R. V. CRAGGS.

FLUID PRESSURE OPERATED BOTTLE CAPPING MACHINE.

APPLICATION FILED JUNE 7, 1910.

985,010.

Patented Feb. 21, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

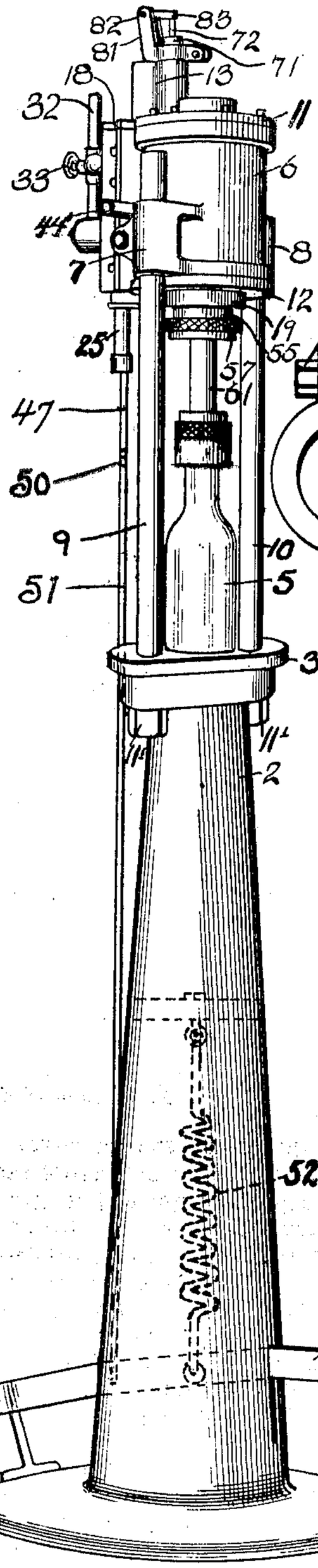
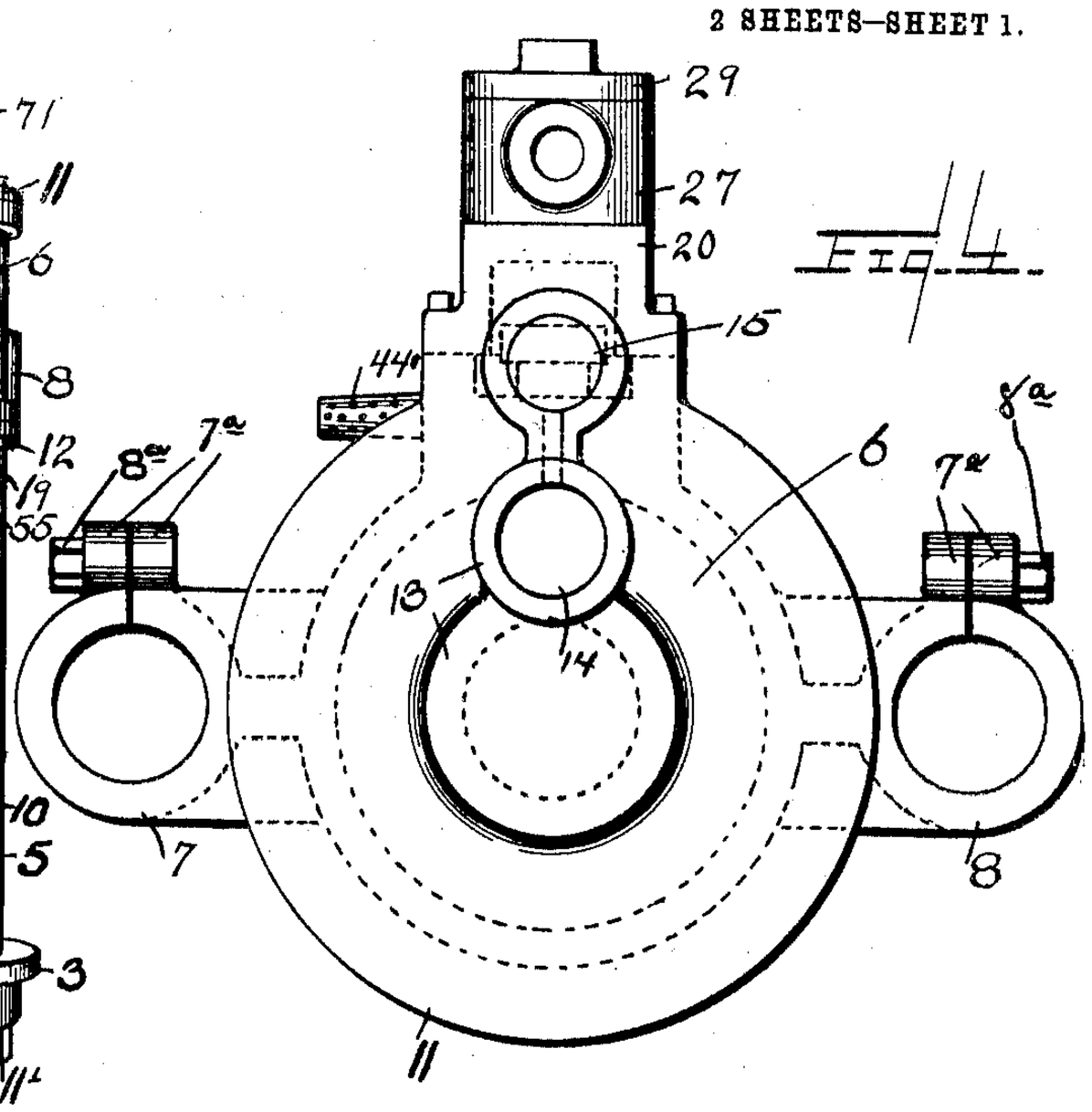


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 2.

