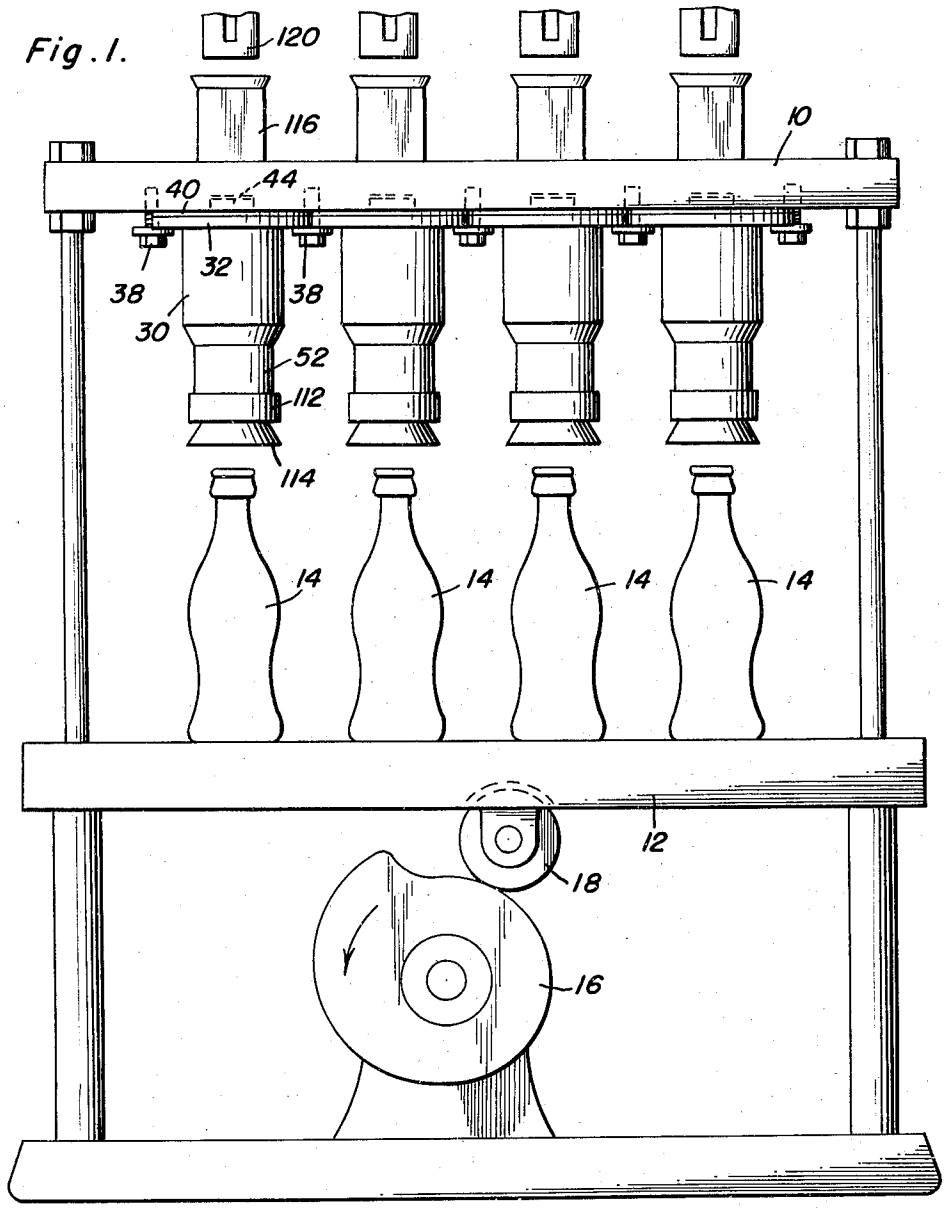
Feb. 21, 1950 A. C. NACCARATO ET AL 2,498,443

BOTTLE CAPPING MACHINE

Filed Nov. 29, 1948 3 Sheets-Sheet 1

Fig. 1.



