

March 12, 1940.

S. T. CARTER

2,193,618

FOIL CAPPING MACHINE

Filed Sept. 13, 1938

7 Sheets-Sheet 1

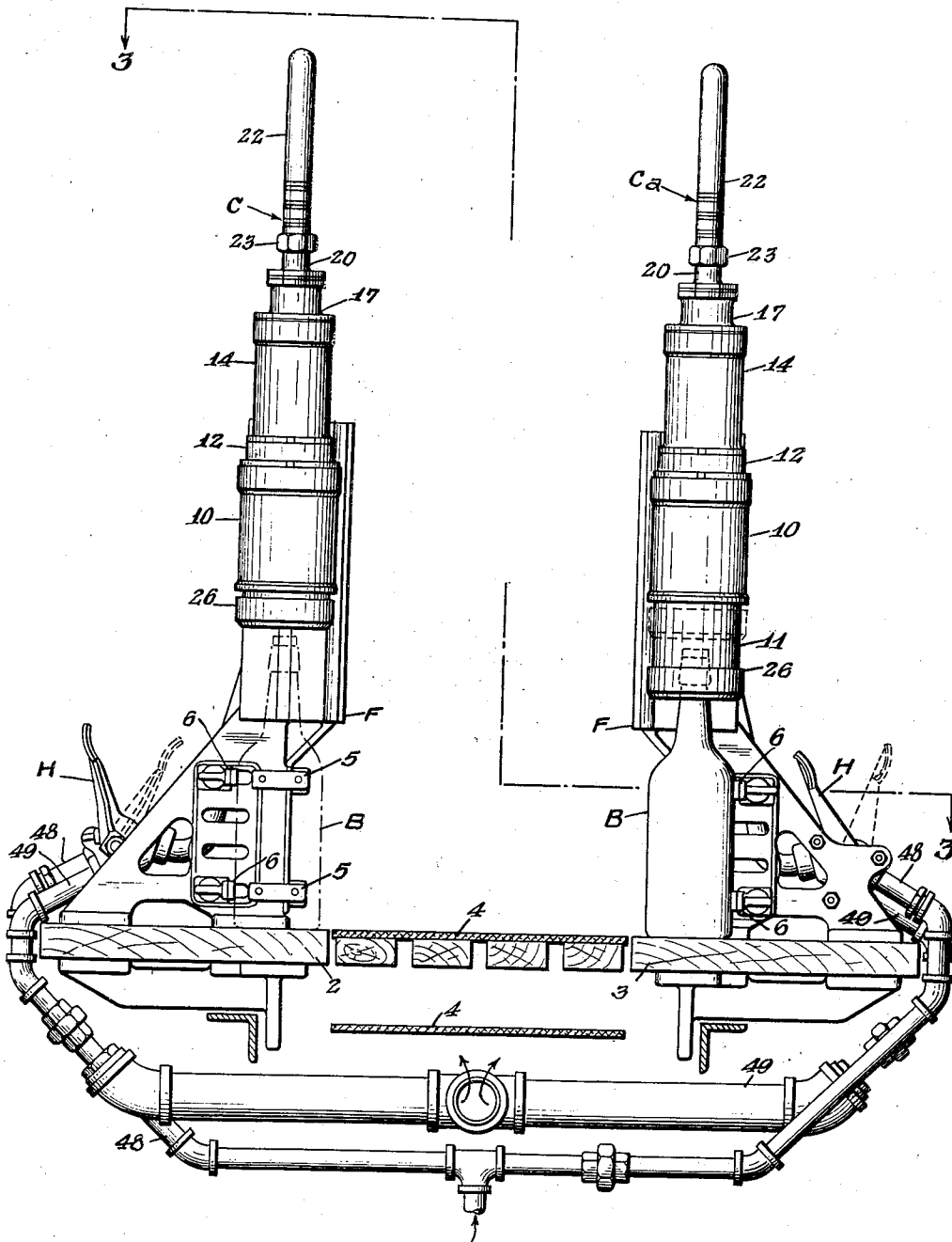


Fig. 1

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7 Sheets-Sheet 2

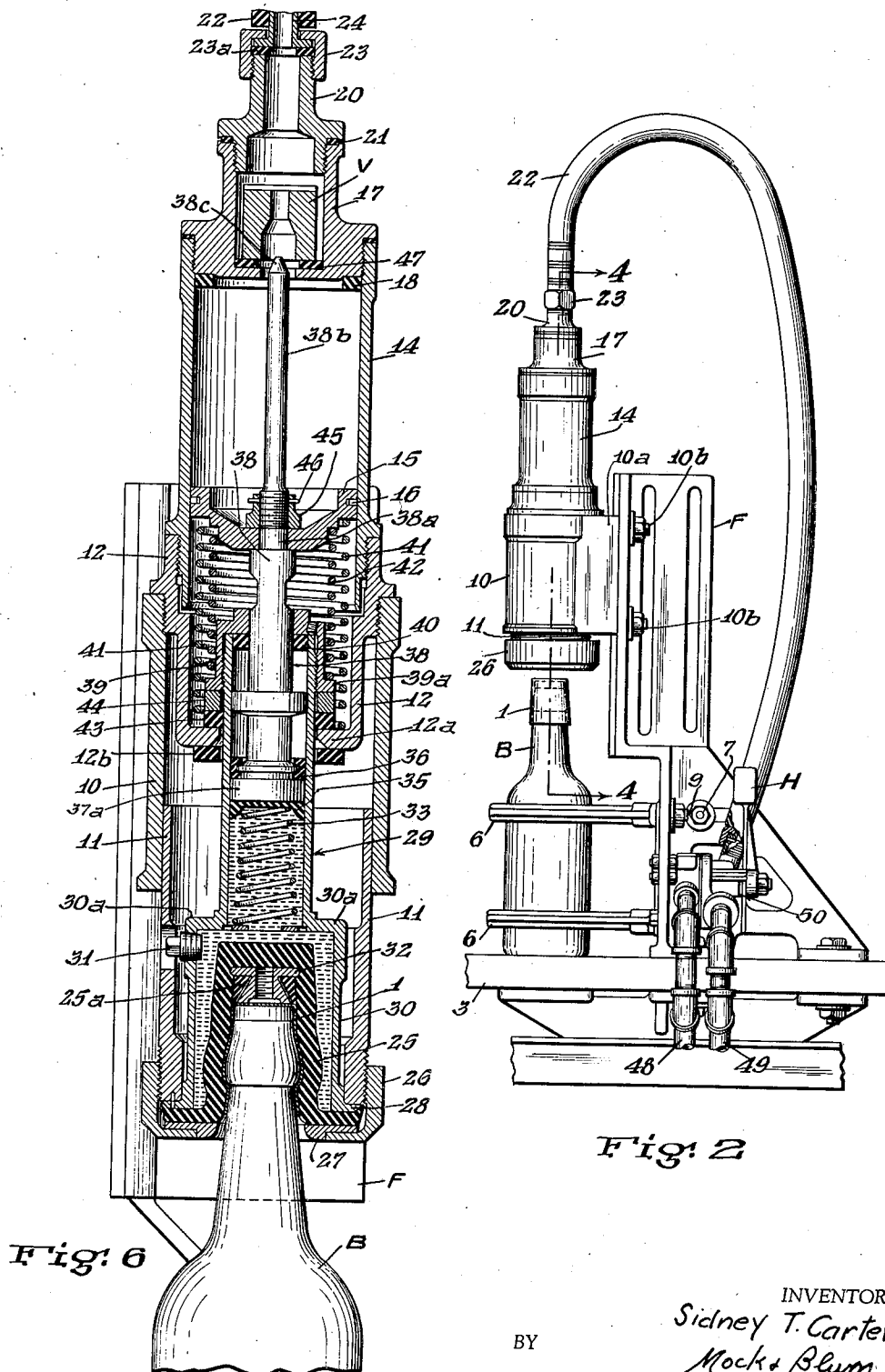


Fig. 2

Fig. 6

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7 Sheets-Sheet 3

