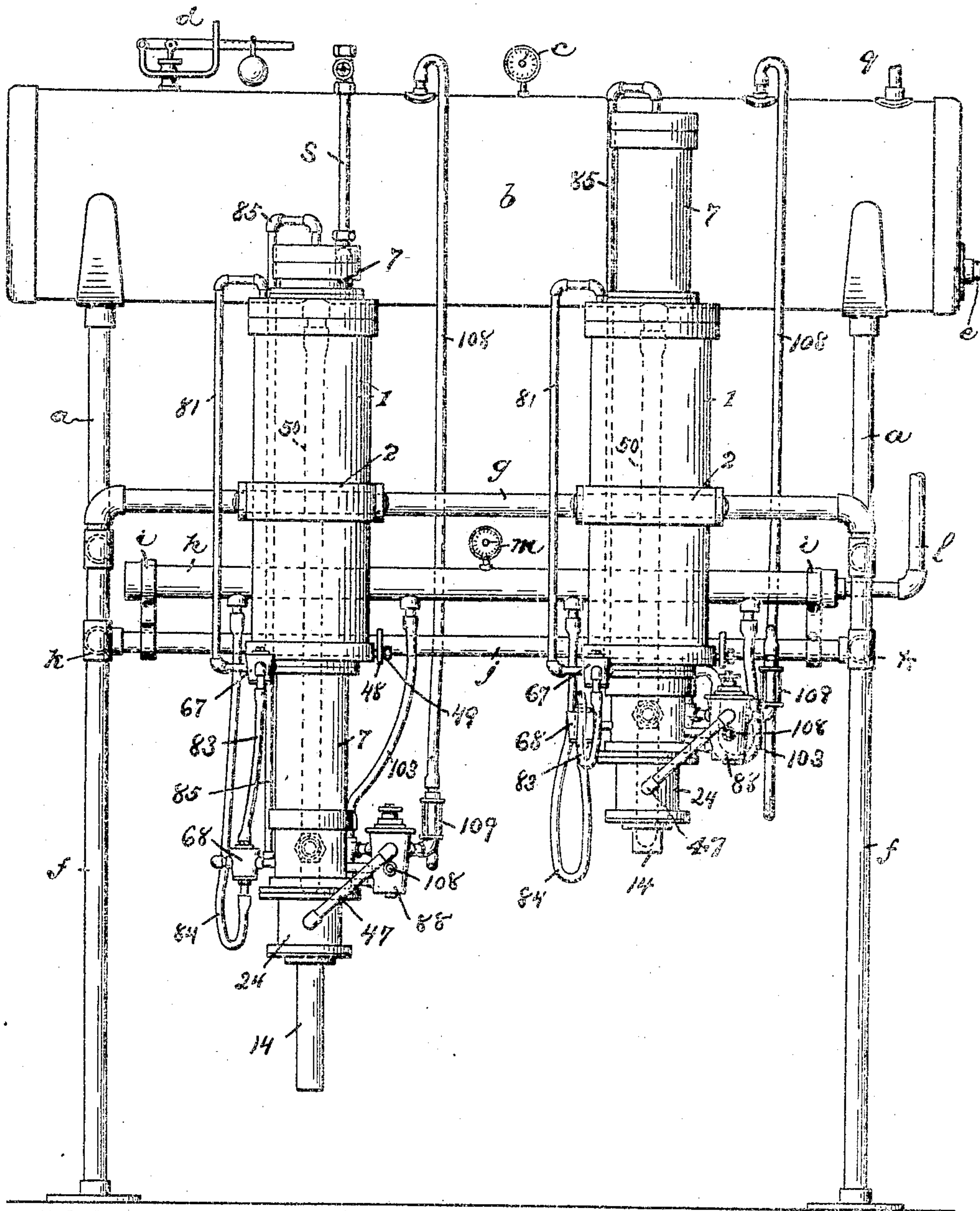


No. 786,621.

PATENTED APR. 4, 1905.

D. BEEBE.
RACKING APPARATUS.
APPLICATION FILED SEPT. 19, 1904.

5 SHEETS—SHEET 1.



WITNESSES:

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Fig. 1.

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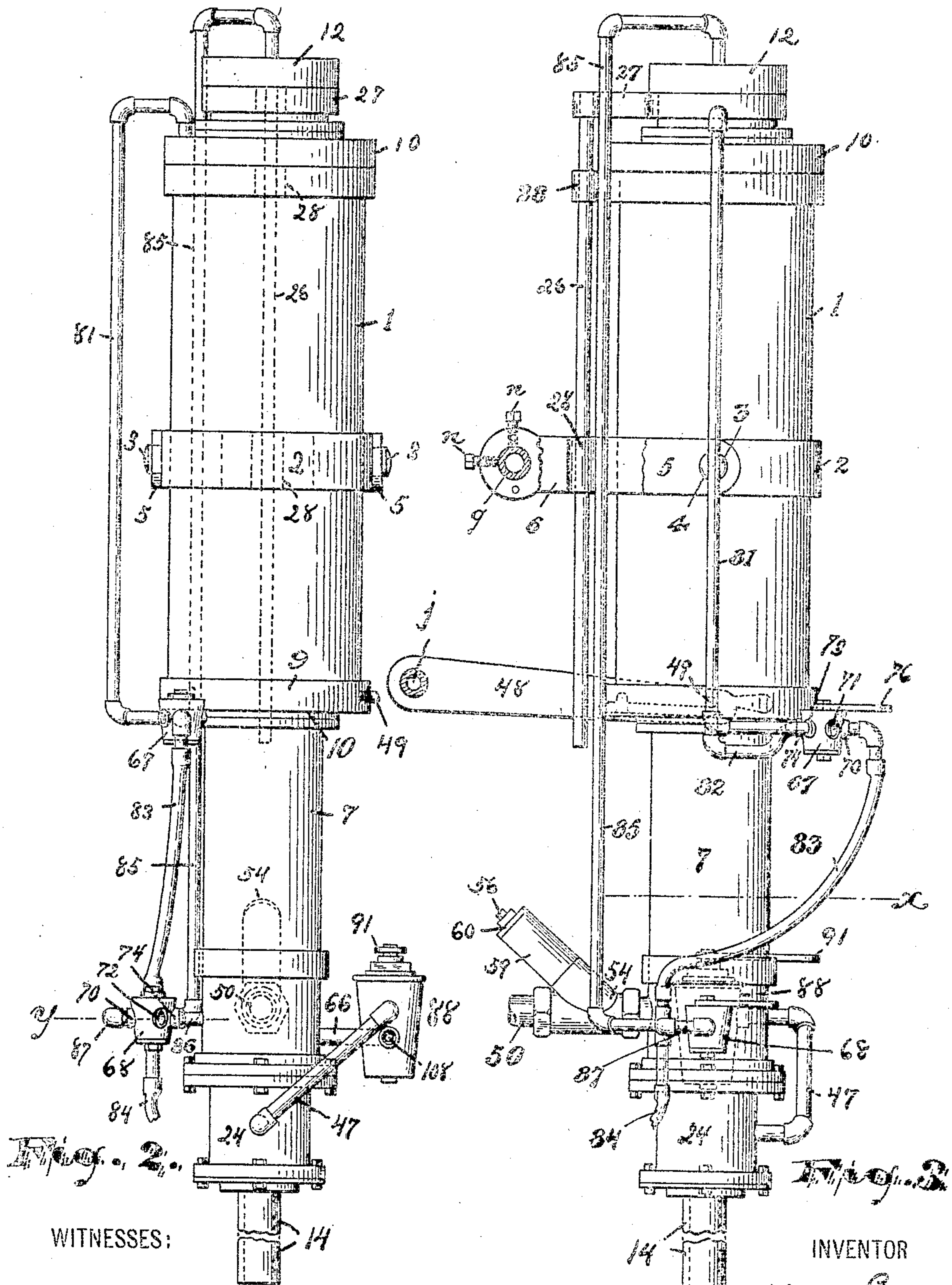
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5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

