20 driven in any suitable manner by the shaft 22 in a counter-clockwise direction, as shown. The turret 20 may be rotated above a table 24 which communicates with a conveyor from a filling machine. The conveyor carries the containers 26 forward to be received in the pockets 28 of the turret, each of the pockets being formed with a protruding flange 30 which assists in moving the containers forward. A suitable guide rail 32 may be provided to direct the containers carried by the turret forward to a cap dropping mechanism 34. A suitable conveyor 36 operated in timed relation with the movement of the turret 20 is adapted to carry the closed containers forward from the capping mechanism 34, the conveyor having suitable side guide members 38 and 40 and container moving lugs 42 on the surface of the same.

The turret 20 is timed to operate so that it moves 60 degrees and then stops for a definite period for the capping operation to take place. The capping mechanism 34 is adapted to carry two parts, the cover C having a circular peripheral ridge C1 and a plurality of downwardly depending finger members C2. The second part of the cap or closure is a retainer ring R having a rolled over top edge R1 and an outwardly rolled lower edge R2. Caps of this type may be fed forward in any suitable manner from a stack on the platform 48 and positioned upon a plurality of centering or retaining jaws 50. In the embodiment shown the caps are hand fed, that is moved forward on the platform 48 against the forward faces 56 of the jaws 50 with the retainer ring resting on the forward projecting lips 52 of the jaws 50. Each jaw has a lip 52 which extends inwardly over a circular opening 54 in the platform 48, the opening 54 having a beveled upper edge 56 for a purpose which will hereinafter be apparent. The lip 52 is wider than the upright portion of the jaw.
59 to present more support for the caps, the lip having extensions 52a on both ends thereof. Each of the jaws 59 has an arcuate vertical forward wall 58 terminating in a bevelled upper edge 60. They are mounted for horizontal reciprocating movement in a notch 62 in the platform 48 and a guide block 64 fastened on the platform 48 by means of screw members 66. Each of the guide blocks 64 has an opened slot 63 formed with parallel side walls 70 to guide the jaw 59 in its back and forth reciprocation, the jaw being held on the platform 48 by means of a set screw 72 which passes through an elongated hole 74 in the jaw and is secured in position by a spring 76 in the platform 48. Compression springs 78 normally urge the jaws forward to the position shown in Fig. 3.

From the description thus far, it can be seen that when the two-piece caps are moved forward on the platform 48, automatically or otherwise, they center themselves upon the retainer rings 58 of the jaws 59 with the rolled over edge R3 of the retainer ring resting upon the protruding lips 52 of the jaws 59.

Referring now to Figs. 4 to 6 which illustrate the step-by-step action of the capping machine plunger, after the caps have been mounted to the station position and a container 26 is moved forward by the turret to rest position below the capping mechanism, the plunger 44 moves downwardly to first separate the cover C from the retainer ring R. This is done by continued downward pressure of the circular edge 44a of the plunger 44 which separates the cover C from the retainer ring R and drops it on top of the open end of the container 26.

It will be noted that the cover C is bulged outwardly in its closing or assembled condition. However, as the cover is pressed downwardly by the plunger 44 and separated from the retainer ring R, the cover comes to rest on a container and the entire cover is sprung or concaved as shown in Fig. 5, thereby spreading apart the fingers C5 to a slightly larger diameter than the outside diameter of the edge of the open end of the container 26. In this condition, even though the container may be slightly off center below the plunger, the entire periphery of the open end of the container is surrounded and automatically centered under the capping mechanism.

The third and final step of the capping operation is the downward movement of the retainer ring R, the outer plunger 46 continuing downwardly to press against the top of the same. Before the lower edge 46a of the plunger 46 engages the rolled over top R3 of the retainer ring, the shoulder 46b engages the bevelled edges 60 of the retaining jaws to radially spread the same and permit the retainer ring to bear against the edge of the cover. Further downward pressure of the plunger 46 presses the retainer ring down to sealing position, locking the cover on the container. At the end of this stroke the combined plungers are withdrawn to the rest position shown in Fig. 2, and the next cap is fed forward on the platform 48 and protruding lips 52 of the centering jaws 59. When the next container is moved forward by the turret 20 to the capping station, the operation is automatically repeated.

From the foregoing description it can be seen that I have provided a machine which is capable of separating the two parts of the two-piece closure shown in my above mentioned previous patent, and then in consecutive operations fastening first the cover and then the retainer ring into position over the open end of a container 26. By pressing the cover down upon the open end of the container 26 from a slight con cave to a slight convex curvature, this action tending to spread the retaining fingers outwardly so that even though a container is not exactly centered under the capping mechanism, the open end of the same will be enwrapped within the confines of the fingers and as the retainer ring is brought down to securely fasten the cover over the end of the container, the positive downward pressure effectively centers and effectually seals the two-piece cover on the container.

