940,366.

S. SCHLANGEN.

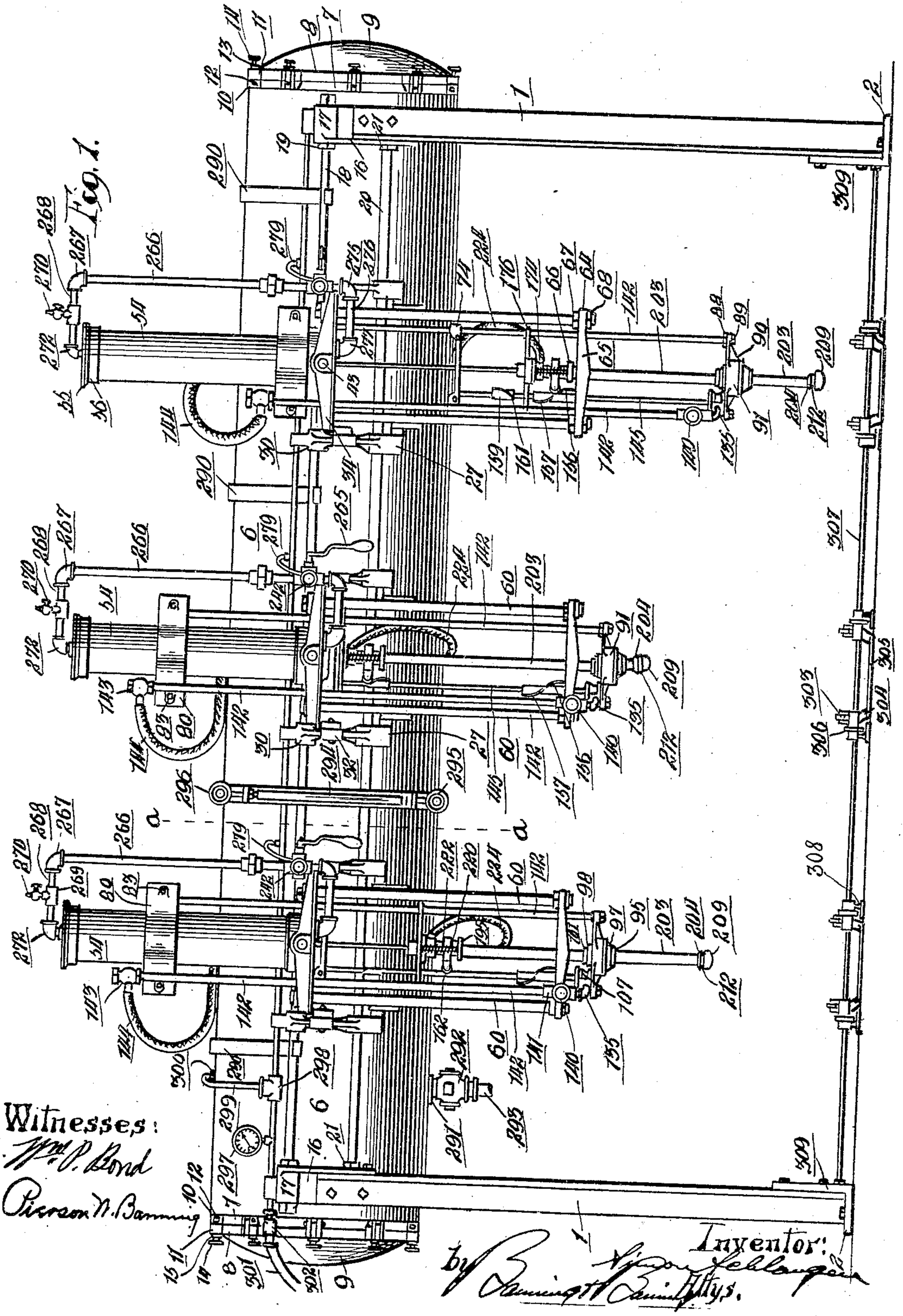
FILLING APPARATUS FOR LIQUIDS.

APPLICATION FILED SEPT. 27, 1907.

Patented Nov. 16, 1909.

11 SHEETS—SHEET 1.

Fig. 1.



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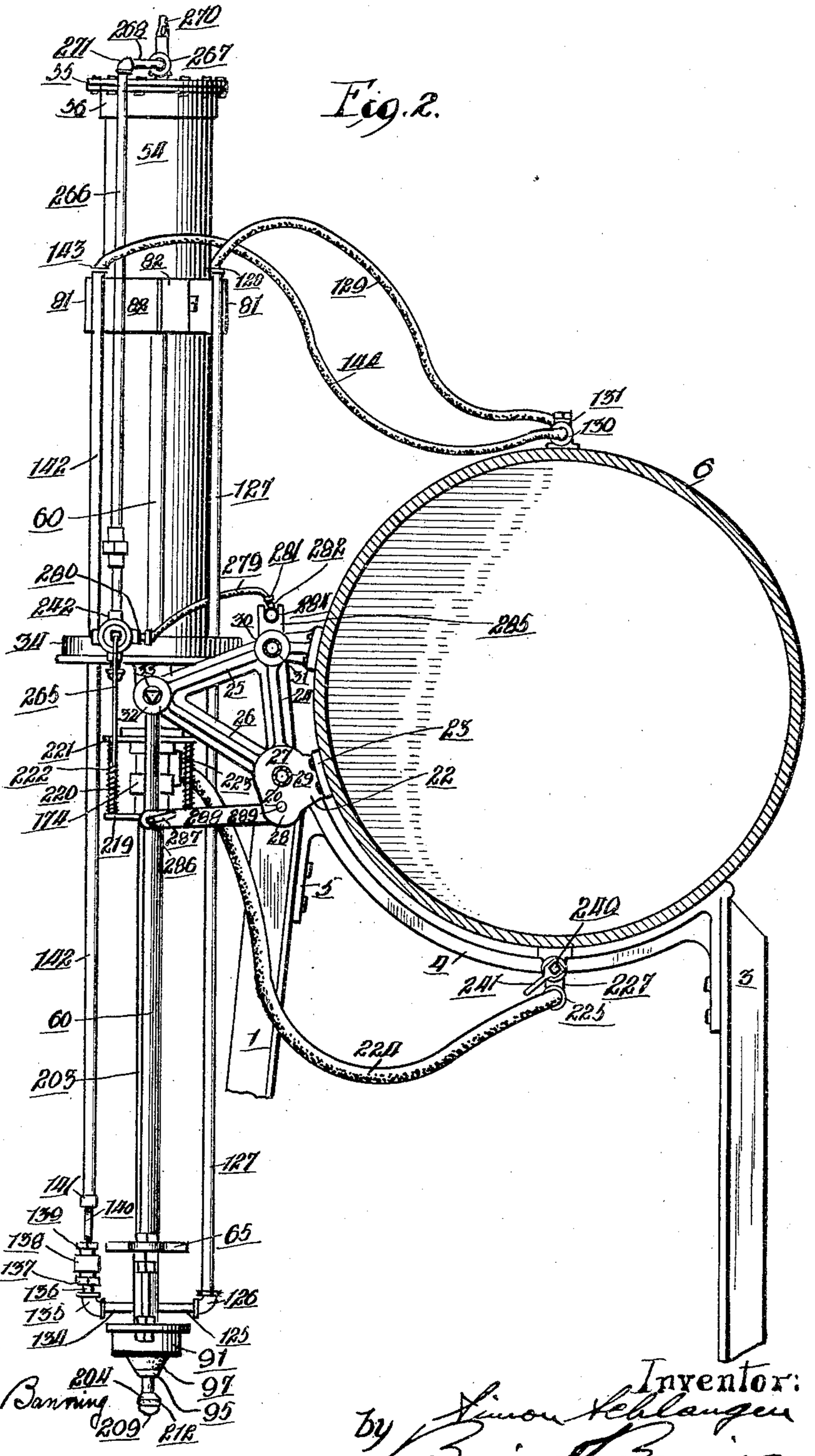
11 SHEETS—SHEET 2.

Fig. 2.



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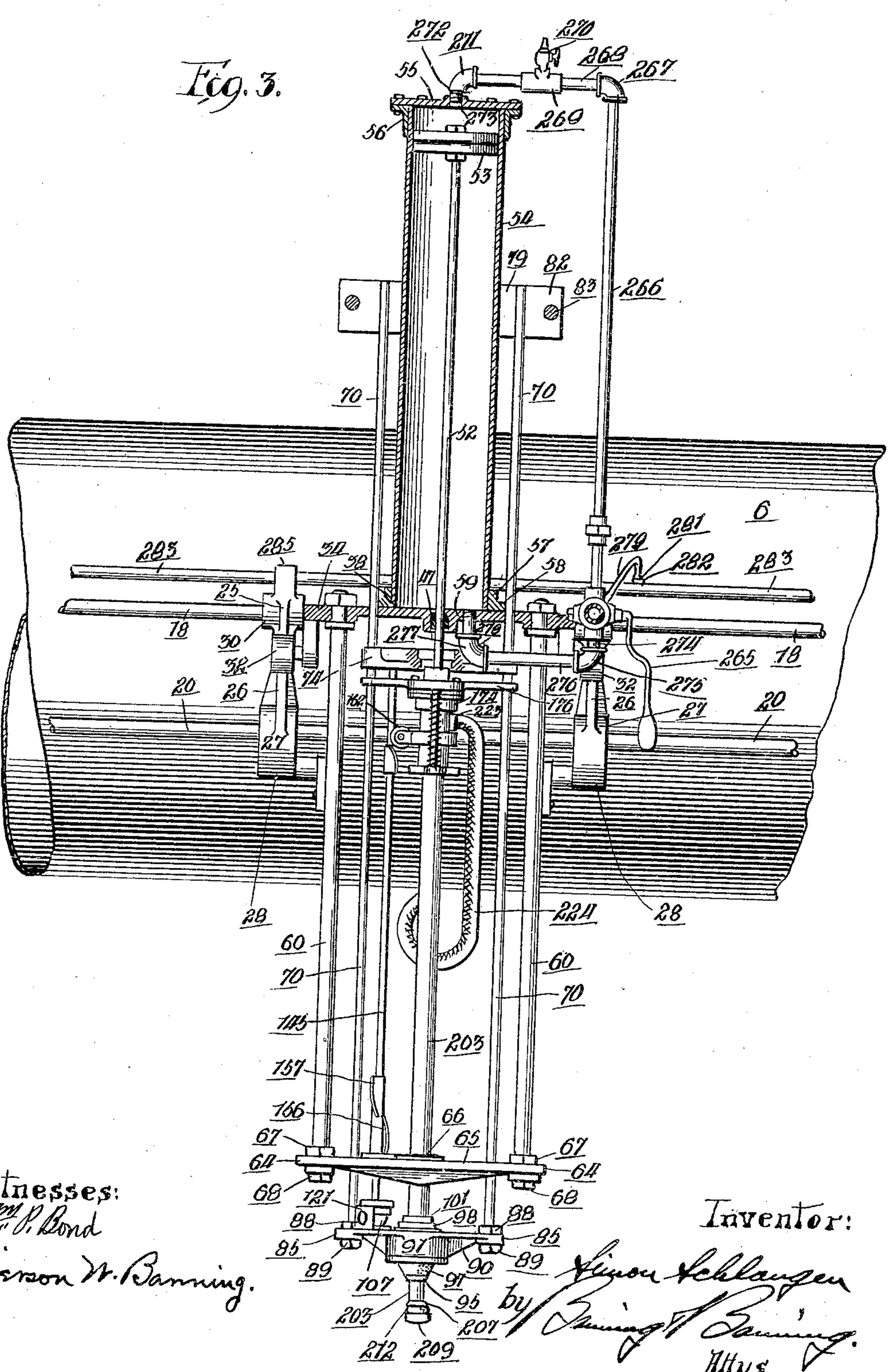
11 SHEETS—SHEET 3.

Fig. 3.