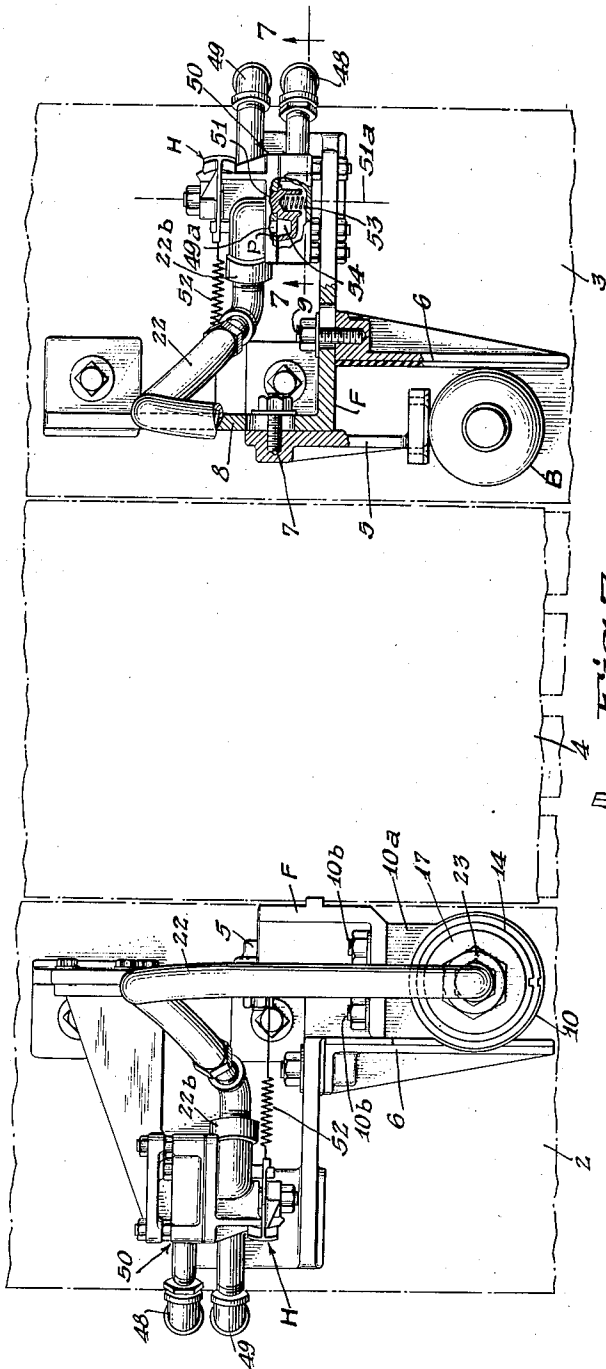


Fig. 3

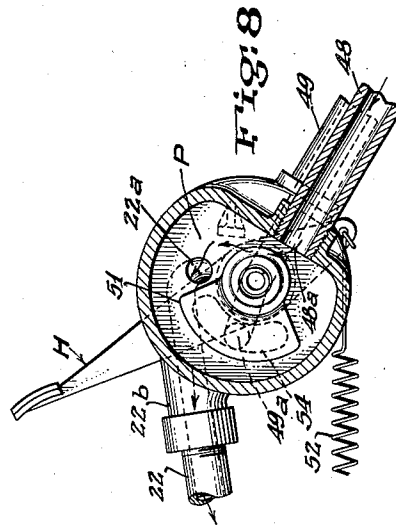


Fig. 8

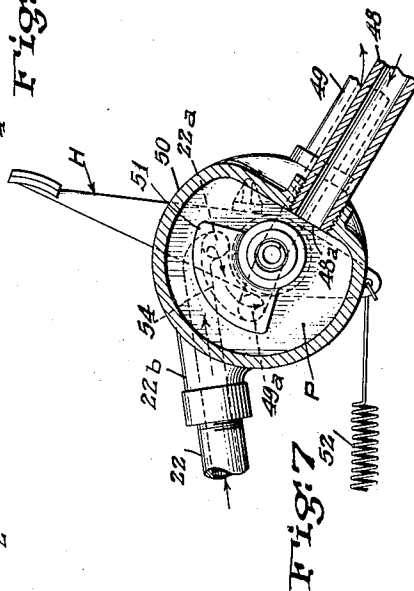


Fig. 7

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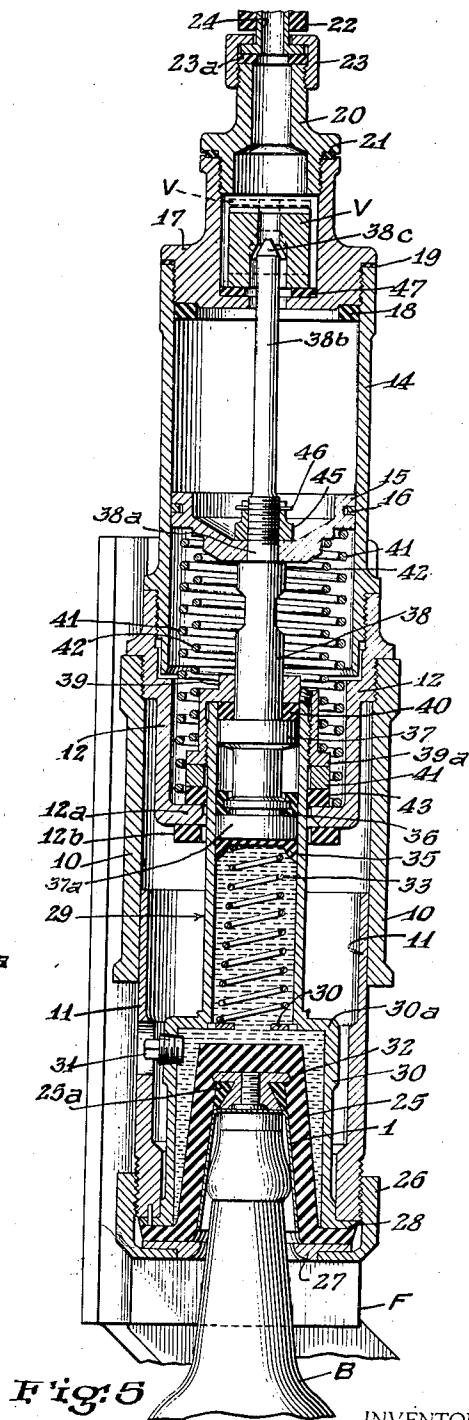
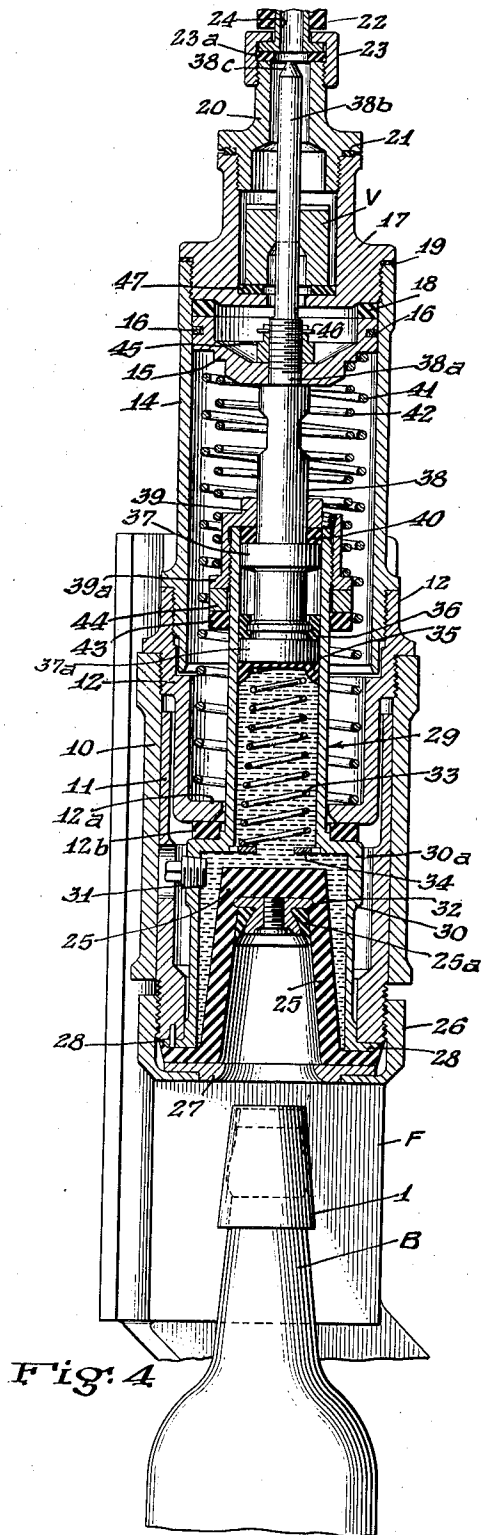
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FOIL CAPPING MACHINE

