

No. 712,832.

Patented Nov. 4, 1902.

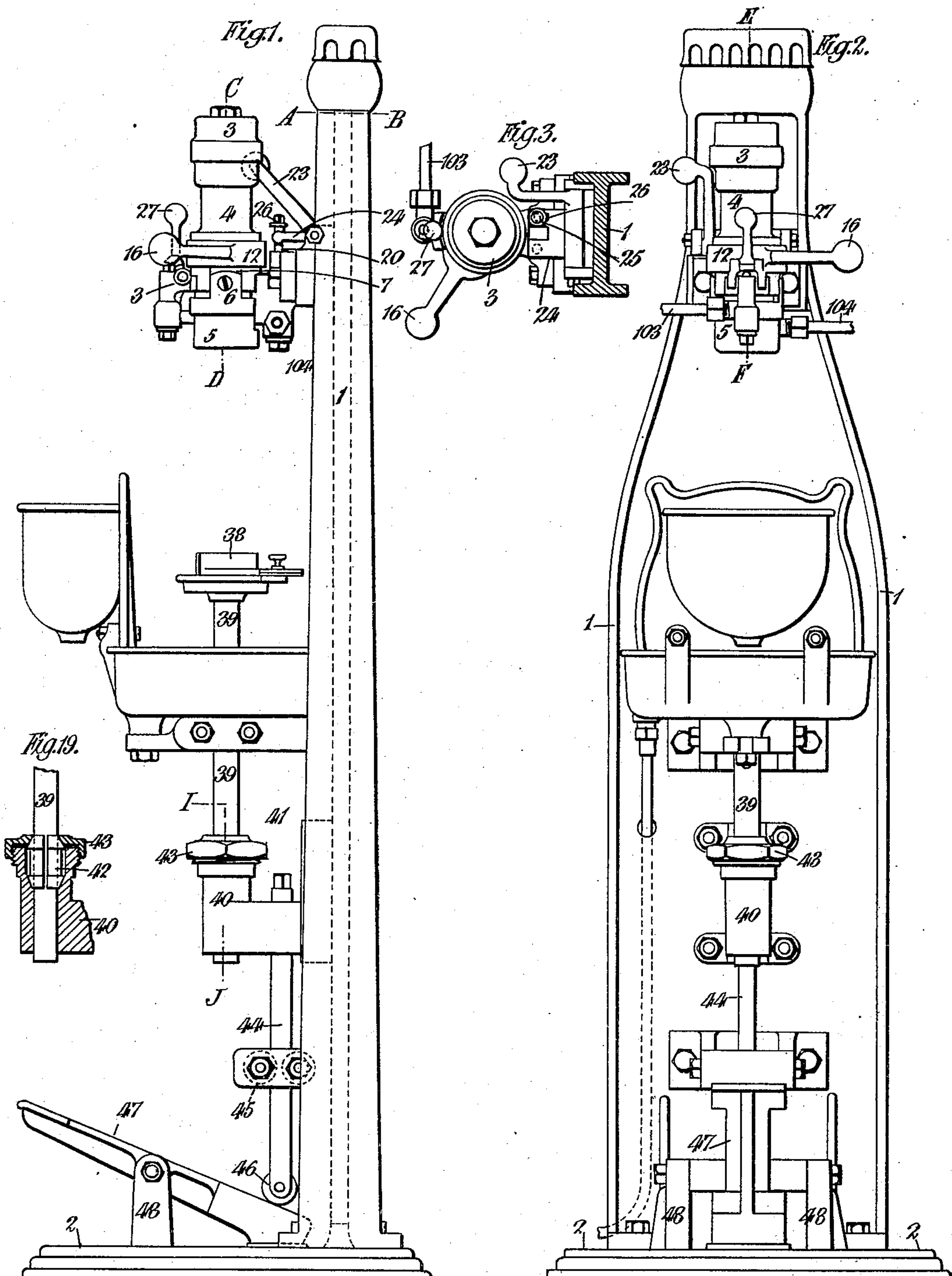
E. K. MOORE.

APPARATUS FOR FILLING AND CLOSING BOTTLES WITH AERATED OR OTHER LIQUIDS.

(Application filed Dec. 8, 1901.)

(No Model.)