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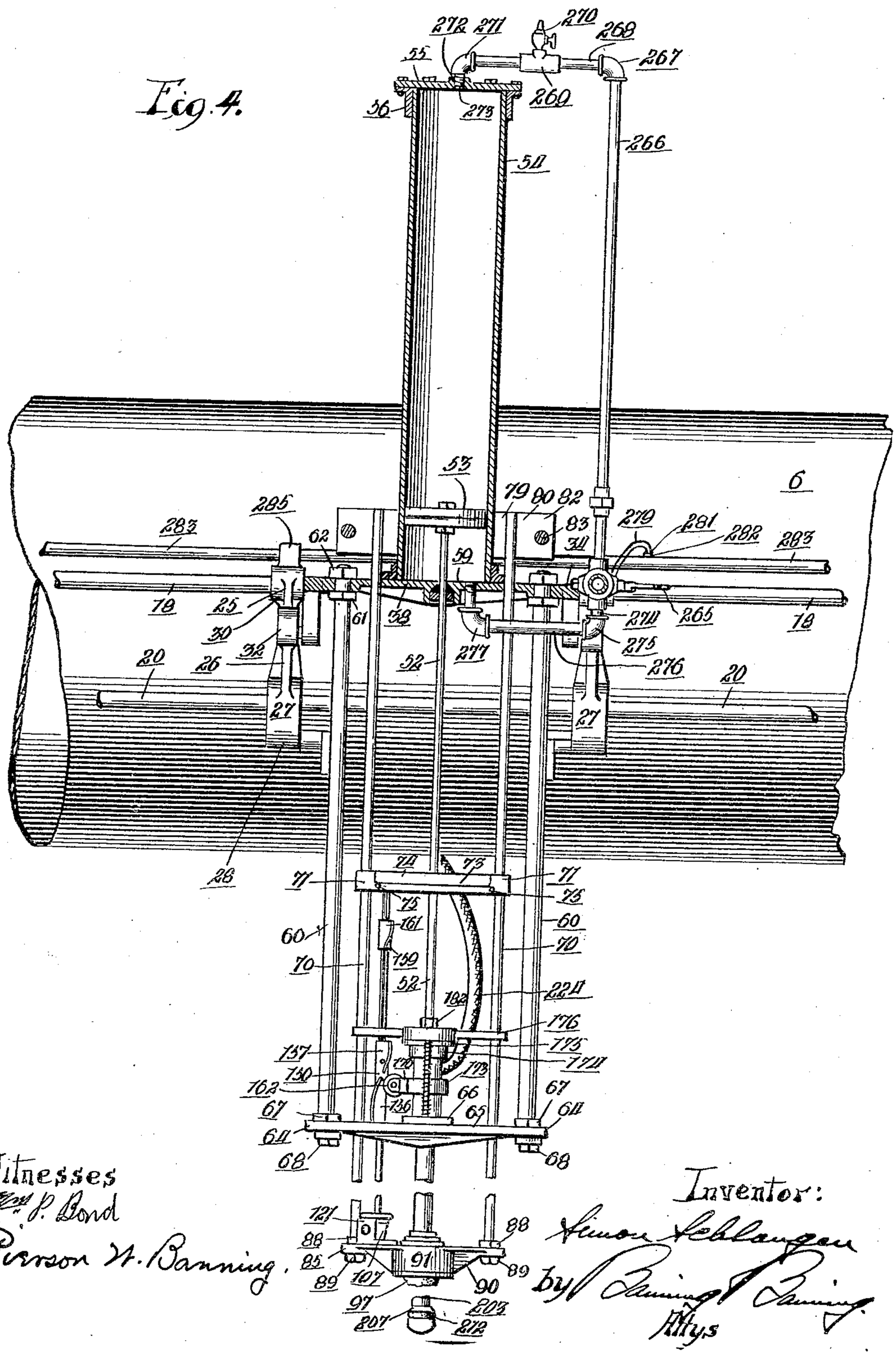
11 SHEETS—SHEET 4.

Fig. 4.



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11 SHEETS—SHEET 5.

Fig 5.

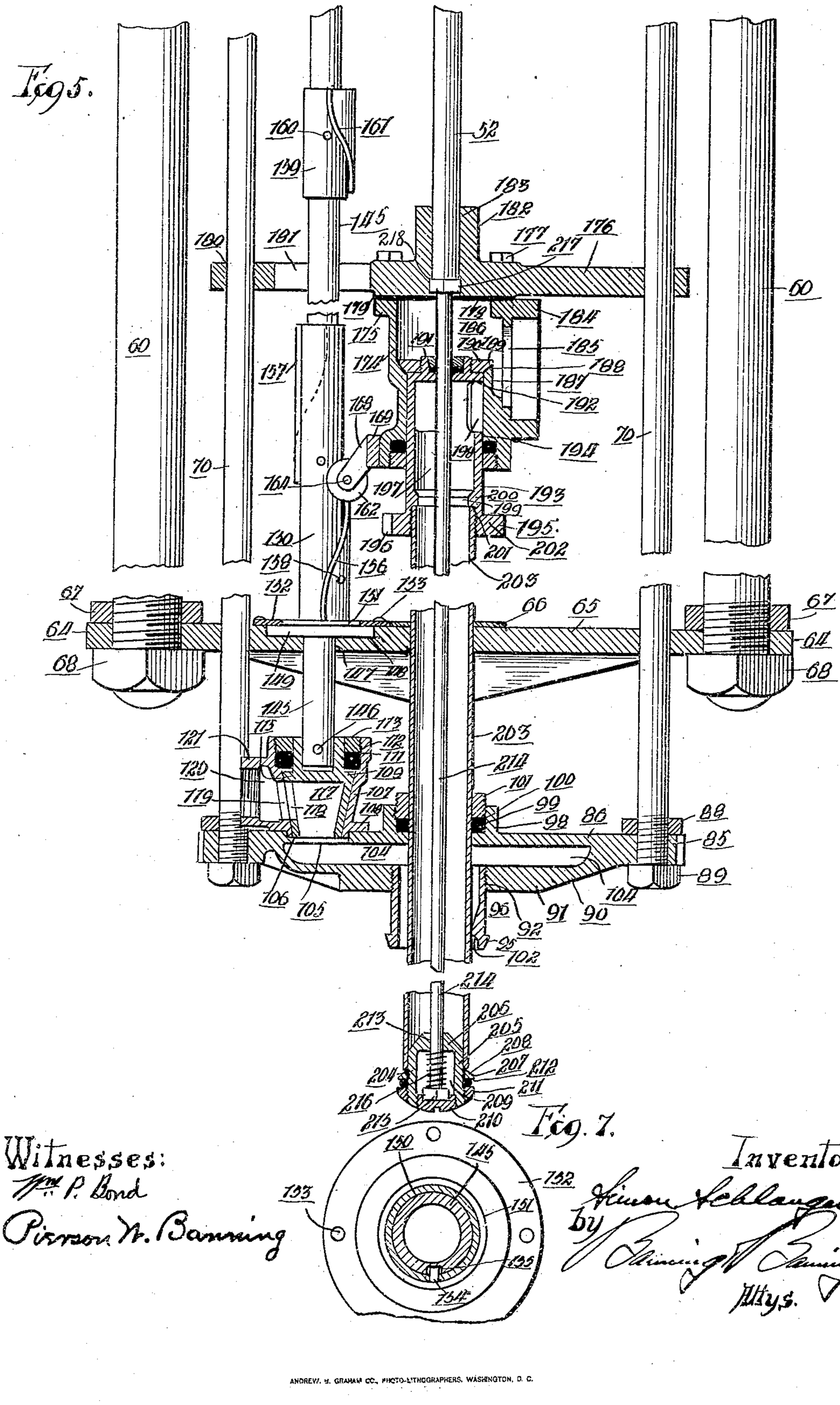

Fig. 7.

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11 SHEETS—SHEET 6.

Fig. 6.

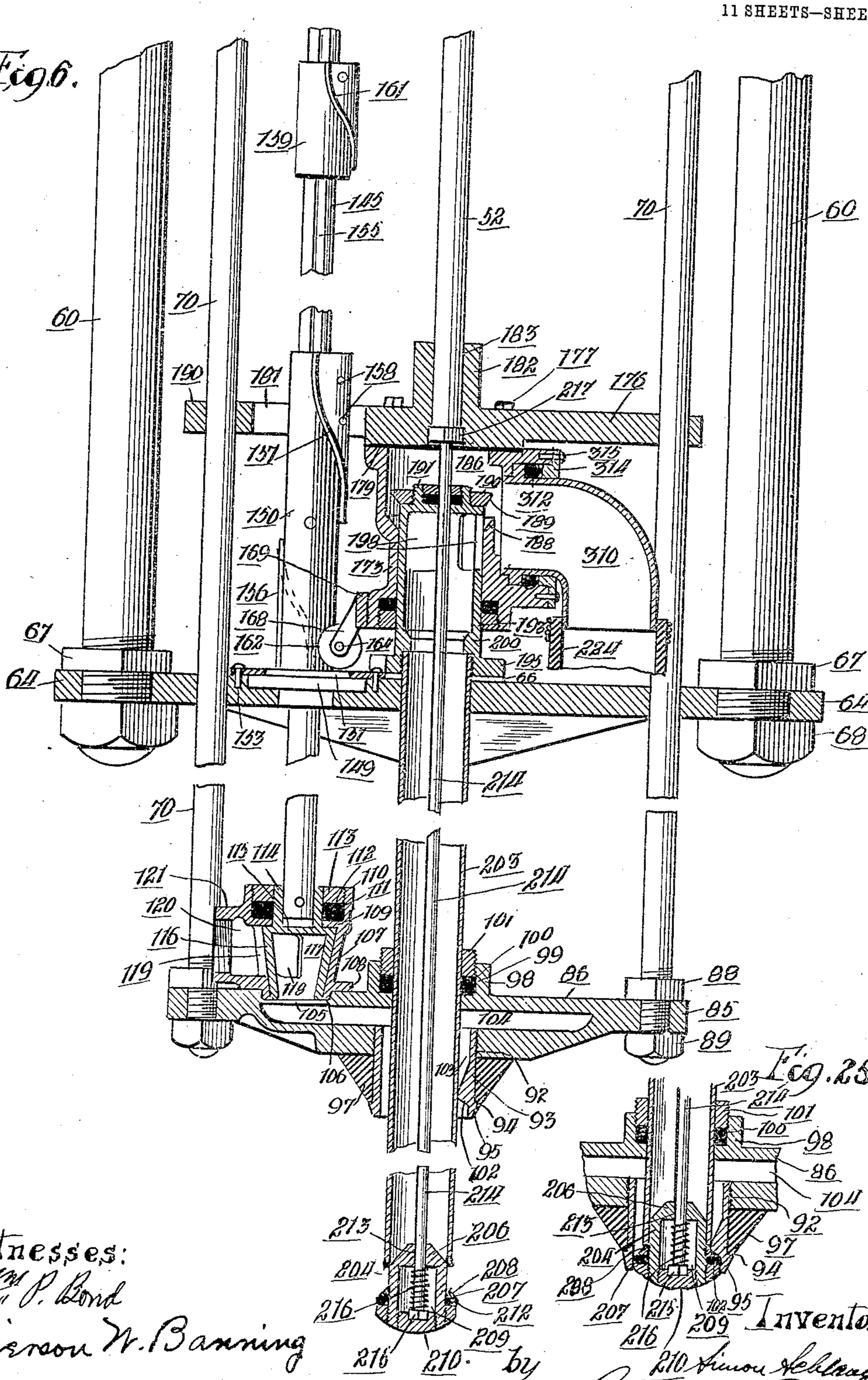

Fig. 25.

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11 SHEETS—SHEET 7.