Inventors

Antonio C. Naccarato

Raymond E. McCauley

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

Feb. 21, 1950 A. C. NACCARATO ET AL 2,498,443

BOTTLE CAPPING MACHINE

Filed Nov. 29, 1948 3 Sheets-Sheet 2

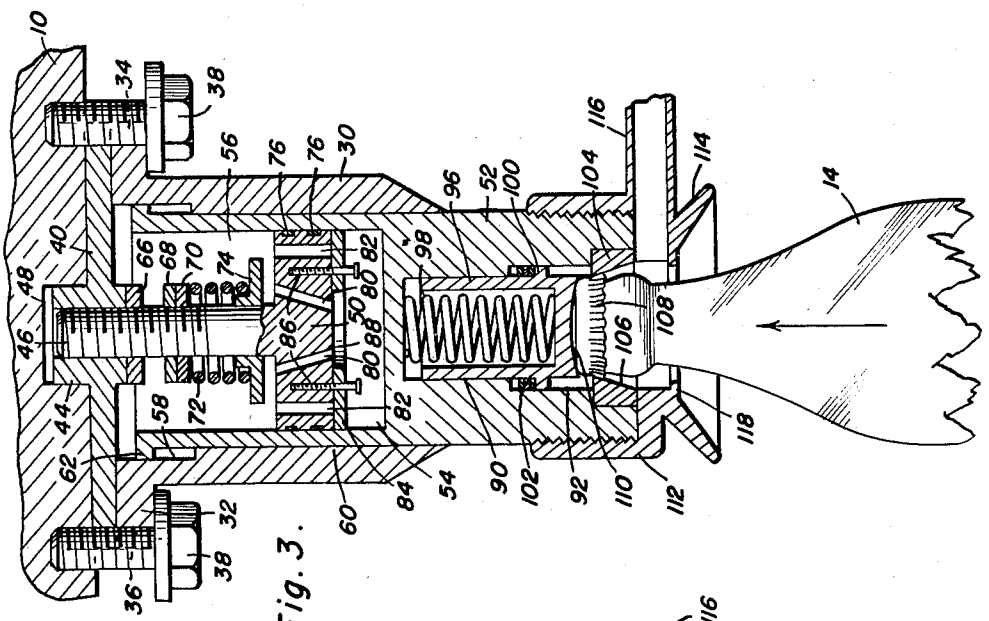


Fig. 3.

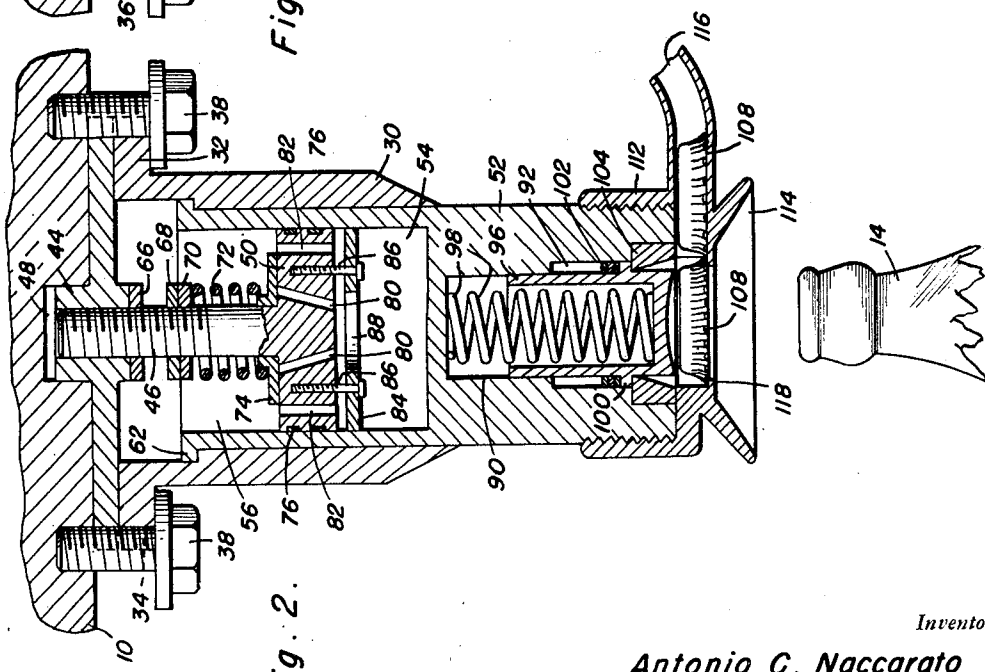


Fig. 2.