5 Sheets—Sheet 1.



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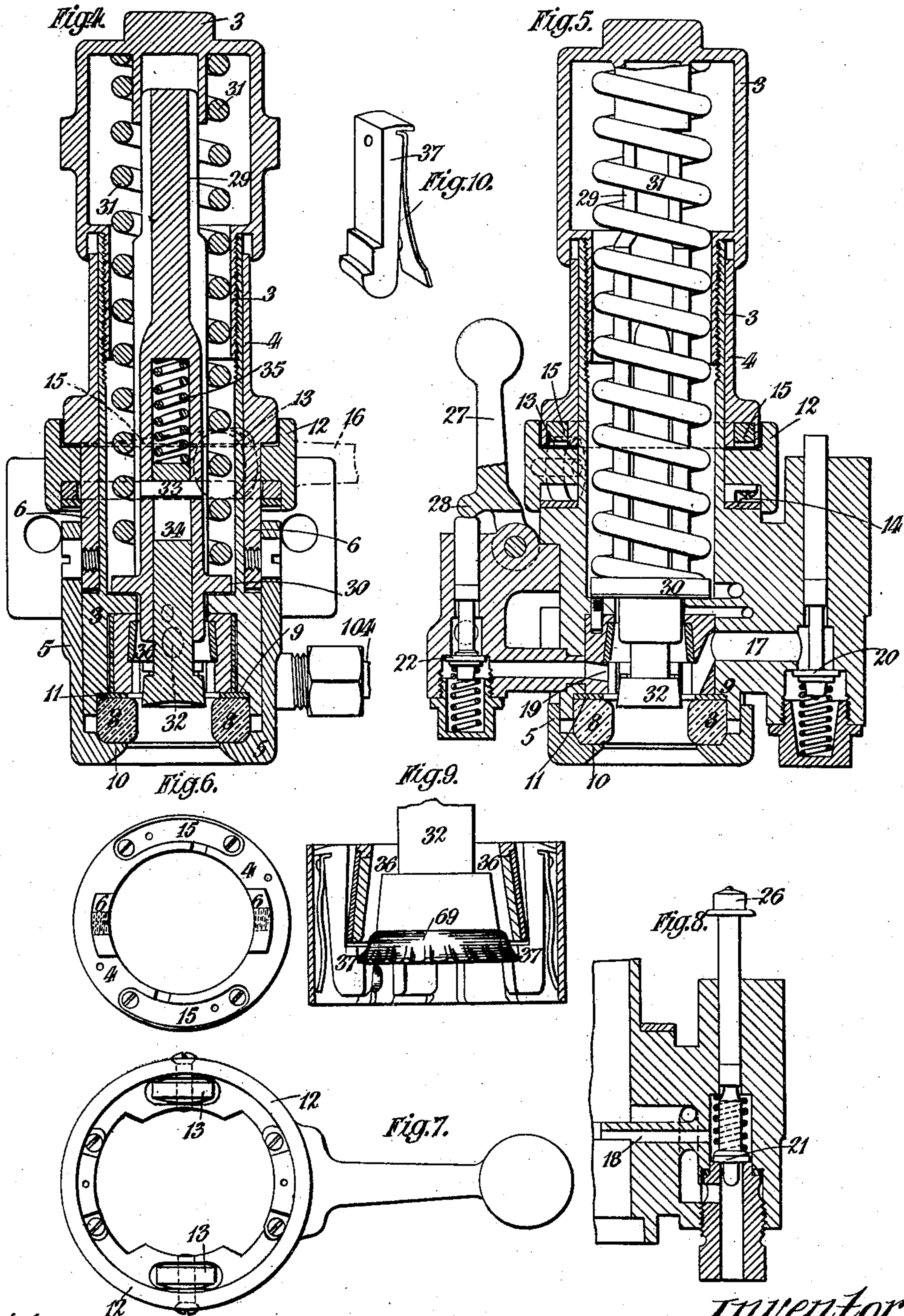
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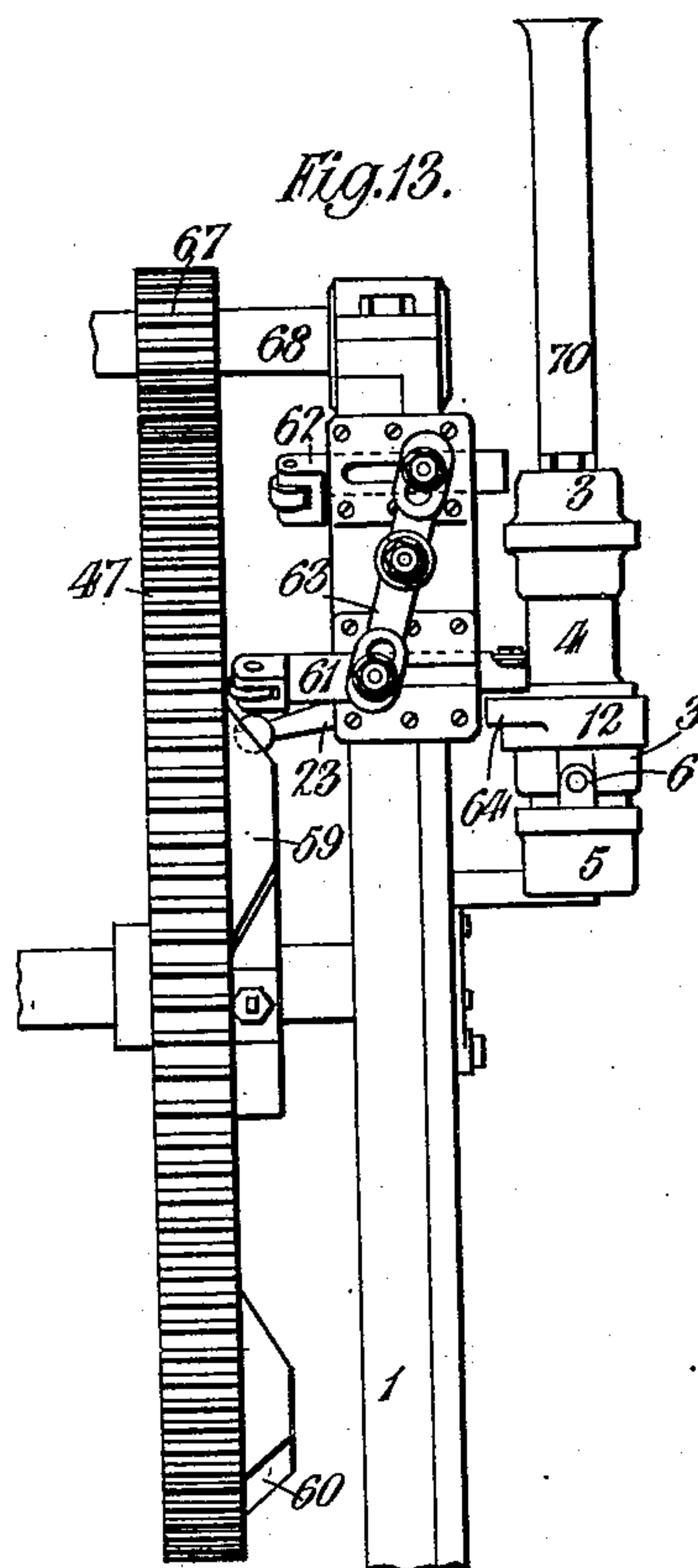
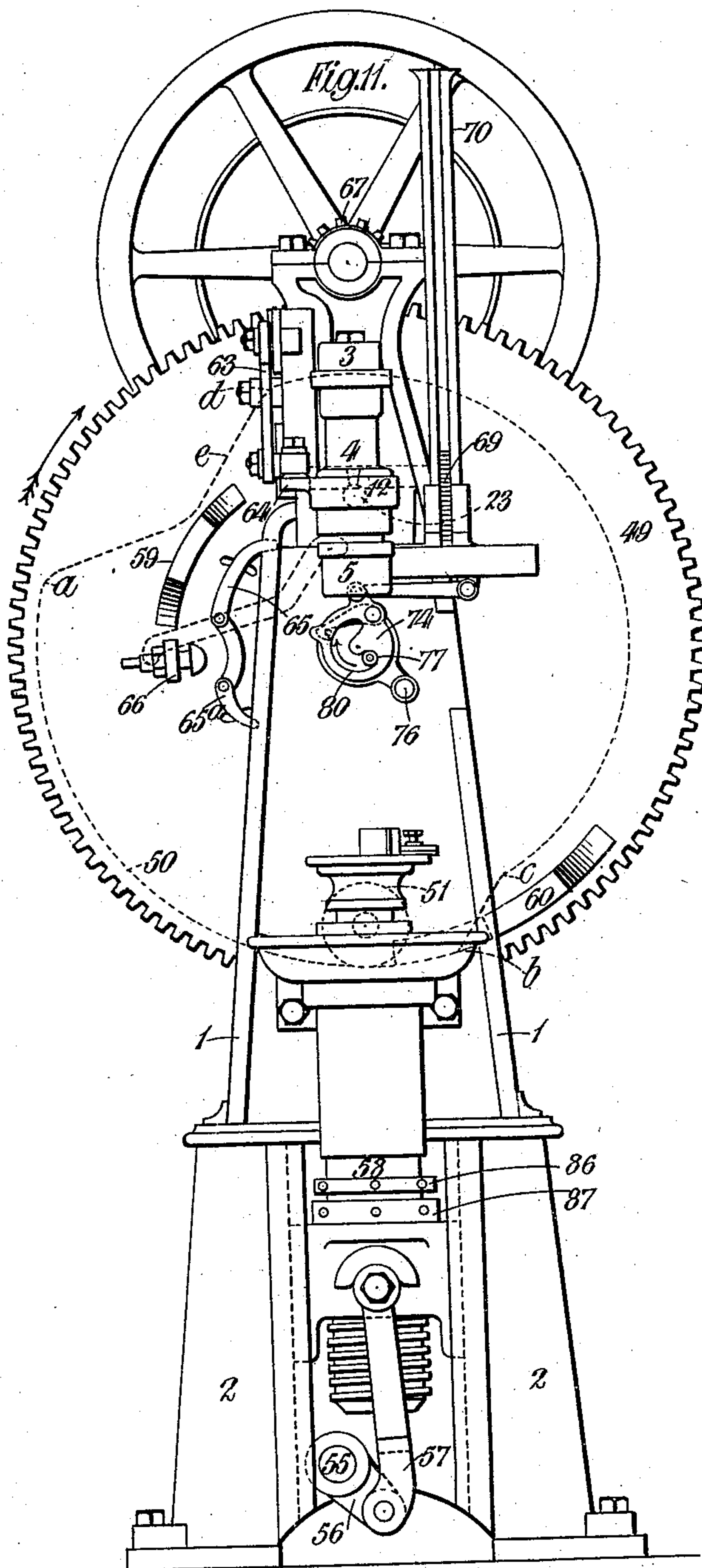
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5 Sheets—Sheet 3.