Fig. 6a

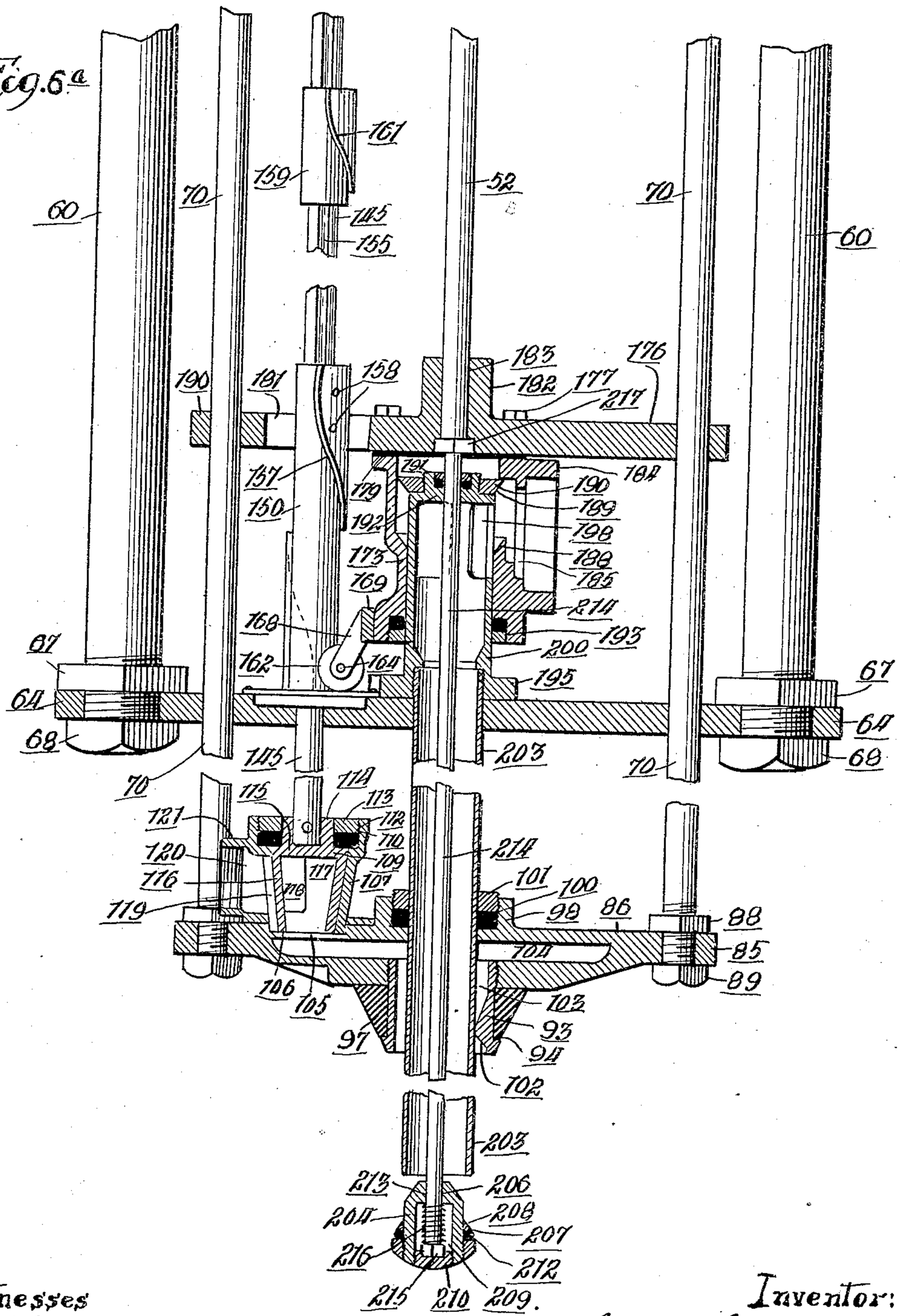

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Fig. 8.

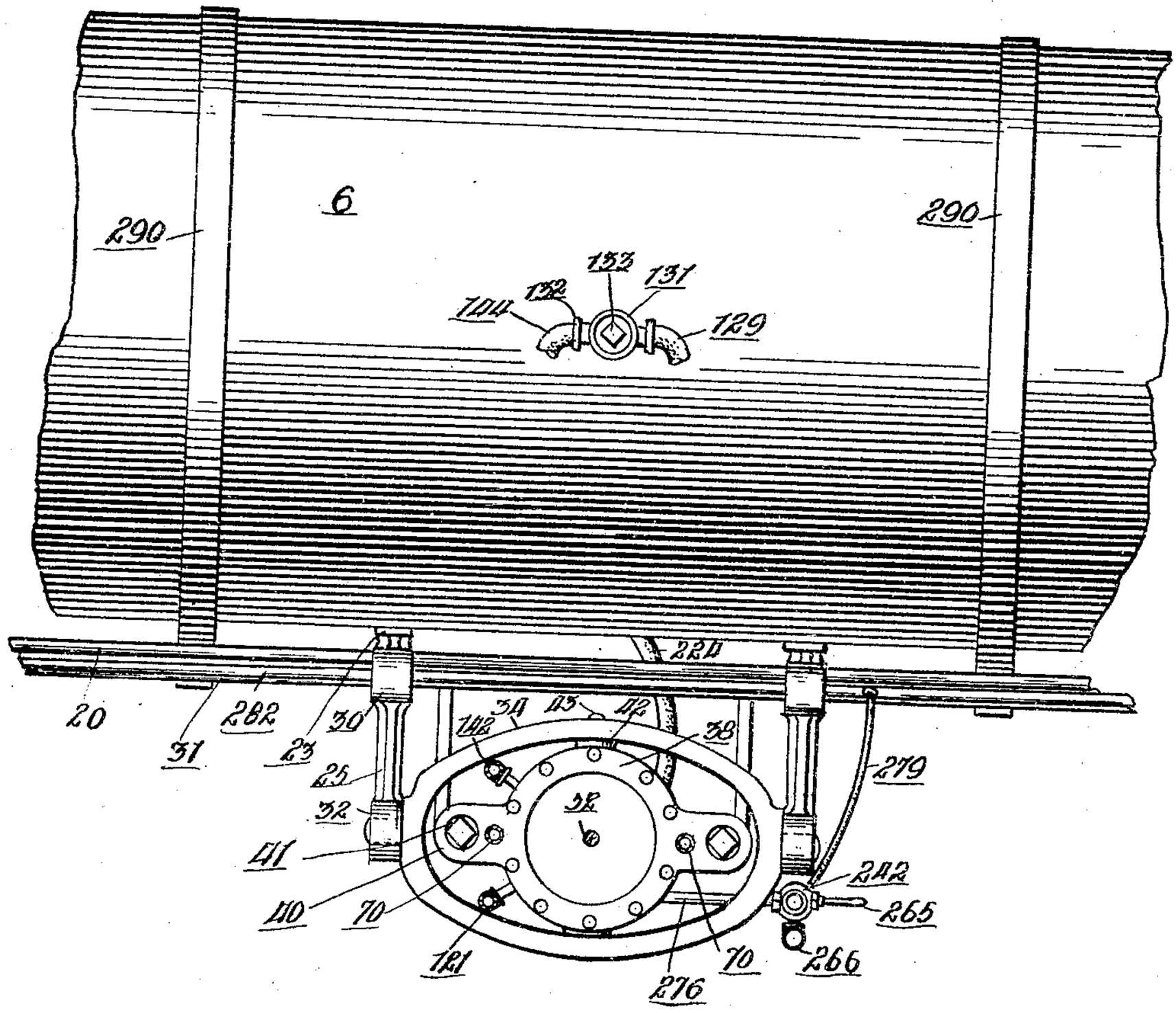

Fig. 10.

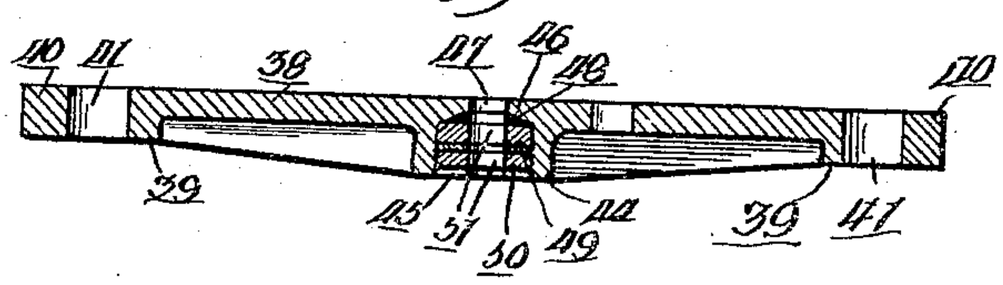

Fig. 9.

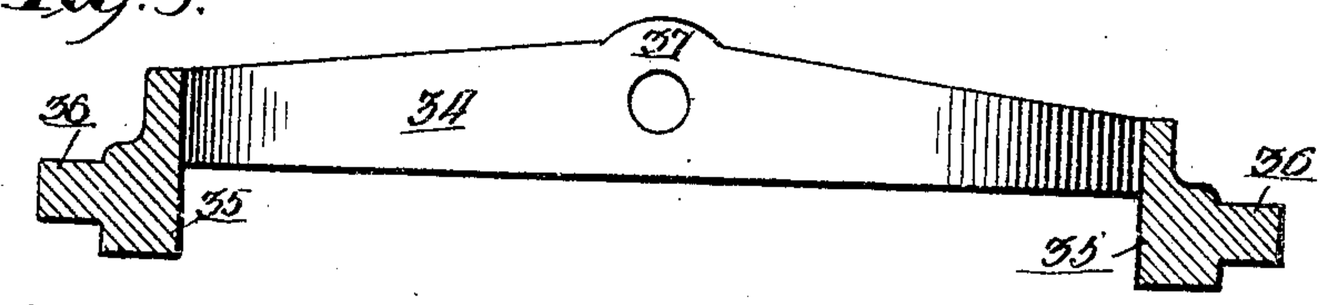

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Fig. 11.

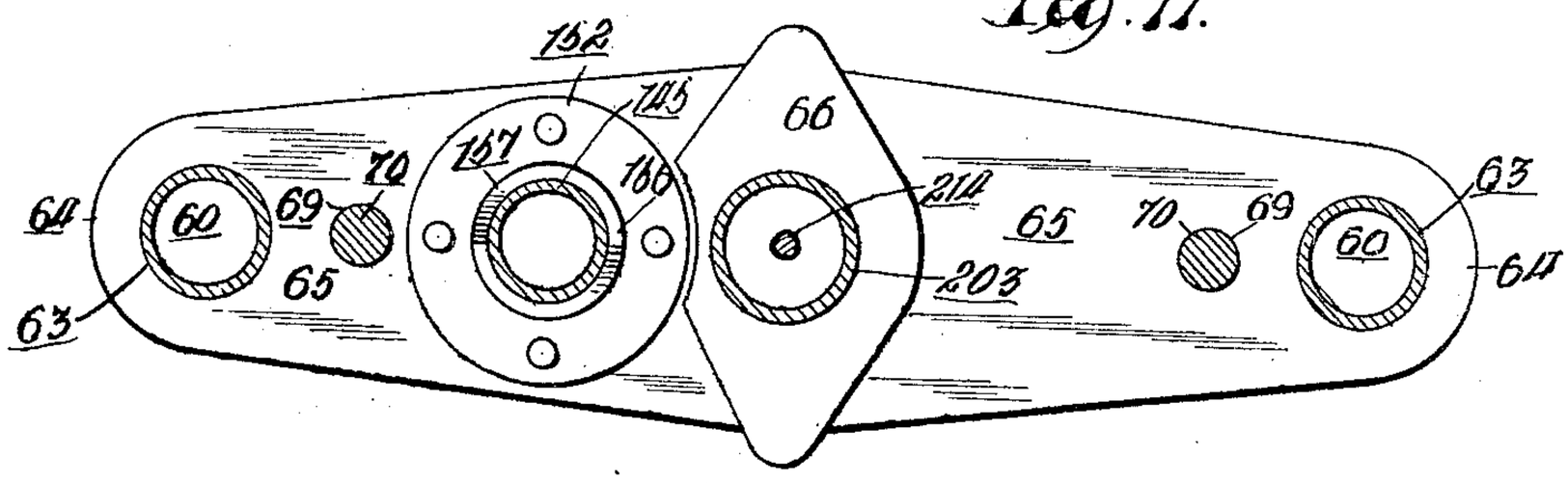


Fig. 12.

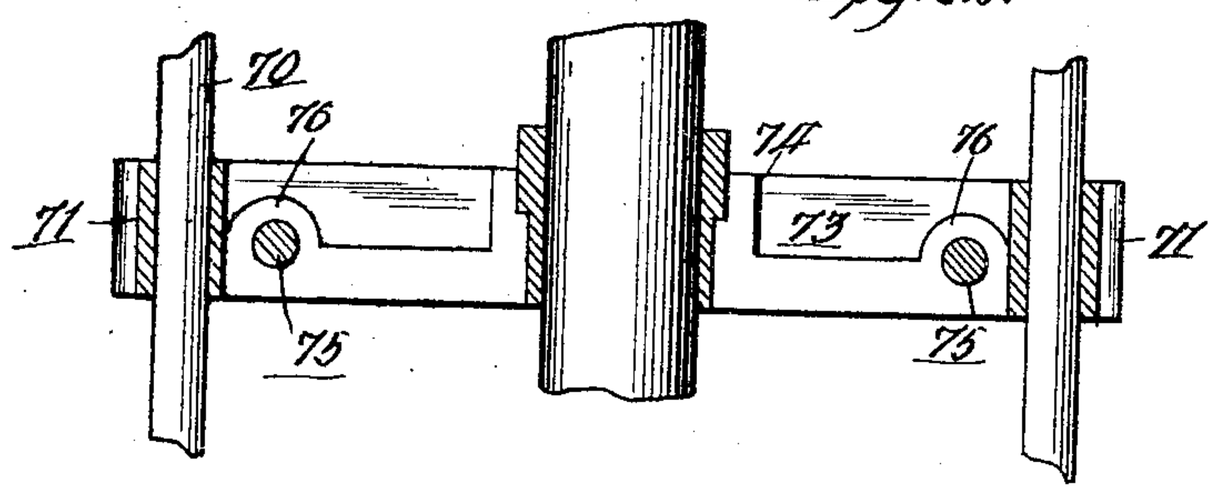


Fig. 13.