Filed Sept. 13, 1938

7 Sheets-Sheet 4



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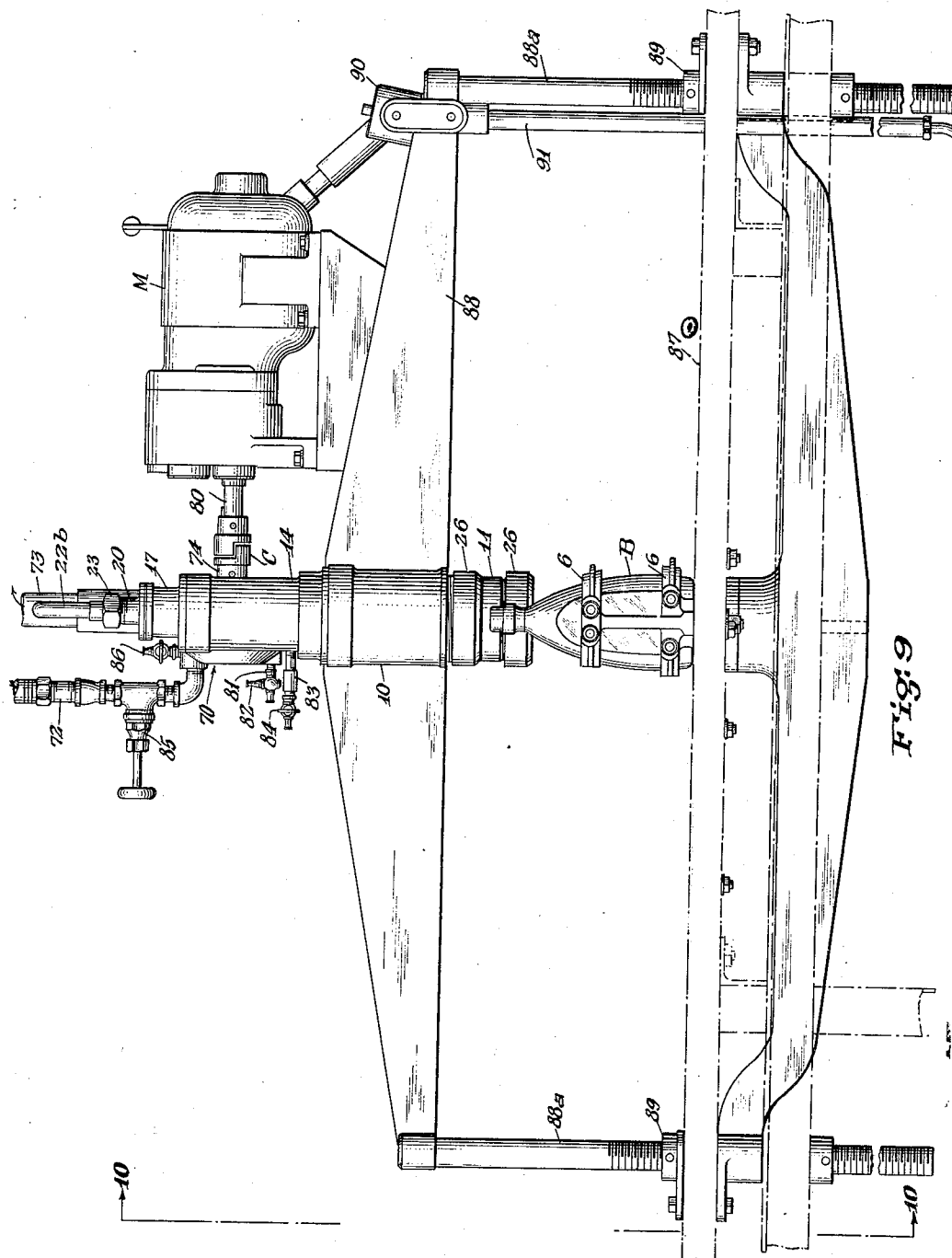
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FOIL CAPPING MACHINE