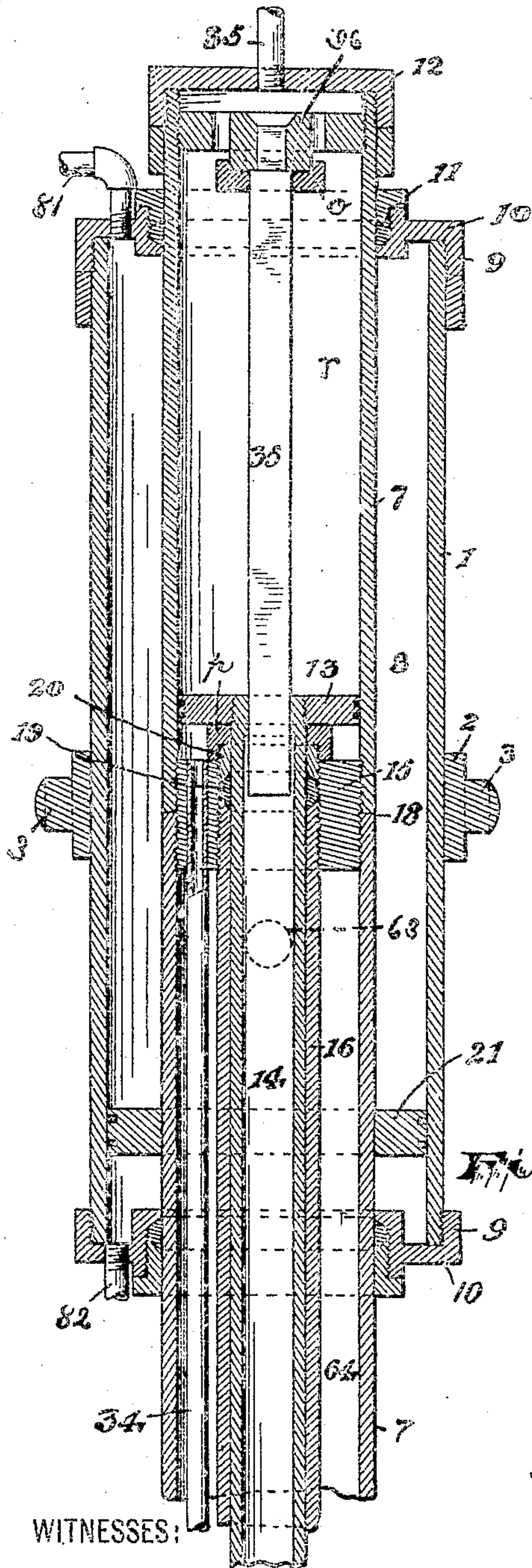


Fig. 4.

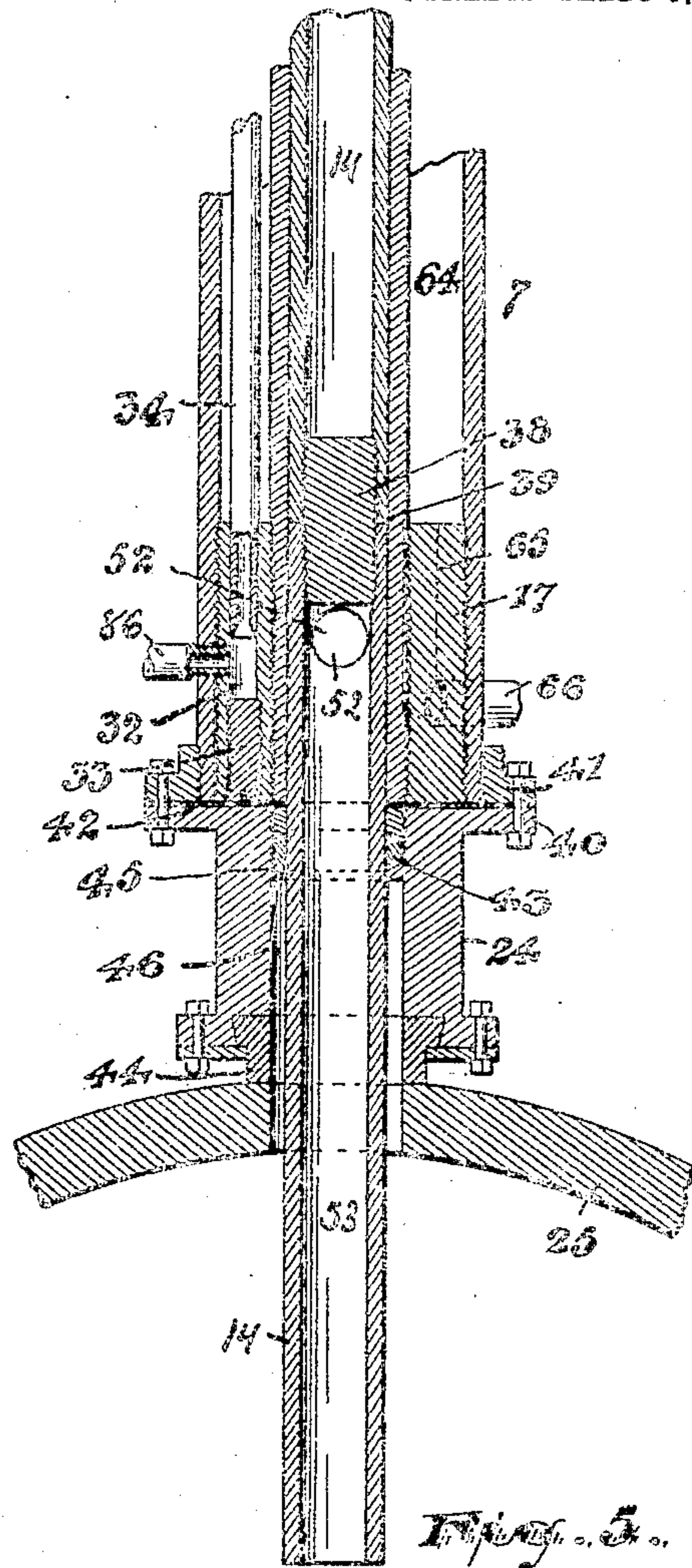


Fig. 5.

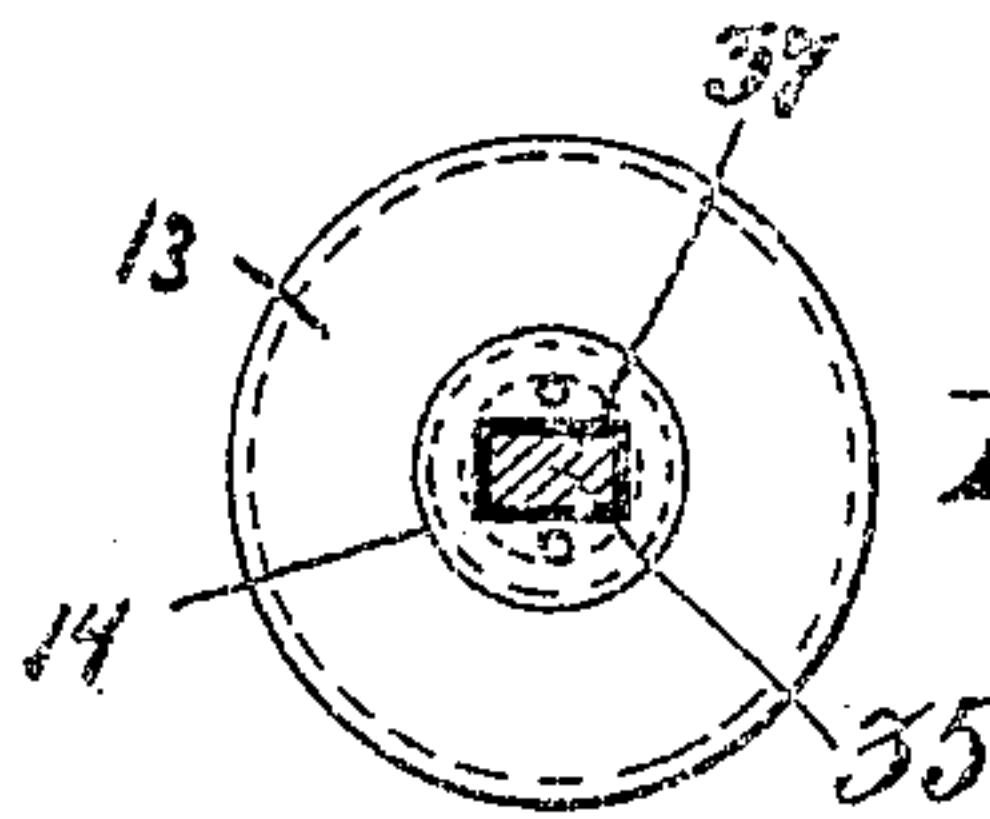


Fig. 6.

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APPLICATION FILED SEPT. 19, 1904.