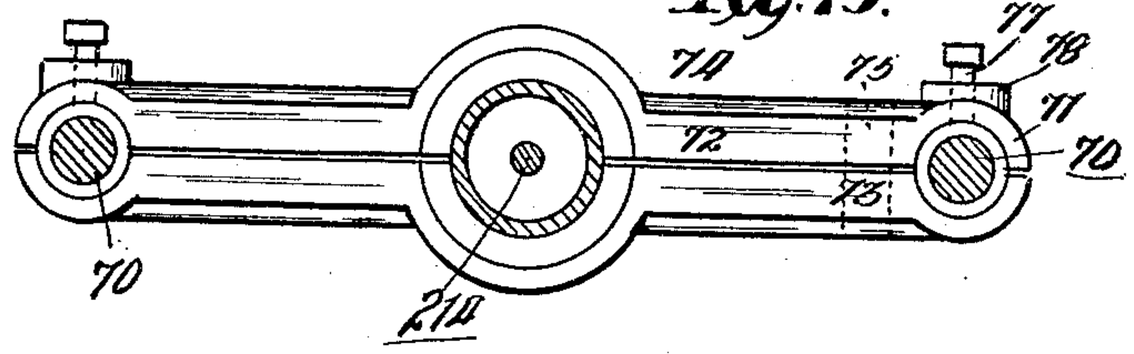
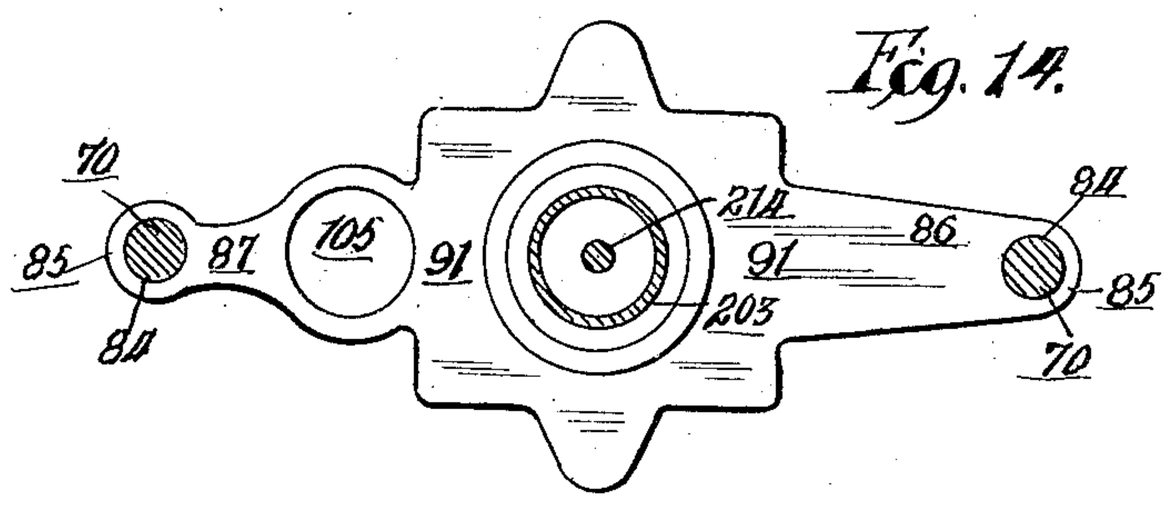


Fig. 14.



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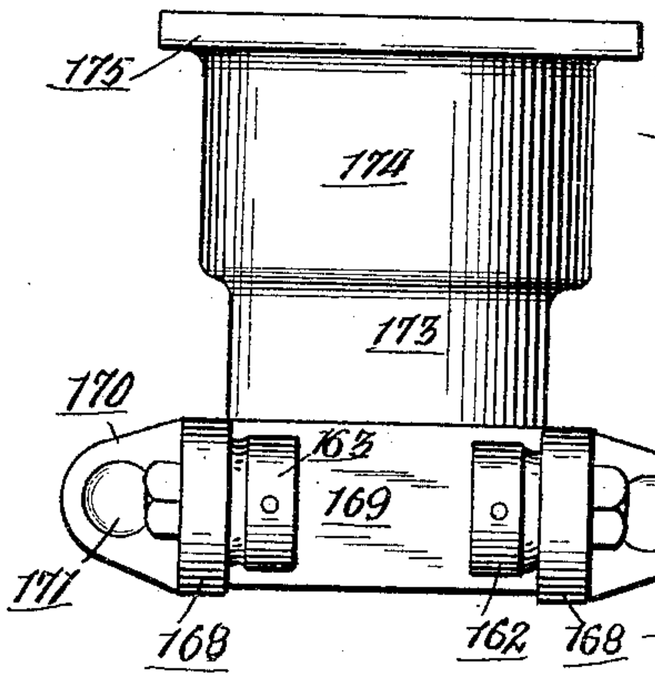

Fig. 15.

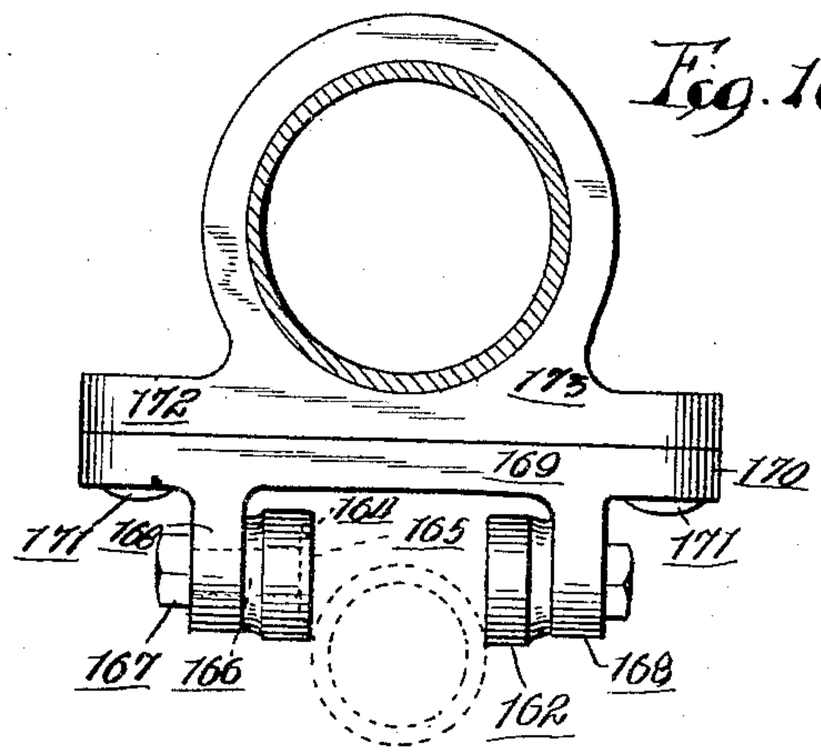

Fig. 16.

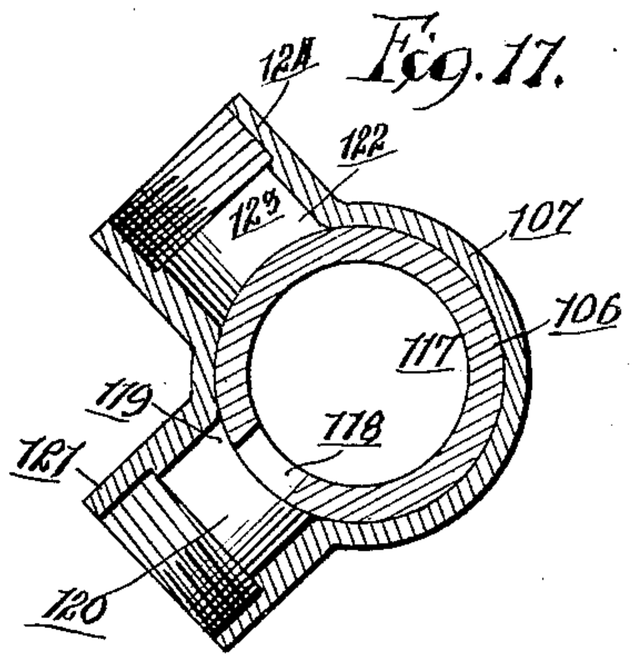

Fig. 17.

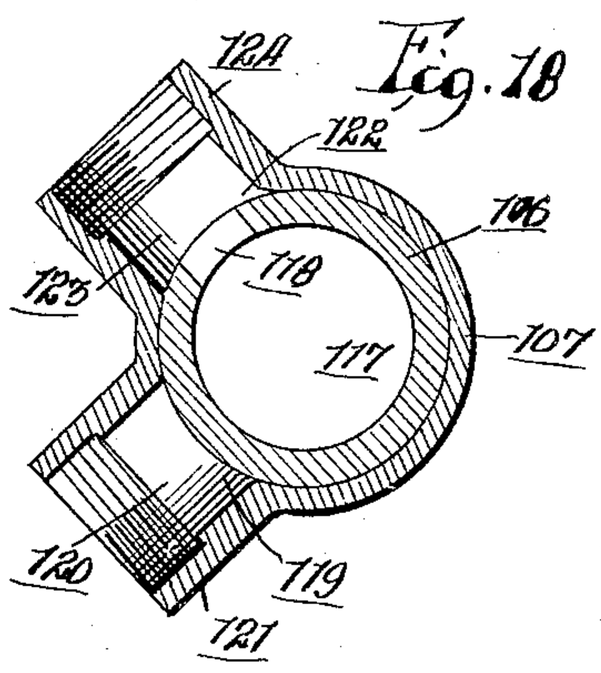

Fig. 18

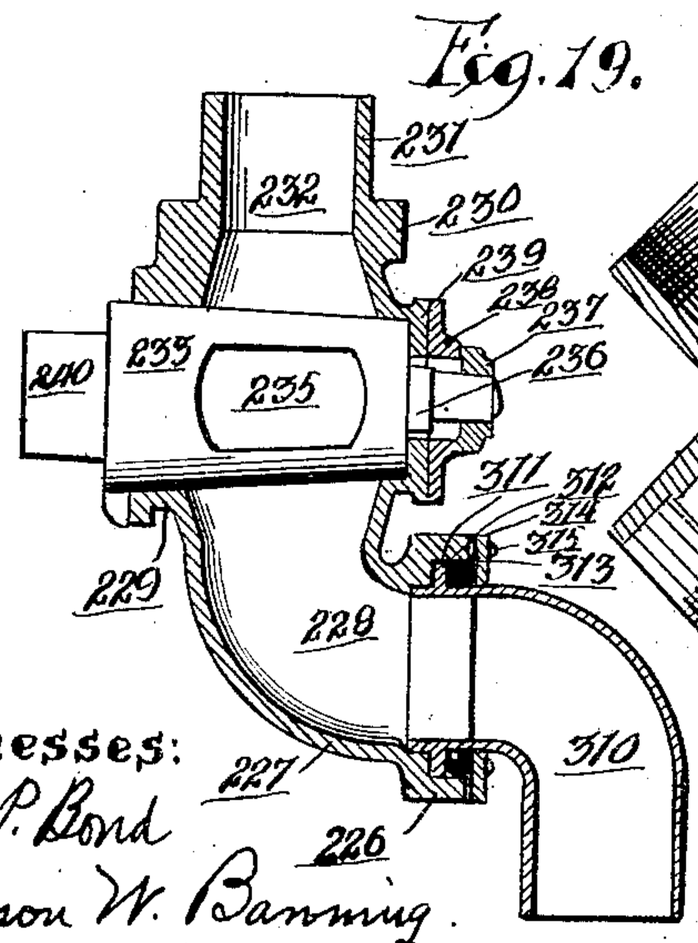

Fig. 19.