Filed Sept. 13, 1938

7 Sheets-Sheet 5



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FOIL CAPPING MACHINE

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7 Sheets-Sheet 6

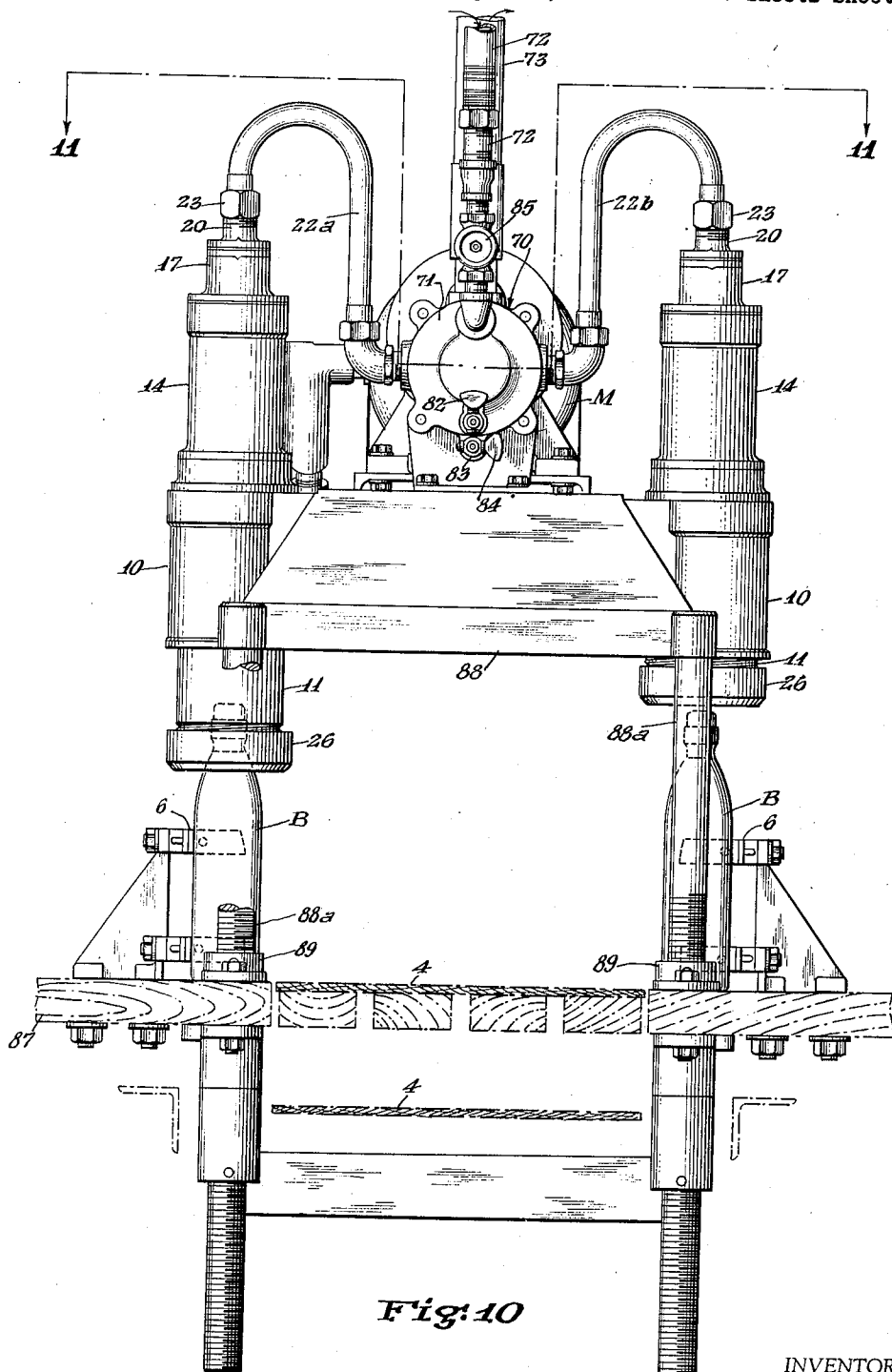


Fig. 10

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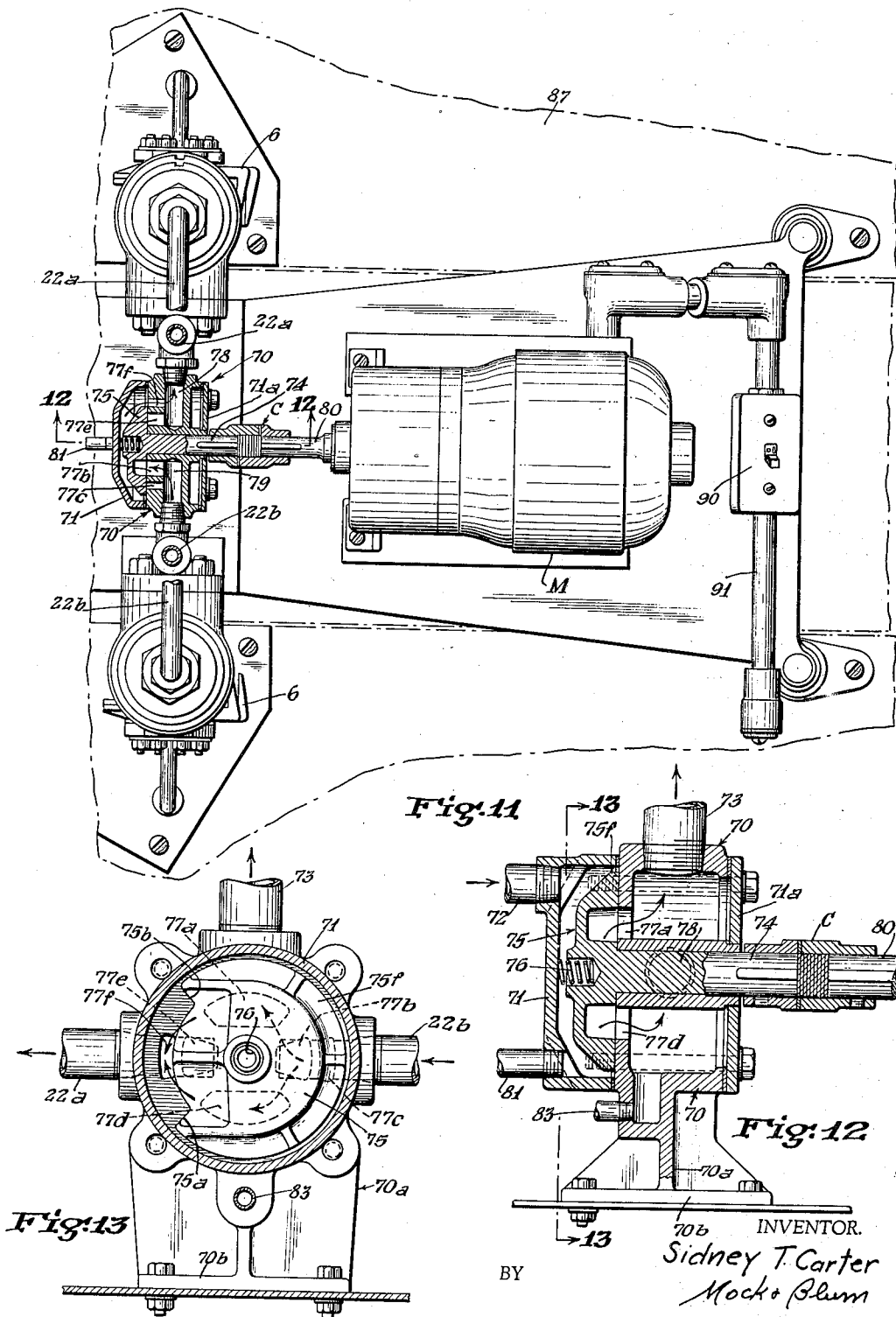
S. T. CARTER

2,193,618

FOIL CAPPING MACHINE

Filed Sept. 13, 1938

7 Sheets-Sheet 7



UNITED STATES PATENT OFFICE

2,193,618

FOIL CAPPING MACHINE

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by mesne assignments, to Schenley Distillers
Corporation, a corporation of Delaware

Application September 13, 1938, Serial No. 229,669

10 Claims. (Cl. 226—85)

My invention relates to a new and improved foil capping machine.

One of the objects of the invention is to provide mechanism which is automatically operated when a control handle or other control device is actuated.

Another object of the invention is to provide improved and reliable means whereby the foiling head is moved to operative position prior to the distortion thereof, and said foiling head is restored to normal shape by the release of the deforming force, before moving the foiling head away from operative position.

Another object of the invention is to provide a device of this kind having a plurality or series of cylinders and springs whereby the parts will be caused to move automatically in desired succession, upon the operation of a control device, such as a valve or the like.

Another object of the invention is to provide mechanism which will operate without injuring the capsule or the foiling head.

Another object of the invention is to provide mechanism which will operate automatically under manual control by the operator, or which will have a continuous and wholly automatic action.

Other objects of my invention will be set forth in the following description and drawings which illustrate preferred embodiments thereof, it being understood that the above statement of the objects of my invention is intended generally to explain the same without limiting it in any manner.

Fig. 1 is a front elevation, partially in section, showing the essential parts of the improved device, utilizing a manual control.

Fig. 2 is a side elevation of Fig. 1.

Fig. 3 is a plan view, partially in section, on the line 3—3 of Fig. 1.

Fig. 4 is a sectional view on the line 4—4 of Fig. 2. This shows the parts in normal position, ready to receive the bottle.

Fig. 5 is similar to Fig. 4, showing the foiling head lowered from the position shown in Fig. 4. In this view the foiling head has not yet been deformed so as to press the foil against the head and neck of the bottle.

Fig. 6 is similar to Fig. 4, showing the parts in their final position for applying the foil to the bottle.

Fig. 7 is a sectional view on the line 7—7 of Fig. 3. This shows certain of the control parts in the position operative for restoring the parts to the position shown in Fig. 4.

Fig. 8 is a view similar to Fig. 7 and showing certain control parts in the position operative to cause the foiling head to move from the position shown in Fig. 4 to the position shown in Fig. 5 and also in Fig. 6.

Fig. 9 is a view which is generally similar to Fig. 1, showing the second embodiment of the machine, which eliminates manual control. In this embodiment the frame of the machine is mounted on vertically adjustable parts.