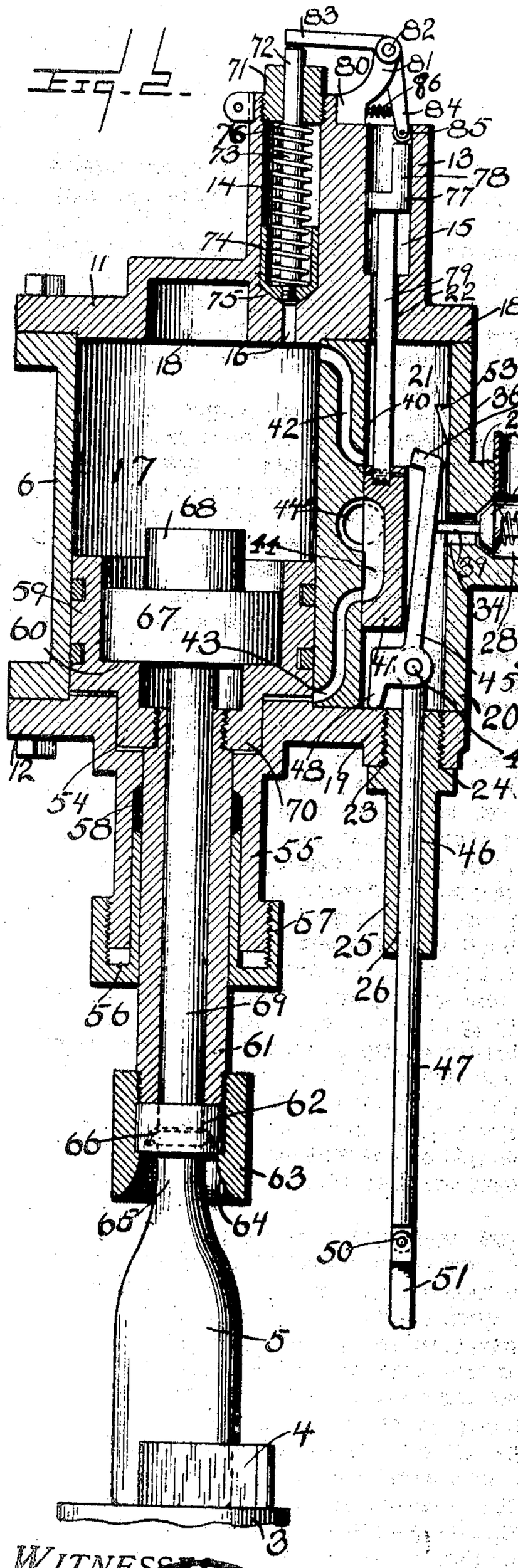
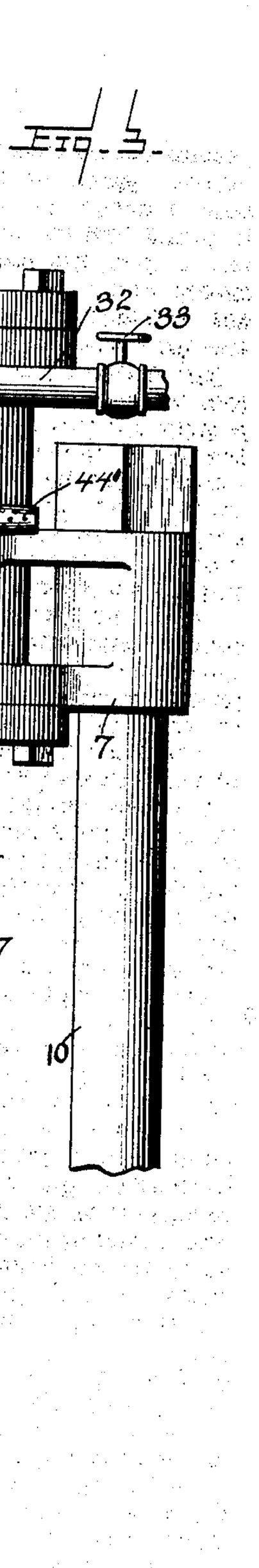


Fig. 3.



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FLUID-PRESSURE-OPERATED BOTTLE-CAPPING MACHINE.

985,010. Specification of Letters Patent. Patented Feb. 21, 1911.

Application filed June 7, 1910. Serial No. 565,556.

To all whom it may concern:

Be it known that I, Ross V. Craggs, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Fluid-Pressure-Operated Bottle-Capping Machines, of which the following is a specification.

This invention relates to a fluid pressure operated bottle capping machine and the object thereof is to provide a machine of such class in a manner as hereinafter set forth and claimed whereby the capping of bottles with what is termed a "metallic cap and seal" will be efficiently had with the liability of breakage of the bottle neck reduced to a minimum.

A further object of the invention is to provide a machine of the class referred to in a manner as hereinafter set forth and claimed which is adapted for use in connection with bottles of varying heights without the employment of vertically-adjustable supports for the bottles to properly position them with respect to the capping elements of the machine.