5 SHEETS—SHEET 4.

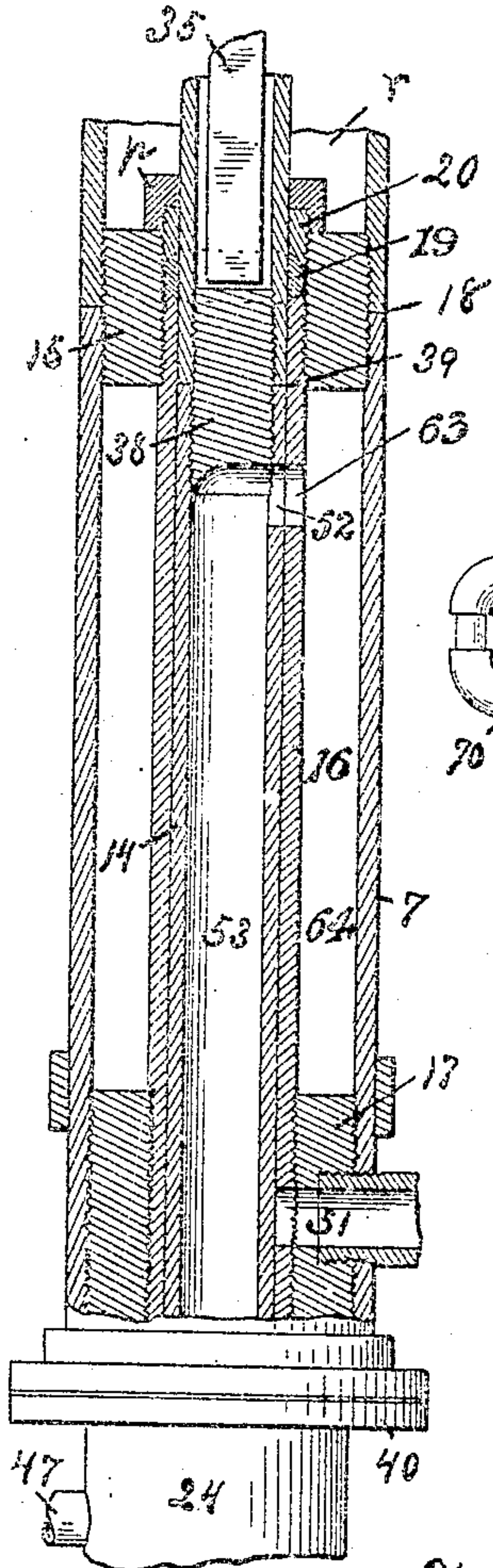


Fig. 7.

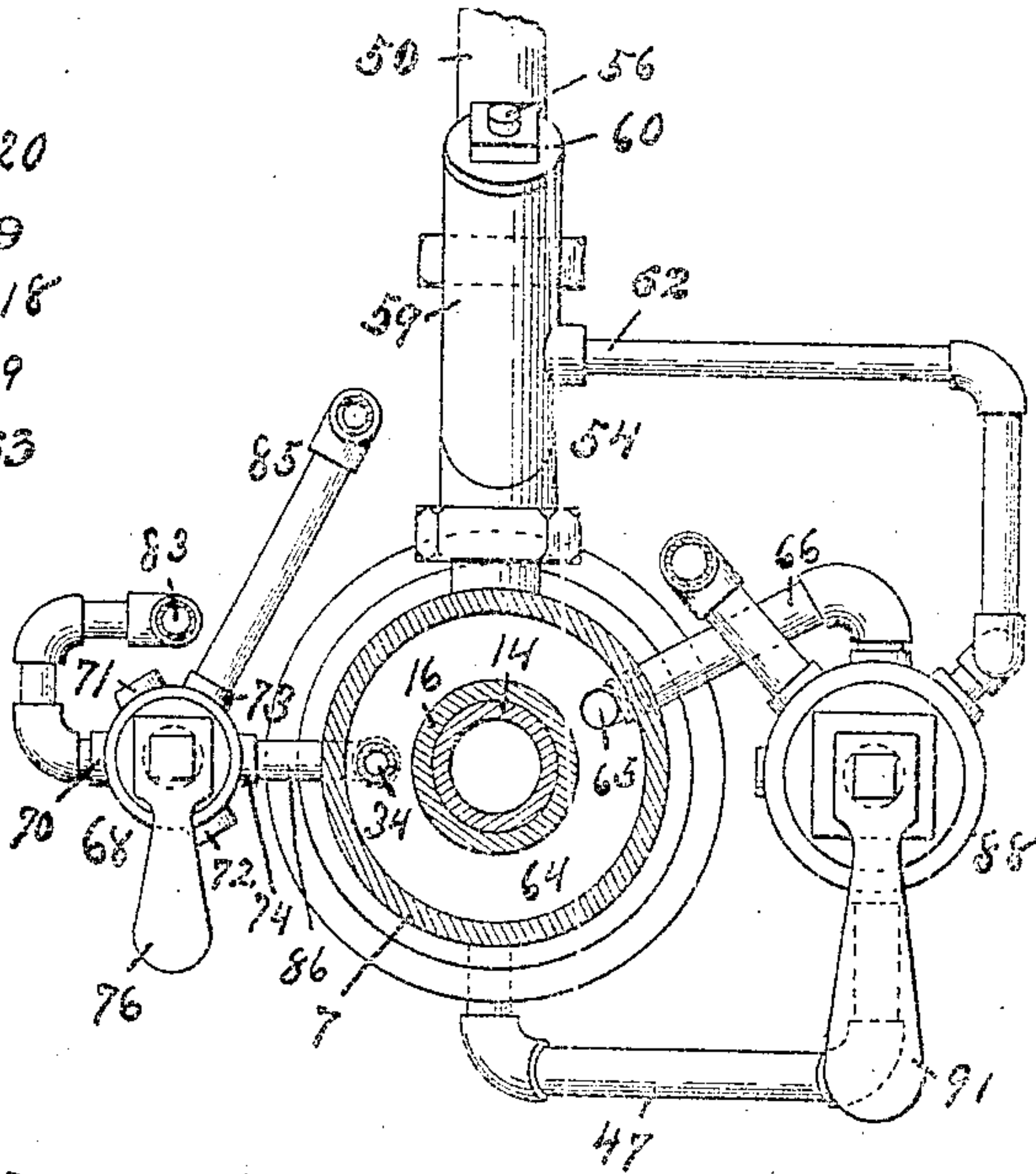


Fig. 8.

Fig. 9.

