No. 673,147. Patented Apr. 30, 1901.

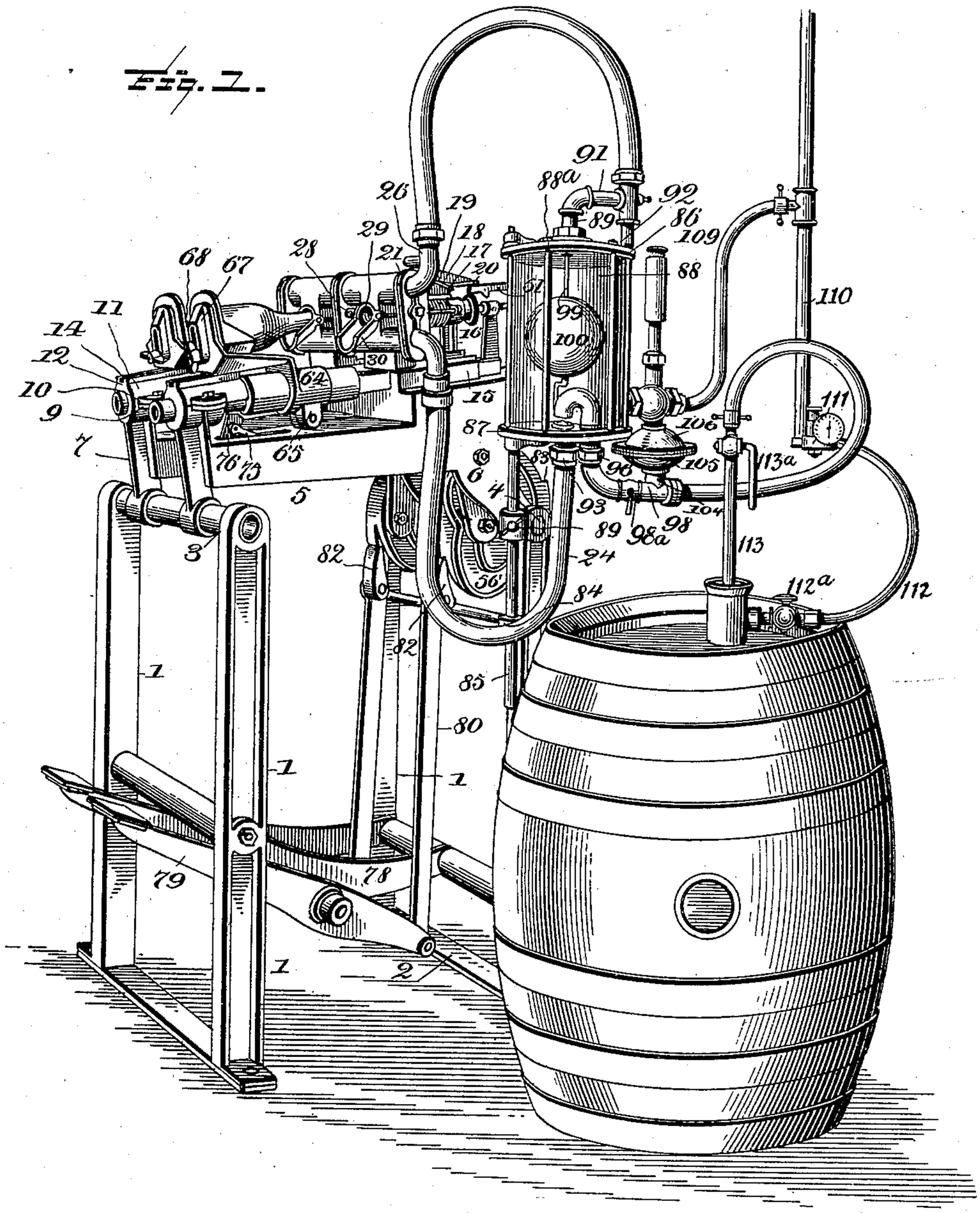
C. B. VAN HORN.

APPARATUS FOR BOTTLING LIQUIDS.

(Application filed Dec. 12, 1898. Renewed Oct 23, 1900.)

(No Model.) 6 Sheets—Sheet 1.

Fig. 1.



Witnesses:

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L. D. Heinrichs

Inventor:

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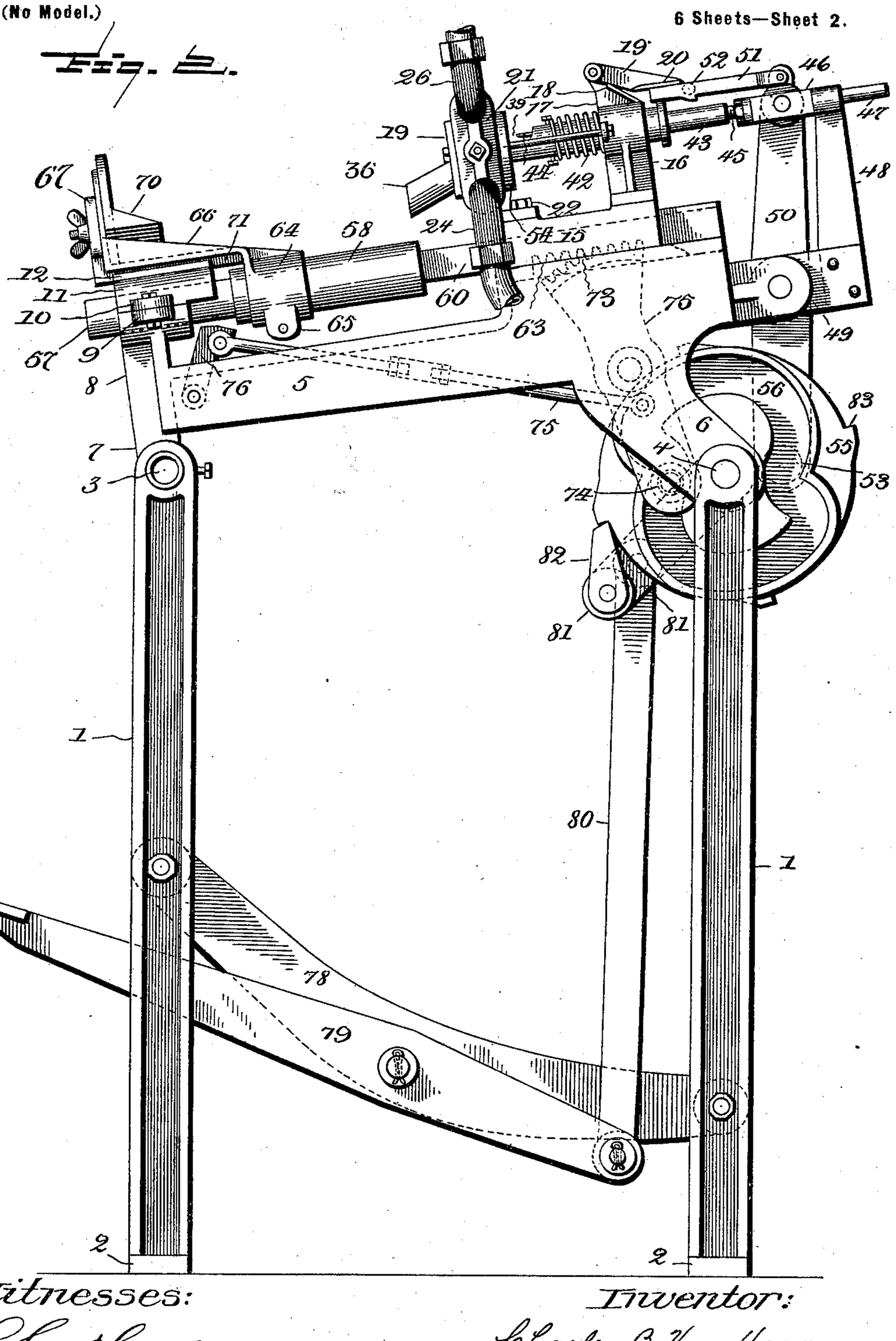
(No Model.) 6 Sheets—Sheet 2.