A further object of the invention is to provide a fluid pressure operated bottle capping machine in a manner as hereinafter set forth with means whereby the capping elements of the machine will be automatically returned to inoperative position after the cap has been crimped upon the bottle neck.

A further object of the invention is to provide a machine of such class with means in a manner as hereinafter set forth whereby the supply of motive fluid to impart to the capping elements a forward stroke will be controlled in such manner to overcome any liability of breakage of the bottle necks due to a sudden or quick stroke when the elements are moved to capping position.

A further object of the invention is to provide a machine of such class with means in a manner as hereinafter set forth whereby the capping elements during their movement toward and from operative position will be cushioned to overcome any liability of breakage of the bottle neck due to a quick stroke when the elements are moved to capping position and to overcome any liability of injury to the capping elements due to a sudden or quick return stroke.

A further object of the invention is to provide a fluid pressure operated bottle capping machine with means in a manner as hereinafter set forth operated by a rise of pressure within the machine to change the direction of the course of the motive fluid whereby the capping elements will be moved to inoperative position.

Further objects of the invention are to provide a fluid pressure operated bottle capping machine which shall be comparatively simple in its construction and arrangement, strong, durable, efficient in its use, readily set up, reducing the liability of breakage of bottle necks to a minimum, and comparatively inexpensive to manufacture and operate.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown the preferred embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views: Figure 1 is a perspective view of a bottle capping machine in accordance with this invention. Fig. 2 is a vertical sectional view with the port for the cylinder removed. Fig. 3 is a rear elevation of the cylinder with the support removed, and, Fig. 4 is a top plan of the cylinder.

Referring to the drawings in detail, 1 denotes a base which is suitably fixed in position and is provided with a pedestal 2 having its top formed with a platform 3 of a width and length greater than the diameter of the pedestal 2 at the top. The platform 3 is provided with a V-shaped positioning member 4 for the bottle 5. That portion of the platform 3 upon which rests the bottle has suitably connected thereto a cushion. Arranged over and suspended above the platform 3 is a cylinder 6 having a pair of split laterally-extending apertured ears 7, 8. Each of the ears 7, 8, is provided with a pair of apertured flanges 7^a in which extends a clamping screw 8^a for adjustably connecting the cylinder in position. The lateral ears 7, 8 are adjustably-connected by the flanges 7^a and clamping screws 8^a to the

vertically-disposed suspension rods 9, 10 which are fixedly secured to the platform 3 and are provided on their lower ends with clamping nuts 11′. By adjustably connecting the ears 7 and 8 to the rods 9 and 10, the cylinder 6 can be vertically adjusted with respect to the platform 3 when occasion so requires.

The cylinder 6 is closed at one end by a head 11 and at its other end by a head 12. The head 11 has formed integral therewith a vertically-disposed enlargement 13 bored to provide vertically-disposed compartments 14, 15. The head 11 is bored to provide a port 16 for establishing communication between the compartment 14 and the interior 17 of the cylinder. The head 11 is recessed as at 18 to form a cushioning chamber. The head 11 as well as the head 12 is provided with a rearwardly-extending off-set, the off-set of the head 11 being indicated by the reference character 18′ and the off-set of the head 12 by the reference character 19. The off-sets 18′ and 19 oppose each other and interposed between said off-sets is a vertically-disposed channel plate 20 forming in connection with the off-sets 18′, 19 and the cylinder 6 a slide valve chamber 21. The off-set 18′ is bored to provide a passage 22 for establishing communication between the chambers 15 and 21. The off-set 19 is provided with a screw-threaded opening 23 for the reception of the screw-threaded inner portion 24 of a guide sleeve 25 which abuts against the off-set 19 and has its opening 26 communicating with the chamber 21. The plate 20 is formed approximately centrally with a rearward extension 27 which is hollowed to provide an inlet valve chamber 28 closed at one end by a cap 29 formed with a pocket 30 which communicates by the port 31 with the chamber 28. Opening into the chamber 28 is a motive supply pipe 32 provided with a cut-off 33 which constitutes a means for regulating the motive fluid supply to the cylinder 6. The chamber 28 communicates with the chamber 21 through the medium of a passage 34 which opens at one end into the chamber 28 and at its other end in the chamber 21.

Arranged within the chamber 28 is an inlet valve 35 adapted to engage a seat 36 formed by one wall of the chamber 28 and close the passage 34. Projecting from the valve 35 is a stem 37 which extends in the pocket 30, the wall of the pocket constituting a guide for the stem. Surrounding the stem 37 and interposed between the cap 29 and the valve 35 is a spring 38 which has a normal tendency to maintain the valve 35 against its seat 36. Projecting from the seating face of the valve 35 and extending through the passage 34 and into the chamber 21 is an arm 39, the function of which will be hereinafter referred to.