Fig. 10 is an end elevation, partially in section, on the line 10—10 of Fig. 9.

Fig. 11 is a top plan view, partially in section, on the line 11—11 of Fig. 10.

Fig. 12 is a sectional view on the line 12—12 of Fig. 11.

Fig. 13 is a sectional view on the line 13—13 of Fig. 12.

The device shown in Figs. 1—3 can be used in combination with any suitable machine which applies the capsules 1 to the heads of the bottles B, or else said capsules 1 can be applied to the bottles B by hand. The capsules 1 are usually made of metal foil but they can be made of any suitable yieldable material.

As shown in Fig. 1, duplicate devices can be connected to tables 2 and 3 which are mounted upon any suitable support. An endless conveyor belt 4 may be provided for feeding the bottles to the capping stations. The top and bottom runs of the endless conveyor belt 4 are preferably horizontal and planar, and said runs move oppositely in planes which are perpendicular to the plane of the paper in Fig. 1. The conveyor belt 4 and the mechanism for operating the same are not disclosed, as they are well known per se.

The capping units C and Ca are identical in all respects.

As shown in Fig. 3, each capping station is provided with a longitudinally adjustable stop 5, and with a laterally adjustable stop 6, so that the bottle B can be located in proper position relative to the unit C or Ca.

As shown in Fig. 3, the longitudinally adjustable stop 5 is connected to the frame F of the machine by means of a clamping screw 7, whose shank extends through a longitudinally slotted part 8 of the frame F. The laterally adjustable stop 6 is likewise adjustably connected to the frame F by means of a clamping screw 9.

As shown in Fig. 2, each capping unit is vertically adjustable relative to the respective table. Each capping unit is provided with an outer casing-cylinder 10 which has an arm 10a, adjustably

connected to the frame F by means of clamping screws 10b.

As shown in Fig. 4, the casing cylinder 10, which may be designated as the first cylinder, has a first piston 11 movably located therein.

The bottom wall of the first piston 11 abuts the top surface of the flange 28 of the enlarged head 30 of a second cylinder 29. The foiling head 25 is made of rubber or other suitable resilient and deformable material. The bottom of said foiling head 25 has a flange which abuts the underside of the flange 28. A metal washer 27 abuts the underside of the flange of the foiling head 25. A nut 26 can be screwed upon the bottom end portion of the piston 11, so as to clamp the washer and the flange of the foiling head to the flange 28 of the head 30.

Additional means may be provided for removably connecting the flange 28 of the head 30 to the first piston 11.

As shown in Figs. 4 and 5, the second cylinder 29 is vertically movable relative to the casing cylinder 10. In Fig. 4 the second cylinder 29 is shown in its top position. The casing cylinder 10 is provided with a head 12 which is screwed into said casing cylinder 10. The head 12 is provided with a stop flange 12a to which a resilient stop-washer 12b, made of rubber or other suitable material, is connected.

As shown in Fig. 4, the shoulder 30a of the cylinder 29 abuts the underside of said stop washer 12b, when cylinder 29 is in its top position.

The second cylinder 29 contains a suitable liquid such as glycerine or a suitable oil or other non-aqueous liquid. The use of water as a filling liquid is not excluded. The use of a compressible gas, instead of a non-compressible liquid is within the scope of the invention.

A piston cup 35, made of rubber or other suitable resilient material, is slidably located in the cylinder 29. This cup 35 has a snug or piston-like fit in the cylinder 29. A spring 33 has its upper end abutting the cup 35. The lower end of the spring 33 abuts a metal washer 34 which is suitably connected to the inner wall of the shoulder 30a.

In the position shown in Fig. 4, the spring 33 is in the relaxed or unstressed condition, and the cup 35 is in its top position. In this position, the liquid in cylinder 29 is under no pressure in excess of the atmospheric pressure, so that foiling head 25 has its normal shape. The cylinder 29 is provided with a filling opening which is closed by means of a removable plug 31, which is screwed into a suitable tapped opening of the cylinder 29.

A third cylinder 14 has its bottom end portion threaded and screwed into the cap 12 of the casing cylinder 10.

A cap 17 is screwed into the top of the cylinder 14, the usual packing washer 19 being provided for air-tight connection. Another cap 20 is screwed into the cap 17, the usual packing washer 21 being provided for air-tight connection.

A piston 37 is vertically movable within the cylinder 29. The cylinder 29 has a perforated cap 39 screwed thereon. A resilient stop washer 40 is connected to the underside of the cap 39.

As shown in Fig. 4, the piston 37 abuts said stop washer 40, when the piston 37 is in its top position. The piston 37 is provided with a first stem-portion 38 which projects through the cap 39. This stem-portion 38 is integral with a reduced stem-portion 38a, and with a top stem-portion 38b, which has a frusto-conical tip 38c. The stem-portion 38a passes through a piston 15,

made of metal or other suitable material, and which is provided with a piston ring 16. The stem-portion 38a is externally threaded and a nut 45 clamps the stem-portion 38a to the piston 15.

The piston 37 is integral with a spaced head or piston 37a. The resilient rubber ring-washer 36 abuts the upper surface of piston 37a, whose lower surface abuts the resilient inverted rubber cup 35.

A cotter-pin 46 locks the nut 45 to the stem-portion 38a. The cap 17 has a flange upon which a resilient washer 47 is located. A valve V is located within the cap 17. Said valve is held against substantial lateral movement by stem-portion 38b, from the position shown in Fig. 4. In Fig. 5, the tip 38c projects partially into the upper part of the bore of valve V, so as to prevent any substantial lateral movement of said valve. The stem-portion 38b is vertically movable relative to the valve V. Stem-portion 38 is guided in cap 39. The upper position of the valve V is indicated in broken lines in Fig. 5.

An inlet pipe 22 is connected to the cap 20. This pipe 22 may be of the well known type which is used for conducting air or a liquid under pressure. Pipes of this kind have an inner flexible metal sheath and an outer covering of rubber or other flexible material. This metal sheath has an exposed rigid coupling portion 24 at the end thereof.

A sealing washer 23a is located at the top of the cap 20. A nut 23 couples the pipe 22 to the cap 20, in conventional manner, as shown in Figs. 4 and 5.

As shown particularly in Fig. 5, the bore of the valve V is reduced at the top thereof. The stem-portion 38b fits snugly but not air-tight in the top reduced portion of the bore of the valve V. The clearance between the stem-portion 38b and the narrow portion of the bore of the valve V, may be comparatively slight, as for example about .010 of an inch. Stem-portion 38b may fit as snugly as desired in the upper part of the bore of valve V, although said stem-portion always moves freely relative to valve V, without any binding action.

As shown in Fig. 3 and Fig. 7, each inlet pipe is connected to a valve casing 50. This valve casing 50 has a partition P which is shown in Figs. 3, 7 and 8. This partition P is imperforate save for spaced ports 22a and 49a. The partition P therefore divides the valve casing 50 into two chambers.

An intake pipe 48 is connected to one of said chambers, by means of a port 48a. A source of compressed air (not shown) is connected to the intake pipe 48. A valve 51 is located in the chamber of the valve casing 50 in which the port 48a is located. The valve casing 50 has an integral extension 22b whose channel communicates with the port 22a. The inlet pipe 22 is suitably connected to the coupling member or fitting 22b.

An exhaust pipe 49, which leads to the outer atmosphere, is connected to the port 49a.

As shown in Fig. 1, the pipes 48 of the units C and Ca may be connected to a common source of compressed air, and the exhaust pipes 49 of the respective units may have a common outlet to the atmosphere.

The valve 51 has a bearing in a bore of the wall of the valve casing 50. Said valve 51 has a projection which extends through said bore of the wall of the valve casing 50, and a handle H is connected to said extension of the valve.

Referring to Fig. 3, the valve 51 is turnable about an axis 51a, which is in the plane of the paper in Fig. 3. Said valve 51 has the face thereof which is adjacent the partition P provided with an arcuate groove 54 whose center is located on the axis 51a. The ends of said groove 54 are spaced from the ends of the valve 51.