Fig. 2.



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(No Model.) 6 Sheets—Sheet 3.

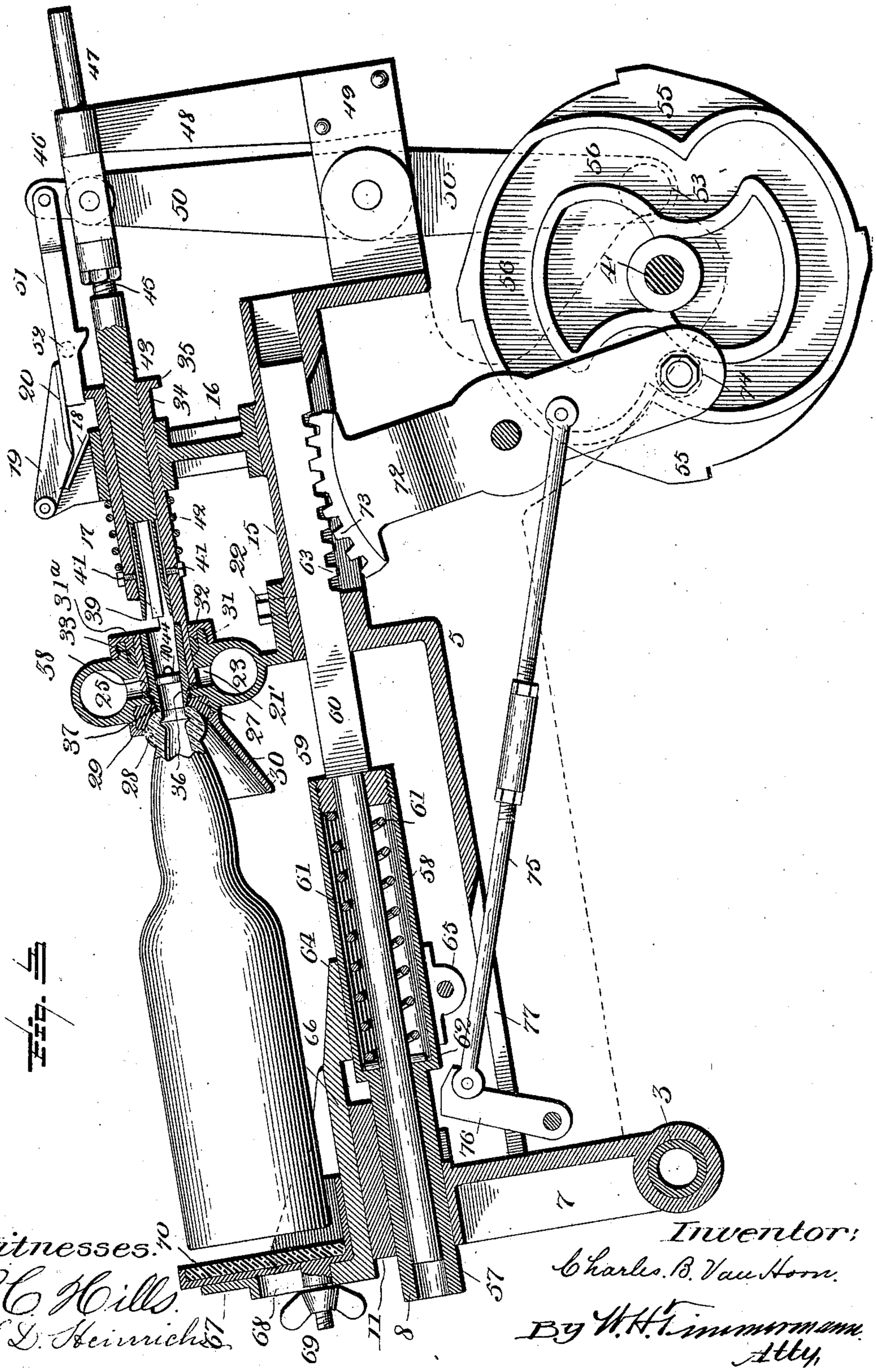

Fig. 5.