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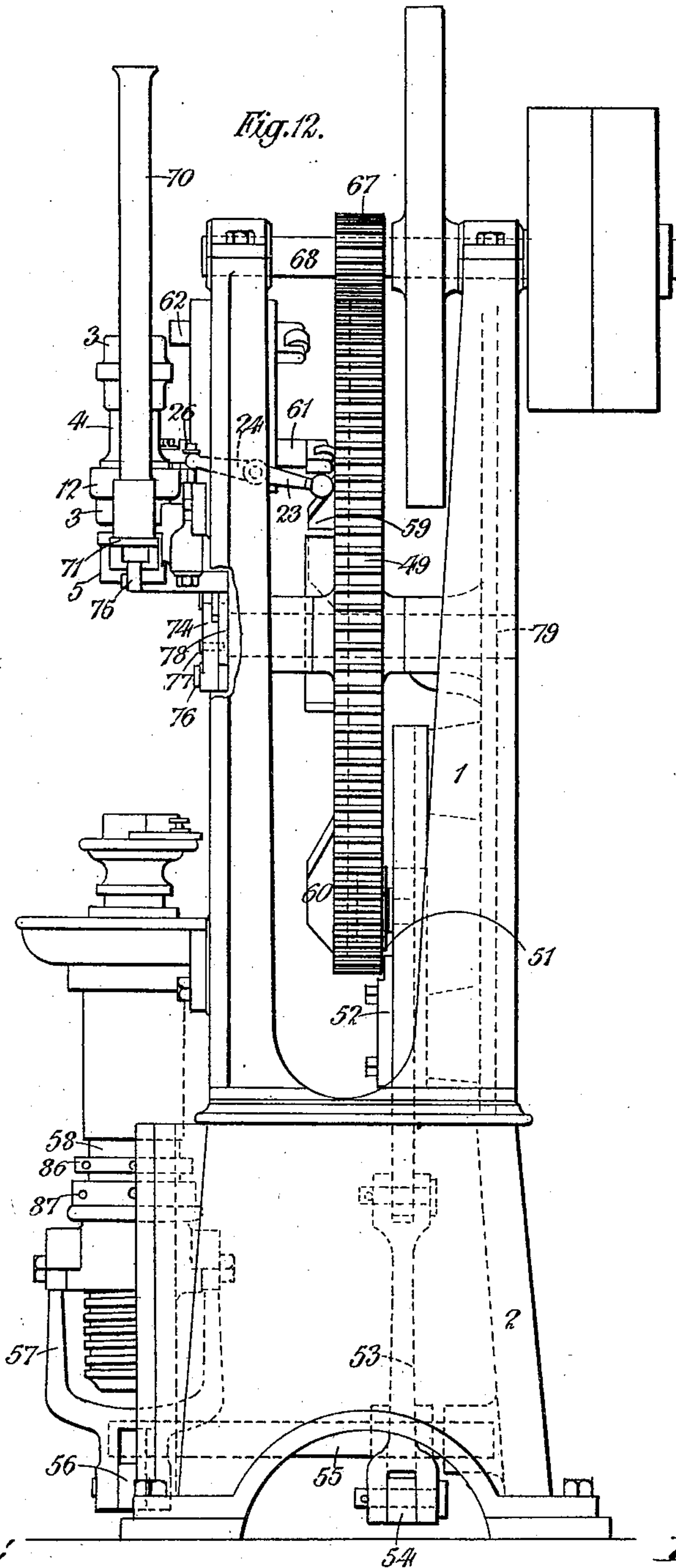
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5 Sheets—Sheet 4.



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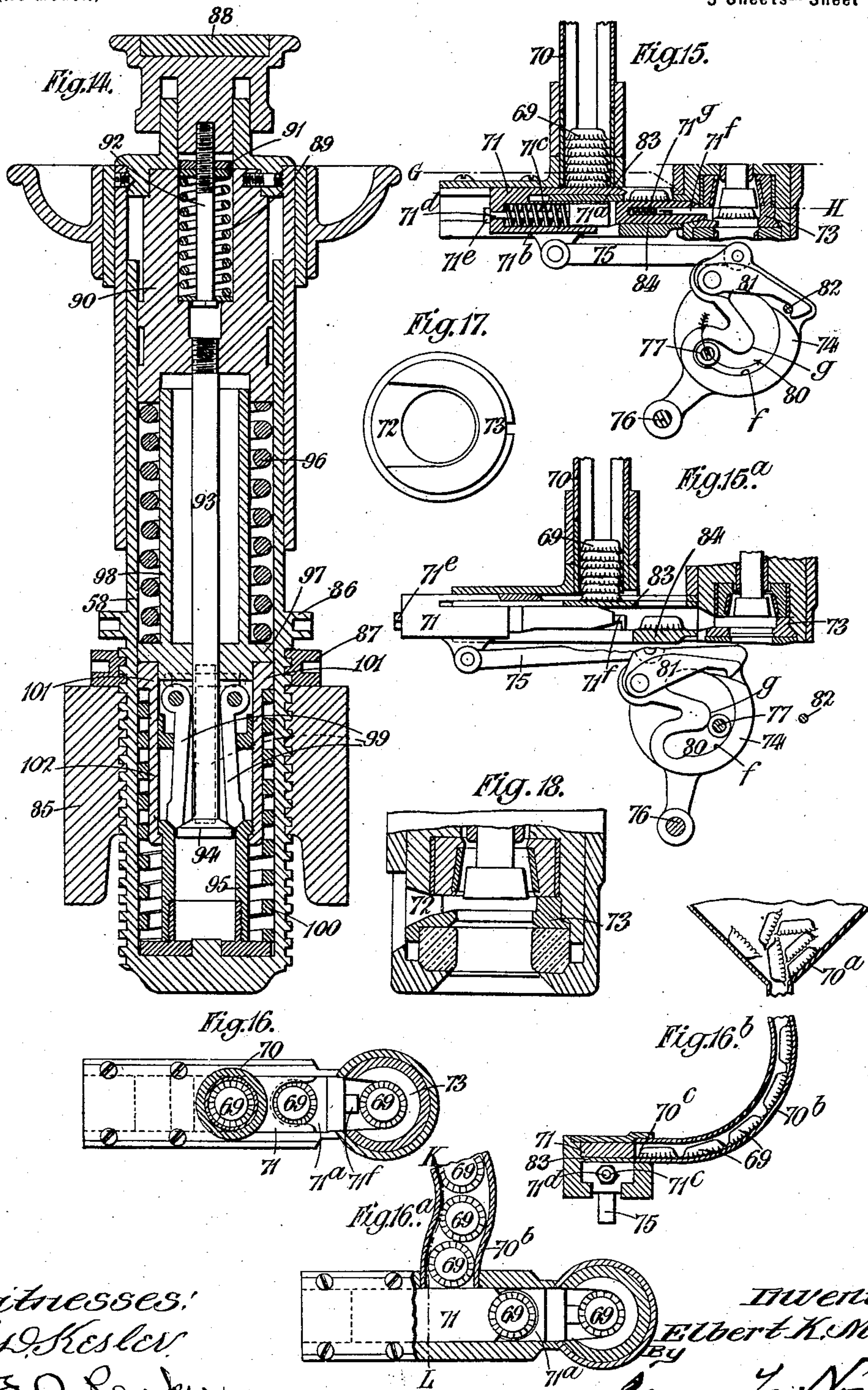
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(No Model.)