That portion of the cylinder 6 which opposes the plate 20 has its outer face flattened as at 40 to provide a valve seat for a slide valve 41. The wall of the cylinder 6 is formed with the ports 42, 43, the former establishing communication between the chamber 21 and the upper portion of the cylinder 6 and the latter establishing communication between the chamber 21 and the lower portion of the cylinder 6. The cylinder 6 is cut-away to provide an outlet 44′ which when the valve 41 is in the position shown in Fig. 2 will establish communication between the lower portion of the interior 17 of the cylinder and the atmosphere and when the valve 41 is shifted in the opposite direction, the valve will establish communication between the upper portion of the interior 17 of the cylinder and the atmosphere. The seating face of the valve 41 is cut-away to provide a concavity 44 which is of the necessary length so as to establish communication between either of the ports 42 or 43 and the outlet 44′. The slide valve 41 is shifted to the position shown in Fig. 2 manually and which will uncover the port 42 and establish communication between the interior 17 of the cylinder 6 and the chamber 21. The slide valve 41 is shifted to the opposite position, which is to uncover the port 43 to establish communication between the interior 17 of the cylinder 6 and the chamber 21, by a rise of pressure within the interior 17 of the cylinder 6 and which will be hereinafter more specifically referred to.

The manual operation of the slide valve 41 is had through the medium of a pivoted hook-shaped arm 45, the latter being pivoted as at 46 to the upper end of a pull bar 47. The arm 45 is provided at its lower end with a nose 48 which is adapted to rock the arm 45 on its pivot so as to throw the hooked end 49 thereof clear of the valve 41 as shown in Fig. 2, the nose 48 engaging the inner face of the off-set 19 and rocking the arm 45 on its pivot on the downward movement of the pull rod 47. The rod 47 is pivotally-connected as at 50 to a link 51 which is attached to a spring-controlled tread lever 52 arranged near the bottom of the pedestal 2 and which when pressure is relieved therefrom will be elevated due to a spring 52ª which is arranged within the pedestal 2. When the free end of the lever 52 moves upwardly, the pull bar 47 is carried therewith and therefore elevates the arm 45. The arm 45 is arranged within the chamber 21 and to one side of the valve 41 which is also arranged in the chamber 21 and the pull bar 47 extends through the opening 26 of the sleeve 25. When the pull bar 47 is moved upwardly due to the action of the return spring within the pedestal 2, the arm 45 is carried therewith and during the upward movement of said arm 45 it engages a bev-

eled deflector 53 carried by the inner face of the plate 20 and which causes the hooked end 49 of the arm 45 to engage over the upper end of the slide valve 41 so that when the rod 47 is pulled downwardly, the slide valve 41 will be carried therewith.

The chamber 28 is normally closed to the chamber 21 and motive fluid is not supplied to the chamber 21 until the valve 35 is shifted from its seat. The shifting of the valve 35 from its seat and against the action of the spring 38 is had by the rocking of the arm 45 on its pivot due to the engagement of the nose 48 with the off-set 19. When the arm 45 rocks on its pivot it swings toward the arm 39 and shifts said arm inwardly thereby unseating the valve 35 and allowing a gradual supply of motive fluid from the inlet chamber 28 to the chamber 21 and as the port 42 is opened, the motive fluid will be supplied to the upper end of the interior 17 of the cylinder 6 and cause a downward movement of the capping elements to be presently referred to. By the foregoing arrangement, the motive fluid is prevented from being quickly supplied to the interior 17 of the cylinder 6 and which overcomes any sudden quick down-stroke of the capping elements, consequently reducing breakage of the bottle necks to a minimum.

The head 12 is recessed on its inner face to provide a cushioning chamber 54 and it is also provided with a depending sleeve 55 carrying a packing gland 56, the sleeve 55 being exteriorly threaded and the gland not only extending in the sleeve 55 but provided with an interiorly-threaded flange 57 which engages with the threads of the sleeve 55 whereby the gland and sleeve are connected together. Arranged within the sleeve and engaged by the gland is a packing 58.

Arranged within the interior 17 of the cylinder 6, said interior 17 constituting a piston chamber and which will be referred to hereinafter by such term, is a pair of capping elements consisting of reciprocatory pistons, each including a head and a stem. One of said capping elements is arranged within the other. The outer piston consists of a cup-shaped head 59 shouldered as at 60 and having connected therewith and depending therefrom a hollow stem 61 which extends through and projects from the sleeve 55 and gland 56. The stem 61 upon its outer end is provided with a throat 62 of known construction and which is secured in position by a carrier 63 having a beveled inner face 64 to facilitate the entrance of the bottle neck into the throat. In Fig. 2 of the drawings the bottle 5 with its neck 65 is shown positioned within the throat with a cap 66 thereon. The inner piston comprises a head 67 having an extension 68 which is adapted to engage in the recess 18 for cushioning the return stroke of the piston elements. Projecting from the head 67 and extending through the hollow stem 61 is a solid stem 69 which constitutes what may be termed a holding down means, the function of which is to engage the cap and hold it in position on the bottle during the crimping of the cap by the throat 62. This prevents any possibility of the cap bulging during the crimping operation. The head 59 of the outer piston is formed with an extension 70 which moves into the chamber 54 on the downward movement of the piston elements for cushioning them on the down stroke. To the extension 70 is connected the hollow stem 61.

To provide for the changing of the course of the motive fluid supplied to the cylinder 6 so as to return the capping elements to their normal position, a fluid pressure operated trip mechanism is employed, which when the pressure rises above a predetermined point within the upper end of the piston chamber 17, is released and the slide valve 41 is shifted by fluid pressure to a position opposite to that shown in Fig. 2 whereby the fluid pressure within the chamber 21 is supplied through the medium of the port 43 against the lower face of the piston head 59 whereby the piston elements are moved in unison to their normal positions. The shoulder 60 engaging with the head 67 causes the inner piston to move to operative position in unison with the outer piston.