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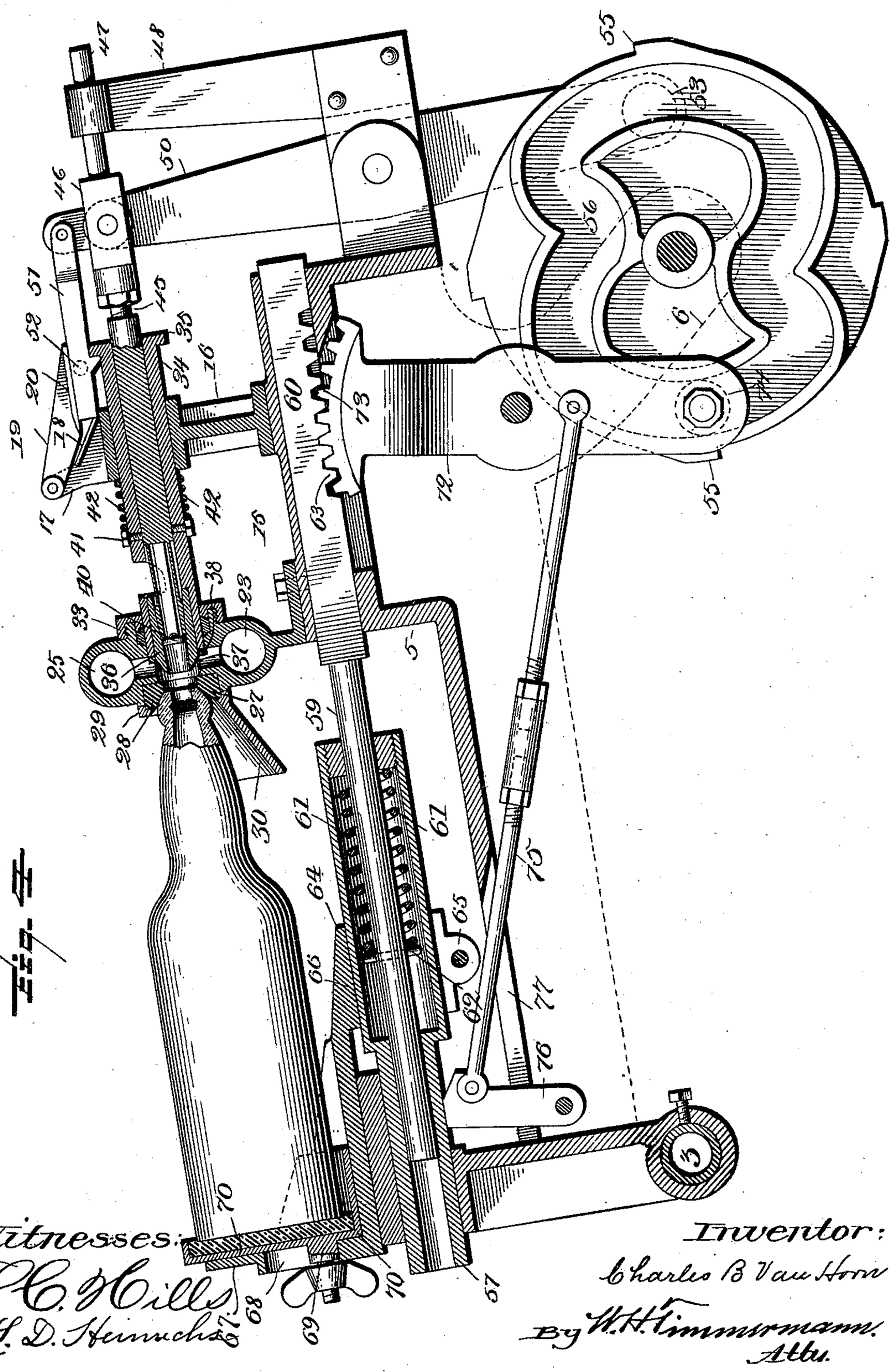
(No Model.) 6 Sheets—Sheet 4.



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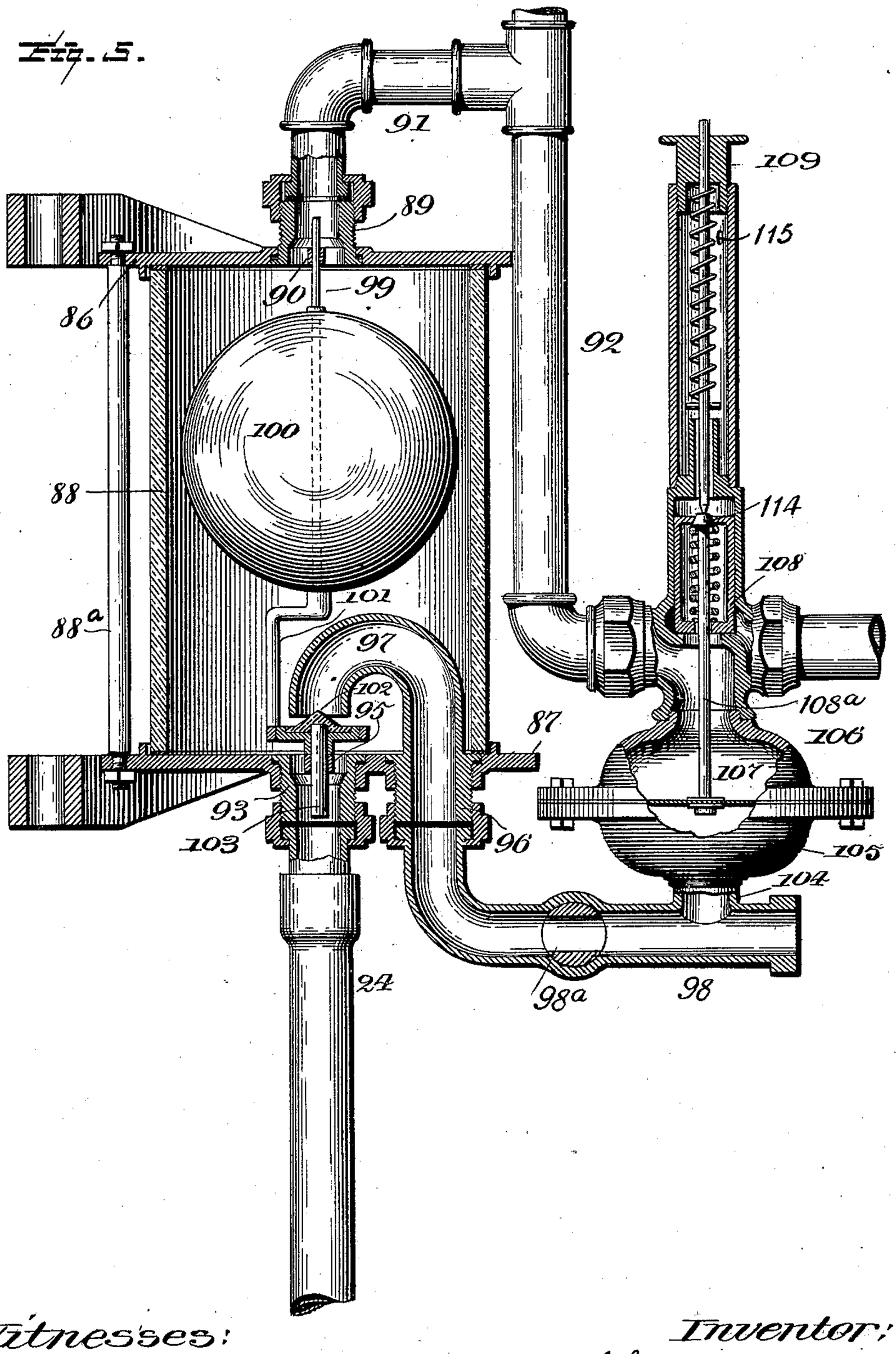
(Application filed Dec. 12, 1898. Renewed Oct. 23, 1900.)