Inventors

Antonio C. Naccarato

Raymond E. McCauley

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

Feb. 21, 1950 A. C. NACCARATO ET AL 2,498,443

BOTTLE CAPPING MACHINE

Filed Nov. 29, 1948 3 Sheets-Sheet 3

Fig. 4.

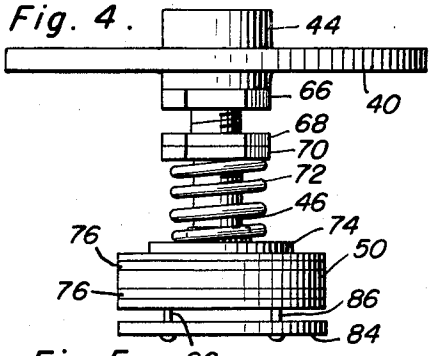


Fig. 5.

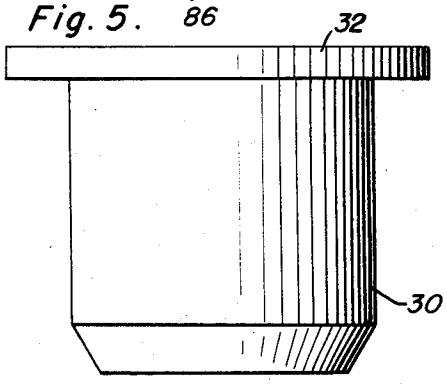
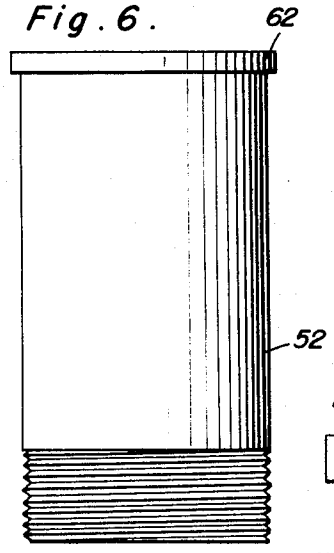


Fig. 6.



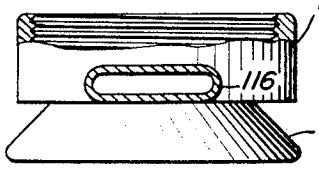


Fig. 9

Fig. 7.

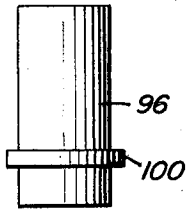


Fig. 8.

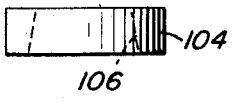


Fig. 10.

Inventors

Antonio C. Naccarato

Raymond E. McCauley

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

Patented Feb. 21, 1950 2,498,443

UNITED STATES PATENT OFFICE

2,498,443

BOTTLE CAPPING MACHINE

Antonio C. Naccarato and Raymond E. McCauley,
Los Angeles, Calif.

Application November 29, 1948, Serial No. 62,442

12 Claims. (Cl. 226—80)

1

This is a continuation-in-part of our co-pending application Serial No. 604,436, filed July 11, 1945, and abandoned as of November 30, 1948.

The primary object of this invention is to apply closures to receptacles, as caps on bottles, by utilizing a preselected maximum force of application, force above a preselected value releasing a valve so that the effective force of application decreases.

Another object of the invention is to apply caps to bottles by means of a device which includes a pair of relatively slidable cylinders, and a piston disposed in and separating said cylinders into fluid chambers with passages in said piston, fluid in said cylinders, a valve on the lower side of said piston closing certain of said passages when the fluid in the lower chamber is put under pressure by the initial pressing of a cap on a bottle, during this period, the other passages being closed by a pressure responsive valve member, then when the pressure in the lower chamber reaches a predetermined value, the pressure responsive valve members opens its appurtenant passages allowing the fluid under pressure to flow into the upper chamber, however, shortly after the pressure responsive valve opens the high pressure in the lower chamber is relieved by fluid flowing into the upper chamber and the pressure responsive valve closes, the bottle is completely capped at that time and the device moved (or the next bottle moved with respect to the device) meanwhile the cylinders are extended with respect to each other by the influence of gravity, causing the first mentioned or lower valve member to move to the passage opening position thereby allowing the fluid in the upper chamber to flow into the lower chamber, the device then being in condition for a second operation.