It will be apparent that the construction which I have provided contemplates the provision of a hand-operated, a semi-automatic, or a completely automatic operation. For example, filled containers may be manually placed in position below the capping mechanism, the caps may then be manually placed in capping position on the tips of the retaining jaws, and a hand-operated lever may be employed to bring the operating plungers downwardly to perform the capping operations. Alternatively, the containers may be fed in timed synchronism with a filling machine to their location below the capping machine, the caps may be manually fed to the retaining jaws, and by operating a switch, the plungers may be mechanically actuated to effect a cap separating and then a capping operation. For a completely automatic operation, the containers may be fed in timed sequence to the capping machine, the caps may be automatically fed to the same, and the plungers actuated, all as part of an automatic timed operation.

While I have illustrated and described a specific embodiment of the invention, it will be apparent to those skilled in the art that changes and modifications may be made in the exact details shown, and I do not wish to be limited in any particular; rather what I desire to secure and protect by Letters Patent of the United States is:

1. A capping machine for separating the cover and the retainer ring of a two-piece cap and then placing first the cover and then the retainer ring on the end of an open container, comprising a horizontal platform having a circular opening therein larger than the outside diameter of the retainer ring of the cap, spring-pressed radially disposed jaw members extending inwardly from the periphery of said opening to hold a cap in operative position, means below the platform for holding a container to be capped, means above the platform for separating a cover from its retainer ring and pushing it down over the end of a container, and other means for spreading said jaw members and then moving the retainer ring down over the cover after it has been placed upon the container, said first named means including a plunger and said second named means including a second plunger concentric to said first plunger.

2. A capping machine for separating the cover and the retainer ring of a two-piece cap and then placing first the cover and then the retainer ring on the end of an open container, comprising a horizontal platform having a circular opening therein larger than the outside diameter of the retainer ring of the cap, spring-pressed radially disposed jaw members extending inwardly from the periphery of said opening to hold a cap in operative position, means below the platform for holding a container to be capped, means above the platform for separating a cover from its retainer ring and pushing it down over the end of a container, and other means for spreading said jaw members and then moving the retainer ring down over the cover after it has been placed upon the container, said first named means including a plunger and said second named means including a second plunger concentric to said first plunger, both of said plungers being reciprocally operated in timed relation.

3. A capping machine for separating the cover and the retainer ring of a two-piece cap and then placing first the cover and then the retainer ring on the end of an open container, said machine including a rotatable turret for moving containers to a capping position, a horizontal platform above one side of said turret, said platform having a circular opening therein larger than the outside diameter of the retainer ring of said cap, spring-pressed radially disposed jaw members extending inwardly from the periphery of said opening to hold a cap in operative position, each of said jaws having a protruding lip, means below the platform for holding a container to be capped, a vertically reciprocal plunger mounted above said platform for separating a cover from its retainer ring and pushing it down over the end of a container,
and a second vertically reciprocal plunger for spreading said jaws and then moving the retainer ring down over the cover after it has been placed upon the container.

4. A capping machine for separating the cover and the retainer ring of a two-piece cap and then placing first the cover and then the retainer ring on the end of an open container, said machine including a rotatable turret for moving containers to a capping position, a horizontal platform above the turret, said platform having a circular opening therein larger than the outside diameter of the retainer ring of said cap, spring-pressed radially disposed jaws members extending inwardly from the periphery of said opening to hold a cap in operative position, each of said jaws having a protruding lip, means below the platform for holding a container to be capped, a vertically reciprocal plunger mounted above said platform for separating a cover from its retainer ring and pushing it down over the end of a container, and a second vertically reciprocal plunger for spreading said jaws to release a retainer ring and then moving the cover down over the cover after the cover has been placed upon the container, said second plunger being concentric to said first plunger and acting after said first plunger has acted.

5. A machine for placing two-piece caps on an open-ended container, the caps being of the type that have a cover with downwardly projecting fingers and a retainer ring for telescoping over the edge of the cover and the projecting fingers to fasten the same over the mouth of the open-ended container, the container having a peripheral groove spaced from the end of the same to receive the fingers in a sealing condition, said machine comprising a support for a container, a platform above the open end of said container, said platform having an opening therethrough above said container, jaws about the edge of said open end, each of said jaws having a lip protruding forward in said opening, a two-piece cap supported on the lips of said jaws, a plunger mechanism directly above said platform axially aligned with the center of said opening, said plunger having concentric members that move downwardly, the inner member moving downwardly first to separate a cover from its retainer ring and by continuously moving downwardly move the cover to separate the same from the depending fingers of said cover.