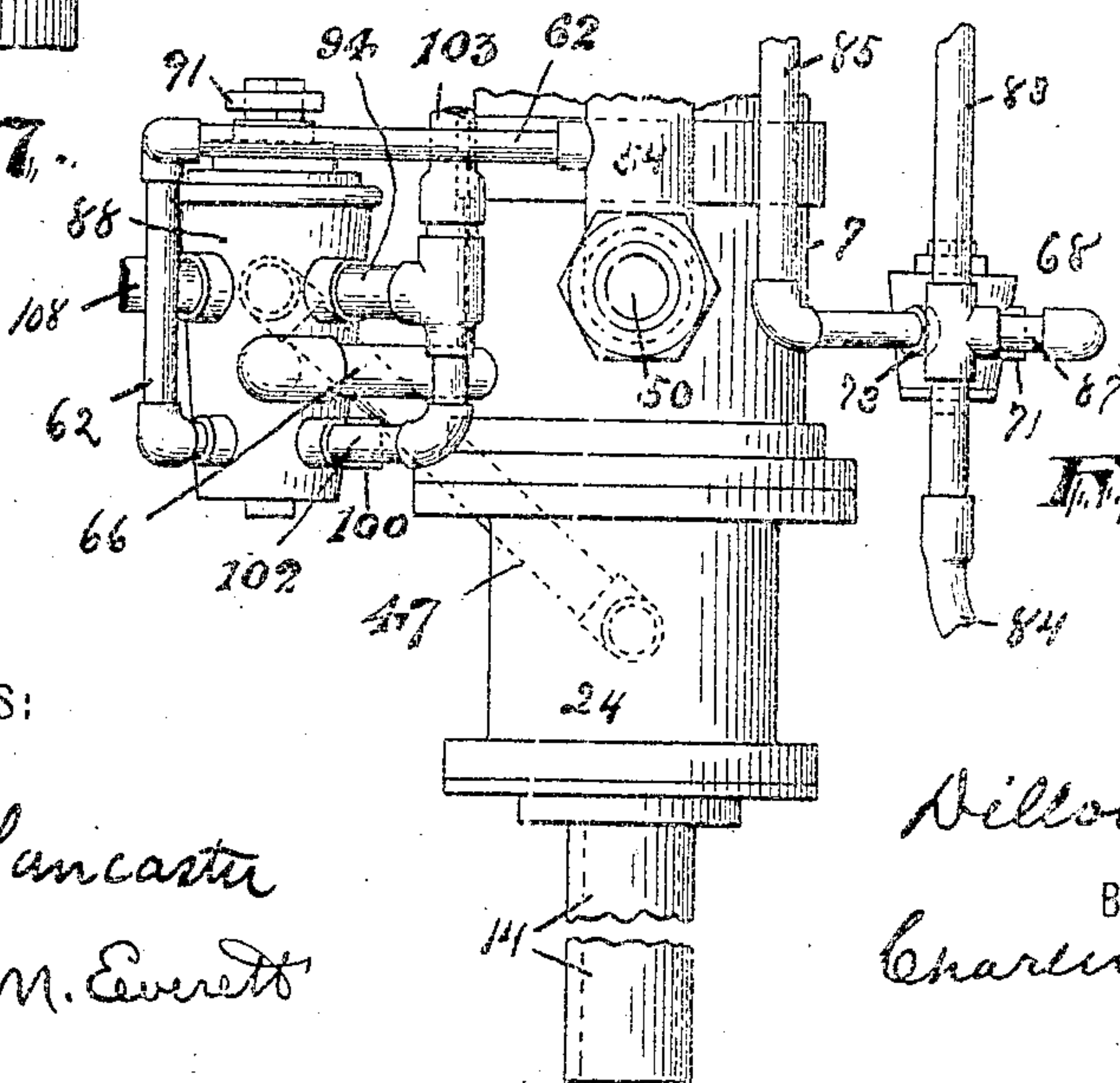
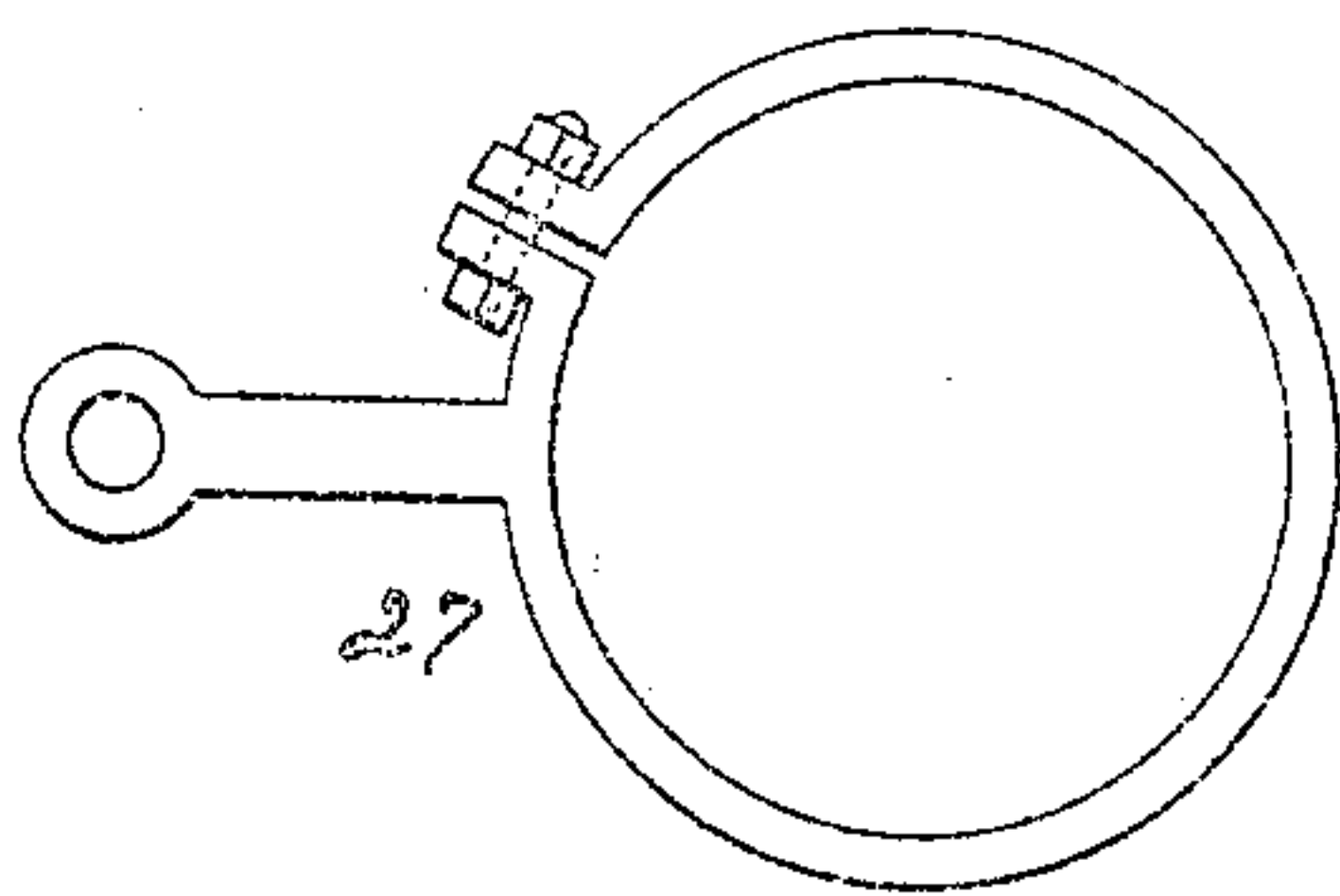


Fig. 10.

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UNITED STATES PATENT OFFICE.

DILLON BEEBE, OF NEWARK, NEW JERSEY.

RACKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 786,621, dated April 4, 1905.

Application filed September 19, 1904. Serial No. 225,005.

To all whom it may concern:

Be it known that I, DILLON BEEBE, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Racking Apparatus; 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, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The objects of this invention are to secure in a racking apparatus a more compact construction, whereby the machine can be employed in rooms where the ceiling is low or the space otherwise restricted; to secure a construction which shall reduce the amount of material needed to build the machine, and, furthermore, confine the material to such kinds as are economical and commonly carried in stock; to cheapen the construction by reducing the labor involved; to secure an automatic action of the various parts of the racker as compared with manually-controlled parts; to secure an improved construction of pressure-fluid cylinders to effect movements of the parts of the racker; to provide a main cylinder which shall be adjustable to any desired position; to positively control the supply or liquid-flow in order to prevent leakage, and to obtain other advantages and results, some of which may be referred to hereinafter in connection with the description of the working parts.

The invention consists in the improved racking apparatus and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth, and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like characters of reference indicate corresponding parts in each of the several figures, Figure 1 shows in front elevation a racking apparatus of my improved construction. Fig. 2 is a front elevation of a single racker-arm, and Fig. 3 is a side elevation of the same. Fig. 4 is a vertical sectional view of the upper part of a racking-arm; and Fig. 5 is a

continuation of Fig. 4, showing the lower part of the arm in central section, the filling-tube being at its lowest limit of movement in both figures. Fig. 6 is a detail plan of the top of the filling-tube, showing a certain guide-bar in cross-section. Fig. 7 is a vertical central section of a portion of a racking-arm, showing the filling-tube in upper or raised position. Fig. 8 is a section taken upon line *x*, Fig. 3. Fig. 9 shows in detail a certain guide-rod support. Fig. 10 is a side elevation of the lower part of the racking-arm from the side opposite that shown in Fig. 2. Fig. 11 is a central sectional view of the lower part of the racking-arm with the filling-tube in position for inflow of liquid to a package. Fig. 12 is a cross-section, as upon line *y*, Fig. 2, of a certain valve employed for operating the cylinders. Fig. 13 is a vertical central section of a valve employed for controlling the inflow and outflow of gas and liquid from a package; and Figs. 14, 15, and 16 are cross-sections of said valve, taken upon lines *z'*, *z''*, and *z'''*, respectively, of Fig. 13.

In said drawings, *aa* indicate suitable standards adapted to support a tank *b*, containing the beer or other beverage to be racked into packages, said tank being provided with a pressure-gage *c*, sight-glass *s*, safety-valve *d*, and gas-charging connection *g* and being entered at one end by a supply-duct *e*, leading from the filter through which the liquid is supplied. At the front of said standards *a* and tank *b* are other standards, *f f*, suitably connected thereto and being joined by a bar *g*, from which the individual filling-arms hereinafter described are suspended. A cylindrical chamber *h* is also supported upon the frame of the apparatus, preferably by clamps *i*, fastening it to a parallel bar or rod *j*, extending between the bars *k k*, connecting the standards *aa* and *f f*. This chamber *h* is for compressed air or gas, being in communication, as by a duct *l* at one end, with a suitable source of supply and provided at some point with a pressure-gage *m*.