A further object of this invention is to incorporate in one of the cylinders a resiliently biased or urged plunger-cylinder used to transmit cap application force from the device to a bottle or from the bottle to the device, depending on which element is stationary with respect to the other and to supply cushioning means in addition to the resilient urging means for the plunger-cylinder.

Ancillary objects and features of novelty such as simplicity of structure will become apparent to those skilled in the art, in following the description of the preferred form of the invention illustrated in the accompanying drawings, wherein:

Figure 1 is an elevational view showing the invention adapted for use in conjunction with

2

relatively movable bottles for capping purposes and also teaching the utility of the device in gangs;

Figure 2 is a longitudinal sectional view of the structure forming the present invention, showing the same before it engages a bottle for capping purposes;

Figure 3 is a longitudinal sectional view of the device shown in Figure 2, the elements being in relative position at the instant when a preselected value of force is applied to the bottle cap, whereby the pressure responsive valve opens certain passages thereby permitting fluid to rush from the lower chamber into the upper chamber;

Figure 4 is an elevational view of the cap and piston utilized in conjunction with the invention;

Figure 5 is an elevational view of the outer cylinder;

Figure 6 is an elevational view of the inner cylinder;

Figure 7 is a perspective view of the plunger cylinder;

Figure 8 is an elevational view of the crimping head used in conjunction with the remainder of the structure;

Figure 9 is an elevational view of the crown receiving mechanism, portions being broken away in section to illustrate details of construction, and

Figure 10 is an elevational view, portions being broken away in section to illustrate internal structure of the device, teaching its use in conjunction with a mannerism of applying caps to bottles whereby the entire device is reciprocated and the bottle held relatively stationary, the reciprocating means being illustrated schematically.

The instant device described herein is an attachment for use in conjunction with various types of existing apparatus or which may be used in conjunction with an entirely new framing apparatus. The broadest purpose of the invention is to apply bottle caps to bottles or other types of closures for various receptacles.

Referring to Figure 1 it will be seen that a number of the devices may be attached to a relatively stationary beam 10 in gang fashion. In this instance a reciprocatable table 12 supports a number of bottles 14 for reciprocating movement with respect to the bottle capping attachments. For illustrative purposes, it is seen that the table 12 may be reciprocated by means of a rotating cam 16 having a cam follower 18 in engagement therewith. The cam follower being mounted for rotation on the bottom surface

of the table 12 imparts a reciprocatory movement to the table. If desired, the device may be utilized in another manner, that is, as shown in Figure 10. Here, the bottle 14 is maintained relatively stationary, while the capping attachment reciprocates thereover by any suitable means such as by operation of a conventional crank 22 and link 24 mechanism which is attached to a cross-head 26, operating through a guide 28.

Bottle capping structure

An outer cylinder 30 is supplied with an outer peripheral flange 32 having recesses 34 and 36 therein for accommodation of fastening screws 38. A closure or cap 40 for this cylinder is fixed to the upper open end thereof by means of the screws 38 which are threadly disposed in the member 10. When the device is adapted for use as shown in Figure 10, the screws 38 will anchor in a lower enlarged portion 42 of the cross-head 26.

A boss 44 is fixed to the cap or closure 40 and has an internally threaded opening accommodating the piston rod 46. It is noted that both the member 10 and the enlarged portion 42 have openings 48 formed therein accommodating the boss 44 for centering purposes.