6. A machine for placing circular two-piece caps on an open-ended container, the caps being of the type that have a cover with downwardly projecting fingers and a retainer ring for telescoping over the edge of the cover and the projecting fingers to fasten the same over the open ended mouth of the circular container that has a peripheral groove spaced from the end of the same to receive the fingers in a sealing condition, said machine comprising a support for a container, a platform above the open end of said container, said platform having a circular opening therethrough above said container, radially disposed jaws about the edge of said opening, each of said jaws having an arcuate lip protruding forward in said opening, a two-piece cap supported on the lips of said jaws, a plunger mechanism directly above said platform axially aligned with the center of said opening, said plunger having concentric members that move downwardly, the inner member moving downwardly first to separate a cover from its retainer ring and by continuous downward movement the cover over the mouth of said container, and said second plunger member moving downwardly next to spread said jaws, thereby permitting said retainer ring to drop and then continuing downwardly to press said retainer ring down to a sealing position on the end of the container over the depending fingers of said cover.

7. A capping machine for applying assembled two-piece caps which consist of a cover and a retainer ring to a container, comprising a support for a container, a platform above the open end of said container, said platform having an opening therethrough above said container, spring-pressed radial jaws about the edge of said opening, each of said jaws having a lip protruding forward in said opening, a plunger mechanism directly above said platform axially aligned with the center of said opening, said plunger having concentric members that move downwardly, the inner member moving downwardly first to separate a cover from its retainer ring and by continuous downward movement place the cover over the open end of a container, and said second plunger member moving downwardly next to move said lips away from said opening to permit a cover to drop through said opening and then continuing downward to press the retainer ring down to lock a cover in a sealing position on the end of a container.

8. A capping machine for applying assembled two-piece caps which consist of a cover and a retainer ring to a container, comprising a support for a container, a platform above the open end of said container, said platform having an opening therethrough above said container, spring-pressed radial jaws about the edge of said opening, each of said jaws having a lip protruding forward in said opening, a plunger mechanism directly above said platform axially aligned with the center of said opening, said plunger having concentric members that move downwardly, the inner member moving downwardly first to separate a cover from its retainer ring and by continuous downward movement place the cover over the open end of a container, said second plunger member moving downwardly next to move said lips away from said opening to permit a cover to drop through said opening and then continuing downward to press the retainer ring down to lock a cover in a sealing position on the end of a container.

9. A machine for placing a two-piece cap on an open-ended circular container, the caps being of the type that has a circular cover with downwardly projecting fingers and a retainer ring for telescoping over the edge of the cover and the projecting fingers to affix the cap over the mouth of the open-ended circular container that consists of receive said cap in a sealing condition, said machine comprising a support for a container, a platform above said support, said platform having a circular opening therethrough of a diameter larger than said cap, means for moving containers forward on said support to a spot below said opening, jaws about the edge of said opening for supporting a two-piece cap, each of said jaws having a lip protruding forward in said opening, a plunger mechanism directly above said platform axially aligned with the center of said opening, said plunger having concentric members, the inner member adapted to separate a cover from its retainer ring while the cover is held by the lips of said jaws, and by continuous downward movement place the same on the mouth of said container, and said second plunger member adapted to follow and move said jaws apart to release said retainer ring and then move down to press the retainer ring on a cover in a sealing position over the end of a container.

10. The method of machine applying circular two-piece caps to an open-ended circular container, the caps being of the type which have a circular cover portion with downwardly projecting fingers and a retainer ring band for telescoping over the edge of the cover and the downwardly projecting fingers, which consists of the steps of placing an assembled two-piece cap on a fingered support above the open-ended container, holding the retainer ring stationary with said fingered support while pushing the cover down to separate the same from the
retainer ring and placing it on the open-ended container, and then withdrawing the fingered support and pressing down the retainer ring over the edge of the cover and downwardly projecting fingers to lock said two-piece cap on the container.

11. The method of machine applying two-piece caps to an open-ended container, the caps being of the type which have a cover portion with downwardly projecting fingers and a retainer band for telescoping over the edge of the cover and the downwardly projecting fingers, which consists of the steps of placing an assembled two-piece cap on a support above the open-ended container, holding the retainer ring stationary, pushing the cover down to separate the same from the retainer ring and placing it on the open-ended container and then pressing down the retainer ring over the edge of the cover and downwardly projecting fingers to lock said two-piece cap on the container.

12. The method of machine applying finger grip over-centering covers and their locking rings to open-mouthed containers which comprises the steps of supporting the over-centering cover and its locking ring at a position elevated from the open mouth of a flanged ring container, ejecting first with a downward stroke the over-centering cover and at the same time depressing its over-centering panel to expand the peripheral fingers, placing the over-centering cover so that its fingers encompass the flange ring of the container and then depressing the locking ring to embrace the fingers and constrict them into locking position surrounding the locking ring.

13. The method of machine applying finger grip over-centering covers and their locking rings to open-mouthed containers which comprises the steps of supporting the over-centering cover and its locking ring at a position elevated from the open mouth of a flanged ring container, ejecting first with a downward stroke the over-centering cover and at the same time depressing its over-centering panel to expand the peripheral fingers, placing the over-centering cover so that its fingers encompass the flange ring of the container, withdrawing the support for the locking ring, and then depressing the locking ring to embrace the fingers and constrict them into locking position surrounding the locking ring.

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