5 Sheets—Sheet 5.



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UNITED STATES PATENT OFFICE.

ELBERT KIRK MOORE, OF LONDON, ENGLAND, ASSIGNOR TO THE CROWN CORK COMPANY, LIMITED, OF LONDON, ENGLAND.

APPARATUS FOR FILLING AND CLOSING BOTTLES WITH AERATED OR OTHER LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 712,832, dated November 4, 1902.

Application filed December 6, 1901. Serial No. 84,987. (No model.)

To all whom it may concern:

Be it known that I, ELBERT KIRK MOORE, engineer, a citizen of the United States, residing at 79 and 81 Paul street, Finsbury, London, England, have invented certain new and useful Improvements in Apparatus for Filling and Closing Bottles with Aerated or other Liquids, of which the following is a specification.

10 This invention relates to improvements in apparatus for filling and closing bottles with aerated or other liquid, and has for its object to provide simple and efficient means for sealing the mouth of the bottle in the machine
15 to prevent the escape of gas or liquid while the bottle is being filled and closed, means for operating the valves controlling the supply of liquid and the removal of air from the bottle, and means for mechanically feeding
20 crowns or caps to the bottle-closing device.

The invention is more particularly applicable to the class of machines described in the specifications of Letters Patent No. 473,776, dated April 26, 1892, and No. 608,158,
25 dated July 26, 1898, in which the mouth of the bottle is inserted into the head of the machine and is there filled and closed or crowned.

According to this invention a ring which
30 surrounds the head of the machine and is adapted to be partially rotated in a horizontal plane carries rollers which coöperate with cam-surfaces on a vertically-movable sleeve or jacket, so that when the said ring is partially rotated it causes the movable sleeve to
35 rise vertically, and thereby compress a gasket or ring of india-rubber or other elastic material between a fixed shoulder in the head of the machine and a flange on said movable
40 sleeve, thus preventing leakage or escape of gas or liquid when the mouth of the bottle is held in contact with said elastic gasket during the subsequent filling operation. The inlet-port for liquid and the escape-passage
45 for air enter the head of the machine above the gasket and are controlled by any appropriate form of valve operated by a lever pivoted to the frame of the machine and having one arm, which when depressed opens the
50 liquid-valve against the resistance of a spring,

and having another arm, which when raised opens a "snift-valve" to permit air to escape from the bottle. The head of the machine may also be provided with a similarly-operated valve, which I term a "vacuum-valve" 55 and which controls the communication between a suction-pump and a port entering the head of the machine above the gasket for exhausting the air from the bottle before filling it with liquid when required. 60

The machine may be adapted for operation either by hand or other power. When operated by steam-power, the ring, the valves, and the means for inserting the mouth of the bottle into and removing it from the gasket 65 are operated by cams carried by a cam-wheel rotated by suitable gearing from any convenient source of power. When the bottle is raised and lowered by a foot-lever, the bottle support or table is carried by a rod ad- 70 justably supported in a vertically-reciprocating block by a split double cone, one end of which engages with a tapered part in said block and the other end of which engages with an internally-tapered nut which screws 75 onto said block. When the machine is operated by steam or other power, the crowns or caps for closing the bottles are fed by gravity from a tube to a horizontally-reciprocating slide, which passes them as required 80 through a lateral slot into the head of the machine in position to receive the mouth of the bottle.

Referring to the drawings, Figure 1 is a side elevation, Fig. 2 is a front elevation, and 85 Fig. 3 is a section on line A B, Fig. 1, of a hand or foot power machine constructed according to the invention. Fig. 4 is an enlarged vertical section of the machine-head on line C D, Fig. 1. Fig. 5 is a vertical section of 90 the machine-head on line E F, Fig. 2, also on an enlarged scale. Fig. 6 is an under side view of the part of the sleeve showing the camways. Fig. 7 is a plan of the ring, showing the rollers which coöperate with said cam- 95 ways. Fig. 8 is an enlarged vertical section of the snift-valve employed in the apparatus. Figs. 9 and 10 are enlarged sectional views of part of the head of the machine, hereinafter referred to. Figs. 11 and 12 are 100

a front elevation and a side elevation, respectively, of the machine, adapted to be actuated by a suitably-driven cam-wheel. Fig. 13 is an elevation of the cam-wheel and head of the machine on the opposite side to that shown in Fig. 12. Fig. 14 is an enlarged longitudinal section of the bottle-supporting cylinder shown in Figs. 11 and 12. Figs. 15 and 15^a are vertical sectional views, and Fig. 16 is a section on line G H, Fig. 15, on an enlarged scale, of the mechanical crown-feeding apparatus shown in Figs. 11, 12, and 13. Fig. 16^a is a similar view to Fig. 16, but shows a modification of the crown-feeding device. Fig. 16^b is a section on line K L of Fig. 16^a. Fig. 17 is a plan of the throat-ring, and Fig. 18 is a vertical section, on an enlarged scale, of the lower part of the head of the machine shown in Figs. 11, 12, and 13. Fig. 19 is a vertical sectional view on line I J, Fig. 1.

1 is the frame or standard of the machine, supported on a base 2 and carrying the head of the machine. This head comprises a fixed hollow casing 3, upon which a sleeve, consisting of an upper member 4 and a lower member 5, connected by two connecting-pieces 6, is adapted to slide vertically, the connecting-pieces 6 being adapted to move freely in a vertical direction in grooves 7, Fig. 1, in the casing 3. The india-rubber ring or gasket 8 is situated between a shoulder 9 on the fixed part 3 of the head and a flange 10, carried by the lower member 5 of the sleeve, Figs. 4 and 5. The gasket 8 projects inwardly some distance beyond the shoulder 9, and a metal washer 11 is situated between the said shoulder and rubber ring.

12 is the ring, which surrounds the head and carries wheels or rollers 13, which rest upon a shoulder or path 14, Fig. 5, on the fixed casing 3. The member 4 of the sleeve is provided with camways 15, which bear, respectively, on the rollers 13. When the ring 12 is given a partial rotation from left to right, the rollers 13, bearing upon the camways, 15 raise the sleeve 4 5, and thereby cause the flange 10 to compress the gasket between said flange and the washer 11, thus causing the gasket to contract.

The fixed part 3 of the head is provided at a point above the gasket 8 with a liquid-inlet port 17, Fig. 5, a "snift-port" 18, and a port 19, leading to a suction-pump. These ports are normally respectively closed by spring-valves 20, 21, and 22 of any appropriate construction. A lever 23, pivoted to the frame 1, is provided with an arm 24, which bears upon the stem of the valve 20 and is also provided with a forked arm 25, which is held in engagement with the stem of the valve 21 by a nut 26 on the head of said valve-stem. By depressing the lever-arm 24 the valve 20 is opened and by raising the lever-arm 25 the snift-valve 21 is opened. The valve 22 is operated by a lever 27, which is pivoted to the casing of valve 22, which is fastened to the fixed part 3 of the head of the machine

and has a projection 28 bearing upon the stem of said valve. By depressing the lever 27 the valve 22 is opened.