A spring 52 maintains the valve 51 in the normal position illustrated in Fig. 7. In said position, the ports 22a and 49a are in communication through the groove 54 so that the pipe 22 communicates with the outer atmosphere through the respective pipe 49 and the pressure within the capping unit is therefore the normal atmospheric pressure. In said normal position the ports 22a and 49a are sealed by valve 51 from the chamber in which port 42a is located.

When the handle H is moved from the normal position shown in Fig. 7 to the position shown in Fig. 8, compressed air can pass through the port 22a as indicated by the arrows in Fig. 8 so that the device is operated by means of the compressed air. A suitable stop maintains the handle H and the valve 51 in the normal position shown in Fig. 7, against the force of the tension spring 52.

As shown in Figs. 4-6, an outer compression spring 41 has its upper end abutting the piston 15. The lower end of said outer compression spring 41 abuts the top surface of the flange 12a.

An inner compression spring 42 has its upper end abutting the piston 15, and its lower end abuts the flange 39a of the cap 39.

In order to minimize the wear of the foiling head 25, this is provided with a metallic insert 32 which has a disc-shaped head and a frusto-conical shank. The insert 32 can be made of metal or other suitable rigid material and it is provided with a central tapped bore. A resilient washer 25a, made of rubber or other suitable material, can be sprung over the shank of the insert 32. This washer 25a has a tight fit against the inner frusto-conical wall of the foiling head 25, so as to keep the insert 32 in position. The head of the insert 32 can be forced into a recess which is provided in the resilient material of the foiling head 25. A suitable tool can engage the tapped bore of the insert 32, in order to apply or to remove the same.

The operation of the device shown in Figs. 1-3, is as follows:

When the valve 51 is in the normal position shown in Fig. 7, the parts of the capping unit are in the corresponding normal positions shown in Fig. 4.

Any suitable fluid under pressure, such as compressed air, is admitted into cap 20 by moving valve 51 to the position shown in Fig. 8. The parts are first moved from the position shown in Fig. 4 to the position shown in Fig. 5. The compressed air in cap 20 presses valve V downwardly, sealing its bottom face against the resilient washer 47. Hence the compressed air which enters the third cylinder 14 must pass through the close clearance between the stem-portion 38b and the bore of the valve V.

The size of this clearance controls the speed at which the compressed air enters the third cylinder 14. It is desirable to control the speed of this change in relative positions because if the compressed air enters the third cylinder 14 too rapidly while the parts are thus moved, the device would operate like a hammer.

If the compressed air enters the cylinder 14

too slowly, the operation of the device is unnecessarily delayed.

When piston 15 is moved downwardly, the spring 42 moves the second cylinder 29 in unison with the piston 15, since the upper end of the spring 42 abuts the piston 15 and the lower end of said spring abuts the flange 39a of the cap 39 of the second cylinder 29.

The second cylinder 29 is connected rigidly to the first piston 11 by means of the head 30 and the nut 26. The second cylinder 29 and the first piston 11 therefore move downwardly in unison until the resilient washer 43 abuts the flange 12a of the head 12, which is fixed rigidly to the stationary casing cylinder 10. The spring 42 is sufficiently stiff to cause the piston 15 and the second cylinder 29 to move in unison, to their positions shown in Fig. 5, without any substantial deformation of said spring 42.

In Fig. 5 the forming head 25 is in its final position relative to bottle B and said head 25 is ready to shape the capsule. The frusto-conical tip 38c has cleared the bore of valve V, so that the compressed air can rapidly enter the third cylinder 14. The pressure in cylinder 14 is therefore now increased much more rapidly than during the movement of the parts to the position shown in Fig. 5.

The additional downward movement of the piston 15 from the position shown in Fig. 5 to the position of Fig. 6 compresses the spring 42, since the downward movement of the second cylinder 29 is now stopped by the flange 12a and the resilient washer 43.

Since the pistons 15 and 37 are rigidly connected to each other and the second cylinder 29 is now held stationary, pressure is exerted on the liquid in the second cylinder 29 by means of the cup 35, while piston 15 moves from the position of Fig. 5 to the position of Fig. 6, thus deforming the foiling head 25 and squeezing the capsule 1 tightly against the bottle, as shown in Fig. 6. The second cylinder 29 is completely filled with liquid up to the cup 35 and it is closed by the cup 35 and by the foiling head 25. The cup 35 always abuts, or it is close to the head 37a which is provided at the bottom of stem 38. Likewise the pressure per unit of area which is exerted on the liquid in the cylinder 29, while piston 15 moves from the position of Fig. 5 to the position of Fig. 6, is greater than the pressure per unit of area of the compressed air on the piston 15, since the area of the cup 35 and of the piston 37 is less than the area of the piston 15.

After the capsule 1 has been finally shaped, the valve 51 is then moved to its position shown in Fig. 7, thus allowing the compressed air in the third cylinder 14 to exhaust into the outer atmosphere. The parts thereupon first move from the position shown in Fig. 6 to the position shown in Fig. 5, under the force of springs 42 and 41, so that the foiling head then assumes its normal shape, thus releasing the pressure on the capsule 1 and releasing the bottle.

The parts then move to the position shown in Fig. 4, under the force of actuating spring 41 alone, since spring 42 is under little or no compression in the position of Fig. 5, so that the machine is ready to cap the next bottle. While the air is exhausted from the third cylinder 14, the valve V moves to the broken-line position shown in Fig. 5. In this position the air can exhaust around valve V, thus permitting a rapid return movement of the apparatus. The members 35 and 36 are of the common cup-and-ring

type of packing washers, which are well-known. Each of them seals only in one direction. Since no liquid must be permitted to escape from the cylinder 29, and since no air or lubricating oil should enter said cylinder 29, said washers are placed in opposite working positions which makes them effective in opposite directions. This makes it impossible for any liquid or gas to enter the cylinder 29 or for any liquid to escape from the cylinder 29. In the positions shown in Figs. 4 and 5, the liquid in the cylinder 29 is under normal atmospheric pressure. The entire operation is thus controlled by means of the valve shown in Figs. 7 and 8 and since the entire machine is actuated by compressed air, no damage occurs if the operator does not place the bottle directly under the foiling head.

If the member 26 should strike the top of the bottle, this will take place before piston 15 is in the position of Fig. 5. This stops the movement of the first piston 11 and of the second cylinder 29 so that the foiling head 25 will deform upon further downward movement of the piston 15 from the position of Fig. 4 to the position of Fig. 5. However the air pressure will not increase to a point where the bottle will be broken. Likewise the blow on the bottle will be a light one, because piston 15 has been moving slowly. When a bottle has been thus misplaced, the operator exhausts the air from the third cylinder 14, and the bottle is then reset to proper position.

In the second embodiment, the capping units have the same construction as in the first embodiment. As shown in Fig. 10, said units have pipes 22a and 22b which have the same function as pipe 22. These pipes 22a and 22b are connected to a valve-casing 70. As shown in Figs. 11 and 12, casing 70 is provided at opposite sides thereof with covers 71 and 71a. These covers are connected to casing 70 by screws, gaskets being provided to make tight seals.

As shown in Fig. 11, a liquid or a gas under pressure is supplied through inlet pipe 72, to the space between valve-casing 70 and cover 71. The valve-casing 70 has an exhaust pipe 73.

A horizontal turnable spindle is mounted in a sleeve-bearing of valve-casing 70. This spindle has a valve-head 75, which is cupshaped, and which has a flange 75f. A spring 76 maintains flange 75f in contact with the adjacent wall of casing 70. Said adjacent wall has six ports, 77a, 77b, 77c, 77d, 77e, and 77f. The four ports 77a, 77b, 77d and 77e have their centers equidistant from the axis of spindle 74, and said centers are separated by arcs of 90°. The ports 77c and 77f have their centers equidistant from said spindle and spaced by an arc of 180°.