The fluid pressure operated trip mechanism consists of a screw-threaded plug 71 provided with an opening 72 through which extends a piston rod 73. The plug 71 is connected to the enlargement 13 and mounted in the upper end of the chamber 14. The valve stem 73 is attached at its lower end to a cup-shaped valve 74 which is seated against the beveled lower wall 75 of the chamber 13, the said wall 75 forming a seat for the valve 74. The valve 74 closes the port 16 whereby communication is shut off between the chamber 14 and the piston chamber 17. Surrounding the stem 73 and interposed between the plug 71 and the valve 74 is a compression spring 76 which can have the tension thereof increased or decreased when occasion so requires by adjusting the plug 71. The force of the spring 76 is such that it maintains the valve 74 against its seat until the pressure in the upper portion of the piston chamber 17 rises above a pre-determined point whereby the valve 74 is shifted from its seat. The valve 74 when shifted carries the valve stem 73 therewith outwardly against the action of the spring 76. When the pressure is reduced within the piston chamber 17, the action of the spring 76 returns the valve 74 to its normal position, which is in engagement with the seat 75. Arranged within the chamber 15 is a piston

77 cut-away at one side as at 78 to provide a clearance for a purpose to be presently referred to. Connected to the piston 77 and extending through the passage 22 is a piston rod 79 which is loosely connected at its lower end to the top of the slide valve 41. Connected to the enlargement 13 at the top thereof is a clamp 80 provided with an arm 81 in which is pivoted as at 82 a bell crank lever, one arm of said lever being indicated by the reference character 83 and the other arm by the reference character 84. The arm 83 projects in the path of the valve stem 73, while the arm 84 carries on its lower end a roller 85 which is normally arranged in the path of the piston 77. The arm 84 extends into the chamber 15 and is maintained against one wall thereof and in the path of the upper portion of the piston 77 by a spring 86 which is interposed between the clamp 80 in the said arm 84. When the motive fluid is supplied to the chamber 21 it also passes up through the port 22 and bears against the piston 77, but the piston 77 is prevented from being shifted by the motive fluid due to the fact that the arm 84 arrests the movement of the piston. Now, it will be assumed that the valve 74 is shifted from its seat which causes the valve stem 73 to move outwardly. When the valve stem 73 is moved outwardly it engages with the arm 83 and shifts the ball crank lever on its pivot, thereby moving the arm 84 toward the opposite wall of the chamber 15 and which enables the fluid pressure to shift the piston 77 upwardly, the cut-away portion 78 of the piston 77 allowing for the piston to clear the arm 84. When the piston 77 is moved upwardly, the piston rod 79 carries the slide valve 41 therewith and uncovers the port 43 to the chamber 21 and opens the port 42 to the atmosphere. This action reduces the pressure in the upper portion of the piston chamber 17 and admits a supply of motive fluid to the lower portion of the chamber 17, whereby the piston elements are moved back to normal position. By the time the piston elements are moved back to normal position, the operator releases pressure upon the foot lever 52 and the arm 45 is moved upwardly and the hooked end 49 of said arm deflected over and upon the upper end of the slide valve 41. In the meanwhile the spring 38 has come into action and seated the valve 35, thereby cutting off the motive fluid supply to the chamber 21.

Briefly described the operation of capping a bottle is as follows: The throat 63 when in an inoperative position is arranged above the neck of the bottle, the latter being mounted upon the base or support 3. A cap is positioned in the throat in alinement with the bottle neck. The operator shifts the foot lever 52 downwardly, which causes the valve 41 to assume the position shown in Fig. 2 and admits a supply of motive fluid to the piston chamber 17 through the port 42. The piston elements are moved downwardly by the pressure of the fluid, the element 69 engaging with the cap and holding it upon the bottle neck. The movement of the element 69 is arrested by the bottle neck. The element 61 continues to move carrying the throat therewith,. causing the cap to be crimped around the neck of the bottle. When the pressure increases in the upper portion of the piston chamber 17, the valve 74 is shifted from its seat, the stem 73 of the valve shifting the bell crank to release the piston 77, the latter carrying the valve 41 therewith, whereby the port 42 will be opened to the atmosphere and the port 43 to the chamber 21 so that the motive fluid can be supplied to the lower end of the piston chamber 17, whereby the piston elements are moved to the upper end of the chamber and the bottle is then removed. In the meanwhile the operator has released the lever 52, the spring 52ª restoring the lever to its normal position and moving the rod 47 upwardly so that the hooked end 49 of the arm 45 will engage the beveled surface 53 and be deflected to engage the top of the valve 41 to enable the downward shifting of the valve 41 when the operator shifts the lever 52. When the pressure is reduced in the upper portion of the chamber 17, the valve 74 is caused by the action of the spring 76 to resume its seat and it moves the valve stem 73 inwardly to enable the spring 86 to shift the arm 84 of the bell crank in the path of the piston 77, thereby locking the latter.

What I claim is:

1. A fluid pressure operated bottle capping machine comprising a piston chamber, a pair of fluid pressure operated reciprocatory pistons extending within said chamber and adapted when operated to hold a cap down on and crimp it upon a bottle neck, a valve chamber having an outlet, means for alternately establishing communication between the ends of the piston chamber and the valve chamber and between the ends of the piston chamber and outlet, and means for establishing communication between a motive fluid supply and the valve chamber subsequent to the opening of one end of the piston chamber to the valve chamber.