The said piston rod 46 has a piston head 50 fixed thereto, or formed integral therewith as is shown in Figures 2 and 3. This piston is disposed in the bore of an inner cylinder 52, thereby separating it into fluid chambers 54 and 56, respectively. The outer cylinder 30 and inner or second cylinder 52 are slidably disposed with respect to each other, with means being provided for limiting the relative movement of one with respect to the other. This means consists of the outer cylinder being formed with bores 58 and 60, respectively, of different diameters. The larger bore is at the top of the outer cylinder 30 and has the outer peripheral flange 62 of the inner cylinder 52 slidable therein, seating on the shoulder formed at the junction of the bores when the cylinders are in their extended position.

In order that the piston be maintained firmly attached to the cap 40, a lock nut 66 is threadedly disposed on the piston rod 46 and engages the lower portion of the boss 44. Also provided on the threaded portion of the piston rod 46 is a pair of nuts 68 and 70, respectively, cooperating to form a stop. A spring 72 or other suitable resilient urging means is disposed on the piston rod 46, being concentric therewith and reacts on the stop formed by the nuts 68 and 70. The opposite end of the spring 72 engages a fluid pressure responsive valve member 74 which seats on the upper surface or side of the piston head 50, and which is slidable on the piston rod 46.

Certain mechanical expedients may be resorted to in conjunction with the specific structure as found desirable. An example is the utility of piston rings 76 which are disposed in the expected manner about the piston head 50.

A number of passages or ports are supplied in the piston head 50, extending therethrough. Any practical number of such passages may be supplied, this being a matter of expediency. For illustrative purposes there is shown an inner series of passages 80 and an outer series of passages 82. The pressure responsive valve member normally closes the passages 80. The series of passages 82 are closed by means of a check

valve member 84 which is slidable on depending screws 86, attached to the piston head 50. This check valve member 84 has an opening 88 in the center thereof so that it cannot cover the passage 80.

The lower end of the inner cylinder 52 has vertically aligned bores 90 and 92, respectively, therein accommodating a plunger or plunger cylinder 96. This plunger cylinder is reciprocable in the bores 90 and 92 and is constantly urged outwardly of the inner cylinder 52 by means of a spring 98 or other suitable urging means of a resilient nature. The spring is seated within the central opening of the plunger 96 and engages the material of the inner cylinder 52 between the chamber 54 and the upper end of the bore 90. This structure is utilized for transmitting force set up between the bottle cap while capping operations are taking place and the lower chamber 54 which has fluid therein.

An annular flange 100 is formed on the external surface of the piston cylinder 96 and is operable in the bore 92. Spacers 102 are disposed on the flange 100 and are used for purpose of regulating the extent of crimping. As the flange 100 reaches the uppermost position of its travel, the spacing rings 102 engage the shoulder between the bore 90 and the bore 92 limiting the travel of the piston cylinder 96 with respect to the cylinder 52 thereby limiting the inward travel of the bottle neck relative to the device.

Limiting the downward travel of the plunger cylinder 96 is the crowner head member 104 which is disposed in a larger bore (unnumbered) at the lower end of the bore 92. This crowner head member has an inclined inner wall 106 for squeezing inwardly the crimped portion of conventional bottle caps as shown at 108. The annular shoulder of flange 100 simply engages the upper edge or side of this crowner head member 104. Also, the bottom surface of the plunger cylinder is smoothly curved as seen at 110 to facilitate crowning operations.

A collar 112 is internally threaded and removably disposed on the lower end of the inner cylinder 52. An outwardly flared guide 114 is fixed to the collar 112 and a crown inlet chute 116 is in communication with the crown receiving zone at the end of the said chute. A flange 118 is disposed in the flared member 114 whereon the crowns are adapted to seat before crowning operations.

Operation

The mode of operation for the attachment is identical, whether the attachment be applied as shown in Figure 1 or as shown in Figure 10. Whether the crowning attachment moves with relation to the bottle 14 or the bottle 14 moves with relation to the crowner attachment is immaterial.

Viewing Figure 2 it will be seen that the crowner attachment is in position for applying the single crown 108 to the bottle 14. As the bottle moves upwardly with respect to the attachment, the neck thereof passes through the seat 118 for cap 108. Then, the bottle 14 moves slightly further upwardly and the spring 98 is compressed slightly by application of the force between the crown on the bottle and the crowner attachment (due to the relative movement therebetween).