The liquid-tank *b*, chamber *h*, and supporting-bar *g* may be of any desired length to accommodate any number of individual filling-arms desired; but in my application I have

shown for purposes of illustration two such arms. In each of said arms, 1 indicates the main, outer, or first cylinder, said cylinder having a clamping-band 2, adjustable intermediate of the ends and providing trunnions 3 at diametrically opposite sides of the cylinder. These trunnions are seated in bearings 4 at the forward ends of the arms 5 of a forked bracket 6, said bracket at its rear end being rigidly fastened to the supporting rod or bar 7, as by set-screws 8 or any other suitable means. The cylinder 1, it will be understood, (and, since this cylinder carries all the other parts of the racking-arm, therefore the entire arm,) can be swung upon its trunnions 3 into or out of alinement with a package, and, furthermore, by shifting the clamping-band having said trunnions up or down on the cylinder the swing of the racking-arm may be varied as desired. Within the said first cylinder 1 is a second cylinder, 7, projecting from the first cylinder at both ends and being sufficiently smaller to form between the two a pressure-fluid chamber 8. At both its opposite ends the said outer cylinder is exteriorly threaded to receive the flange 9 of a cap 10, said cap being centrally apertured to receive the inner cylinder 7 and having suitable packing means 11 to secure an impervious engagement or contact with the said inner cylinder. The inner cylinder 7 is in turn closed at its upper end, as by a cap 12, and said cylinder receives a piston-head 13, fast upon the upper end of the filling-tube 14. Beneath the lower limit of the range of movement of said piston-head 13 an interior sleeve 15 is fixed in the inner cylinder and supports the upper end of a tube or sheath 16, which incloses the filling-tube and forms a sliding fit therewith, said sheath being held central at its lower end by a lower sleeve 17 similar to the upper one, 15. Said sleeves 15 and 17 preferably screw into the cylinder 7, the cylinder being cut transversely, as at 18, to provide convenient access to the upper sleeve and parts adjacent thereto. Both said sleeves are threaded interiorly to receive the correspondingly-threaded ends of the sheath, and against the upper end of the sheath is arranged a packing 19, held by a packing-ring 20, screwing into the top of the sleeve 15.

The inner cylinder 7 has upon itself within the outer cylinder 1 a peripheral collar 21, which at its outer edges engages the walls of said cylinder after the manner of a piston-head. A duct 81 leads into the top of the outer cylinder 1, and another duct, 82, leads into the bottom, so that a pressure fluid can be admitted through either one of said ducts to act upon the piston-collar 21 of the inner cylinder, exhaust from the opposite side of said piston-collar taking place through the other duct. In this manner the inner cylinder is slid up or down to secure the desired position of its packing-head 24, hereinafter described, with respect to a package 25. Pref-

erably the said inner and outer cylinders 7 and 1 are held against twisting or rotary movement with respect to each other by means of a guide-rod 26, made fast to one of the cylinders, as to the inner one, by means of a support 27 and adapted to slide through sockets on the other, as shown at 28, on the outer cylinder. It will be furthermore noted that the inner cylinder projects at both ends from the outer or main cylinder or, in other words, extends entirely through the same.

Pressure fluid is admitted to the inner cylinder to move the filling-tube 14 therein by means of a duct 85, opening into its top, and a second duct 86, opening through the side of the cylinder near its bottom into a passage 32 of the sleeve 17, said passage being closed at its outer end by a screw-plug 33 and receiving at its inner end a tube 34, which leads upward between the sheath 16 and inner cylinder through the upper sleeve 15, thus opening beneath the piston 13. Pressure fluid can therefore be admitted through either one of said passages and exhaust take place through the other, so that the filling-tube can be moved up and down with respect to the inner cylinder and the filling-head carried thereby. To cushion the same at the ends of its movement, stop-gaskets 35 are arranged at the top and bottom of the chamber of the inner cylinder. To prevent twisting of the filling-tube within its cylinder 7, a guide-bar 36 of angular cross-section held rigidly and centrally of the inner cylinder, as by a spider 36, set into the top of the cylinder, extends downward through a correspondingly-shaped opening 37 into the upper part of the filling-tube. Said upper part of the filling-tube is, however, not used for the passage of liquid and is shut off from the lower part, which is so used, by a plug 38, preferably screwed and soldered imperviously into the filling-tube, which is made sectional, as at 39, for that purpose.

The packing-head 24 is attached to the lower end of the inner cylinder 7, being preferably bolted by its flange 40 to a flanged ring 41, screwing exteriorly upon the cylinder 7. A suitable gasket 42, placed between the end of the cylinder and top of the packing-head 24, forms a tight joint between said parts, and a packing 43, arranged in the upper part of the packing-head, forms a joint around the filling-tube. The lower portion of the packing-head is of usual construction, with an elastic end piece 44 to engage a package around its bung-hole and having the filling-tube passage 45 radially enlarged at its lower part, as at 46, with a duct 47 leading therefrom which serves both for charging and for venting, as will be hereinafter more fully described.

It will be understood that the pivotal support of my entire device by means of the trunnions 3 upon the clamping-band 2 enables it to be adjusted up and down, so that it may be brought to such a point that when the fill-

ing-tube and filling-head are both raised away from the package the center of gravity shifts and the device becomes top-heavy to an extent sufficient to cause its lower end to swing away from the package. When drawn back again into line with the package, the racking-arm may be held by any suitable means, such as a hooked catch 48, engaging stops 49 on the arm.

For the inflow of liquid to my improved racking-arm a supply-pipe 50 communicates at the lower part of the inner cylinder with a passage 51 through the lower sleeve 17 and sheath 16 and adapted to register with the lateral opening 52 of the filling-tube flow-passage 53. Preferably a check-valve 54 is arranged in said supply-duct, comprising a valve-disk 55, whose stem 56 has a piston-head 57, working in a chamber 58 of a tubular branch 59 of the check-valve. A spider 60 at the end of said branch 59 affords a guide for the valve-stem 56, and between said spider and the piston-head 57 is arranged a spring 61, which with the flow-pressure normally holds the valve closed. A duct 62 opens into the side of said check-valve below the piston-head 57 and through which pressure fluid is admitted, as hereinafter described, to open the check-valve.

The upper part of the sheath 16 for the filling-tube has a lateral opening 63, and when the filling-tube is elevated after the filling of a package its lateral opening 52 comes into coincidence with said opening 63 in the sheath, so that communication is established with the space 64 in the lower part of the inner cylinder. This space communicates at its lower end, as by a passage 65, through the collar 17 and a lateral duct 66 with a valve to be hereinafter described, so that the filling-tube may be vented and its contents allowed to fall into the package. This vent-opening 63 in the sheath, it will be noted, is, like the flow-opening 51, between the upper and lower packings 19 43 of said sheath, and thus the lateral opening 52 of the filling-tube has its limits of movement as the tube slides up and down between the said packings 19 43, so that it never crosses or engages them to cut or wear the packing material. In other words, the limits of movement of the filling-tube render it absolutely impossible for the lateral opening to even reach the said packings.

For controlling the inlet and outlet of pressure fluid to the outer cylinder and inner cylinder to move the inner cylinder and filling-tube, respectively, I employ valves 67 68, which are just alike and arranged upon the same pressure-fluid supply, so that a description of one will suffice for both. Each valve comprises a casing 69, (see Fig. 12 especially,) through the sides of which open ports 70 for the pressure-fluid supply 71 72, leading into the open air substantially opposite each other, 73, which communicates with the top of the

cylinder, and 74, which communicates with the bottom of the cylinder. The rotary portion 75 of the valve is adapted to be turned by a handle 76 and has various transverse passages adapted to communicate with the ports described. One of said passages, as 77, extends diametrically of the valve, so as to connect the air-supply port 70 with the opposite port 74, leading to the bottom of the cylinder. At the same time this is done an angular passage 78 at one side of said passage 77 places the port 73 from the top of the cylinder in connection with the vent 71, so that the moving part in said cylinder will be forced upward.

To reverse the direction of the pressure fluid, a branch 79 of the valve-passage 77 enables the same when turned out of alinement with the ports 70 74 to connect the ports 70 73, a curved passage 80 on the opposite side of the middle passage 77 from the first-mentioned passage 78 then connecting the port 74 for the bottom of the cylinder with the second vent-port 72, as shown in Fig. 12. Thus by a slight rotary movement of the valve-plug 75 the direction of the pressure fluid to the cylinder may be varied at will to drive the moving part in said cylinder in either direction.

The valve 67 for the main cylinder 1 is connected by pipes 81 82 with the top and bottom of said cylinder, respectively, and thus supported, a flexible tube 83, leading from the main air-supply pipe 84, permitting relative movement of the two cylinders. The lower valve 68, or one for the inner cylinder 7, is supported thereon by means of tubes 85 86, leading to the top and bottom of said lower inner cylinder, respectively. A branch pipe 87 leads to said valve from the main pressure-supply pipe 84, and said supply-pipe 84 is flexible to permit movement of the cylinder.