2. A fluid pressure operated bottle capping machine comprising a piston chamber, a pair of fluid pressure operated reciprocatory pistons extending within said chamber and adapted when operated to hold a cap down on and crimp it upon a bottle neck, a valve chamber having an outlet, means for alternately establishing communication between the ends of the piston chamber and the valve chamber and between the ends of piston chamber and outlet, and means for

gradually establishing communication between a motive fluid supply and the valve chamber subsequent to the opening of one end of the piston chamber to the valve chamber.

3. A fluid pressure operated bottle capping machine comprising a cylinder having a pair of ports, a pair of fluid pressure operated reciprocatory elements extending within said cylinder and adapted when operated to hold the cap down on and crimp it upon a bottle neck, a valve chamber communicating with the cylinder through said ports and having an outlet, a shiftable valvular element within said chamber for alternately opening said ports to the chamber and for alternately connecting said ports with the outlet, and means for establishing communication between said chamber and a motive fluid supply subsequent to the opening of one of said ports by said valve to said chamber.

4. A fluid pressure operated bottle capping machine comprising a cylinder having a pair of ports, a pair of fluid pressure operated reciprocatory elements extending within said cylinder and adapted when operated to hold the cap down on and crimp it upon a bottle neck, a valve chamber communicating with the cylinder through said ports and having an outlet, a shiftable valvular element within said chamber for alternately opening said ports to the chamber and for alternately connecting said ports with the outlet, and means for gradually establishing communication between said chamber and a motive fluid supply subsequent to the opening of one of said ports by said valve to said chamber.

5. A fluid pressure operated bottle capping machine comprising a cylinder having a pair of ports, a pair of fluid pressure operated reciprocatory elements extending within said cylinder and adapted when operated to hold the cap down on and crimp it upon a bottle neck, a valve chamber communicating with the cylinder through said ports and having an outlet, a shiftable valvular element within said chamber for alternately opening said ports to the chamber and for alternately connecting said ports with the outlet, and an inlet valve mechanism communicating with a motive fluid supply and normally closing said valve chamber to said supply and actuated subsequently to the opening of one of said ports to the valve chamber, whereby communication is established between the valve chamber and the motive fluid supply after the said port has been opened.

6. A fluid pressure operated bottle capping machine comprising a cylinder having a pair of ports, a pair of fluid pressure operated reciprocatory elements extending within said cylinder and adapted when operated to hold the cap down on and crimp it upon a bottle neck, a valve chamber communicating with the cylinder through said ports and having an outlet, a shiftable valvular element within said chamber for alternately opening said ports to the chamber and for alternately connecting said ports with the outlet, an inlet valve mechanism communicating with a motive fluid supply and normally closing said valve chamber to said supply and actuated subsequently to the opening of one of said ports to the valve chamber, whereby communication is established between the valve chamber and the motive fluid supply after the said port has been opened, and means for actuating said inlet valve mechanism.

7. A fluid pressure operated bottle capping machine comprising a cylinder having a pair of ports, a pair of fluid pressure operated reciprocatory elements extending within said cylinder and adapted when operated to hold the cap down on and crimp it upon a bottle neck, a valve chamber communicating with the cylinder through said ports and having an outlet, a shiftable valvular element within said chamber for alternately opening said ports to the chamber and for alternately connecting said ports with the outlet, an inlet valve mechanism adapted when actuated in one direction to establish communication between said valve chamber and a motive fluid supply, means for shifting said valvular element in one direction to open one of said ports to said chamber and for further actuating the valve mechanism after said port has been opened whereby the pistons will be operated in one direction, and means for shifting the valvular element in the opposite direction to open the other of said ports to said chamber whereby the pistons will be shifted in the opposite direction.

8. A fluid pressure operated bottle capping machine comprising a cylinder having a pair of ports, a pair of fluid pressure operated reciprocatory elements extending within said cylinder and adapted when operated to hold the cap down on and crimp it upon a bottle neck, a valve chamber communicating with the cylinder through said ports and having an outlet, a shiftable valvular element within said chamber for alternately opening said ports to the chamber and for alternately connecting said ports with the outlet, an inlet valve mechanism adapted when actuated in one direction to establish communication between said valve chamber and a motive fluid supply, means for shifting said valvular element in one direction to open one of said ports to said chamber and for further actuating the valve mechanism after said port has been opened whereby the pistons will be operated in direction, a fluid pressure operated means for shifting the valvular element in the opposite direc-

tion to open the other of said ports to said chamber whereby the pistons will be shifted in the opposite direction.

9. A fluid pressure operated bottle capping machine comprising a cylinder having a pair of ports, a pair of fluid pressure operated reciprocatory pistons extending in said cylinder and adapted when operated to hold a cap down on and crimp it upon a bottle neck, a slide valve chamber having an outlet, an inlet valve chamber normally closed to said slide valve chamber and normally communicating with a fluid pressure supply, an inlet valve within the inlet chamber for normally closing the latter to the slide valve chamber, a slide valve within the slide valve chamber for alternately opening said ports to the slide valve chamber and for alternately connecting said ports with the outlet, means for shifting the slide valve in one direction to open one of said ports to said chamber and to unseat the inlet valve after said port has been opened whereby communication is established between the slide valve chamber and a motive fluid supply for supplying motive fluid to one end of the cylinder for operating the pistons in one direction, and means for shifting the slide valve in the other direction, thereby opening the other of said ports to the chamber whereby motive fluid is supplied to the cylinder for shifting the pistons in the opposite direction.