This force is immediately transmitted through the material of the inner cylinder 52 into the lower chamber 54 which maintains a fluid therein,

This initial application of force causes the first valve member 84 to close the first valve passage or passages 82. Accordingly, further movement of the bottle 14 upwardly causes an increased fluid pressure in the said chamber 54.

While this fluid pressure is being increased in the chamber 54, it is (the pressure) reacting on the fluid pressure responsive valve member or second valve member 74. This condition occurs due to the opening 88 in the lower valve member and second passages 80.

When fluid pressure of sufficiency is present in the chamber 54 to overcome the counter-force of the spring 72, the valve member 74 will open.

However, while this is occurring (the pressure increasing in the chamber 54) the inner cylinder 52 moves steadily upwardly within the outer cylinder 30. At the instant that the fluid pressure in the chamber 54 is sufficient to overcome the counterforce of the spring 72, the valve member 74 opens and the cylinder 52 is moved upwardly within the outer cylinder 30, this operational condition being shown in Figure 3.

By adjustment of the stop formed by the nuts 70 and 68 respectively, the effective spring pressure may be regulated whereby a preselected force is necessary to open the valve member 74. At that time the fluid in the chamber 54 rushes into the chamber 56, thereby relieving the pressure in the said chamber 54. Hence, the spring 72 exerting the larger force again closes the passages 80.

As a result of the above, the stop may be adjusted to a preselected position so that only a predetermined pressure will be applied to the bottle cap 108 and then the pressure will slightly fall off due to the fact that the valve member 74 exposes a greater area to the fluid pressure. From there on, the pressure remains constant no matter how much faster the bottle 14 is urged upwardly into the relatively stationary device.

This, of course, is stated within the practical limits of the size of elements and relationship of parts. It is apparent that by improper operation the bottle 14 may simply be urged upwardly an extremely large amount thereby crushing the bottle, but the stroke of either the crowner attachment or the table 12 is regulated by common mechanical means, the instant crowner attachment compensating for irregularities in size of bottles or varying sized bottles.

While the fluid in the chamber 54 is being placed under pressure and while it is allowed escapement upon reaching the preselected value of pressure, the bottle 14 is moved steadily upward into the crowing head member 104 thereby crimping the lower edge of the crown 108 around the bottle top. By so crimping the same, the diameter of the crown 108 is reduced, so that it will be of a smaller size thereby easily passing through the seat 118 which supported the crown or cap before the crimping operation began.

The spring 98 constantly applies a force on the crown 108, whereby the bottle 14 being lowered is maintained in a steady condition until it has passed through (substantially) the seat 118.

Since a portion of the fluid has passed from the chamber 54 into the chamber 56, it must be returned to the chamber 54 in order to perform the second crowning operation on another bottle. Hence, as the bottle 14 is being moved from the inner cylinder 52, the said inner cylinder 52 is allowed to fall downwardly with respect to the outer cylinder 30 due to the force of gravity. The spring 72 reacting on the valve 74 closes the passages 80. Hence, the valve member 84 will simply fall by the force of gravity to the passage 82 opening position thereby allowing the fluid which was trapped in the upper chamber 56 to return to the lower chamber 54. This places the apparatus in a condition, as shown in Figure 2, ready for a second operation on another bottle.

In instances wherein one of the bottles 14 is urged inwardly with respect to the crowner head attachment such an extent that the plunger cylinder 96 reaches the inwardmost travel thereof, the spacing rings or members 102 engage the shoulder between the bore 90 and bore 92 thereby serving the effect of a stop of crimping.

The operation of the feeding mechanism is deemed obvious. Caps or other closures simply fall from the gravity feed chute 120 into the chute 116 which is attached as described above. One cap following closely the previous cap simply fills in at the proper position on the seat 118 for crowning operations.

It is appreciated that variations may be made without departing from the spirit of the invention.