(No Model.) 6 Sheets—Sheet 5.

Fig. 5.



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(Application filed Dec. 12, 1898. Renewed Oct. 23, 1900.)

(No Model.) 6 Sheets—Sheet 6.

Fig. 5.

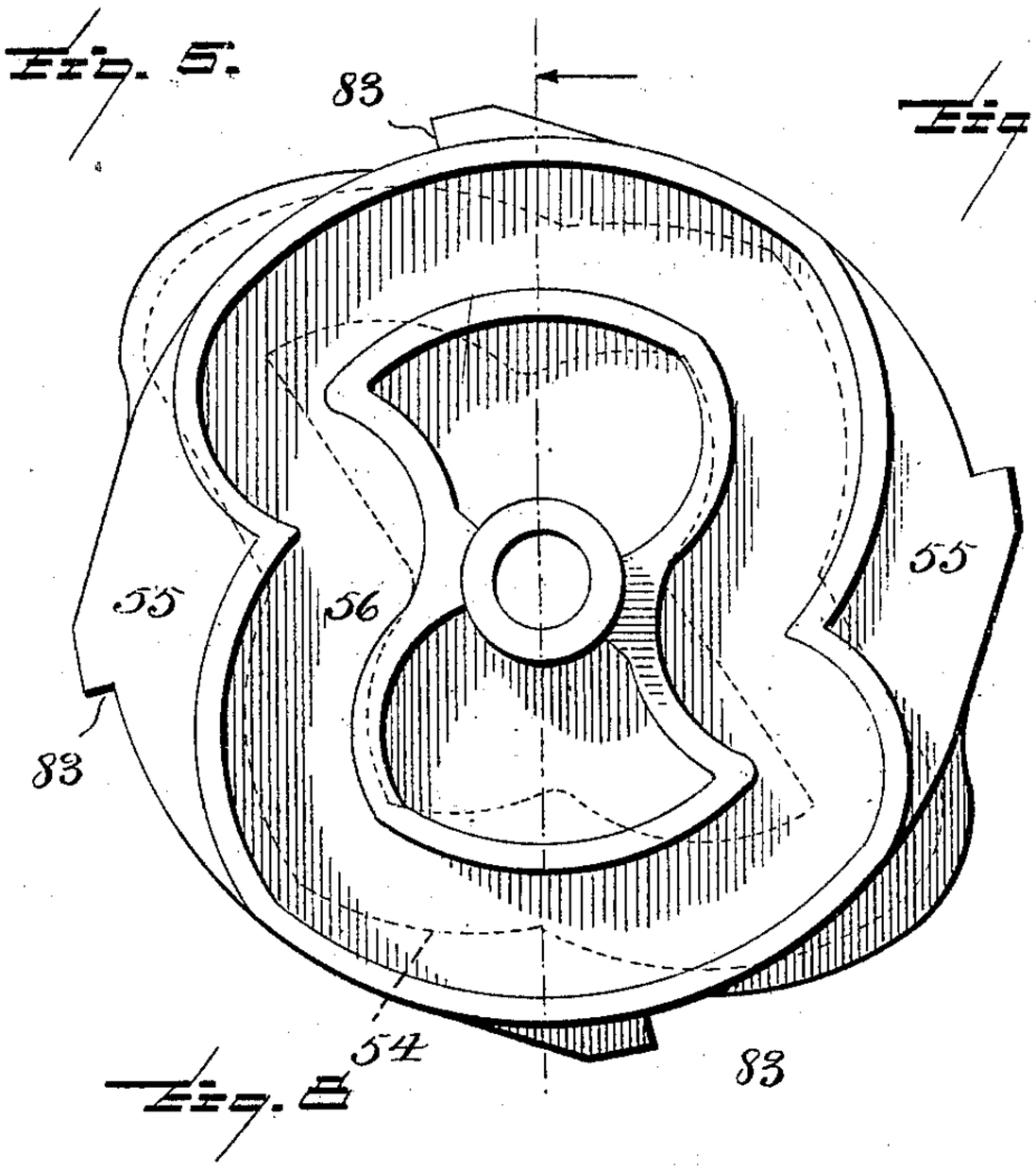

Fig. 8.