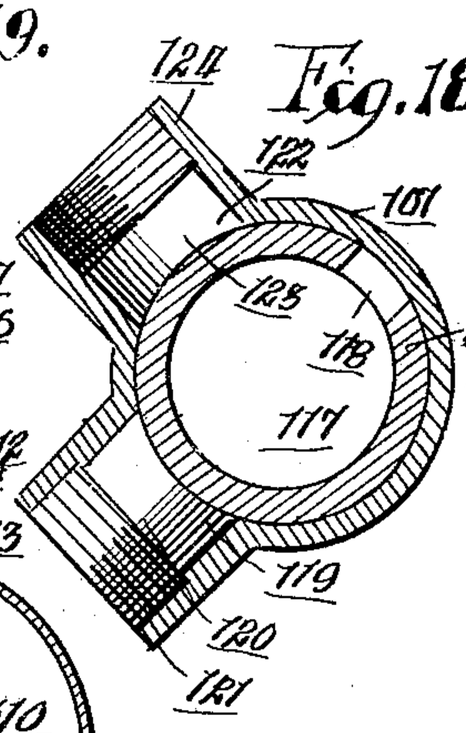

Fig. 18a

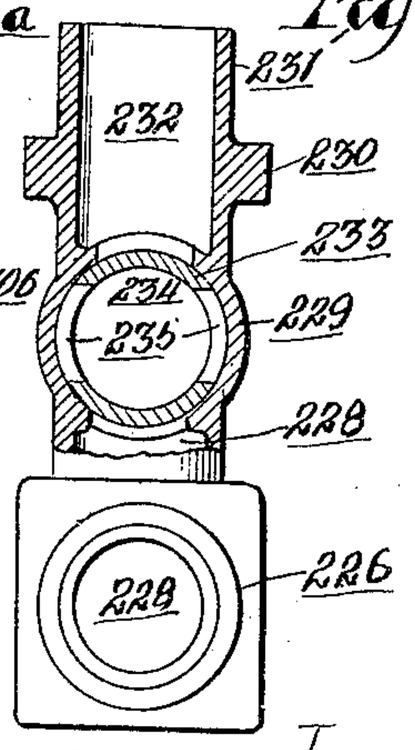

Fig. 20.

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11 SHEETS—SHEET 11.

Fig. 21.

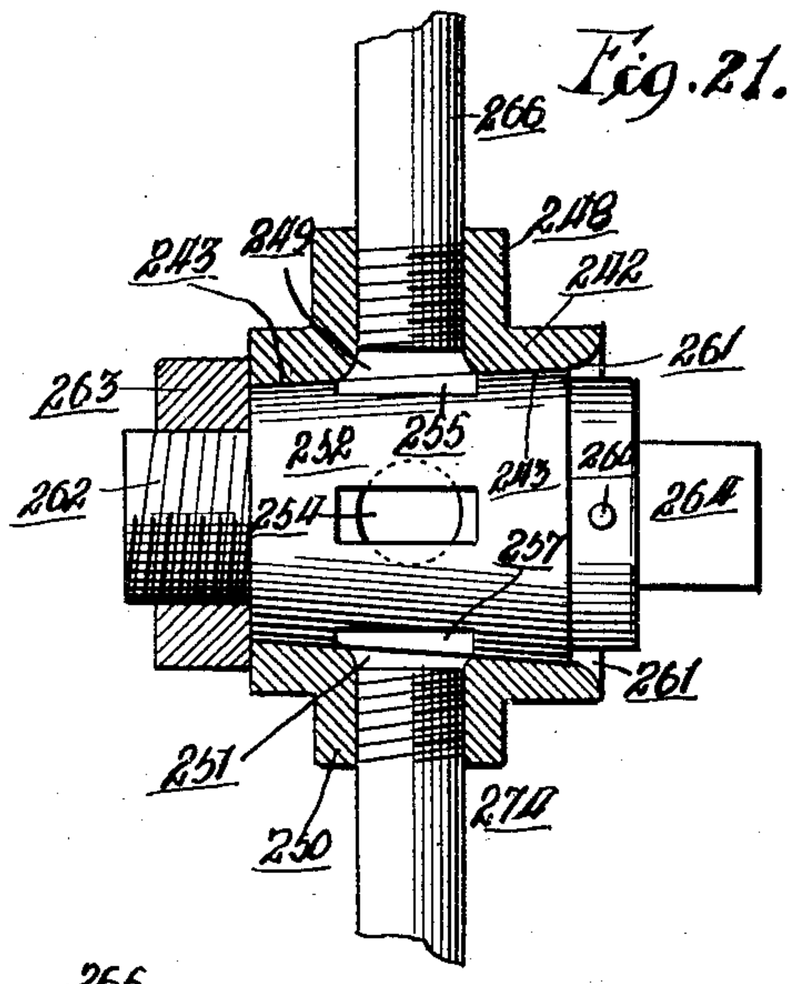


Fig. 22.

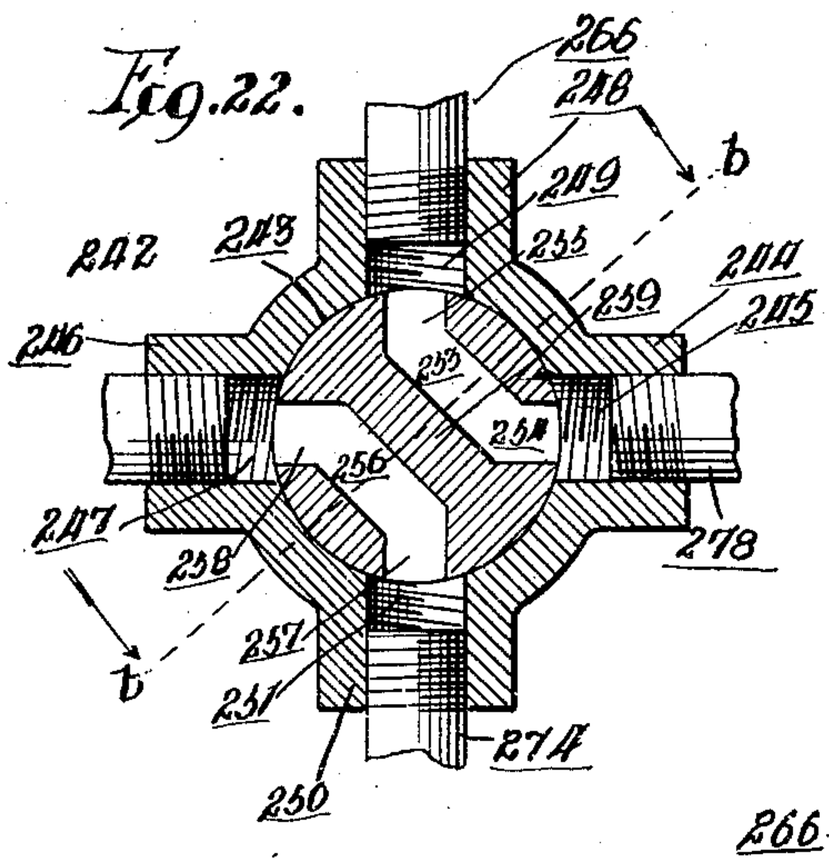


Fig. 23.

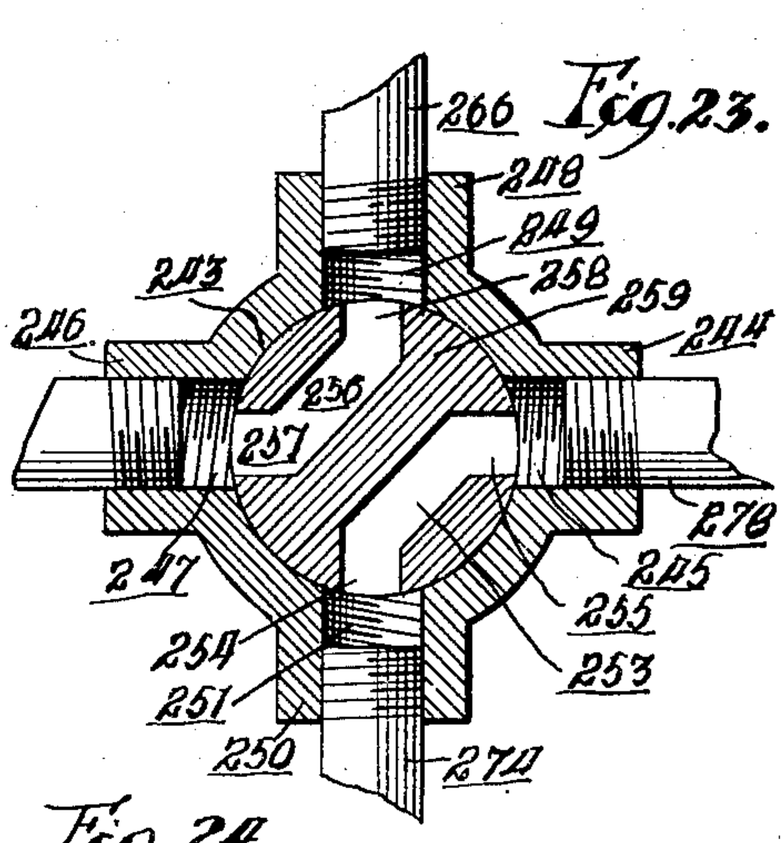
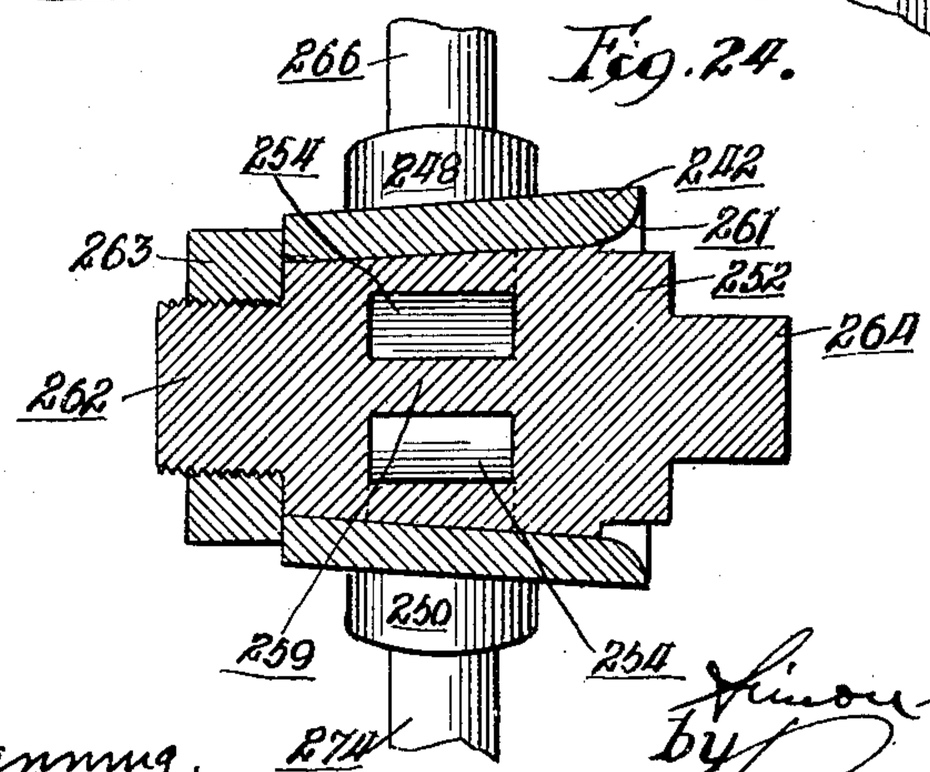


Fig. 24.



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UNITED STATES PATENT OFFICE.

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FILLING APPARATUS FOR LIQUIDS.

940,366. Specification of Letters Patent. **Patented Nov. 16, 1909.**

Application filed September 27, 1907. Serial No. 394,833.

To all whom it may concern:

Be it known that I, SIMON SCHLANGEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Filling Apparatus for Liquids, of which the following is a specification.