Having described the invention, what is claimed as new is:

1. A bottle capping device comprising an outer cylinder having concentric bores of different diameters and an annular internal seat formed between said bores, a second cylinder having an outwardly extending peripheral flange about its upper end disposed in the enlarged bore in said first mentioned cylinder and having vertically spaced aligned bores of different diameters, a cap plate for said first mentioned cylinder, a depending ported piston adjustably supported by said cap plate for operation in the upper bore in said second cylinder, a valve carried by said piston for opening and closing the port in said piston, a hollow plunger cylinder operable in the lower bore in said second cylinder, resilient means for urging the hollow plunger cylinder to its foremost position, a spacing ring in the lower end of said second cylinder, and means in said second cylinder for crimping a cap on a bottle neck when said second cylinder and a bottle are moved with respect to each other.

2. The combination of claim 1, and a combined bottle neck receiving throat and crown cap feeding chute secured to the lower end of said second cylinder.

3. A bottle capping device comprising an outer fluid retaining cylinder, an inner fluid retaining cylinder slidably disposed in said outer cylinder, means associated with said cylinders limiting the sliding movement of said cylinders relative to each other, a piston disposed in said cylinders having a first and a second passage therein, a first valve member carried by said piston and selectively opening and closing said first passage, a fluid pressure responsive valve member disposed in opening and closing relation with said second passage, means carried by said inner cylinder for crimping bottle caps on bottles and means disposed in said inner cylinder for transmitting force from a bottle cap while it is being applied to a bottle to said valve members.

4. A bottle capping device comprising an outer fluid retaining cylinder, an inner fluid retaining cylinder slidably disposed in said outer cylinder, means associated with said cylinders limiting the sliding movement of said cylinders relative to each other, a piston disposed in said cylinders having a first and a second passage therein, a first valve member carried by said piston and

selectively opening and closing said first passage, a fluid pressure responsive valve member disposed in opening and closing relation with said second passage, means carried by said inner cylinder for crimping bottle caps on bottles and means disposed in said inner cylinder for transmitting force from a bottle cap while it is being applied to a bottle to said valve members, said pressure responsive valve member being disposed on said piston, a piston rod extending from said piston, and adjustable stop disposed on said piston rod, and resilient means reacting on said stop and said pressure responsive valve member.

5. Means for applying closures on receptacles by application of a force on the closure which increases until reaching a preselected value, whence the force decreases below the preselected value comprising: an outer liquid retaining cylinder and an inner liquid retaining cylinder slidable therein, means limiting the travel of said cylinders with respect to each other, a closure for said cylinders, a piston having a piston rod carried by said closure, said piston separating said inner cylinder into an upper and a lower liquid chamber, means carried by said inner cylinder for crimping closures to receptacles, means for transmitting force to the liquid in said lower chamber while a closure is being applied to a receptacle, passages in said piston, and valve members carried by said piston closing said passages, means reacting on said piston rod and one of said valve members retaining it in the passage closing position until a predetermined liquid pressure is applied thereon from the lower chamber.

6. Means for applying closures on receptacles by application of a force on the closure which increases until reaching a preselected value, whence the force decreases below the preselected value comprising: an outer liquid retaining cylinder and an inner liquid retaining cylinder slidable therein, means limiting the travel of said cylinders with respect to each other, a closure for said cylinders, a piston having a piston rod carried by said closure, said piston separating said inner cylinder into an upper and a lower liquid chamber, means carried by said inner cylinder for crimping closures to receptacles, means for transmitting force to the liquid in said lower chamber while a closure is being applied to a receptacle at which time it will be opened allowing fluid to flow into the upper chamber, and said force transmitting means including a piston slidable in said inner cylinder, and a spring constantly urging said last-mentioned piston outwardly of said inner cylinder.

7. Means for applying closures on receptacles by application of a force on the closure which increases until reaching a preselected value, whence the force decreases below the preselected value comprising: an outer liquid retaining cylinder and an inner liquid retaining cylinder slidable therein, means limiting the travel of said cylinders with respect to each other, a closure for said cylinders, a piston having a piston rod carried by said closure, said piston separating said inner cylinder into an upper and a lower liquid chamber, means carried by said inner cylinder for crimping closures to receptacles, means for transmitting force to the liquid in said lower chamber while a closure is being applied to a receptacle, passages in said piston, and valve members carried by said piston closing said passages, means reacting on said piston rod and one of said valve members retaining it in the passage closing position until a predetermined liquid pressure is applied thereon from the lower chamber, a second valve member carried by said piston closing other of said passages while liquid pressure is being applied to said first mentioned valve member.