The internal construction of the head of the machine comprises a plunger 29, capable of vertical movement within the fixed casing 3. The plunger 29 has a flange 30, which is normally held in contact with a shoulder on the casing 3 by a strong spring 31, Figs. 4 and 5. Within a space in the lower end of the plunger 29 is a rod 32. The rod 32 is retained in the plunger by a bolt 33, which passes through and is secured in the walls of the plunger 29 and which also passes through a longitudinal slot 34 in the rod 32, thereby limiting the movement of said rod. The rod 32 is normally held in the position shown in Figs. 4 and 5 by a weak spring 35. At the base of the casing 3 is an internally-tapered ring or throat-piece 36, provided with spring-clips 37 for retaining a metal cap in the throat, as hereinafter referred to.

Referring to Figs. 1 and 2, the bottle to be filled is carried by a support or table 38 and is connected by a rod 39 to a block or sleeve 40, adapted to reciprocate vertically in a groove or guide 41 in the frame 1. The upper end of the block or sleeve 40 is tapered internally to receive a split double cone 42, one end of the cone 42 fitting a corresponding tapered part in the block 40 and the other end of said cone fitting a similarly-tapered surface in a nut 43, screwed onto the upper end of block 40 and through which the rod 39 passes, Fig. 19. By these means the bottle-support 38 is made vertically adjustable and is also securely locked or fastened in the block 40. The block 40 carries a rod 44, which passes through guides 45 and has a roller 46 on its free end which rests upon one arm of a foot-lever 47, pivoted to lugs 48 on the base 2 of the apparatus. The support 38 normally falls by gravity to the position shown in the drawings, but may be raised when required by depressing the foot-lever 47.

Referring to Figs. 11, 12, and 13, 49 is the cam-wheel, provided on one side with a camway 50, with which a roller 51, carried by a slide 52, engages. The slide 52 is connected by a rod 53 with a crank 54 on a crank-shaft 55. The shaft 55 also carries a crank 56, which is connected by a forked arm 57 with a reciprocating bottle-supporting cylinder 58. As the cam-wheel 49 rotates, the cam 50 by bearing on the roller 51 rocks the crank-shaft, and thereby raises and lowers the bottle-support 58, as hereinafter described. The wheel 49 also carries cams 59 60 for coöperating with horizontally-reciprocating slides 61 62 for actuating the ring 12. The slides 61 62 are respectively connected to the opposite ends of a centrally-pivoted lever 63, and the slide 61 is also pivotally connected to a lug 64 on the ring 12. The cam-wheel 49 also carries cams 65 and 66, in the path of which the valve-lever 23 for operating the snift and liquid valves lies. The periphery of the wheel

49 is toothed and gears with a pinion 67, carried by a shaft 68, driven by band-and-pulley gear from any convenient source of power.

Caps or crowns for closing the mouths of the bottles are arranged in a vertical column in a tube or holder 70 and descend by gravity to a horizontally-reciprocating slide which feeds them one at a time through a slot or opening 72, Fig. 18, in the head of the machine in a shouldered ring 73, where they are retained until fixed over the mouth of the bottles, as hereinafter explained. This horizontally-reciprocating slide comprises a forked part 71, which slides over a fixed piece 83, and a part 71^a, which is capable of sliding in a recess 71^b in the part 71 and which rests upon a fixed piece 84, the fixed pieces 83 84 serving as guides to the slide. A spring 71^c holds the part 71^a in the position shown in the drawings, a rod 71^d, carried by the part 71^a, passing through the part 71 and having a nut 71^e secured to its free end to limit the movement of the spring 71^c. The free end of the part 71^a is recessed and carries a tongue 71^f, which is normally projected by a weak spring 71^g for holding the caps or crowns firmly in the throat-ring 73. This slide is caused to reciprocate by a lever 74, which is connected to said slide by a rod 75 and is pivoted at 76 to the frame of the machine. A crank-pin 77, carried by a rotary disk 78, fixed concentrically on the rotary axle 79 of the cam-wheel 49, engages with a curved slot or camway 80, Figs. 11 and 15, in the lever 74 for operating said lever. When the slide 71 is in the position shown in Fig. 15, a cap or crown has just been fed into the throat-ring 73 by the slide 71. The end of the part 71^a of the slide is tapered and is of rubber or other elastic material, so as to accurately fit the opening 72. A pawl 81, pivoted to the lever 74, engages with a pin 82, carried by the frame of the machine to lock the slide 71 in this position during the filling and closing of the bottle, as hereinafter described, while the pin 77 travels along the part *f* of the camway 80 in the direction indicated by the arrow in Figs. 11 and 15. After the bottle has been filled and closed, the pin 77 strikes the pawl 81, thereby raising the pawl out of engagement with the pin 82. As the pin 77 then continues to rotate it moves the lever 74, together with the slide 71, to the left, Fig. 15^a, until the pin 77 reaches the point *g* of the camway 80. The forked part 71 of the slide is then withdrawn, so as to permit the bottom crown of the column in the holder 70 to rest upon the fixed piece 83. At the same time the part 71^a of the slide is withdrawn from the opening 72, so as to permit a crown, which was previously resting upon it, to fall upon the fixed piece 84, as shown in Fig. 15^a. The pin 77, as it continues to rotate, then passes across the camway 80 from the point *g*, striking the part *f*, and then drawing the lever 74 over to the right until the pin 77 assumes the position shown in Fig. 15, thus moving the lever 74 into the position shown

in Fig. 15. During this movement to the right the part 71^a of the slide pushes the cap or crown from the fixed piece 84 into the throat 73 and tightly closes the opening 72, while the fork of the part 71 pushes the lowest cap or crown out from under the column in the holder 70 onto the part 71^a. When the slide is in the position shown in Fig. 15, the spring 71^c is preferably somewhat compressed. This spring 71^c is employed to insure that the length of the slide shall be such that the part 71^a shall tightly fit the opening 72, while the pawl 81 is held in engagement with the pin 82.

Referring to Figs. 16^a and 16^b, the mechanical crown-feeding apparatus here shown is similar to that shown in Figs. 15, 15^a, and 16, but the crowns 69 pass from a hopper 70^a, through a tube 70^b, to an opening 70^c in the casing of the reciprocating slide. The member 71 of the slide is not forked, but is curved. In its rearward movement the member 71 opens the opening 70^c and permits the lowest crown in the tube 70^b to move by gravity onto the guide 83. In its forward movement the member 71 closes the opening 70^c and pushes the crown from the guides 83 onto the member 71^a. In these figures the slide is operated in the same way as above described with reference to Figs. 15, 15^a, and 16.

The bottle-supporting cylinder 58 is hollow and is provided with an external screw-thread which engages with a nut 85, carried by the forked arm 57, so that by rotating the cylinder 58 the bottle-support may be adjusted to suit bottles of different lengths.

86 is a ring carried by the cylinder 58 to serve as a means for rotating said cylinder, and 87 is a lock-nut.