For controlling the flow of gas in charging and venting the packages and also for controlling the check-valve 54 in the flow-pipe 50 I employ a valve 88, which is located at the side of the lower part of the inner cylinder adjacent to the packing-head. Said valve 88 comprises a casing 89, in which a plug or valve proper, 90, fits imperviously, having a handle 91 at its upper end outside the casing for turning, a spiral spring 92 being arranged between the top of the casing and the top of the valve proper, all as is common in valves. Said valve proper and its casing have passages and ports on three planes, one above the other, as shown all together in Fig. 13 and separately in Figs. 14, 15, and 16. In the upper plane a port 93 in the casing is connected, as by a pipe 94, with the compressed-air or gas supply, and the valve-plug has a Y-shaped transverse passage, the stem 95 of which is adapted to be turned into coincidence with the said air-supply passage 93. When this is done, one of the branches, as 96, of said Y-shaped passage communicates through a port 97 in the

valve-casing with the duct 47, before referred to, which communicates through the packing-head with the package to be filled. Gas can therefore pass freely into the said package to charge the same. Upon throwing the valve-lever to its opposite limit, as herein-
 5 after more fully described in connection with the simultaneous operation of the three series of passages of the valves, the stem 95 of the Y-shaped passage coincides with a vent-
 10 opening 98 in communication with the gas-pressure above the liquid-supply, as herein-after more fully described, its other branch arm 99 now registering with the passage 97,
 15 leading to the package, so that gas may escape therefrom as the liquid enters.

At its lowest plane, or the one at line z^3 in Fig. 13, the valve-casing has a vent-port 100, an air-inlet 101, connected, as by a pipe 102,
 20 with the compressed air or gas supply 103, and a port 104, connected by the duct 62 with the check-valve 54 in the supply-pipe. The said vent 100 and the port 104, leading to the check-valve, are adapted to be in communi-
 25 cation when the valve is in position shown in Figs. 13 and 16 by a passage 105, so that compressed air or gas beneath the head 57 of the check-valve piston is vented and said valve permitted to close. It will be noted
 30 from a comparison of Figs. 14 and 16 that this connection is made when the ports at the top plane of the valve are all closed or the valve-plug at the intermediate position to which it is thrown as soon as the package
 35 is full. The upper part of the valve thus cuts off the vent from the package to prevent liquid rising thereinto, and simultaneously the lower part of the valve closes the check-valve 54 to stop further inflow from the liq-
 40 uid-supply. When, however, the valve-plug 90 is turned in position to have the passages 99 95 in its upper part connect ports 97 and 98 for venting of a package, a branch 106 of the passage 105 at the lower end of the valve
 45 registers with the check-valve port 104, while one end of said passage 105 registers with the air-inlet 101 and the other end is dead. This admits pressure beneath the check-valve piston 57 to open said check-valve, and filling
 50 and venting of the package begin simultaneously.

On its middle plane, or at line z^2 , Fig. 13, the valve-plug 90 has a single transverse pas-
 55 sage 107, adapted to coincide at its opposite ends with a vent-port 108 and a port 109, opening into the pipe 66, leading from the chamber 64 of the inner cylinder 7 and adapted, as above described, to vent the filling-tube. Thus when the valve-plug is brought into the
 60 position shown in Fig. 14 to shut off both flow into and venting from the package communication will be established by the passage 107 between the open air and said chamber 64, so that as the filling-tube is raised it will be vented
 65 at the top and its contents allowed to pass

into the package. In other positions of the valve-plug this passage 107 is dead at both ends.

In the operation of my improved racking device an empty package is brought beneath one of the arms, it being understood that the liquid-tank *b* is constantly being supplied under uniform pressure and that above the liquid therein a predetermined pressure of, say, ten or twelve pounds has been introduced through valved inlet *q* and then cut off. The cylinder *h* is in constant communication with the gas-supply means wholly independent of the above-mentioned gas-pressure above the liquid in the supply-tank. The vent-opening 98 of the valve 88 is also in communication, as by a flexible tube 108, having a sight-glass 109, with the top of the liquid-supply tank *b*. The air-supply tube 103 to the said valve 88 is connected to the gas-chamber *h*, and likewise the pipe 84, which supplies air to the cylinder-operating valves 67 and 68. Said chamber *h* carries a pressure of, say, fifty pounds, and, as stated, is continuously supplied. A package being in place, the valve 67, controlling the pressure-fluid supply to the outer cylinder, is then turned to admit pressure fluid to the upper part of said cylinder and force the inner cylinder down until its packing-head 24 is in impervious engagement with the pack-
 age, when the valve 67 is turned to an intermediate position, where all its ports are closed, or may be left with pressure alive to prevent relaxation from leakage or the like. The valve 68 is then manipulated in a manner precisely similar to that just described of valve 67, and as a result thereof the filling-tube is projected into the package.

To facilitate making connection with a package, as just described, the length of the filling-tube is such that its lower end is never entirely withdrawn up into the inner cylinder, but projects to enter the bung-hole ahead of the engagement of the packing-head with the package, and thus serve as a guide to center the filling-arm with respect to the package. This downward movement of the filling-tube brings its lateral opening 52 into coincidence with the liquid-supply passage 51. The check-valve 54 in the supply-duct 50 is closed, it will be remembered, and the valve 88 is standing with its three planes or series of passages as shown in Figs. 14, 15, and 16, respectively—that is, the upper one is dead, the lower one venting the check-valve 54 to allow it to stand closed, and the middle one open to the chamber 64 of the inner cylinder, but which chamber is at this time idle. The plug 90 of said valve 88 is now turned in the direction of the single arrow shown on Fig. 14, which brings the passage 95 of the upper series into registration with the air-inlet 94 and the branch passage 96 into registration with the port 97, leading to the package. The other branch, 99, is dead, as are also the passages of

the lower and middle series of the valve, so that the only effect is that the package is given a primary charge from the gas-chamber *h*. This occupies but an instant of time, and then the valve-plug 90 is swung to the other limit of its range of oscillation, as shown by the double arrows in Fig. 14. This brings the passages 95 99 of the upper series or plane of said plug into registration with the ports 98 97, respectively, and opens up communication between the package and top of the supply-tank *b* to permit venting, the other branch, 96, being dead, as is also the passage 107 of the middle series. Of the lower series or plane the passages 105 and 106 connect the air-inlet 101 with the port 104, leading to the check-valve 54, so that pressure is admitted beneath the piston of said check-valve to open the same. Flow into the package now takes place by gravity, the primary gas-pressure therein escaping to the top of the liquid-supply tank to take the place of the liquid, and if there is a surplus it is relieved by the safety-valve *d*. When the package is full and liquid appears at the sight-glass 109, the plug 90 of the valve 88 is swung or turned back to its original position midway of the ends of its range of movement, as shown in Figs. 13, 14, 15, and 16. This closes the check-valve 54 to stop the flow of liquid, stops venting from the package, and opens up the vent 108 to the chamber 64 of the inner cylinder. The valve 68 is then operated to admit pressure to the bottom of the inner-cylinder chamber 13 and exhaust from its top, thus driving the piston-head upward and carrying the filling-tube out of the package. This upward movement of the filling-tube first carries its lateral opening 52 out of coincidence with the flow-opening 51, through which it has been receiving liquid, and this, in addition to the check-valve 54, shuts off further flow to the package. Said lateral opening 52 then passes into registration with the opening 63 through the sleeve 16 into the chamber 64, and thus vents the filling-tube to permit its contents to fall into the package. The other valve, 67, is then operated to admit pressure to the bottom of the outer cylinder and exhaust from its top, thus driving its head 21 upward and disengaging the packing-head from the package. The package is then bunged and removed.

It will be understood that the body of gas in the top of the supply-tank *b* is after its introduction positively cut off from its supply source by a cock in the connection *q*, so that it is actually a detached body. Furthermore, I would point out that the stops *o p* in the inner cylinder positively limit the movement of the filling-tube, so that the lateral opening 52 cannot pass beyond the packings 19 43 of the sheath 16, and obviously fluid-pressure for operating the cylinders of my improved filling-arm may be compressed gas (preferably air) taken from the chamber *h*, as shown, or

may be any other suitable fluid supplied in any ordinary and well-known manner.

Having thus described the invention, what I claim as new is—

1. In a racking apparatus, a racker-arm comprising a main or outer cylinder having suitably-packed apertures at its opposite ends, means for supporting said main cylinder, an inner cylinder slidably arranged in said outer cylinder and projecting at both ends thereof through said apertures, said inner cylinder forming with the outer cylinder a chamber for pressure fluid and being closed at its top, a collar upon said inner cylinder fitting the outer cylinder in the capacity of a piston-head, a packing-head on said inner cylinder, a filling-tube arranged to slide in the said inner cylinder and having a piston-head fitting the same, and means for supplying pressure fluid to said cylinders to move the said sliding parts therein.