8. Means for applying closures on receptacles by application of a force on the closure which increases until reaching a preselected value, whence the force decreases below the preselected value comprising: an outer liquid retaining cylinder and an inner liquid retaining cylinder slidable therein, means limiting the travel of said cylinders with respect to each other, a closure for said cylinders, a piston having a piston rod carried by said closure, said piston separating said inner cylinder into an upper and a lower liquid chamber, means carried by said inner cylinder for crimping closures to receptacles, means for transmitting force to the liquid in said lower chamber while a closure is being applied to a receptacle, a first passage in said piston and a valve member carried by said piston closing said passage by liquid pressure in said lower chamber, second passage in said piston, and a second valve member closing said second passage, means retaining said second valve member in the passage closing position until a predetermined liquid pressure is present in the lower chamber.

9. Means for applying closures on receptacles by application of a force on the closure which increases until reaching a preselected value, whence the force decreases below the preselected value comprising: an outer liquid retaining cylinder and an inner liquid retaining cylinder slidable therein, means limiting the travel of said cylinders with respect to each other, a closure for said cylinders, a piston having a piston rod carried by said closure, said piston separating said inner cylinder into an upper and a lower liquid chamber, means carried by said inner cylinder for crimping closures to receptacles, means for transmitting force to the liquid in said lower chamber while a closure is being applied to a receptacle, a first passage in said piston and a valve member carried by said piston closing said passage by liquid pressure in said lower chamber, second passage in said piston, and a second valve member closing said second passage, means retaining said second valve member in the passage closing position until a predetermined liquid pressure is present in the lower chamber including a spring reacting on said second valve member, and a stop adjustably disposed on said piston rod having said spring seated thereon.

10. A device for applying caps to bottles comprising an outer cylinder having bores of different diameters, an inner cylinder slidable in said bores and having a flange in the larger of said bores, said inner cylinder having vertically spaced bores of different diameters, a cap plate for said outer cylinder, a depending piston having ports supported by said cap plate for operation in one of the bores of said inner cylinder, a valve carried by said piston for opening and closing at least one of said ports, a spring constantly urging said valve member in the port closing position, a second valve carried by piston closing at least one other of said ports, a plunger cylinder operable in the other bore in said inner cylinder, resilient means urging said plunger cylinder outwardly of said inner cylinder, spacing means in said last mentioned bore engaged by said plunger piston, and means carried by said inner cylinder for crimping caps on bottle necks.

11. For use in crowning machines, a crowner attachment comprising an outer cylinder, an inner cylinder slidable in said outer cylinder,

means associated with said cylinders for limiting the sliding travel of the cylinders with respect to each other, means for seating a crown at the lower portion of said inner cylinder for application on a bottle, resiliently urged means for transmitting force caused by application of a crown to a bottle to the bore of said inner cylinder, a piston disposed in the bore of said inner cylinder separating said bore into an upper and lower fluid chamber, and means carried by said piston responsive to the pressure in the lower chamber for relieving the pressure in the lower chamber and for the passage of fluid from said lower chamber to the upper chamber.

12. For use in crowning machines, a crowner attachment comprising an outer cylinder, an inner cylinder slidable in said outer cylinder, means associated with said cylinders for limiting the sliding travel of the cylinders with respect to each other, means for seating a crown at the lower portion of said inner cylinder for application on a bottle, resiliently urged means for transmitting force caused by application of a crown to a bottle to the bore of said inner cylinder, a piston disposed in the bore of said inner cylinder separating said bore into an upper and lower fluid chamber, and means carried by said piston responsive to the pressure in the lower chamber for relieving the pressure in the lower chamber and for the passage of fluid from said lower chamber to the upper chamber including passages in said piston, a piston rod supporting said piston, a closure for said outer cylinder supporting said piston rod, a valve member mounted for axial movement on said piston rod, and resilient means reacting on said piston rod and said valve member constantly urging said valve member in the passage closing position.

ANTONIO C. NACCARATO.
RAYMOND E. McCAULEY.

No references cited.