Referring to Fig. 14, 88 is the bottle-support, which is supported by a coiled spring 89, inserted in a cylindrical piece 90, one end of the spring 89 bearing on a shoulder in the piece 90 and the other end of said spring bearing on adjustable lock-nuts 91, carried by a rod 92, secured to the support 88. The piece 90 carries a rod 93, having secured to its lower end a beveled disk 94, which accurately fits a cylinder 95, located in the bottom of the cylinder 58 and having a beveled upper edge. The piece 90 is supported by a coiled spring 96 of predetermined strength, one end of which bears on the under side of the piece 90 and the other end of which bears upon a shoulder 97 on a cylinder 98, located within the cylinder 58. The cylinder 98 is supported by four arms or dogs 99 99, which are pivoted to it and have their free ends inclined, so as to engage with the beveled parts of the cylinder 95 and disk 94. When the bottle is being closed, if the pressure on the head of said bottle exceeds the predetermined pressure of the spring 96, said spring is depressed, thereby permitting the part 90 to descend and the disk 94 to descend into the cylinder 95. The arms or dogs 99 then move inwardly toward the rod 93, and thereby permit the cylinder 98,

part 90, and support 88 to freely descend and relieve the pressure on the head of the bottle to prevent said bottle being broken. 100 is a coiled spring, one end of which bears on a flange on the bottom of the cylinder 95 and the other end of which bears on the shoulder 101 on the upper end of a sleeve 102, which in turn bears upon the shoulder 97 of the cylinder 98. This spring 100 is of only sufficient strength to return the parts 88, 90, 98, and 99 to the position shown in Fig. 14 after they have descended as aforesaid. The spring 89 is arranged to give way if too great pressure is exerted on the mouth of the bottle during the filling operation.

The operation of the apparatus is as follows: Referring to Figs. 1 to 10, a cap or crown 69 is inserted from below into the ring 36, the clips 37 permitting said crown to pass into the ring and then holding it, as shown in Fig. 9, while the rod 32 rests upon the top of the crown and holds it firmly in position. The bottle to be filled is placed on the support 38. By means of a hand-lever 16 the ring 12 is then given a partial rotation from left to right, thereby raising the sleeve 4 5 and causing the gasket 8 to be compressed. The foot-lever 47 is then depressed, which causes the support 38 to be raised until the mouth of the bottle is brought and held in contact with the said compressed gasket 8, thus preventing the escape of gas or liquid during the subsequent filling operation. Air may then be exhausted from the bottle by depressing the hand-lever 27, and thereby opening the valve 22 and putting the bottle in communication through the port 19 with a pipe 103, leading to a suction-pump. (Not shown.) The valve 22 is then permitted to close, and the liquid-valve 20 is opened by depressing the lever 24 by the hand-lever 23, thereby permitting the aerated liquid to enter the bottle through the pipe 104 and port 17. When the bottle is filled, the lever 23 is released, thus closing the port 17. Then the foot-lever 47 is further depressed in order to force the head of the bottle through the gasket 8 and then to force the head of the bottle, with the cap or crown 69, into the inclined part of the ring or throat 36 against the resistance of the spring 31, and thereby clamp the cap 69 on the head of the bottle. The ring 12 is then moved back to its original position by the lever 16, thereby causing the gasket 8 to relax its grip upon the neck of the bottle. The foot-lever 47 is then released, and the filled and closed bottle is lowered by gravity for removal from the support 38. In cases where it is not necessary to create a vacuum in the bottle before filling it the vacuum-valve 22 or its operation is omitted, the excess of air being removed from the bottle by the use of the snift-valve only, as follows: When the bottle has been nearly filled by depressing the lever 23, the lever 23 is momentarily raised, thus closing the liquid-valve 20 and opening the snift-valve 21 to allow the excess of air

to escape from the bottle. Then the lever 23 is again depressed, closing the valve 21 and reopening the valve 20, thus allowing the bottle to be completely filled. The bottle is then sealed as above described. This method of attaching the cap 69 to the head of the bottle forms by itself no part of the present invention, but it is here briefly described for the sake of clearness.

Referring to Figs. 11 to 19, the cycle of operations here followed is substantially the same as that described with reference to Figs. 1 to 10, but the movements are effected by the cam-wheel 49, as follows: A cap or crown 69 is fed into the throat-ring 73, as shown in Fig. 15. As the wheel 49 rotates and the cam 50 travels under the roller 51 from the point *a* to the point *b* the bottle-support 88, with the bottle, is in the lowest position, as shown in Fig. 11. As the cam-wheel 49 continues to rotate the cam 59 strikes the roller on the end of slide 61, thrusting said slide forwardly and causing the lever 63 to move about its pivot, so as to retract the rod 62. When thus moved, the slide 61 partially rotates the ring 12, thereby causing the gasket 8 to be compressed, as above described. As the wheel 49 continues to rotate the incline *c* on the cam 50 raises the roller 51 and the slide 52 and rod 53, thereby moving the shaft 55, so as to raise the forked arm 57 and the cylinder or bottle-support 58 to cause the head of the bottle to fit tightly against the now contracted gasket 8. As the wheel 49 continues to rotate and the cam 50 passes under the roller 51 from the top of the incline *c* to the point *d* the cam 65 raises the lever 23 and depresses the lever 24 for opening the liquid-valve 20, as above described. The cam 66 then depresses the lever 23, which closes the liquid-valve 20 and opens the snift-valve 21 for a moment. Then the cam 65^a raises lever 23, closing the snift-valve 21 and again opening the liquid-valve 20, thus completing the filling of the bottle. The cams 65 and 66 are adjustable in order to regulate the opening and closing of the valve 20 and 21. The incline *e* on the cam 50 then strikes the roller 51, and thereby raises the bottle, so as to force its mouth into the head of machine for affixing the cap 69, as above described. At the same time the cam 60 strikes the roller on the end of the slide 62, thereby moving said slide 62 forwardly and moving the lever 63 about its pivot, so as to retract the rod 61, and thereby move the ring 12, so as to lower the sleeve 4 5 to release the gasket 8. The roller 51 then descends by gravity to the point *a* on the cam 50, when the full bottle may be removed and replaced by an empty bottle.

I claim—

1. In a bottle filling and closing machine, the combination with the head of the machine and means for presenting a bottle to said head for filling and closing, of a ring around said head, means for partially rotating the

ring in either direction about the head, a vertically-reciprocating sleeve on said head, means operated by the ring when moved for actuating said sleeve, a flange on the sleeve, 5 a shoulder on the head, an elastic ring located between said flange and shoulder, valves controlling ports in said head for the admission of liquid and the removal of air from the bottle, and means for operating said valves, substantially as described. 10

2. In a bottle filling and closing machine, the combination with the head of the machine and means for presenting a bottle to said head for filling and closing, of a ring around 15 said head, means for partially rotating said ring in either direction about the head, rollers carried by said ring, a shoulder on said head on which said rollers bear, a vertically-reciprocating sleeve on said head, cam-surfaces carried by said sleeve and cooperating with the rollers on the ring, a flange on said sleeve, a shoulder on the said head, an elastic ring located between said flange and 20 shoulder, valves controlling ports in said head for the admission of liquid and the removal of air from the bottle, and means for operating said valves, substantially as described. 25