Said flange 75f has a major portion of continuous annular shape of equal radius through an arc of 270°, and it has a minor segment of 90° between the points 75a and 75b. Said minor segment has a smaller radius than the major portion of said flange.

In the position shown in Fig. 13, the flange 75f covers the port 77c and it uncovers the diametrically opposite port 77f. As the valve spindle 74 is turned, the flange 75f alternately covers and uncovers said ports 77f and 77c, one of said ports always being closed when the other is open. The other four ports 77a, 77b, 77d and 77e always communicate with each other through the interior annular space of the head 75. These four ports are therefore always in communication with the annular chamber of the valve-casing 70, which is located around the sleeve-bearing of spindle 74.

The port 77f is in permanent communication with the bore 78 of the valve casing 70, and the port 77c communicates permanently with the bore 79 of said valve casing 70. Therefore, when the port 77f is uncovered by the flange 75f, the air under pressure which enters through the pipe 72 will pass through said port 77f into the bore 78 and into the pipe 22a.

When the valve head 75 has been turned so that its flange 75f covers the port 77f and uncovers the port 77c, the compressed air is supplied through port 77c to the bore 79 and to the pipe 22b.

Therefore the respective units will be operated alternately when the spindle 74 is turned.

The valve spindle 74 is turned continuously by means of a suitable electric motor M, whose shaft 80 is releasably connected to the spindle 74 by a suitable coupling C. The speed of rotation of the shaft 80 is regulated so that each of the capping units can perform its pressure stroke, in the manner stated in connection with the first embodiment, while air under pressure is supplied thereto.

The shaft 80 can turn thirty to sixty revolutions per minute, although this can be regulated, depending upon the speed at which the bottles are to be capped. The maximum speed is about 120 bottles per minute.

The exhaust stroke of each capping unit is completed during the period in which its respective port 77c or 77f is covered by the flange 75f. During said period, the air cannot escape from the unit through its respective port 77f or 77c. Therefore, and as indicated by the arrows in Figs. 11-13, the air passes from the respective unit through the annular space of the cupshaped head 75 to the exhaust pipe 73. The space between the valve casing 70 and its cover 71 is provided with a relief pipe 81, which has a manually operable valve 82 for draining any excess water and oil from the air supplied.

The valve casing 70 can also be provided with a supplemental exhaust pipe 83, which has a manually controlled valve 84.

The inlet pipe 72 is provided with the usually manually controlled valve 85. The apparatus can also be provided with relief valve 86, which also acts as a means of lubrication.

As shown in Fig. 9, the second embodiment is provided with a table 87. A frame 88 which is integral with the frames of the capping units is vertically adjusted by means of threaded standards 88a and turnable nut-members 89.

As shown in Fig. 11, the motor M is controlled by means of a switch 90. As shown in Fig. 9, the power cable of the motor is led through a conduit 91.

While I have shown preferred embodiments of the invention, it is clear that numerous changes and omissions can be made without departing from its spirit.

Whenever any part is referred to by specific mechanical description in the claims, the claims cover parts having the same essential mode of operation.

For convenience the claims refer to the vertical position of the capping unit illustrated in the drawings, but the capping unit may be mounted so as to operate in any plane. The member 11 has been referred to as a piston but it operates essentially as a plunger-guide, in order to guide the movement of the cylinder 29. Therefore the member 11 may be omitted or it may be replaced by any suitable type of guide.

Likewise the invention covers numerous valuable sub-combinations which are not operative per se and which can be used in capping units which differ widely from the preferred embodiment disclosed herein.

While the use of a liquid for deforming the foiling head is preferred to the use of a gas, the use of a gas is not excluded.

In its broadest aspect, the invention includes a capping cylinder 29 which is movable to-and-fro in a path of predetermined length, in combination with automatic means which apply pressure to the deformable head 25 only after the capping cylinder has completed its operative stroke to the position shown in Fig. 5, and said means automatically release the pressure upon said deformable head 25 before the capping cylinder is moved away from the operative position shown in Fig. 5.

Whenever "means" are referred to in the claims, this term is intended to cover the corresponding element or elements specifically disclosed herein, plus the broadest equivalents to which the invention is entitled in view of the prior art.

By suitably designing the valve of the second embodiment, said valve may control three or more capping units. Hence, whenever I refer in the claims to a valve which controls a pair of capping units, I include machines in which the valve controls more than two capping units.

For convenience, the parts have been referred to by reference numerals in some of the claims. The use of such reference numerals is not a limitation.

I claim:

1. A foil capping-device comprising a second cylinder which is mounted for vertical movement, a deformable foiling head connected to the mouth of said second cylinder, said second cylinder containing a fluid which contacts with the inner wall of said foiling head, a second piston located in the second cylinder above said foiling head, the downward movement of said second piston relative to the second cylinder being adapted to subject the fluid in the second cylinder to pressure and to deform the foiling head, the second cylinder having a second cap, the second piston having a vertical stem which extends movably through said cap, a third piston connected to said stem above the second cap and intermediate the ends of said stem, a third and stationary cylinder in which the third piston is located, the third cylinder having a third cap which is provided with a bore through which air under pressure can be admitted into the third cylinder to move the third piston downwardly in unison with the second piston, the stem of the second piston having a stem portion which is located in said bore when the above-mentioned parts are in normal position, the third cap having a flange, a valve located within the bore of the third cap and supported by said flange, said valve being vertically movable relative to the third cap, said valve having a vertical bore comprising a lower bore-portion and a top bore portion which is narrower than the bottom bore-portion, said stem having a stem-portion which extends through the top bore-portion and which fits snugly in said top bore-portion in the normal positions of the aforesaid parts, a first spring having its upper end abutting the underside of the third piston and having its lower end abutting a stop, a second spring having its upper end abutting the underside of the third piston and having its

lower end abutting the second cylinder, said stem-portion having a smaller horizontal cross-section than the horizontal cross-section of the third cylinder, said stem-portion being located below the top bore portion when the foiling head is deformed by the pressure of the fluid in the second cylinder, the top surface of the second piston abutting the underside of the cap of the second cylinder when the parts are in their normal positions.

2. In a foil capping-device, a capping cylinder, a deformable foiling head connected to the mouth of said capping cylinder, said capping cylinder containing a fluid which deforms said foiling head when the fluid is subjected to pressure, a piston located in said capping cylinder and movable relative to said capping cylinder, said capping cylinder being mounted for movement back-and-forth in a predetermined path to an operative position and to a second position which is spaced from said operative position, said piston being movable in said capping cylinder in a direction parallel to said path, a fluid-actuated device connected to said piston and adapted to actuate said piston relative to said cylinder so as to increase the pressure of the fluid in said capping cylinder and to deform said foiling head, spring-means located between said fluid-actuated device and said capping cylinder, said spring means being constructed to move the capping cylinder in unison with its piston until the capping cylinder has been moved to operative position so that the foiling head is not deformed until said capping cylinder has been moved to operative position.

3. In a foil capping device, a capping cylinder, a deformable foiling head connected to the mouth of said capping cylinder, said capping cylinder containing a fluid which deforms said foiling head when the fluid is subjected to pressure, a piston located in said capping cylinder and movable relative to said capping cylinder, said capping cylinder being mounted for movement back-and-forth in a predetermined path to an operative position and to a second position which is spaced from said operative position, said piston being movable in said capping cylinder in a direction parallel to said path, a fluid-actuated device connected to said piston and adapted to actuate said piston relative to said cylinder so as to increase the pressure of the fluid in said capping cylinder and to deform said foiling head, spring-means located between said fluid-actuated device and said capping cylinder, said spring means being constructed to move the capping cylinder in unison with its piston until the capping cylinder has been moved to operative position so that the foiling head is not deformed until said capping cylinder has been moved to operative position, spring means located and constructed to move the fluid-actuated device in a direction away from said foiling-head, additional spring means located and constructed to move the piston in a direction away from said foiling head.