10. A fluid pressure operated bottle capping machine comprising a cylinder having a pair of ports, a pair of fluid pressure operated reciprocatory pistons extending in said cylinder and adapted when operated to hold a cap down on and crimp it upon a bottle neck, a slide valve chamber having an outlet, an inlet valve chamber normally closed to said slide valve chamber and normally communicating with a fluid pressure supply, an inlet valve within the inlet chamber for normally closing the latter to the slide valve chamber, a slide valve within the slide valve chamber for alternately opening said ports to the slide valve chamber and for alternately connecting said ports with the outlet, means for shifting the slide valve in one direction to open one of said ports to said chamber and to unseat the inlet valve after said port has been opened whereby communication is established between the slide valve chamber and the motive fluid supply for supplying motive fluid to one end of the cylinder for operating the pistons in one direction, and fluid pressure operated means for shifting the slide valve in the other direction, thereby opening the other of said ports to the chamber whereby motive fluid is supplied to the cylinder for shifting the pistons in the opposite direction.

11. A fluid pressure operated bottle capping machine comprising a cylinder, a pair of fluid pressure operated reciprocatory elements operating within the cylinder and adapted to hold a cap upon and crimp it around a bottle neck, a valve chamber adapted to communicate with a motive fluid supply and alternately communicate with the ends of said cylinder for supplying a motive fluid thereto, means whereby motive fluid is supplied to said chamber subsequent to the establishing of communication between one end of the cylinder and said chamber to prevent a quick stroke of said elements in one direction, and means actuated on the rise of pressure within the said end of the cylinder for automatically changing the course of the fluid supplied from the chamber to the cylinder for directing the fluid against said elements to operate them in the opposite direction.

12. In a fluid pressure operated bottle capping machine, a cylinder, a pair of fluid pressure operated elements extending within the cylinder and adapted when operated to hold and crimp a cap upon a bottle neck, a manual and fluid pressure actuated mechanism for alternately opening the ends of said cylinder for charge and exhaust of motive fluid whereby said elements are reciprocated, and means operated by said mechanism when the latter is actuated manually for opening a motive fluid supply to the cylinder.

13. A fluid pressure operated bottle capping machine comprising a cylinder having a pair of ports, a pair of fluid pressure operated elements extending within the cylinder and adapted when operated to hold a cap on and crimp it upon a bottle neck, a valve chamber having an outlet, a slide valve within said chamber for alternately opening said ports to said chamber to change the direction of flow of the motive fluid to the cylinder and for alternately establishing communication between the ports and the outlet for exhaust of motive fluid whereby said elements are reciprocated, means for shifting said valve in one direction to open one of the ports for charge and the other for exhaust, mechanism operated when the slide valve moves in one direction for opening a motive fluid supply, and means actuated on the rise of pressure in the cylinder for shifting the valve in the opposite direction thereby reversing the action of the ports.

14. A fluid pressure operated bottle capping machine comprising a cylinder, a pair of fluid pressure operated elements extending within the cylinder and adapted when operated to hold the cap on and crimp it upon a bottle neck, means whereby one end of the cylinder is opened prior to the opening of a motive fluid supply for the reception of a charge of motive fluid to impart the operative stroke to said elements, means for open-

ing a motive fluid supply subsequent to the opening of said end of the cylinder to supply motive fluid to said end of the cylinder, and means whereby a return stroke is imparted to said elements.

15. A fluid pressure operated bottle capping machine comprising a cylinder, a pair of fluid pressure operated elements extending within the cylinder and adapted when operated to hold the cap on and crimp it upon a bottle neck, means whereby one end of the cylinder is opened prior to the opening of a motive fluid supply for the reception of a charge of motive fluid to impart the operative stroke to said elements, means for opening a motive fluid supply subsequent to the opening of said end of the cylinder to supply motive fluid to said end of the cylinder, and a fluid pressure operated means for changing the direction of flow of motive fluid to impart a return stroke to said elements.

16. A fluid pressure operated bottle capping machine comprising a cylinder, a pair of fluid pressure operated elements extending within the cylinder and adapted when operated to hold the cap on and crimp it upon a bottle neck, means whereby one end of the cylinder is opened prior to the opening of a motive fluid supply for the reception of a charge of motive fluid to impart the operative stroke to said elements, means for gradually opening the motive fluid supply subsequent to the opening of the said end of the cylinder whereby a sudden operative stroke of the elements will be prevented, and means for changing the direction of flow of the motive fluid whereby a return stroke will be imparted to said elements.

17. A fluid pressure operated bottle capping machine comprising a cylinder, a pair of fluid pressure operated elements extending within the cylinder and adapted when operated to hold the cap on and crimp it upon a bottle neck, means whereby one end of the cylinder is opened prior to the opening of a motive fluid supply for the reception of a charge of motive fluid to impart the operative stroke to said elements, means for gradually opening the motive fluid supply subsequent to the opening of the said end of the cylinder whereby a sudden operative stroke of the elements will be prevented and a fluid pressure operated means for changing the direction of flow of the motive fluid whereby a return stroke will be imparted to said elements.