2. In a racking apparatus, a racker-arm comprising a main or outer cylinder having suitably-packed apertures at its ends, an inner cylinder extending through said outer cylinder and projecting therefrom at both ends, said inner cylinder forming with the outer cylinder a chamber for pressure fluid, a collar upon said inner cylinder fitting the outer cylinder in the capacity of a piston-head, a packing-head on said inner cylinder, a filling-tube arranged to slide in said inner cylinder and having a head fitting the same, separate sets of ducts leading to the top and bottom of each cylinder, a valve at the junction of the ducts of each set adapted to introduce pressure fluid through either duct and exhaust through the other, and a pressure-fluid-supply pipe leading to said valves.

3. In a racking apparatus, a racker-arm comprising a main or outer cylinder having suitably-packed apertures at its ends, an inner cylinder extending through said outer cylinder and projecting therefrom at both ends, said inner cylinder forming with the outer cylinder a chamber for pressure fluid, a collar upon said inner cylinder fitting the outer cylinder in the capacity of a piston-head, a packing-head on said inner cylinder, a filling-tube arranged to slide in said inner cylinder and having a head fitting the same, a set of ducts on each cylinder comprising pipes leading to opposite sides of the piston-head therein, a valve mounted on each cylinder and adapted to introduce pressure fluid through either one of said ducts and exhaust through the other, and a flexible pressure-fluid-supply pipe leading to the valves.

4. In a racking apparatus, a racker-arm comprising a main or outer cylinder having suitably-packed apertures at its ends, an inner cylinder extending through said outer cylinder and projecting therefrom at both ends, said inner cylinder forming with the outer cylinder a chamber for pressure fluid, a collar

upon said inner cylinder fitting the outer cylinder in the capacity of a piston-head, a packing-head on said inner cylinder, a filling-tube arranged to slide in said inner cylinder and
 5 having a head fitting the same, a set of ducts on each cylinder comprising pipes leading to opposite sides of the piston-head therein, a valve mounted on each cylinder and adapted to introduce pressure fluid through either one
 10 of the said ducts and exhaust through the other, a flexible pressure-fluid-supply pipe leading to the valves, and means for preventing relative twisting of the filling-tube and inner cylinder, and of the inner cylinder and outer cylinder, each comprising a rod rigidly carried
 15 on one part and sliding in a correspondingly-shaped socket on the other part.

5. A racking-arm comprising an outer cylinder, a clamping-band upon said cylinder adjustable toward either end and having diametrically opposite trunnions projecting therefrom, a forked supporting-bracket adapted at the ends of its arms to pivotally receive said trunnions, means for holding the other end of
 20 said bracket fixed, an inner cylinder in said outer cylinder and having a collar fitting therein to serve as a piston-head, a packing-head on said inner cylinder, a filling-tube within said inner cylinder and also a piston-head,
 25 means for introducing pressure fluid to and exhausting the same from said cylinders, and suitable flow and vent ducts.

6. A racking-arm comprising an outer cylinder, a clamping-band upon said cylinder adjustable toward either end and having diametrically opposite trunnions projecting therefrom, a forked supporting-bracket adapted at the ends of its arms to pivotally receive said trunnions, means for holding the other end of
 35 said bracket fixed, an inner cylinder in said outer cylinder, projecting therefrom at both ends and having a collar fitting the outer cylinder as a piston-head, a packing-head on said cylinder, a filling-tube adapted to slide in said
 40 inner cylinder and also having a piston-head, means for introducing pressure fluid to and from said cylinders to slide the inner cylinder and filling-tube and shift the center of gravity to swing the arm on its pivots, and suitable flow and vent means.
 50

7. A racker-arm comprising an outer cylinder, a clamping-band upon said cylinder adjustable toward either end and having diametrically opposite trunnions projecting therefrom, a forked supporting-bracket adapted at the ends of its arms to pivotally receive said trunnions, means for holding the other end of said bracket fixed, an inner cylinder in said outer cylinder, projecting therefrom at both
 55 ends and having a collar fitting the outer cylinder as a piston-head, a packing-head on said inner cylinder, a filling-tube adapted to slide in said inner cylinder and also having a piston-head, means for introducing pressure fluid
 60 to and from said cylinders to slide the inner

cylinder and filling-tube upward and raise the center of gravity of the arm above its pivotal support and tip the same into inclined position, a catch for holding the arm in vertical position, and suitable flow and vent means. 70

8. In a racker-arm, the combination of a sheath mounted therein and having lateral ports or openings, a filling-tube adapted to slide in said sheath and having a longitudinal flow-passage with a lateral aperture adapted to register with the ports of said sheath, and packings at the upper and lower ends of said sheath adapted to imperviously engage the filling-tube and being located outside the range of movement of the said lateral aperture of the filling-tube. 75 80

9. In a racking-arm, the combination with an outer cylinder, an inner cylinder adapted to slide in said outer cylinder, and a filling-tube adapted to slide in said inner cylinder, of a sheath mounted in the lower part of said inner cylinder and nicely fitting the filling-tube, said sheath having lateral ports or openings and the filling-tube having a lateral aperture adapted to register with said ports, packings at the upper and lower ends of said sheath adapted to imperviously engage the filling-tube, and means for supplying liquid and for charging and venting packages. 85 90

10. In a racking-arm, the combination of an outer cylinder, an inner cylinder projecting at both ends from said outer cylinder and forming therewith an annular pressure-fluid chamber, a collar upon said inner cylinder fitting the outer cylinder to serve as a piston-head, a filling-tube in said inner cylinder having a head fitting the upper part thereof, a sheath in the lower part of the inner cylinder fitting said filling-tube, annular sleeves supporting said sheath at its upper and lower ends, the upper sleeve imperviously dividing the interior of the cylinder into upper and lower chambers and the sheath having upper and lower lateral ports the former of which opens into the lower of said chambers, packings at the upper and lower ends of said sheath outside the ports thereof and imperviously engaging the filling-tube, said filling-tube having a flow-passage with a lateral aperture adapted to register with the ports of the sheath, means for supplying pressure fluid to and exhausting it from said cylinders, means for the flow of liquid and gas to a package and means for venting. 95 100 105 110 115

11. The combination with a racking-arm providing a slideway, of a filling-tube in said slideway, comprising two sections rigidly connected by a solid filling-piece dividing the interior of the tube into upper and lower chambers, a guide-rod sliding through an aperture in the top of the said upper chamber, and means for supplying liquid to the lower chamber. 120 125

12. In a racking-arm, an outer cylinder and means for supporting the same, an inner cylinder 130

inder in said outer cylinder, a sheath centrally mounted in the lower portion of said inner cylinder, a filling-tube slidable in said sheath, said filling-tube comprising two tubular sections rigidly connected with a solid filling-piece forming at the lower part of the filling-tube a flow-passage independent of the upper part, and means for sliding said filling-tube and inner cylinder, a guide-rod projecting into the upper part of the filling-tube and means for supplying liquid to the lower part.

13. In a racking-arm, an outer cylinder and means for supporting the same, an inner cylinder slidable in said outer cylinder and comprising sections rigidly connected by a sleeve or filling-piece dividing the said cylinder into upper and lower chambers, a sheath mounted in said lower chamber, a filling-tube slidable in said sheath and having a head fitting said upper chamber, means for supplying pressure fluid to the upper chamber to slide said filling-tube, and means for securing a flow of liquid and for charging and venting.

14. In a racking-arm, an outer cylinder and means for supporting the same, an inner cylinder slidable in said outer cylinder and comprising sections rigidly connected by a sleeve or filling-piece dividing the said cylinder into upper and lower chambers, a sheath mounted centrally in the lower chamber of said inner cylinder and forming an annular space between itself and said cylinder and having lateral ports or openings, a filling-tube slidably fitting said sheath and having a head fitting the upper chamber of the cylinder and a lateral aperture adapted to register with the said ports of the sheath, a pressure-fluid duct leading through said annular space to the upper chamber, and a vent-duct opening into said annular space, means for sliding said inner cylinder and filling-tube, and means for supplying liquid.

15. In a racking apparatus, a racking-arm having an outer cylinder, an inner cylinder slidably arranged in said outer cylinder and projecting therefrom at both ends, a filling-tube slidable in the inner cylinder and having within said inner cylinder a lateral aperture adapted to register with an inlet-opening in the side of the cylinder, said inner cylinder and filling-tube being adapted to be independently operated by pressure fluid, a packing-head mounted directly upon the lower end of said inner cylinder and forming at its upper part a continuation of the filling-tube slide-way thereof and below said upper part loosely inclosing the filling-tube, said packing-head being of substantially uniform diameter with the inner cylinder and short with respect thereto, whereby a firm seating upon the package is insured.