The invention relates more especially to an apparatus by means of which barrels, half barrels, kegs, and similar packages, can be filled with liquid, such as beer, under pressure, with the package sealed and filled, while sealed, under an equalized pressure between the supply tank for the liquid and the to-be filled package; and has for its objects to improve the construction and operation of the sealing head and the seal carried thereby for sealing the package prior to equalizing the pressure between the package and the supply tank for the liquid before discharging liquid into the package; to control the flow of air and liquid, between the to-be filled package and the supply tank for the liquid, through the medium of a valve automatically operated with the descent and ascent of the filling tube in opening and closing the valve; to furnish a sealing or closing head having therein a passage in communication with a controlling valve having a rod or stem actuated by the descent and ascent of the filling tube to open and close the valve; to operate a controlling valve, mounted on the sealing or closing head, by means of a stem having thereon cam flanges engaged by a wheel or disk carried by the filling tube, for the wheel to engage the cam flanges and automatically turn the valve stem to open and close the valve; to furnish a controlling valve mounted on the sealing or closing head and having ports, one port in communication with a tube leading to the supply tank and delivering any overflow of liquid from the to-be filled package to the supply tank, and the other port in communication with a tube leading to the supply tank for the passage of air or other medium under pressure between the to-be filled package and the supply tank for liquid; to improve the construction and operation of the filling tube, as regards the valves controlling the discharge of the liquid from the filling tube; to improve the head carrying the filling tube; to improve the valve controlling the discharge of the liquid at the lower end of the filling tube; to enable the filling tube, when raised, to close the passage in the sealing or closing head and prevent further outflow of liquid; to open the discharge valve at the lower end of the filling tube after the filling tube is fully entered into the package; to enable a piston and piston rod to open the discharge valve at the end of the filling tube when the filling tube is fully entered into the to-be filled package; to furnish a main controlling valve by means of which the flow of liquid into the to-be filled package from the supply tank for the liquid and the flow of air, or other medium under pressure, from the supply tank into the to-be filled package are regulated and controlled; to improve the construction and operation of the main controlling valve for the liquid and air, or other medium under pressure; and to improve generally the construction and operation of the several parts and mechanisms which enter into the construction of the apparatus as a whole.

The invention consists in the features of construction and combinations of parts hereinafter described and claimed.

In the drawings, Figure 1 is a front elevation, showing three filling tubes and their coacting parts, one filling tube completely raised, one filling tube partly lowered, and one filling tube fully lowered; Fig. 2 a cross section, enlarged as compared with Fig. 1, taken on line *a*—*a* of Fig. 1 looking in the direction of the arrow, showing a single filling tube and the parts coöperating therewith; Fig. 3 a front elevation, with the motor cylinder and the rocking frame supporting the same in section, and showing the sealing head and filling tube in their elevated position; Fig. 4 a similar view to Fig. 3, showing the sealing head and the filling tube lowered, the filling tube and the rods carrying the sealing head being broken out; Fig. 5 a sectional elevation, showing the filling tube, the support and head therefor, the sealing or closing head and the controlling valve mounted on the sealing or closing head, with the controlling valve closed and the filling tube valves also closed; Fig. 6 a similar view to Fig. 5, showing the controlling valve open for the passage of liquid from the to-be filled package to the sight glass, for indicating when the package is filled with liquid, with the valves of the

filling tube partly open; Fig. 6ª a similar view to Fig. 6, with the filling tube partly open; Fig. 7 a cross section, showing the connection between the rod or stem for operating the controlling valve on the sealing or closing head and the cam support by which the rod or stem of the valve is automatically turned; Fig. 8 a top or plan view, showing a portion of the filling or supply tank, and showing the frame or support carrying the motor cylinder, and the sealing or closing head and filling tube; Fig. 9 a sectional elevation of the side rocking member of the frame or support shown in Fig. 8; Fig. 10 a sectional elevation of the end rocking member of the frame shown in Fig. 8; Fig. 11 a top or plan view of the cross head at the lower end of the frame carrying the sealing or closing head and the filling tube; Fig. 12 a sectional elevation of the upper cross head for the frame carrying the sealing or closing head and the filling tube; Fig. 13 a top or plan view of the cross head of Fig. 12; Fig. 14 a top or plan of the sealing or closing head; Fig. 15 a detail, in elevation, showing the casing or head for the filling tube; Fig 16 a top or plan view of the casing or head shown in Fig. 15; Fig. 17 a cross section of the controlling valve mounted on the sealing or closing head, showing the plug of the valve turned to open communication for the passage of liquid; Fig. 18 a similar view to Fig. 17, showing the plug turned for the passage of air or other medium under pressure; Fig. 18ª a similar view to Fig. 17, showing the valve entirely closed; Fig. 19 a sectional elevation of the valve controlling the flow of liquid between the supply tank for the liquid and the casing or head of the filling tube; Fig. 20 a sectional elevation of the valve shown in Fig. 19, with a portion of the casing in full elevation; Fig. 21 a detail, partly in section and partly in elevation, of the main controlling valve for the air, or other medium under pressure; Fig. 22 a cross section of the valve shown in Fig. 21, showing the plug turned for admitting air, or other medium under pressure, to the upper end of the motor cylinder and discharging air, or other medium under pressure, from the lower end of the motor cylinder; Fig. 23 a similar view to Fig. 22, showing the valve plug turned for discharging air, or other medium under pressure, from the upper end of the motor cylinder and for admitting air, or other medium under pressure, to the lower end of the motor cylinder; and Fig. 24 a sectional elevation on line *b*—*b* of Fig. 22 looking in the direction of the arrow; Fig. 25 a detail in section of the valve at the lower end of the filling tube.

The apparatus, in the construction shown, has, at each end, a front standard or leg 1, with a flange 2 at the lower end by means of which, and suitable bolts or otherwise, the standard or leg can be secured to the floor, or other support, in the room where the apparatus is located; and, at each end and in line with the front standard or leg 1, is a rear standard or leg 3, having, at its lower end, a flange corresponding to the flange 2 and by means of which the rear standard or leg is secured to the floor, or other support, like the front standard or leg 1 is secured. A curved cross piece 4, having, at each end, a flange 5, is secured to the upper ends of the standards or legs 1 and 3, as shown in Fig. 2, and the cross pieces 4, in connection with the standards 1 and 3, at each end, furnish a support or frame on which is mounted the supply tank 6 for the liquid. At each end of the tank 6 is a flange 7, and a companion flange 8 is formed on a head 9 for closing each end of the tank. The flange 7 has thereon a plurality of ears 10, and the flange 8 has thereon a plurality of companion ears 11, and each pair of ears 10 carries a pivot or pin 12 on which is mounted a swinging bolt or stem 13, having at the end a hand nut 14 which bears against a washer 15 on each stem or bolt 13, so that by turning the hand nut the flanges 7 and 8 can be made to abut closely for closing each end of a tank 6 by a head 9, it being understood that between the flanges a suitable packing is inserted, so as to make a tight joint for each end of the tank.

A plate 16 is attached by suitable bolts, or otherwise, to the upper end of each front standard or leg 1, and each plate has, at its upper end, a socket or bearing 17 in which is entered the end of a cross rod 18, and the cross rod is firmly secured in each socket or bearing 17 by clamping or locking nuts 19 engaging the end faces of the socket or bearing, as shown in Fig. 1. A cross rod 20 is entered into a lower socket on the plate 16 at the rear of each standard or leg 1, and this rod is fixedly held in place in the sockets or bearings at its ends by clamping or locking nuts 21, which bear against the end face of the socket or bearing. The rods 18 and 20 furnish a support for the several frames carrying the swinging frame and the frame supporting the sealing head and filling tube.

The apparatus, shown in Fig. 1, has three filling appliances, so that three packages can be filled from the same supply tank, but each filling apparatus is of the same construction and a description of the various parts for one filling apparatus applies equally as well to each filling apparatus shown in Fig. 1.

The frame supporting the filling apparatus consists of two side frames or supports. Each side frame or support has an upper and lower bracket or arm 22, each connected by a flange 23 and suitable bolts

to the wall of the supply tank 6, as shown in Fig. 2. An upright piece or bar 24 connects the brackets or arms 22 and 23, and a downwardly inclined or diagonal piece or bar 25 extends from the upper end of the piece or bar 24, and at its forward end is joined to an upwardly inclined or diagonal bar 26, extending from the lower end of the upright piece or bar 24, so that the brackets or arms 22 and 23 and the pieces or bars 24, 25 and 26 form an integral whole supported from the wall of the filling tank and constitute side frames, between which the swinging frame, supporting the motor cylinder and the sealing head and filling tube, is mounted. Each side frame, at the juncture of the pieces or bars 24 and 26 has a head or boss 27, with a depending ear 28, and integral with the lower bracket or arm 22, and this head or boss has a hole 29 for the passage of the supporting rod or tube 20, so that the rod or tube 20 furnishes a lower support for each side frame. Each side frame, at the juncture of the pieces or bars 24, and 25 and in line with the upper bracket or arm 22, has a head or boss 30, with a hole 31 for the passage of the rod or tube 18, so that the rod or tube forms an upper support for each side frame. Each side frame, at the juncture of the pieces or bars 25 and 26, has a head or boss 32, with a hole 33, to receive the trunnion or journal pin at the end of the sidewise rocking member of the supporting frame for the motor cylinder and the sealing head and filling tube.

The supporting frame for the motor cylinder and the sealing head and filling tube consists of an outer ring member 34 of an oval shape, as shown in Fig. 8, and at each end of the outer member 34, is a depending ear 35 projecting out from which is a trunnion or bearing pin 36, of a V shape, as shown, which enters the hole 33 in the side frame, so that the outer member is free to rock sidewise on the knife edge trunnions or bearing pins. The outer member 34 of the frame encircles the inner member of the frame, which member is supported in bearings 37 on the outer member, as shown in Fig. 9. The inner member of the frame consists of a plate 38 having a rib or flange 39, and having, at each end, an ear 40, with a hole 41 for the attachment of the vertical side rods of the swinging frame. Each side of the main body or plate of the inner member of the supporting frame or table has a boss 42 extending out from which is a journal pin or trunnion 43, which enters the bearings 37, so that the inner member of the supporting frame or table is free to rock endwise on the journal pins or trunnions, thus giving the supporting frame or table a sidewise rock from the outer frame and an endwise rock from the inner frame, by means of which the sealing head and the filling tube can be made to properly center with the bunghole of the package, so as to insure the perfect sealing of the package at the bunghole and a clear passage for the filling tube into the package through the bunghole. An annular wall or rim 44 depends centrally from the under side of the main body or plate 38 of the inner member of the supporting frame or table, and this rim or wall 44 surrounds a chamber 45, having a countersink or concave wall or face 46 at the upper end, with a hole 47 leading through the main body or plate 38, as shown in Fig. 10. The chamber 45 has entered thereinto a packing ring 48 contacted by a washer 49, against which a follower ring nut 50 acts to compress the packing ring. The packing ring, washer and follower or ring nut each have a hole 51 in line with the hole 47 for the passage of the piston rod of the piston of the motor cylinder.

The piston rod 52 passes through the holes 47 and 51, and, at its upper end, has secured thereto a piston 53 of any suitable construction, which piston reciprocates in a cylinder 54, closed at the top by a cap or cover 55 secured in place by an angle iron band 56 and suitable bolts, by means of which the angle iron is secured to the wall of the cylinder 54 and to the cap or cover, as shown in Fig. 3. The lower end of the cylinder 54 is entered into an annular rim 57 having a lateral flange 58, by means of which and suitable bolts, or otherwise, the rim is attached to the upper face of the main body or plate 38 of the inner member of the supporting frame or table. The main body or plate 38 of the inner member of the supporting frame or table has therethrough a hole, 59 which opens into the interior of the cylinder 54, so as to admit air, or other medium under pressure, into the cylinder below the piston and discharge air, or other medium under pressure, from the cylinder below the piston in reciprocating the piston.

The inner member of the supporting frame or table has attached thereto a pair of side rods 60, with the upper end of each rod entering into a hole 41 of the inner member of the frame or table and secured in place by an under locking nut or flange 61 and an upper locking nut 62, so that each rod 60 is fixedly attached at its upper end. The lower end of each side rod 60 is entered into and through a hole 63 in an ear 64 of a cross head or plate 65, which, as shown, has a central raised portion or face 66 furnishing a stop to limit the descent of the filling head and the filling tube; and each rod is securely held in place by an upper jam nut 67 and a lower jam nut 68, which nuts abut against the top and bottom face respectively of each ear 64 of the cross plate or head 65, as shown in Fig. 5.