3. In a bottle filling and closing machine, the combination with the head of the machine 30 and means for presenting a bottle to said head for filling and closing, of a ring around said head, means for partially rotating the ring in either direction about the head, a vertically-reciprocating sleeve on said head, means operated by the ring when moved for actuating said sleeve, a flange on the sleeve, 35 a shoulder on the head, an elastic ring located between said flange and shoulder, a spring-valve controlling the liquid-inlet to said head, a spring "snift-valve" controlling a gas-outlet from said head, a lever pivoted to the machine, and two arms carried by said lever and connected respectively with the liquid-inlet 40 and "snift" valves in such manner that when said lever is depressed the liquid-inlet valve is opened, and when said lever is raised the "snift-valve" is opened while the liquid-inlet valve is permitted to close, substantially as described. 45

4. In a bottle filling and closing machine, the combination with the head of the machine and means for presenting a bottle to said head for filling and closing, of a ring around 50 said head, means for partially rotating said ring in either direction about said head, rollers carried by said ring, a shoulder on said head on which said rollers bear, a vertically-reciprocating sleeve on said head, cam-surfaces carried by said sleeve and cooperating with the rollers on the ring, a flange on said 55 sleeve, a shoulder on the head, an elastic ring located between said flange and shoulder, a spring-valve controlling the liquid-inlet to said head, a spring "snift-valve" for controlling an air-outlet from said head, a lever pivoted to the machine, and two arms carried by 60 said lever and connected respectively with

the liquid-inlet and "snift" valves in such manner that when said lever is depressed the liquid-inlet valve is opened, and when said 70 lever is raised the "snift-valve" is opened while the liquid-inlet valve is permitted to close, substantially as described.

5. In a bottle filling and closing machine, the combination with the head of the machine 75 and the bottle-supporting cylinder; of a ring located around said head and adapted to be partially rotated in a horizontal plane; a vertically-reciprocating sleeve on said head; a flange on said sleeve; a shoulder on the head; 80 an elastic ring located between said flange and shoulder; means operated by the horizontally-movable ring for actuating said sleeve; valves controlling ports in said head for the admission of liquid and the removal 85 of air from the bottle; a lever for controlling said valves; a cam-wheel provided with a cam for raising and lowering the bottle-supporting cylinder, with other cams for operating the horizontally-movable ring, and with other 90 cams for operating the valve-lever; and means for rotating said cam-wheel; substantially as described.

6. In a bottle filling and closing machine, the combination with the head of the machine 95 and the bottle-supporting cylinder; of a horizontally-rotatable ring located around said head; a lug on said ring; a vertically-reciprocating sleeve on said head; a flange on said sleeve; a shoulder on the head; an elastic 100 ring located between said flange and shoulder; means operated by the horizontally-movable ring for actuating said sleeve; a pair of horizontally-reciprocating slides carried by the machine-frame and one of which is connected to the lug on the horizontally-movable 105 ring; a pivoted lever connecting said slides; valves controlling ports in said head for the admission of liquid and the removal of air from the bottle; a lever for controlling said 110 valves; a cam-wheel provided with a cam for raising and lowering the bottle-supporting cylinder, with a pair of cams for respectively and alternately operating the said horizontally-reciprocating slides, and with other cams 115 for operating the valve-lever; and means for rotating the cam-wheel; substantially as described.

7. In a bottle filling and closing machine, the combination with the head of the machine 120 and the bottle-supporting cylinder; of a ring around said head and adapted to be partially rotated in a horizontal plane; a vertically-reciprocating sleeve on said head; rollers carried by the ring; a shoulder on said head on 125 which said rollers bear; cam-surfaces carried by the sleeve and cooperating with the rollers on the ring; a shoulder on said head; a flange on the sleeve; an elastic ring located between said flange and shoulder; valves controlling 130 ports in said head for the admission of liquid and the removal of air from the bottle; a lever for controlling said valves; a cam-wheel provided with a cam for raising and lowering

the bottle-supporting cylinder, with other cams for operating the horizontally-movable ring, and with other cams for operating the valve-lever; and means for rotating said cam-wheel; substantially as described.

8. In a bottle filling and closing machine, the combination with the head of the machine and the bottle-supporting cylinder; of a ring located around said head and adapted to be partially rotated in a horizontal plane; a vertically-reciprocating sleeve on said head; a flange on said sleeve, an elastic ring located between said flange and shoulder; means operated by the horizontally-movable ring for actuating said sleeve; a spring-valve controlling the liquid-inlet to said head; a spring "snift-valve" controlling an air-outlet from said head; a lever pivoted to the machine; two arms carried by said lever and connected respectively with the liquid-inlet and the "snift" valves in such manner that when said lever is depressed the liquid-inlet valve is opened, and when said lever is raised the snift-valve is opened while the liquid-inlet valve is permitted to close; a cam-wheel provided with a cam for raising and lowering the bottle-supporting cylinder, with other cams for operating the horizontally-movable ring, with a cam for raising the valve-controlling lever, another cam for then depressing said lever and another cam for raising said lever a second time, during each revolution of the cam-wheel; and means for rotating said cam-wheel; substantially as described.

9. In a bottle filling and closing machine, the combination with the head of the machine and the bottle-supporting cylinder; of a horizontally-rotatable ring located around said head; a lug on said ring; a vertically-reciprocating sleeve on said head; a flange on said sleeve; a shoulder on said head; an elastic ring located between said flange and shoulder; rollers carried by the horizontally-movable ring; a shoulder on the head on which said rollers bear; cam-surfaces carried by the sleeve and coöperating with the said rollers; a pair of horizontally-reciprocating slides carried by the machine-frame and one of which is connected to the lug on the horizontally-movable ring; a pivoted lever connecting said slides; a spring-valve controlling the liquid-inlet to said head; a spring "snift-valve" controlling an air-outlet from said head; a valve-lever pivoted to the machine; two arms carried by said lever and connected respectively with the liquid-inlet and the "snift" valves in such manner that when said lever is depressed the liquid-inlet valve is opened, and when said lever is raised the "snift-valve" is opened while the liquid-inlet valve is permitted to close; a cam-wheel provided with a cam for raising and lowering the bottle-supporting cylinder, with a pair of cams for respectively and alternately operating the said horizontally-reciprocating slides, with a cam for raising the valve-controlling lever, another cam for then depressing said lever

and a third cam for again raising said lever, at each revolution of the cam-wheel; and means for rotating said cam-wheel; substantially as described.

10. In a bottle filling and closing machine, the combination of a filling and closing head provided with a lateral slot, a throat-ring located in said head and having a slot coinciding with the slot in the head, a crown holder or tube, crowns in said holder, a horizontally-reciprocating slide for feeding the crowns one by one from said holder through the slots in the head and throat-ring into said ring, means for operating said slide, means for raising and lowering bottles to and from the head, valves controlling the liquid-inlet to said head and the outlet for air from the bottle, means for operating said valves, and means for preventing the escape of liquid or gas from the head during the filling of the bottle, substantially as described.

11. In a bottle filling and closing machine, the combination of a filling and closing head provided with a lateral slot; a throat-ring located in said head and having a slot coinciding with the slot in the head; a crown holder or tube; crowns in said holder; a horizontally-reciprocating slide comprising a forked member which moves in contact with the outlet from the crown-holder and between said holder and a fixed piece or guide, a second member adapted to slide upon another fixed piece or guide, and a spring connection between said members; means connected to the forked member of the slide for reciprocating said slide to and from the head; means for raising and lowering the bottle to and from the head; valves controlling the liquid-inlet to said head and the outlet for air from the bottle; means for operating said valves; and means for preventing the escape of liquid or gas from the head during the filling of the bottle; substantially as described.