4. In a foil capping-device, a second cylinder 29 mounted for vertical movement downwardly to an operative position and upwardly away from said operative position, a deformable foiling head 25 having a normal shape and connected to the mouth of said second cylinder, said second cylinder 29 containing a fluid which deforms said foiling head from said normal shape when the fluid is subjected to pressure, a second piston 37a located in said second cylinder 29 and mov-

able downwardly in and relative to said second cylinder 29 to subject said fluid to pressure, actuating means adapted to move the second cylinder 29 upwardly in unison with the second piston 37a when the second piston 37a is in such position in said second cylinder 29 that the foiling head 25 is in normal shape, said second piston having a stem 38 having a projecting portion which projects upwardly from the second cylinder 29, a third piston 15 connected to said stem 38 above the second cylinder 29, a third cylinder 14 in which said third piston 15 is located, means adapted to supply a fluid under pressure to the third cylinder 14 and also to relieve the pressure in the third cylinder 14, said third piston 15 being moved downwardly when fluid under pressure is supplied to said third cylinder 14, and means to move the third piston 15 upwardly when the pressure in the third cylinder 14 is relieved.

5. In a foil capping-device, a second cylinder mounted for vertical movement downwardly to an operative position and upwardly away from said operative position, a deformable foiling head having a normal shape and connected to the mouth of said second cylinder, said second cylinder containing a fluid which deforms said foiling head from said normal shape when the fluid is subjected to pressure, a second piston located in said second cylinder and movable downwardly in and relative to said second cylinder to subject said fluid to pressure, actuating means adapted to move the second cylinder upwardly in unison with the second piston when the second piston is in such position in said second cylinder that the foiling head is in normal shape, said second piston having a stem having a projecting portion which projects upwardly from the second cylinder, a third piston connected to said stem above the second cylinder, a third cylinder in which said third piston is located, means adapted to supply a fluid under pressure to the third cylinder and also to relieve the pressure in the third cylinder, said third piston being moved downwardly when fluid under pressure is supplied to said third cylinder, and means to move the third piston upwardly when the pressure in the third cylinder is relieved.

6. In a foil capping-device, a second cylinder 29 mounted for vertical movement downwardly to an operative position and upwardly away from said operative position, a deformable foiling head 25 having a normal shape and connected to the mouth of said second cylinder 29, said second cylinder 29 containing a fluid which deforms said foiling head 25 from said normal shape when the fluid is subjected to pressure, a second piston 37a located in said second cylinder 29 and movable downwardly in and relative to said second cylinder 29 to subject said fluid to pressure, means adapted to move the second cylinder 29 upwardly in unison with the second piston 37a when the second piston 37a is in such position in said second cylinder 29 that the foiling head 25 is in normal shape, said second piston 37a having a stem 38 having a projecting portion which projects upwardly from the second cylinder, a third piston 15 connected to said stem above the second cylinder 29, a third cylinder 14 in which said third piston 15 is located, means adapted to supply a fluid under pressure to the third cylinder 14 and also to relieve the pressure in the third cylinder 14, said third piston 15 being moved downwardly when fluid under pressure is supplied to said third cylinder 14, and spring means to move the third piston 15 upwardly when the

pressure in the third cylinder 14 is relieved, said spring means comprising a first spring 41 whose upper end abuts the underside of the third piston 15 and whose lower end abuts a fixed stop, and a second spring 42 whose upper end abuts the underside of the third piston 15 and whose lower end operatively abuts the second cylinder 29.

7. In a foil capping-device, a second cylinder mounted for vertical movement downwardly to an operative position and upwardly away from said operative position, a deformable foiling head having a normal shape and connected to the mouth of said second cylinder, said second cylinder containing a fluid which deforms said foiling head from said normal shape when the fluid is subjected to pressure, a second piston located in said second cylinder and movable downwardly in and relative to said second cylinder to subject said fluid to pressure, means adapted to move the second cylinder upwardly in unison with the second piston when the second piston is in such position in said second cylinder that the foiling head is in normal shape, said second piston having a stem having a projecting portion which projects upwardly from the second cylinder, a third piston connected to said stem above the second cylinder, a third cylinder in which said third piston is located, means adapted to supply a fluid under pressure to the third cylinder and also to relieve the pressure in the third cylinder, said third piston being moved downwardly when fluid under pressure is supplied to said third cylinder, and means to move the second piston upwardly when the pressure in the second cylinder is relieved, and control means adapted to control the admission of fluid under pressure into the third cylinder to actuate the third piston downwardly so as to subject said third piston to an initial pressure while the third piston and the second cylinder move downwardly in unison, and then to subject the third piston to a greater pressure after the second cylinder has reached its operative position.

8. In a foil capping-device, a capping cylinder, a deformable foiling head connected to the mouth of said capping cylinder, said capping cylinder containing a fluid which deforms said foiling head when the fluid is subjected to pressure, said capping cylinder being mounted for downward vertical movement to an operative position and for an upward vertical movement away from said operative position, a piston located in said capping cylinder, spring means mounted and adapted to cause the capping cylinder to move downwardly in unison with said piston to the operative position of said capping cylinder when the piston is downwardly actuated, pneumatic means operative to move said piston downwardly so as to move the capping cylinder downwardly to operative position and then to continue the downward movement of the piston so as to subject the fluid to pressure, means adapted to cause the capping cylinder and the piston to move upwardly in unison after the piston has moved upwardly relative to the cylinder to an extent sufficient to relieve the pressure on said fluid.

9. A foil-capping machine, comprising a pair of capping units, each unit comprising a capping cylinder having a deformable foiling head connected to its mouth and containing a fluid which deforms said foiling head when the fluid is subjected to pressure, each capping-cylinder being mounted for movement back-and-forth in a predetermined path to an operative position and to a second position which is spaced from said opera-

tive position, means operated by fluid under pressure and adapted to move said capping cylinders to their respective operative positions and to exert pressure upon the fluid in said capping cylinders, return means adapted to move said capping cylinders back to their second positions, each unit having a conduit connected thereto through which fluid under pressure is supplied to operate said means and through which said fluid can be exhausted to permit said return means to operate, a valve-device connected to said conduits, said valve having an inlet for admitting fluid under pressure and also having an outlet for relieving the pressure in said means, said valve-device having a movable valve which is adapted to connect said inlet to one of said conduits to the other conduit in all positions of said valve.

10. A foil-capping machine, comprising a pair of capping units, each unit comprising a capping cylinder having a deformable foiling head connected to its mouth and containing a fluid which deforms said foiling head when the fluid is subjected to pressure, each capping-cylinder being mounted for movement back-and-forth in a predetermined path to an operative position and to a second position which is spaced from said operative position, means operated by fluid under pressure and adapted to move said capping cylinders

to their respective operative positions and to exert pressure upon the fluid in said capping cylinders, return means adapted to move said capping cylinders back to their second positions, each unit having a conduit connected thereto through which fluid under pressure is supplied to operate said means and through which said fluid can be exhausted to permit said return means to operate, a valve-device comprising a valve-casing having an imperforate wall and an opposed perforated wall, a turnable spindle extending through said walls, said valve-casing having an annular chamber around said spindle, said perforated wall having a pair of diametrically opposed parts, said conduits being connected to said annular chamber, said spindle having a head having a flange which is shaped to close one of said ports and to open the other said ports in all positions of said flange, said head being located in an auxiliary chamber which has an inlet for liquid under pressure, said annular chamber having an outlet, said perforated wall having additional ports which communicate with said annular chamber, said additional ports being adapted to connect the conduit whose diametrically opposed port is closed by said flange, to said annular chamber, said additional ports being located inwardly of said flange.

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