18. A fluid pressure operated bottle capping machine comprising a cylinder adapted to communicate with a motive fluid supply, a pair of fluid pressure operated capping elements extending within the cylinder, means whereby one end of the cylinder is opened prior to the opening of the motive fluid supply for the reception of a charge of motive fluid to impart the operative stroke to said elements, means for opening the motive fluid supply subsequently to the opening of said end of the cylinder to prevent a sudden operative stroke of said elements, and a fluid pressure operated means for changing the direction of motive fluid supplied to said cylinder thereby imparting a return stroke.

19. A fluid pressure operated bottle capping machine comprising a cylinder, a pair of fluid pressure operated reciprocatory elements for holding a cap upon and crimping it around a bottle neck, said elements operating within and projecting out of said cylinder, means whereby motive fluid is supplied to said cylinder for operating said elements in one direction, and means actuated on the rise of pressure within the cylinder for automatically changing the course of the fluid supplied to the cylinder for directing the fluid against one of said elements for operating them in the opposite direction.

20. In a fluid pressure operated bottle capping machine, a pair of fluid pressure operated elements for holding and crimping a cap upon a bottle neck, means for supplying fluid pressure against said elements for shifting them to operative position, and a fluid pressure operated means for changing the direction of flow of the motive fluid for returning the elements to inoperative position.

21. In a fluid pressure operated bottle capping machine, a pair of fluid pressure operated elements for holding and crimping a cap upon a bottle neck, means for supplying fluid pressure against said elements for shifting them to operative position, means for changing the direction of flow of the motive fluid for returning the elements to inoperative position, means for providing a fluid cushion for the elements when moving in one direction, and means for providing a fluid cushion when the elements are moving in the opposite direction.

22. In a fluid pressure operated bottle capping machine, a pair of fluid pressure operated elements for holding and crimping a cap upon a bottle neck, means for supplying fluid pressure against said elements for shifting them to operative position, a fluid pressure operated means for changing the direction of flow of the motive fluid for returning the elements to inoperative position, means for providing a fluid cushion for the elements when moving in one direction, and means for providing a fluid cushion when the elements are moving in the opposite direction.

23. In a fluid pressure operated bottle capping machine, a pair of fluid pressure operated elements for holding and crimping

a cap upon a bottle neck, means for supplying fluid pressure against said elements for shifting them to operative position, and a fluid pressure operated trip mechanism for changing the direction of flow of the motive fluid for returning the elements to inoperative position.

24. In a fluid pressure operated bottle capping machine, a pair of fluid pressure operated elements for holding and crimping a cap upon a bottle neck, means for supplying fluid pressure against said elements for shifting them to operative position, a fluid pressure operated trip mechanism for changing the direction of flow of the motive fluid for returning the elements to inoperative position, and means for regulating the supply of motive fluid.

25. In a fluid pressure operated bottle capping machine, a pair of fluid pressure operated elements for holding and crimping a cap upon a bottle neck, means for supplying fluid pressure against said elements for shifting them to operative position, a fluid pressure operated trip mechanism for changing the direction of flow of the motive fluid for returning the elements to inoperative position, means for regulating the supply of motive fluid, means for providing a fluid cushion for the elements when moving in one direction, and means for providing a fluid cushion when the elements are moving in the opposite direction.

26. In a fluid pressure operated bottle capping machine, a pair of fluid pressure operated reciprocatory elements for holding and crimping a cap upon a bottle neck, one of said elements arranged within the other, means for supplying pressure against said elements for shifting them to operative position, and a fluid pressure operated trip mechanism for changing the direction of flow of the motive fluid for returning the elements to inoperative position.

27. In a fluid pressure operated bottle capping machine, a pair of fluid pressure operated reciprocatory elements for holding and crimping a cap upon a bottle neck, one of said elements arranged within the other, means for supplying pressure against said elements for shifting them to operative position, a fluid pressure operated trip mechanism for changing the direction of flow of the motive fluid for returning the elements to inoperative position, means for providing a fluid cushion for the elements when moving in one direction, and means for providing a fluid cushion for the elements when moving in the opposite direction.

28. In a fluid pressure operated bottle capping machine, a pair of fluid pressure operated reciprocatory elements for holding and crimping a cap upon a bottle neck, one of said elements arranged within the other, means for supplying pressure against said elements for shifting them to operative position, a fluid pressure operated trip mechanism for changing the direction of flow of the motive fluid for returning the elements to inoperative position, means for providing a fluid cushion for the elements when moving in one direction, means for providing a fluid cushion for the elements when moving in the opposite direction, and means for regulating the application of pressure to said elements.

29. A fluid pressure operated bottle capping machine comprising a cylinder having a pair of ports, a pair of fluid pressure operated reciprocatory capping elements extending within said cylinder and adapted when operated in one direction to secure a cap upon a bottle neck, a valve chamber communicating with the cylinder through said ports, a slide valve within said chamber, an inlet valve mechanism adapted when shifted in one direction to establish communication between said chamber and a motive fluid supply, a vertically movable member for shifting said slide valve to open one of said ports, means whereby said member is rocked to shift the inlet valve mechanism to open said chamber to a motive fluid supply subsequent to the opening of said port, and normally locked fluid pressure operated means for shifting the slide valve in the opposite direction to open the other of said ports, and means actuated by the rise of pressure within the cylinder for releasing said fluid pressure operated means.

In testimony whereof I affix my signature in presence of two witnesses.

ROSS V. CRAGGS.

Witnesses:

ROBERT M. LOVELL,

CARY D. HALL, Jr.