12. In a bottle filling and closing machine, the combination of a filling and closing head provided with a lateral slot; a throat-ring located in said head and having a slot coinciding with the slot in the head; a crown holder or tube; crowns in said holder; a horizontally-reciprocating slide comprising a forked member which moves in contact with the outlet from the crown-holder and between said holder and a fixed guide, a second member whose free end is adapted to fit the slot in the head and which is adapted to slide upon another fixed piece or guide, a spring connection between said members, and a tongue carried by said second member for holding the crown in position in the throat-ring; means connected to the forked member of the slide for reciprocating said slide to and from the head; means for raising and lowering the bottle to and from the head; valves controlling the liquid-inlet to said head and the outlet for air from the bottle; means for operating said valves; and means for preventing the escape of liquid or gas from the head

during the filling of the bottle; substantially as described.

13. In a bottle filling and closing machine, the combination of a filling and closing head provided with a lateral slot; a throat-ring located in said head and having a slot coinciding with the slot in the head; a crown holder or tube; crowns in said holder; a horizontally-reciprocating slide comprising a forked member which moves in contact with the outlet from the crown-holder and between said holder and a fixed guide, a second member whose free end is adapted to fit the slot in the head and which is adapted to slide upon another fixed piece or guide, and a spring connection between said members; means connected to the forked member of the slide for reciprocating said slide to and from the head; means for locking the slide with its end in the slot in the head during the filling and closing of the bottle; means for raising and lowering the bottle to and from the head; valves controlling the liquid-inlet to said head and the outlet of air from the bottle; means for operating said valves; and means for preventing the escape of liquid or gas from the head during the filling of the bottle; substantially as described.

14. In a bottle filling and closing machine, the combination of a filling and closing head provided with a lateral slot, a throat-ring located in said head and having a slot coinciding with the slot in the head, a crown holder or tube, crowns in said holder, a horizontally-reciprocating slide for feeding the crowns one by one from said holder through the slots in the head and throat-ring into said ring, a pivoted lever provided with a camway and connected to the reciprocating slide, a rotary crank-pin engaging with the camway in said lever, means for raising and lowering bottles to and from the head, valves controlling the liquid-inlet to said head and the outlet for air from the bottle, means for operating said valves, and means for preventing the escape of liquid or gas from the head during the filling of the bottle, substantially as described.

15. In a bottle filling and closing machine, the combination of a filling and closing head provided with a lateral slot, a throat-ring located in said head and having a slot coinciding with the slot in the head, a crown holder or tube, crowns in said holder, a horizontally-reciprocating slide for feeding the crowns one by one from said holder through the slots in the head and throat-ring into said ring, a pivoted lever provided with a camway and connected to the reciprocating slide, a rotary crank-pin engaging with the camway in said lever, means for locking the end of the horizontally-reciprocating slide in the slot in the head during the filling and closing of the bottle, means for raising and lowering bottles to and from the head, valves controlling the liquid-inlet to said head and the outlet for air from the bottle, means for operating said

valves, and means for preventing the escape of liquid or gas from the head during the filling of the bottle, substantially as described.

16. In a bottle filling and closing machine, the combination of a filling and closing head provided with a lateral slot, a throat-ring located in said head and having a slot coinciding with the slot in the head, a crown holder or tube, crowns in said holder, a horizontally-reciprocating slide for feeding the crowns one by one from said holder through the slots in the head and throat-ring into said ring, a pivoted lever provided with a camway and connected to the reciprocating slide, a rotary crank-pin engaging with the camway in said lever, a pawl pivoted to said lever and situated in the path of the crank-pin, a fixed pin with which said pawl engages during the filling and closing of the bottle, means for raising and lowering bottles to and from the head, valves controlling the liquid-inlet to said head and the outlet for air from the bottle, means for operating said valves, and means for preventing the escape of liquid or gas from the head during the filling of the bottle, substantially as described.

17. In a bottle filling and closing machine, the combination of a filling and closing head provided with a lateral slot; a throat-ring located in said head and having a slot coinciding with the slot in the head; a crown holder or tube; crowns in said holder; a horizontally-reciprocating slide comprising a forked member which moves in contact with the outlet from the crown-holder and between said holder and a fixed piece or guide, a second member adapted to slide upon another fixed piece or guide, and a spring connection between said members; a pivoted lever provided with a camway; a rotary crank-pin engaging with the camway in said lever; a rod connecting said lever with the forked member of the reciprocating slide; a pawl pivoted to the lever and situated in the path of the crank-pin; a fixed pin with which said pawl engages during the filling and closing of the bottle; means for raising and lowering bottles to and from the head; valves controlling the liquid-inlet to said head and the outlet for air from the bottle; means for operating said valves; and means for preventing the escape of liquid or gas from the head during the filling of the bottle; substantially as described.

18. In a bottle filling and closing machine, the combination with the filling and closing head provided with a lateral slot and the bottle-supporting cylinder; of a ring located around said head and adapted to be partially rotated in a horizontal plane; a vertically-reciprocating sleeve on said head; a flange on said sleeve; a shoulder on said head; an elastic ring located between said flange and shoulder; means operated by the horizontally-movable ring for actuating said sleeve; valves controlling ports in said head for the admission of liquid and the removal of air from the bottle; a lever for controlling said valves; a cam-

wheel provided with a cam for raising and lowering the bottle-supporting cylinder, with other cams for operating the horizontally-movable ring, and with other cams for operating the valve-lever; a throat-ring located in the head and having a slot coinciding with the slot in the head; a crown holder or tube; crowns in said holder; a horizontally-reciprocating slide comprising a forked member which moves in contact with the outlet from the crown-holder and between said holder and a fixed piece or guide, a second member adapted to slide upon another fixed piece or guide, and a spring connection between said members; a pivoted lever provided with a camway; a rotary crank-pin fixed upon the axis of the cam-wheel and engaging with the camway in said lever; a rod connecting said lever with a forked member of the reciprocating slide; a pawl pivoted to the lever and situated in the path of the crank-pin; a fixed pin with which said pawl engages during the filling and closing of the bottle; and means for rotating said cam-wheel; substantially as described.

19. In a bottle filling and closing machine, the combination of a filling and closing head, valves for controlling the liquid-inlet to said head and the outlet for air from the bottle, means for operating said valves, means for preventing the escape of liquid or gas from

the head during the filling of the bottle, a vertically-reciprocating internally-screw-threaded nut, an externally-screw-threaded hollow cylinder engaging with said nut, a vertically-movable block in said hollow cylinder, a bottle-support, a spring connection between said block and bottle-support, an internal hollow cylinder located in the mid-portion of the screw-threaded cylinder, a shoulder on said internal cylinder, a spring of predetermined strength located between said shoulder and the said block, a weak spring located between said shoulder and the bottom of the screw-threaded cylinder, a rod depending from said block, a disk carried by said rod and having its upper surface beveled, a hollow cylinder having its upper edge beveled and within which the beveled disk is located, and four dogs pivoted to the internal cylinder and having pointed or inclined ends which engage with the beveled surfaces of the disk and bevel-edged cylinder, and means for vertically reciprocating the nut, substantially as described.

In testimony whereof I have hereunto set my hand, in presence of two subscribing witnesses, this 23d day of November, 1901.

ELBERT KIRK MOORE.

Witnesses:

STEPHEN H. NILVEN,
WM. C. GOLBY.