Fig. 7

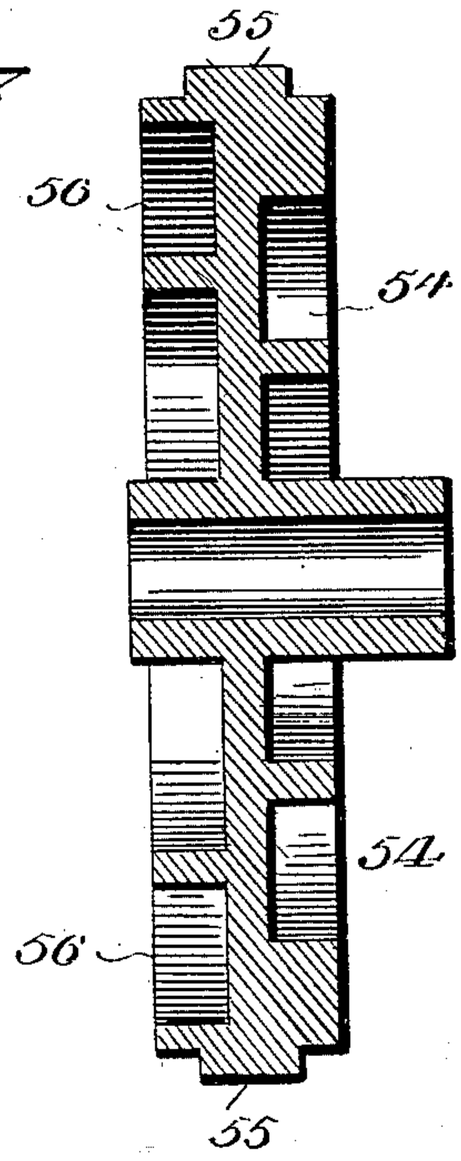

Fig. 9.

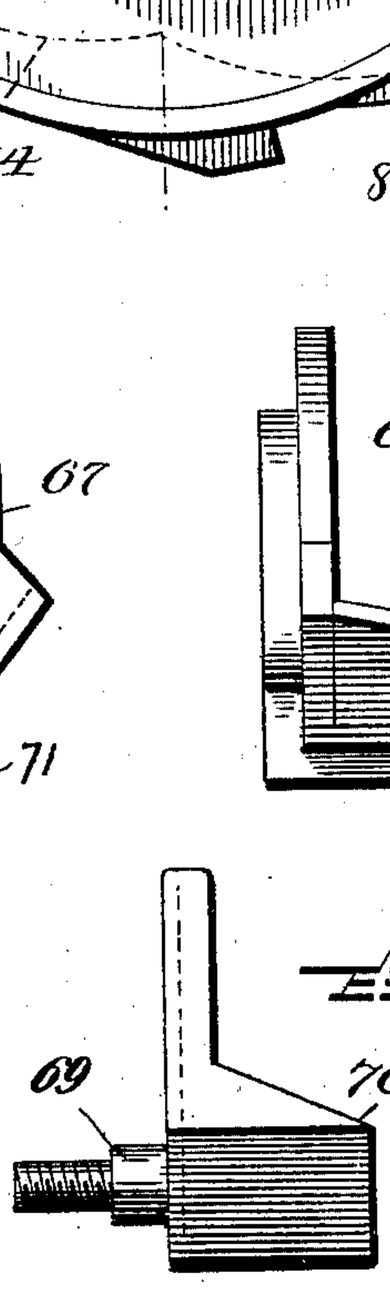

Fig. 10.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR BOTTLING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 673,147, dated April 30, 1901.

Application filed December 12, 1898. Renewed October 23, 1900. Serial No. 34,064. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. VAN HORN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Bottle Filling and Corking Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in bottle filling and corking machines.

The primary object of the invention is to provide means whereby bottles may be filled with carbonated and other liquids either by gravity or by forced flow, and corked under counter-pressure without allowing escape of gas and waste of the liquid.

Another object of the invention is to provide a bottling-machine having a balanced-valve inlet which completely controls the flow of liquid, as well as the counter-pressure against the liquid, at any pressure required for the desired velocity at which the liquid is to flow.

Another object of the invention is to obtain a uniform pressure upon the bottles during the corking operation and to provide means for securely holding the bottles while the corks or seals are being applied.

A further object of the invention is to construct a bottling-machine which will be entirely automatic in its operation in the sense that the parts are actuated through connection with a source of power.

The several parts of the machine are operated through connection with a cam, one-quarter turn of which accomplishes all the movements of the mechanism performing the work of the first steps, which consist, first, in sealing the opening occupied by the inserted bottle; second, in sealing the cork-passage; third, in locking the bottle-support against the pressure required to drive the cork or seal, and, fourth, in opening a valve to admit the counter-pressure and the liquid. These four steps are all accomplished by a one-fourth revolution of the cam, and by this "first" movement, as I term it, the bottle is filled, and thereafter the second movement takes place and is caused by another one-quarter turn of the cam. This second movement involves four steps, consisting in, first, closing the valve; second, driving the cork or seal into the bottle; third, releasing the bottle-support, and, fourth, returning the parts to their original or normal positions. Preferably the cam is rotated by foot-power means, and but two foot movements are necessary to accomplish the one-half revolution of the cam. Two bottles are filled and corked at each complete revolution.

The main purpose of the balanced-valve inlet is to retain the liquid-line at the flowing-point against the counter-pressure; furthermore, to allow the liquid to flow by gravity and to reduce the counter-pressure in the same cylinder. This balanced-valve inlet further serves to retain the liquid at the flowing-point when the bottle has been filled without changing any of the conditions, thereby rendering it impossible for the liquid to overflow into the counter-pressure inlet. A further object of the balanced-valve inlet is to increase or decrease the counter-pressure in proportion to the pressure at the liquid-inlet.

In the drawings, Figure 1 is a perspective view of a bottling-machine embodying my invention. Fig. 2 is a side elevation of the machine with the bottle removed. Fig. 3 is a central vertical sectional view of the upper portion of the machine with the bottle in position to be locked. Fig. 4 is a similar view showing the bottle locked and the valve in open position. Fig. 5 is a central vertical sectional view of the balance-valve inlet and float-valve. Fig. 6 is an elevation of the cam. Fig. 7 is a vertical central sectional view of the same. Figs. 8, 9, and 10 are details of the bottle holding and clamping parts.

Referring to the drawings by reference-numerals, 1 1 designate the legs of the supporting-frame, secured together at the bottom by girths 2. These legs are connected together at their upper ends by a cross-rod 3 and a shaft 4, on which is supported a frame 5, provided rearwardly with a depending arm 6, secured to the shaft 4, while at the front end of said frame is a downwardly-extending arm 7, secured to the rod 3.