The cross plate or head 65 has, at each

end, and inside of the vertical tie or supporting rod or tube 60, a hole 69, and each hole 69 has passing therethrough a rod 70, and each rod 70 passes through an eye, formed by half rings 71 shown in Fig. 13, one half eye 71 at each end of a cross bar 72 and one half eye 71 at each end of a cross bar 73, the two cross bars 72 and 73 forming a cross head 74 consisting of two members, and the two cross bars or members 72 and 73 of the cross head are secured together by bolts or screws 75, passing through lugs or bosses 76 on each cross bar or member, as shown in Figs. 12 and 13. The cross head 74, as a whole, is fixedly attached to the side rods 70, by set screws or bolts 77, each passing through a boss 78 on the cross bar or member 72 at each end thereof, for the end of each set screw or bolt 77 to engage the side rod 70, so that the side rods 70 and the cross head 74 will move as one. The upper end of each cross rod 70 has attached thereto a ring or band 79 encircling the motor cylinder 54, and the ring or band 79 is formed of two half rings 80 and 81, each half ring, at each end, having an ear 82, through which ears a tightening bolt 83 passes, by means of which the band 79 is fixedly attached to the upper end of the two side rods, for the side rods and band to move together, and the band 79 also serves as an additional weight to the weight of the side rods and cross heads for self-lowering the sealing or closing head in sealing a package.

The lower end of each side rod 70 enters a hole 84 in an ear 85 on a cross bar or head constituting the sealing or closing head and having, on one side, a projecting member 86 and on the opposite side a projecting member 87, each member terminating in an ear or end 85, and each side rod 70, at its lower end, passes through the ear or end 85 of each member and is securely held in place by a jam nut 88, engaging the upper face of the end 85, and a lock or tightening nut 89, engaging the under face of the end 85, so as to hold the sealing or closing head in position on the lower ends of the sliding rods 70 for the sealing or closing head to move up and down with the rods. A web or fin 90 connects each side member 86 and 87 with a center 91, which center has, in its under side, a central hole 92, in which is entered a sleeve 93 having, adjacent to its lower end, a shoulder 94 and terminating in a tapered end 95, to facilitate entering the seal into the bunghole of the package. A space 96 is formed between the shoulder 94 and the under face of the center 91, and this space receives a sealing ring 97, of india rubber, or other suitable material, which is located between the shoulder 94, and the under face of the center 91 and around the sleeve 93, and has a tapered or conical exterior face for entering the bunghole of the package and sealing the package during the filling operation. The upper face of the center 91 of the cross head, has an upwardly extending annular rim or flange 98 inclosing a chamber 99, which receives a packing 100, compressed by a follower or ring nut 101, threaded into the interior of the flange or rim, as shown in Fig. 5. The inner face of the sleeve 93 has inwardly projecting lugs or bearing points 102 furnishing a guide for the filling tube and maintaining the filling tube away from the inner face of the sleeve, so as to furnish a passage 103 between the exterior of the filling tube and the interior of the sleeve, as shown in Fig. 5, and this passage 103 opens into a passage 104 having, at one end, an opening 105 extending through the side arm or member 87 of the cross head.

A rim or neck 106, at the lower end of a valve shell or casing 107, is entered into the opening or hole 105 of the arm 87 of the cross head at the lower end of the reciprocating rods 70, and the valve casing or shell 107, adjacent to its lower end, has a flange 108, by means of which and suitable bolts the valve shell or casing is attached to the arm 87 of the cross head. At the upper end of the shell or casing 107 is a cross wall 109 extending up from which is an annular rim or wall 110 inclosing a chamber 111, in which is located a packing ring 112 compressed, by a follower or ring nut 113 around the tubular stem 114 extending up from the end wall 115 of a controlling valve, so as to make a tight joint against leakage around the tubular valve stem. The shell or casing 107 has entered thereinto a tapered valve plug formed of the upper end wall 115 and a side wall 116 and inclosing a chamber 117, with a port 118 in the wall 116, furnishing communication with the chamber 117, which chamber, at its lower end, is in communication with the passage 104 at the opening 105, as shown in Fig. 5. The wall of the shell or casing 107 has a port or opening 119, in communication with a passage 120 in a neck or boss 121, and the wall of the shell or casing 107 has a port or opening 122, in communication with a passage 123 of a neck or boss 124, so that, by properly turning the valve plug, the port 118 of the plug can be brought into communication with the port 119 or the port 122, as may be required in opening and closing communication between either port 119 or 122 and the chamber 117 of the valve plug.

A tube 125 is entered at one end into the neck or boss 124, and its other end is connected by an elbow coupling 126 with a vertical pipe 127, the other end of which pipe 127 is connected by a coupling 128 with a hose or other conduit 129, and the hose or conduit 129 is connected at its other end with a neck or boss 130 of a T coupling 131 having, opposite the neck or boss 130, a neck

or boss 132; and, as shown, the wall of the T coupling 131 constitutes a shell or casing in which is located a valve plug 133, by means of which communication can be shut off between the tank 6 and the T coupling, which is entered into the wall of the tank and has free communication with the interior of the tank 6, when the valve plug 113 is properly turned. A tube 134 is entered at one end into the neck or boss 121 and its other end is connected by an elbow coupling 135 with a short tube 136, entered into a coupling 137, by which the shell or casing 138 of a check valve is attached, and the check valve is attached, by a coupling 137, to the casing 139 of a sight glass 140, which frame or casing has a neck or boss 141 into which is entered the lower end of a vertical tube or pipe 142, the upper end of which is connected by a coupling 143 with a hose or other conduit 144, and the other end of the hose or conduit 144 is connected to the neck or boss 132 of the T coupling, so as to establish communication with the interior of the tank 6, when the valve plug 133 is properly turned. It will be seen that when the valve plug 133 is turned, so as to establish communication with the T coupling 131 and the interior of the tank, and when the valve plug on the arm 87 of the cross head is turned to bring the port 118 into communication with the port 122, communication is established, between the interior of the tank 6 and the chamber 117 of the valve plug, so that air, or other medium under pressure, is free to flow from the tank into the chamber 117 and enter the passage 104 and discharge through the passage or channel 103, when the sealing head has closed the bunghole of the package, for the air, or other medium under pressure, to enter the package and equalize the pressure between the tank and the package; and with the port 118 in communication with the port or opening 122, the port or opening 120 is closed against communication with the chamber 117 of the valve plug, as shown in Fig. 18. The turning of the valve plug into the position shown in Fig. 17 brings the port 118 into communication with the port 119, establishing communication between the chamber 117 of the valve plug and the passage 120, so that, with the sealing head closing the bunghole of the package, communication is established between the interior of the package and the sight glass through the passage or channel 103, passage 104, chamber 117 of the valve plug, port 118, port or opening 119, passage 120 and the connection between the passage 120 and the sight glass 140; and with communication established with the sight glass, communication is also established between the interior of the package and the interior of the tank 6, through the tube or pipe 142 and hose or conduit 144 and the T coupling 131, so that pressure within the to-be filled package, as the liquid fills the package, will be returned to the filling or supply tank 6 and add the pressure within the package to the pressure in the tank, thereby maintaining the proper pressure within the package, and as the package becomes filled the beer or other liquid will flow into the sight glass following the pressure, and when the beer or other liquid shows in the sight glass 140, such showing indicates that the package is filled. Any overflow that might occur, by a continued discharge of the liquid into the package will pass through the sight glass and into the tube or pipe 142 to the height of the liquid in the tank, to be discharged into the next to-be filled package with the opening of the ports 118 and 119, thus preventing any waste of the liquid by reason of overflow.

A valve rod or stem 145 is entered at its lower end into the tubular stem 114 of the valve plug in the casing or shell 107 and is connected to the tubular stem 114 by a cross pin 146 or otherwise. The stem 145 passes upwardly through a hole 147 in the cross head 65, and the cross head 65, in its upper portion, has formed therein an annular recess 148 into which is entered a disk or circular plate 149 at the lower end of a tube 150; and the disk or plate 149 has an annular shoulder 151 forming, with the disk or plate, a depression which receives a ring 152 attached to the cross head 65 by suitable bolts or screws 153, or otherwise, so that the disk or plate 149 and the tube 150 are free to turn. The tube 150 has an inwardly projecting pin or stud 154 which engages a longitudinal slot 155 in the valve stem 145, locking the tube 150 to the stem 145, so that the turning of the tube will turn the stem and at the same time the stem is free to move up and down, by reason of the slot 155, with the raising and lowering of the sealing or closing head. The exterior of the tube 150 has a lower cam plate or flange 156 and an upper cam plate or flange 157, which plates are attached to the tube by suitable screws 158, or otherwise, and by means of which plates the tube 150 can be turned to turn the valve stem 145, for the valve stem to turn the valve plug within the shell or casing 107 and open and close communication through the port of the valve plug with the ports of the shell or casing. A sleeve 159 is attached to the valve stem 145 below its upper end by means of suitable bolts or screws 60, or otherwise, and this sleeve 159, on its exterior, has a cam flange or plate 161 by means of which the valve stem 145 can also be turned, turning the valve plug in the shell or casing 107 to open and close communication between the port 118 of the valve plug and the port 119 and 122 of the shell or casing.

The valve stem 145 is turned or rocked, through the cam plates 156 and 157 and 159, by means of contact wheels or rollers 162 and 163, having an up and down movement coincident with the up and down movement of the filling tube. Each roller 162 and 163 has, in its inner face, a countersink 164, which receives a flange 165 on the end of a journal pin 166, and each journal pin is screw threaded at its outer end and has entered thereonto a nut 167, by means of which the journal pin is fixedly held in an ear 168, which ears 168 project out from a plate 169, and the plate 169 has projecting ears 170, by means of which and suitable bolts 171 the plate is attached to ears 172 on the neck 173 of a shell or casing 174, so that the rollers 162 and 163 will travel up and down with the shell or casing 174, and in so traveling will contact the cam plates 156, 157 and 161 and turn or rock the valve stem 145 in opposite directions.

The shell or casing 174, at its upper end, has a flange 175, and is connected to a cross bar or head 176 by means of suitable lag bolts or screws 177, and, as shown, a packing 178 is inserted between the flange 175 and a facing 179 on the cross bar or head 176, so as to make a tight joint, between the shell or casing 174 and the cross bar or head 176, to prevent leakage. The cross bar or head 176, at each end, has a slot or hole 180, through which the side rods 70 pass, and the cross bar or head 176, at one end, has a hole 181 for the passage of the valve stem 145, so that the side rods 70 and the valve stem 145 are free to slide through the cross head or bar 176 in the up and down movement of the sealing or closing head and the filling tube. The cross bar or head 176 has upwardly extending therefrom a neck or boss 182, with a hole 183 into which enters the lower end of the piston rod 52, so that the cross head or bar is connected with the piston rod.

The shell or casing 174, on one side, has a rim or wall 184 which surrounds a port or hole 185 in the wall of the shell or casing 174 and furnishes communication with the chamber 186 of the shell or casing, for admitting liquid to the chamber 186. An inner wall 187 is located within the shell or casing 174, and its upper end has thereon a valve seat or seating face 188, with which a seating face 189 on a ring 190 coacts. The ring 190 is threaded onto the exterior of a neck or rim 191, extending up from a top wall 192 of a piston valve, having a side wall 193 and free to reciprocate in a passage 194 within the neck 173 of the shell or casing 174, so that the seating faces 188 and 189 can act and open and close communication between the chamber 186 and the chamber of the piston valve, for admitting liquid to the chamber of the piston valve.

The lower end of the piston valve, in the construction shown, has a flange or rim 195 which is cut away on one side so as to furnish an opening 196 in order that the piston valve may pass the retaining ring 152 and have the under face of the flange or rim 192 contact the upper face of the center 66 of the cross head 65, when the filling tube is lowered. The chamber 197 of the piston valve is open to communication with the chamber 186, by means of ports 198 formed in the wall 193 of the piston valve, as shown in Figs. 5 and 6, and communication is established when the seating face 189 is out of contact with the seating face 188, as shown in Fig. 5, and communication is closed, between the chambers 186 and 197, when the seating faces 188 and 189 are in contact as shown in Fig. 6. The lower end of the chamber 197 of the piston valve has a mouth or opening 199, within an inwardly projecting bead or flange 200 on the interior of the wall 193 of the piston valve, as shown in Figs. 5 and 6; and below the rib or flange 200 is an opening 201, terminating in a shoulder 202, into which opening and abutting against the shoulder 202 is entered the upper end of the filling tube 203, so that the filling tube is connected with the piston valve, and, when the piston valve is opened for its chamber 197 to be in communication with the chamber 186, liquid can flow into the filling tube, and when the piston valve is closed against communication between the chambers 186 and 197, the flow of liquid into the filling tube 203 is shut off. The lower end of the filling tube receives a sleeve 204 having a side wall 205 and a top wall 206; and encircling the sleeve 204 is a ring 207 having an inclined upper face 208, as shown, adapted to engage the inclined end faces of the projections 102, when the sleeve 204 is entered into the lower end of the filling tube, as shown in Fig. 25. The sleeve 204 has a chamber 209 closed at its lower end by a plug 210, as shown in Figs. 5 and 6. A ring nut 211 is threaded onto the exterior of the annular side wall 205 at its lower end, and between the ring nut 211 and the ring 207 is located a packing ring 212, which is compressed and seated against the inner face of the sleeve 93, when the lower end of the filling tube is within the sleeve 93, as shown in Fig. 25, and in this condition the sleeve and the packing form a controlling valve at the lower or discharge end of the filling tube. The end wall 206 has therein a hole 213, through which passes a rod or stem 214, at the lower end of which is a nut or head 215; and between the nut or head 215 and the face of the end wall 206 around the lower end of the stem 214 is a coil spring 216, which serves to hold the sleeve 204, ring 207, and packing ring 212 in position for closing the

passage around the lower end of the sleeve 93 and of the filling tube against the discharge of liquid. The upper end of the rod or stem 214, is connected by a coupling nut 217, with the lower end of the piston rod or stem 52, so that the two rods or stems move together and with the cross head or bar 176 which has a recess 218 in which the coupling nut 217 is entered.