16. In a racking apparatus, a racking-arm having an outer cylinder, an inner cylinder arranged in said outer cylinder and a filling-tube within said inner cylinder, said filling-tube

and inner cylinder being adapted to be independently operated by pressure fluid, a packing-head mounted directly upon the lower end of the inner cylinder and being annularly recessed around the filling-tube and having a duct communicating with said recess, a flow-duct and filling-tube vent-duct leading to the filling-tube, a primary charging-duct and a vent-duct, and a valve adapted to place either one of said last-mentioned ducts in communication with the packing-head duct and close the other.

17. In a racking apparatus, a racking-arm having an outer cylinder, an inner cylinder arranged in said outer cylinder and a filling-tube within said inner cylinder, said filling-tube and inner cylinder being adapted to be independently operated by pressure fluid, a packing-head mounted directly upon the lower end of the inner cylinder and being annularly recessed around the filling-tube and having a duct communicating with said recess, a flow-duct and filling-tube vent-duct leading to the filling-tube through the lateral walls of the inner cylinder, a primary charging-duct and a vent-duct, and a valve adapted to place either one of said last-mentioned ducts in communication with the packing-head duct and close the other.

18. In a racking apparatus, a racking-arm having an outer cylinder, an inner cylinder arranged in said outer cylinder and a filling-tube within said inner cylinder, said filling-tube and inner cylinder being adapted to be independently operated by pressure fluid, a packing-head mounted directly upon the lower end of the inner cylinder, a venting-duct opening through the side of said packing-head, a flow-duct and a filling-tube vent-duct opening through the walls of the said inner cylinder, means for operating said cylinders, and for supplying liquid and gas.

19. The combination with a racking-arm providing a filling-tube slideway with a vent-port and a liquid-flow duct opening through the side thereof, a check-valve in said flow-duct adapted to be operated by a pressure fluid, a packing-head at the lower end of the racking-arm having a vent-duct opening through its side, a filling-tube in said slideway of the racking-arm, and having a longitudinal flow-passage with a lateral opening adapted to coincide with the said flow-opening, a compressed-gas supply, and a liquid-supply tank providing an entrapped body of gas above the liquid therein, of a valve having a horizontal series of ports one of which is connected to said compressed-air supply, the second to the top of the liquid-tank and the third is adapted to be connected to a package to be filled, and a second series of ports one of which is connected to the compressed-air supply, another to the said check-valve and a third opens into the atmosphere, a valve-plug in said casing having a Y-shaped passage

in the same plane with the first said series of ports and adapted to connect either the air-supply or the top of the liquid-tank to the package, and a second branched passage in the same plane with the second series of ports and adapted to connect the check-valve chamber with the atmosphere when the said Y-shaped passage is dead and to connect the air-inlet with said check-valve chamber when the Y-shaped passage has established communication between the package and top of the liquid-supply.

20. The combination with a racking-arm providing a filling-tube slideway with a vent-port and a liquid-flow duct opening through the side thereof, a packing-head at the lower end of the racking-arm having a vent-duct opening through its side, a filling-tube in said slideway of the racking-arm, and having a longitudinal flow-passage with a lateral opening adapted to coincide with the said flow-opening, a compressed-gas supply, and a liquid-supply tank providing an entrapped body of gas above the liquid therein, of a valve having a horizontal series of ports one of which is connected to said compressed-air supply, the second to the top of the liquid-tank and the third is adapted to be connected to a package to be filled, and a second series of ports one of which is connected to the vent-port of the racking-arm slideway and the other of which opens into the atmosphere, a valve-plug in said casing having a Y-shaped passage in the same plane with the first said series of ports and adapted to connect either the air-supply or the top of the liquid-tank with a package, said plug having a second passage in the same plane with the said second series of ports and adapted to connect the vent-port of the filling-tube slideway with the atmosphere when the said Y-shaped passage is dead.

21. The combination with a racking-arm providing a filling-tube slideway with a vent-port and a liquid-flow duct opening through the side thereof, a check-valve in said flow-duct adapted to be operated by a pressure fluid, a packing-head at the lower end of the racking-arm having a vent-duct opening through its side, a filling-tube in said slideway of the racking-arm, and having a longitudinal flow-passage with a lateral opening adapted to coincide with the said flow-opening, a compressed-gas supply, and a liquid-supply tank providing an entrapped body of gas above the liquid therein, of a valve-casing having a horizontal series of ports one of which is connected to said compressed-air supply, the second to the top of the liquid-tank and the third is adapted to be connected to a package to be filled, and a second series of ports one of which is connected to the compressed-air supply, another to the said check-valve and a third opens into the atmosphere, and a third series of ports one of which is

connected to the vent-port of the filling-tube slideway and the other of which opens into the atmosphere, and a valve-plug in said casing having a Y-shaped passage in the same plane with the first said series of ports and adapted to connect either the air-supply or the top of the liquid-tank with the package, a second branched passage in the same plane with the second series of ports and adapted to connect the check-valve with the atmosphere when the said Y-shaped passage is dead, and to connect the air-inlet with said check-valve when the Y-shaped passage has established communication between the package and the top of the liquid-supply, and a third passage in the same plane with the said third series of ports and adapted to connect the vent-port of the filling-tube slideway with the atmosphere when the said Y-shaped passage is dead and the check-valve vented.

22. In a racking apparatus, the combination of a tank or reservoir connected at its lower part to a continuous liquid-supply and being adapted to contain at its upper part an entrapped body of gas, a safety-valve at the upper part of said tank and a valved inlet for said gas, a primary charging-chamber independent of said tank, means for supplying gas to said chamber independent of the reservoir and its gas-supply, a packing-head adapted to engage a package, a filling-tube in said packing-head, a duct adapted to connect said filling-tube to the liquid-supply tank, a gas-pipe leading from the packing-head and connecting with a valve having branch ducts one of which leads to the primary charging-chamber and the other to the upper part of the liquid-supply tank, and means for connecting either one of said branch ducts with the gas-pipe and closing the other.

23. In a racking apparatus, the combination of a tank or reservoir connected at its lower part to a continuous liquid-supply and being adapted to contain at its upper part an entrapped body of gas, a safety-valve at the upper part of said tank and a valved inlet for said gas, a primary charging-chamber independent of said tank, means for supplying gas to said chamber independent of said tank and its gas-supply, a series of packing-heads adapted to engage packages, a filling-tube in each packing-head, ducts adapted to connect said filling-tubes to the liquid-supply tank, gas-pipes leading one from each packing-head and having one series of branches leading to the primary charging-chamber and another series of branches leading to the upper part of the liquid-supply tank, and means for connecting either one of said series of branches with the gas-pipe and closing the other series.

24. In a racking apparatus, the combination of a tank or reservoir connected at its lower part to a continuous liquid-supply and being adapted to contain at its upper part an entrapped body of gas, a safety-valve at the

upper part of said tank and a valved inlet for said gas, a primary charging-chamber independent of said tank, means for supplying gas to said chamber independent of the tank and its gas-supply, a packing-head adapted to engage a package, a filling-tube in said packing-head, a duct adapted to connect said filling-tube to the liquid-supply tank, a gas-pipe leading from the packing-head and connecting with a valve having branch ducts one of which leads to the primary charging-chamber and the other to the upper part of the liquid-supply tank, a check-valve in said flow-duct adapted to be controlled by compressed gas or air, and a valve adapted to connect either one of said branches of the gas-pipe to said pipe and close the other and to simultaneously admit and exhaust pressure fluid to or from the said check-valve.

25. In a racking apparatus, the combination of a tank or reservoir connected at its lower part to a continuous liquid-supply and being adapted to contain at its upper part an entrapped body of gas, a safety-valve at the upper part of said tank and a valved inlet for said gas, a primary charging-chamber independent of said tank, means for supplying gas to said chamber independent of the tank or reservoir and its gas-supply, a filling-arm comprising an outer cylinder, an inner cylinder adapted to slide in said outer cylinder, a

packing-head carried by said inner cylinder, a filling-tube sliding in said inner cylinder, pressure-fluid ducts leading to the opposite ends of each cylinder, a flow-duct adapted to connect said filling-tube to the liquid-supply tank, gas-pipes leading one from each packing-head and having one series of branches leading to the primary charging-chamber and another series of branches leading to the upper part of the liquid-supply tank, and means for connecting either one of said series of branches with the gas-pipe and closing the other series.

26. In a racker-arm, the combination of a sheath mounted therein and having lateral ports or openings, a filling-tube adapted to slide in said sheath and having a longitudinal flow-passage with a lateral aperture adapted to register with the ports of said sheath, and packings at the upper and lower ends of said sheath adapted to imperviously engage the filling-tube and being located outside the range of movement of the said lateral aperture of the filling-tube, and stop means positively limiting the sliding of said filling-tube.

In testimony that I claim the foregoing I have hereunto set my hand this 10th day of September, 1904.

DILLON BEEBE.

Witnesses:

CHARLES H. PELL,
RUSSELL M. EVERETT.