At the front end of the frame 5 and extend-

ing upwardly therefrom is an extension 8, the upper end of which is provided with a bearing-surface flanked by ears 9. Bolted to the ears are ears 10 on a bearing cap or box 11. On the upper side of the cap or box 11 are flanges 12, forming a guideway 14 for the bottle-support. On the top of the frame is a box 15, provided with a longitudinal opening forming a guideway, and secured on the rear end of said box is a bracket 16, having a longitudinal opening forming a guide. At the upper end of the bracket is a projection 17, having a laterally-extending flange 18. Pivotally secured to said projection 17 is a movable guide 19, having a laterally-projecting flange 20. Secured at the front end of said box 15 by means of bolts 22 is a filling-head 21, provided with a longitudinal opening, below which is a chamber 23, receiving the liquid from a source of supply through a pipe 24. Above this longitudinal opening is a chamber 25, corresponding in construction to the chamber 23 and forming the back-pressure chamber. This chamber 25 receives air or gas through a pipe 26, connected with a back-pressure supply. In a series of machines the chambers 23 and 25 of the filling-heads are connected together to intercommunicate each with the other, as will be understood.

The filling-head is provided about the bottle-opening with a recess which receives a rubber gasket 27, the opening 28 of which is outwardly flared, and secured to the front of the filling-head and engaging the outer edge of the rubber gasket is a clamping-ring 29, having formed integrally therewith at its lower side a projection 30, which serves as a support for the neck of the bottle.

Projecting from the rear side of the filling-head is a screw-threaded flange 31, forming a recess 32, said recess receiving a packing-ring 33, and secured to said screw-threaded flange is a cap 31^a, forming, with the ring and flange, a stuffing-box.

Moving in the longitudinal opening of the filling-head and the opening of the bracket 16 is a tube 34, having at its rear end a collar 35 and at the front end an inserted tube portion 36, provided at its forward end with a reduced portion, the face 37 of which is beveled. Around the reduced portion and engaging a shoulder formed thereon is a gasket 38. This reduced portion and gasket 38 form a valve which controls the admission of back pressure and flow of liquid simultaneously.

The tube 34 is cut away to permit the introduction of the bottle-seal 40 previous to the filling operation.

At the rear of the opening 39 is a shoulder 41, between which and the bracket 16 is a spring 42, coiled around the tube and operating normally to move the tube forwardly to bring the valve against its seat around the bottle-opening of the filling-head. A rod 43 reciprocates in the tube 34, and said rod carries at its forward end spring-fingers 44, which operate to force the seal into the neck of the bottle. The opposite end of this rod is provided with a reduced screw-threaded portion 45, to which is adjustably secured an extension 46, terminating in a reduced portion 47, reciprocably confined in an opening in the upper end of a bracket 48, secured to an extension 49 of the frame 5.

On the extension 49 is fulcrumed a lever 50, which is pivoted near its upper end to the extension 46. Pivotally secured to the upper end of said lever 50 is a dog 51, carrying a roller 52 at one side thereof, which roller is adapted in the movements of the dog to engage the flange 18 and flange 20.

At one side of the lower end of the lever 50 is a roller 53, which is confined in a groove 54, provided in one face of a cam 55. This cam is rotatably mounted on the shaft 4 and is provided in its opposite face with a groove 56.

Operating in the guide-bearing formed by the cap 11 and in the guide-bearing of the extension 8 is a tube 57, provided with an enlarged portion 58, in the rearward end of which is a screw-threaded ring 59. The tube 57, ring 59, and box 15 form guide-bearings for a rod 60, and encircling said rod, within the enlarged portion 58, is a spiral spring 61, which is confined between a pin 62 in the rod 60 and the inner face of the ring 59. The under side of the rod 60, near the rear end, is provided with a series of teeth 63.

66 denotes a bracket provided at its rearward end with a split collar 64, having lugs 65 to receive suitable fastening means for clamping the bracket to the enlarged portion 58 of the tube 57. The bracket is provided with an upwardly-extending plate 67, having a slot 68, receiving the screw-threaded lug 69 of a vertically-adjustable bottle-rest 70. On the under side of the bracket 66 is a tongue 71, slidably engaging the guideway 14. The adjustability of the bottle-support allows of the filling and corking of bottles of different capacity.

A lever 72, fulcrumed on the frame 5, has its upper end provided with teeth 73, which engage the teeth 63 of the rod 60. On the lower end of the lever 72 and at one side thereof is a roller 74, which engages the groove 56 of the cam 55, and pivotally secured to said lever 72 below the fulcrum-point is an adjustable rod 75, having its opposite end connected to a dog 76, which is pivoted to the frame 5 and is movable in a slot 77 in the frame to engage the tube 57 to lock the same against movement.

79 denotes a foot-lever pivotally secured to a brace 78, connecting the legs 1. Pivotally connected to the rear end of the lever 79 is a rod 80.

81 is a lever mounted to rock on the shaft 4, and to the outer end thereof is pivoted a pawl 82, adapted to engage ratchet-teeth 83 on the periphery of the cam 55. The upper end of the rod 80 is pivotally secured to the lever 81.

Vertically adjustable in brackets 84 on one of the legs 1 is a rod 85, affording the support for a casing 88, forming an equalizing-chamber. The casing has a top 86 and a bottom 87, and 88ª denotes bolts which secure the top, bottom, and the transparent cylindrical portion together. The top 86 is provided with an opening to receive the lower end of a union-coupling 89, in which is arranged a spider-guide 90. Secured to this union in any suitable manner is a pipe 91, which communicates with a pipe 92, leading from the back-pressure supply to the chamber 25. The casing-bottom 87 is provided with an opening in which is secured the upper end of a union 93, to which is attached the pipe 24, conveying the liquid from the equalizing-chamber 88 to the chamber 23. The union 93 is provided with a spider-guide 95. Leading through the bottom 87 is a pipe 97, coupled by a union 96 to a pipe 98, leading from the liquid-supply. That portion of the pipe 97 within the equalizing-chamber is provided with a return-bend, the outlet from which is in axial alinement with the pipe 24. In the pipe 98 is a valve 98ª. A rod 99, guided at its upper end by the spider 90, has mounted thereupon a ball-float 100. The rod 99, below the float, is offset, as at 101, and to the lower end of the rod is secured a valve 102, having a depending stem 103, guided by the spider 95. The pipe 98 has a branch pipe 104, to which is secured the lower portion 105 of a casing forming the pressure-regulating chamber. Secured between flanges on the lower portion 105 and the upper portion 106 of the casing is a diaphragm 107. In the back-pressure pipe is a balanced valve 108, regulated by the adjustment of a screw-threaded plug 109, which varies the tension of the spring controlling said valve. The valve 108 is connected by a rod 108ª with the diaphragm 107, and the back-pressure pipe is in communication with the diaphragm-casing, whereby movement of the diaphragm is communicated to the valve.

Secured to the initial-pressure pipe 110 is a pressure-reducer 111, to which is connected a pipe 112, leading to the source of liquid-supply. In the pipe 112 is a valve 112ª, and the liquid-supply pipe 113, leading from the supplier to the pipe 98, is provided with a valve 113ª.

The operation is as follows: The valve 98ª is closed, and by opening the stop-cock 112ª pressure from the pipe 110 is admitted to the receptacle containing the liquid. The stop-cock 113ª of pipe 113 is then opened, allowing the liquid to enter the pipe 98 and exert pressure against the under side of the diaphragm 107, thereby raising said diaphragm and the balanced valve 108 and allowing the air from the pipe 110 to enter the chamber 106 and the equalizing-chamber 88. The stop-cock 98ª is then opened, giving a free passage to the liquid to enter the equalizing-chamber; but before the liquid will enter the equalizing-chamber a reduction of the counter-pressure therein is necessary. This is effected by the plug 109, which is turned to exert pressure against the diaphragm. The liquid will now rise in the equalizing-chamber until it reaches a point slightly above the entrance to the bottle to be filled. The liquid-level in the equalizing-chamber is maintained while the bottles are being filled. When the filling ceases, the liquid rises in the equalizing-chamber and elevates the float 100 until the valve 102, carried by the rod 99, is brought into contact with the discharge end of the pipe 97 and the flow of liquid is checked. The tendency to an increase of pressure in the equalizing-chamber due to the inflow of liquid is prevented by the employment of a relief-valve 114, which is connected to the diaphragm and which is unseated by movement of the diaphragm and allows the excess of pressure to pass off through openings 115 in an extension of the balance-valve casing. The bottle to be filled is positioned upon the support 70, and a cork is placed by hand in the opening 39 of tube 34. By pressing the lever 79 downward the cam is caused to make a one-quarter revolution, and in this movement the lever 50 and extension 46 and rod 43 are actuated to force the cork into the tube 34 to prevent the escape of the counter-pressure from the bottle. The upper end of said lever moves the dog 51 forward and under the pivoted guide 19 until it engages the collar 35 on the tube 34. By the construction of the groove 56 of the cam the lever 50 is caused to make two distinct movements, the first being a forward movement of the upper end of the lever and the second a backward movement of the same. During this backward movement the rod 43 and tube 34 are withdrawn, unseating the valve at the forward end of the tube. This one-quarter revolution of the cam forces the lower end of the lever 72 forward and the upper end backward, carrying with it the rod 60 and the tube 57 58, in which it slides, and also moving the bottle-support toward the filling-head until the mouth of the bottle comes in contact with the gasket 27, when the tube 57 58 is checked; but the rod 60 continues its traverse until the lever 72 has completed its movement, the spring 61 compressing and allowing the additional movement of the rod 60 without injury to the bottle.

To prevent the bottle from being forced away from the gasket 27 during the operation of driving the cork, the dog 76 is forced into engagement with the tube 57 by the forward movement of the lower end of the lever 72, thereby locking the support. As soon as the valve is opened the back pressure enters and fills the bottle, and the same movement of the valve simultaneously opens the inlet for the liquid to the bottle.

The liquid flows from the equalizing-chamber into the bottle by gravity, and the greatest height to which the liquid can rise in the equalizing-chamber is slightly above the low-

est point of admission of the liquid to the bottle and below the opening leading to the back-pressure chamber. By this arrangement the liquid will not rise sufficiently high to enter the back-pressure chamber.

After the bottle has been filled with liquid, by forcing the foot-lever 79 downwardly, giving another one-quarter revolution to the cam, the upper part of the lever 50 is moved in the direction of the filling-head, forcing the seal into the neck of the bottle. At the same time the dog 51 is moved from engagement with the collar 35, thus relieving the tension on the spring 42, which coöperates with the rod 43 to drive the cork or seal into the neck of the bottle and brings the valve on the front end of the tube 34 into closing position. The dog 51 is moved forwardly, and its roller 52 comes into engagement with the flange 18, upon which it travels, raising the pivoted guide 19 until the roller 52 passes the flange 20, when it falls back into position, causing the roller 52 of the dog 51 to ride on the flange 20 in the backward movement of the lever 50. This prevents the dog 51 from engaging the flange 25 on the tube 34. This one-fourth revolution of the cam operates to move the bottle-support away from the filling-head, so the bottle may be removed. By means of the specially-constructed cam one full revolution thereof fills and seals two bottles.

I desire to call particular attention to the fact that the liquid flows into the bottle entirely by gravity, and as the bottle fills with liquid the air is forced out of the bottle until the liquid finds its level, at which time the flow of the liquid is checked, as heretofore described. The bottle is arranged at a slight incline, its rear end being lowest in order that at the time the liquid finds its level and ceases to flow the bottle is filled, with the exception of a small pocket, in which the air still remains and which determines the height of the liquid in the bottle.

While I have herein described and shown a certain form of construction by means of which I accomplish the purpose of my invention, yet I do not wish to limit myself to the exact construction shown, but desire to make such changes as may be suggested by circumstances and which will not depart from the general spirit of my invention.

I claim as my invention—

1. In a machine of the class described, a filling-head having a longitudinal opening, a counter-pressure conduit and a liquid-conduit, and a tube reciprocating in said opening and forming a valve controlling the admission of counter-pressure and liquid to the package to be filled.

2. In a machine of the class described, a filling-head having a longitudinal opening, a counter-pressure conduit and a liquid-conduit, a tube reciprocable in said opening and forming a valve to control the admission of counter-pressure and liquid to the package to be filled, a cam, and a lever operatively connected with the cam and tube to actuate the latter.

3. In a machine of the class described, a filling-head having a longitudinal opening, a counter-pressure conduit and a liquid-conduit, a tube reciprocable in said opening provided at its forward end with a valve adapted to control the admission of counter-pressure and liquid to the package to be filled, and means for reciprocating said tube.

4. In a machine of the class described, a filling-head having a longitudinal opening, a counter-pressure conduit and a liquid-conduit, a tube reciprocable in said opening provided with a valve adapted to control the admission of counter-pressure and liquid to the package to be filled and provided with a device for driving the seal, and means for reciprocating said tube.

5. In a machine of the class described, a filling-head having an opening, a counter-pressure conduit and a liquid-conduit communicating with said opening, a tube reciprocable in said opening provided with a valve to control the admission of counter-pressure and liquid to the package to be filled and provided with a device for driving the seal, a support for the package and means for locking the support.

6. In a machine of the class described, a filling-head connected with a counter-pressure supplier and a liquid-supplier, a tube reciprocable in said head provided with means for driving the package-seal, a package-support, and means for locking the support during the seal-driving operation and for releasing said support after the package is filled and sealed.

7. In a machine of the class described, a filling-head connected with a counter-pressure supplier and a liquid-supplier, a tube reciprocable in said head provided with a valve for controlling the admission of counter-pressure and liquid to the package to be filled, and a seal-driver reciprocable in said tube.

8. In a machine of the class described, a filling-head connected with a counter-pressure supplier and a liquid-supplier, a tube reciprocable in said head provided with means for controlling the admission of counter-pressure and liquid to the package to be filled and provided with an opening for the introduction of a package-seal, and a seal-driver reciprocably confined in said tube.

9. In a machine of the class described, a filling-head having an opening, a seat for the package and a valve-seat, a liquid-conduit and a counter-pressure conduit communicating with said opening, a tube reciprocable in said opening and provided at one end with a valve, and means for moving the tube to seat and unseat the valve.

10. In a machine of the class described, a filling-head having an opening formed at its forward end to receive the mouth of the package, a valve-seat adjacent to the forward end of the opening, a counter-pressure conduit and a liquid-conduit communicating with the

opening, and a tube reciprocable in the opening provided with a valve adapted to engage the valve-seat and simultaneously control the admission of counter-pressure and liquid.

11. In a machine of the class described, a filling-head having an opening, a package-seat and a valve-seat, a tube reciprocable in the opening provided with a valve, a spring operating to press the valve against its seat, and means for retracting the tube.

12. In a machine of the class described, a filling-head having an opening, a counter-pressure conduit and a liquid-conduit communicating with the opening, a tube reciprocable in the opening and carrying a valve adapted to control the admission of counter-pressure and liquid, a spring operating to move the tube to seat the valve, a seal-driver reciprocable in the tube, means for reciprocating the driver, and means movable with the driver to engage and retract the tube against the action of the spring.

13. In a machine of the class described, a filling-head having an opening and conduits leading to counter-pressure and liquid suppliers, a tube reciprocable in the opening and controlling the admission of counter-pressure and liquid, a spring operating to move the tube inwardly, a seal-driver reciprocable in the tube, a cam, a lever operatively connected with the cam and driver to actuate the latter, a dog pivoted to the lever and adapted in its initial movement to engage in one direction a shoulder on the tube and move the latter rearwardly, and a pivoted guide in the path of the dog operating in the final rearward movement of the latter to carry the dog out of contact with the shoulder on the tube.

14. In a machine of the class described, a filling-head having an opening and conduits leading to counter-pressure and liquid suppliers, a tube reciprocable in the opening and carrying a valve and provided with a shoulder and an opening for the introduction of a seal, a spring operating to press the tube forwardly, a seal-driver reciprocably confined in the tube, a pivoted lever connected at its upper end to the driver, a pivoted dog on the lever, a pivoted guide on the frame in the path of the dog, and a cam operating through the lever to move the driver forwardly sufficiently to force the seal into sealing position in the tube, to retract the driver and move the tube rearwardly through the engagement of the dog with the tube-shoulder, to move the driver forwardly to force the seal into the package and bring the dog into engagement with the pivoted guide, and to retract the driver and move the dog rearwardly free from engagement with the shoulder on the tube.

15. In a machine of the class described, a filling-head, a spring-controlled tube reciprocable in said head provided with a shoulder, a seal-driver comprising a rod having at its forward end seal-engaging spring-fingers, means for reciprocating the seal-driver, a pivoted dog movable with the seal-driver adapted in its rearward movement to engage the shoulder on the tube and move the latter, a pivoted guide in the path of the dog having a flange adapted to support the dog during one of the rear movements of the latter, and a fixed inclined guide-flange operating to elevate the dog above the flange on the pivoted guide.

16. In a machine of the class described, a filling-head having a central opening, a lower liquid-conduit and an upper counter-pressure conduit, an equalizing-chamber, connected with said conduits and with the liquid and counter-pressure suppliers, and means in the equalizing-chamber for governing the flow of liquid to prevent the rise of liquid into the back-pressure conduit.

17. In a machine of the class described, a filling-head having a central opening, a lower liquid-conduit and an upper counter-pressure conduit, pipes leading from said conduits to suppliers, an equalizing-chamber in said pipes, a liquid-controlling valve in the equalizing-chamber, a float in the equalizing-chamber connected to the valve, a pressure-regulator in the counter-pressure pipe beyond the equalizing-chamber, said pressure-regulator being connected with the liquid-pipe, and a hand-valve in the liquid-pipe between the pressure-regulator and equalizing-chamber.

18. In a machine of the class described, a filling-head having a central opening, a lower liquid-inlet and an upper counter-pressure inlet, an equalizing-chamber, a counter-pressure pipe leading from a supplier to the upper portion of the chamber and to the counter-pressure inlet of the head, a liquid-pipe leading from the lower portion of the chamber to the liquid-inlet in the head, a liquid-pipe leading from a supplier into the bottom of the chamber where it is provided with a return-bend, a valve adapted to be seated against the open end of said return-bend, a float connected with the valve, a hand-valve in the liquid-pipe leading to the chamber, a casing connected to said liquid-pipe beyond the hand-valve said casing communicating with the counter-pressure pipe, a flexible diaphragm in the casing, a spring-controlled valve in the counter-pressure pipe connected with the diaphragm, a vent-valve connected with the diaphragm, a spring-pressed rod bearing against the upper side of the diaphragm, and means for varying the tension of the spring.

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

CHARLES B. VAN HORN.

Witnesses:
JACOB J. WITTBRODT,
WILLIS KESSLER.