The flange or rim 195, on its front and rear side, has a projecting ear 219, in each of which is secured the lower end of a rod 220, and the upper end of each rod 220 passes through an ear 221, on the front and rear sides of the flange 175 of the shell or casing 174, so that each rod is free to slide up and down in its ear 221, and a coil spring 222 encircles each rod 220 between each pair of ears 219 and 221, which coil springs serve to return the piston valve, from its raised position to its closed position, and to hold the seating faces 188 and 189 in abutting relation, thereby shutting off communication between the chambers 186 and 197 and preventing the inflow of liquid into the filling tube.

A swiveling coupling 223, on the end of a hose or conduit 224, connects the hose or conduit with the rim or flange 184 of the shell or casing 174 around the piston valve of the filling tube; and the other end of the hose or conduit 224 is connected by a swiveling coupling 225 with the rim or flange 226 of a goose neck 227, having a passage 228 and formed with, or suitably connected to a shell or casing 229, which shell or casing has a flange 230 with a neck 231 extending from the flange, the neck having a passage 232, which continues through the wall of the shell or casing 229 as does also the passage 228, and the neck 231 is entered into the under side of the filling or supply tank 6, so as to be in communication with the interior of the tank. The shell or casing 229 has a chamber in which is entered a valve plug 233, which, as shown, has a chamber 234, with ports 235 opposite each other in the wall of the valve plug, as shown in Figs. 19 and 20. The small end of the valve plug has, extending out from the center, a stem 236 on to which is threaded a nut 237, which bears against a washer 238 and forces the washer 238 in close contact with the end face of a neck or boss 239 on the shell or casing 229 of the valve, so as to close the valve at the small end of the valve plug as usual. The large end of the valve plug 233 has, projecting out therefrom at the center, a rectangular or square shank or stem 240 for a handle 241 by means of which the valve plug 233 can be turned for the ports 235 to be in line with the passages 228 and 232, or the valve plug can be turned so as to close the passages 228 and 232, as shown in Figs. 19 and 20. The turning of the valve plug 233, to furnish communication between the passages 228 and 232 allows the liquid to flow from the tank and pass through the hose or conduit 224 and into the chamber 186 of the shell or casing 174 of the head of the filling tube, so that, with the piston valve on the upper end of the filling tube open, liquid from the tank can flow through the filling tube 203, and with the valve at the lower end of the filling tube open, the liquid can discharge into the package. The liquid will continue to flow from the tank into the hose or conduit 224, so long as the valve plug 233 is in position to furnish communication through the ports 235 with the passages 228 and 232; and with the turning of the valve plug 233 for the ports 235 to be out of line with the passages 228 and 232, the outflow of liquid from the filling or supply tank 6 into the hose or conduit 224 is shut off or stopped.

A valve for controlling the air, or other medium under pressure, to operate the piston 53 in the cylinder 54 is employed. The valve shown has a shell or casing 242 with a tapered chamber 243, and around the exterior of the shell or casing is located a plurality of necks or bosses, four being required in the construction and arrangement of the valve shown. A boss or neck 244 having a passage 245 admits air, or other medium under pressure, to pass through the valve; and a boss 246, with a passage 247, allows air, or other medium under pressure, to discharge from the valve. A boss or neck 248, having a passage 249, furnishes a connection for one of the supply pipes leading to the motor cylinder; and a boss 250, with a passage 251, furnishes a connection for the other supply pipe leading to the motor cylinder. The tapered chamber 243 of the shell or casing 242 has located therein a tapered valve plug 252, and this plug has, in line with the several passages or ports 245, 247, 249 and 251, a passage 253, having at one end a port 254 and at the other end a port 255, and a passage 256, having at one end a port 257 and at the other end a port 258, with a wall or partition 259 between the passages 253 and 256, as shown in Figs. 22 and 23. The valve plug 252, when turned into the position shown in Fig. 22, allows air, or other medium under pressure, to directly flow, through the passage 245, port 254, passage 253 and port 255, into the passage 249, to be delivered, in the arrangement shown, to the upper end of the motor cylinder, and at the same time the passage 251 is in communication with the port 257, passage 256, and port 258, for air, or other medium under pressure, to discharge from below the piston in the motor cylinder, so that when the air, or other medium under pressure, enters the cylinder 54 above the piston 53, and acts to force the piston down-

wardly, the air, or other medium under pressure, below the piston, discharges at the port or passage 247 into the atmosphere, or otherwise. The turning of the valve plug into the position shown in Fig. 23 reverses the operation, as with the valve plug 252 turned as shown in Fig. 23, the inlet passage 245 is in communication with the port 257, passage 256 and port 258, for air, or other medium under pressure, to enter the passage 251 and be discharged into the cylinder 54 below the piston 53, for the air, or other medium under pressure, to act and raise the piston, and with the admission of air, or other medium under pressure, to the under side of the piston, the air, or other medium under pressure, above the piston, discharges, entering the passage 249, and, through the ports and passage 254, 253 and 255, discharging at the passage 247 into the atmosphere, or otherwise. It will thus be seen that by means of a single valve of the construction shown and described, air, or other medium under pressure, can be admitted to or discharged from either end of the cylinder 54 to reciprocate the piston 53 in such cylinder.

The valve plug 252, at its larger end, has a pin or stop 260, arranged to engage an upper and lower lug 261 and limit the turning of the valve plug in either direction and at the proper point for the ports and passages to be in communication. The smaller end of the valve plug 252 has projecting out therefrom a screw threaded stem 262 onto which is entered a nut 263 by means of which the valve plug is held in the shell or casing, so as to prevent leakage of the valve. The valve plug 252, at the center of the larger end, has a rectangular or square stem 264 for the attachment of a handle 265 by means of which the valve plug can be turned as required for opening the ports in admitting air to and discharging air from the upper and lower ends of the motor cylinder.

A pipe or tube 266 has its lower end entered into the neck or boss 248, and this pipe 266 extends upwardly and is connected, at its upper end, by an elbow coupling 267, with a horizontal pipe or tube 268 formed in two parts or sections connected together by a T coupling 269, one neck or boss of which coupling has entered thereinto a pet or release cock 270 for venting purposes when required. The other end of the pipe or tube 268 is connected by an elbow coupling 270 with a short tube 272 entered into a hole 273 at the center of the cap 55 of the cylinder 54, as shown in Fig. 3. The pipe 266, with the valve plug turned as in Fig. 22, allows air, or other medium under pressure, to discharge into the upper end of the cylinder 54 above the piston 53, for the air, or other medium under pressure, to act and force the piston downward; and with the forcing of the piston upwardly the pipe 266 allows the air, with the valve plug turned as in Fig. 23, to discharge at the passage 247 into the air, or elsewhere.

A short pipe or connection 274 is entered at one end into the neck or boss 250, and its other end is connected by an elbow 275 with a horizontal pipe 276, the other end of which is connected by an elbow 277 with a short pipe or connection 278, entered into the hole 59 in the inner plate 58 of the supporting frame or table, for the admitted air to enter the motor cylinder 54 below the piston 53 and move the piston upward; and with the moving of the piston 53 downwardly the air, or other medium under pressure, below the piston, flows back through the pipe or tube 276 and is discharged at the passage 247 into the atmosphere, or elsewhere. The air, or other medium under pressure, is admitted to the pipe 276 when the valve plug 252 is turned as in Fig. 23, and the air, or other medium, is discharged through the pipe 276 with the valve plug turned as in Fig. 22.

A hose or conduit 279 is connected at one end by a coupling 280 with the neck or boss 244, and at the other end is connected by a coupling 281 with a neck or boss 282 on a supply pipe 283 for air, or other medium under pressure; and the pipe 283, in the arrangement shown, is supported in slots or recesses 284 formed in ears or wings 285 on the bosses or bearings 30 of each side frame and on the sockets or sleeves 17 of the plates 16 on the front standards, as shown in Figs. 1 and 2. The supply pipe for air, or other medium under pressure, is connected with the top of the supply or filling tank, in which the medium is under pressure, so as to maintain a regulated pressure in the supply pipe 283, and the air, or medium under pressure, is conducted under the regulated pressure, through the hose 279, into the passage 245, to be transmitted through the passages 253 and ports 254 and 255, and the passage 256 and the ports 257 and 258, to discharge by the tube or pipe 266 into the upper end of the cylinder 54, or to discharge by the pipe 276, into the lower end of such cylinder for supplying air, or other medium under pressure, to the cylinder above and below the piston for the air, or other medium under pressure, to act on the piston 53 and lower and raise the piston.

A pin or stud 286 projects outwardly from each rod or tube 60, and enters a slot 287 in a connecting bar or link 288, the other end of which bar or link is connected to a pin or pivot 289 on the ear 28 of each side frame and the pins 286 in connection with the slotted bars or links 288 limit the rearward swing of the motor cylinder and frame carrying the sealing head and the filling tube when the filling apparatus self swings rearward to clear the filling package and permit

the bung or stopper to be inserted and driven or forced tightly into place to close the filled package.

The construction shown has a plurality of bands 290 extending partly around the filling or supply tank 6, and connected at their ends with the cross rod 18, which bands serve to furnish an additional support for the cross rod. The filling or supply tank 6, at one end on the under side, in the arrangement shown, has entered thereinto a bushing 291, connected with which is a controlling valve 292, having one end of a supply hose 293 connected therewith, which supply hose leads from a suitable source of supply for the liquid under pressure and the source of supply for the liquid, preferably, should be higher than the center longitudinally of the filling tank, so that when the valve 292 is open the liquid can flow by gravity from the source of supply into the filling tank, filling the tank half full, approximately, leaving a space above the liquid in the tank for compressing air, or other medium under pressure.

The construction shown has, at the front of the filling or supply tank 6, a sight glass 294 with a connection 295 at its lower end, for the bottom of the filling or supply tank, and a connection 296 at the upper end, for the top of the filling or supply tank, by means of which sight glass the operator can determine the height of the liquid in the filling or supply tank.

A pressure indicating gage 297 is connected with the pipe 283 for indicating the pressure in the pipe and in the tank. The pipe 283, in the arrangement shown, has a T coupling 298, and a pipe or hose 299 is connected at one end with the T coupling and at the other end with a bushing 300, entered into the wall of the filling or supply tank 6, so as to supply pressure from the interior of the tank above the liquid to the supply pipe for use in the motor or power cylinders. The air, or other medium under pressure in the tank, in the event of an excess of pressure, in the arrangement shown, is vented or escapes into the pipe 283 by the hose or conduit 299, and from the pipe 283 the excess of pressure passes into a hose 301, leading from the pipe 283 to a reservoir or other place of use, which hose or conduit 301 is attached to a reducing valve 302 at one end of the pipe 283, the other end of the pipe being closed, and, if desired a relief valve can be connected with the top of the tank to escape an excess of pressure.

A support for a barrel, or other package, is provided for each filling apparatus, and such support is located underneath each apparatus. The support shown consists of bearing wheels 303 mounted on a tilting frame formed of side pieces or arms 304 and a foot bar or lever 305 between the side pieces or arms and by means of which the tilting frame can be raised and lowered, for the upward or rising movement to discharge the filled package. The tilting frame, having the rollers 303, coacts with rollers 306 mounted on a supporting rod 307 held in position by brackets or legs 308 attached to the floor, or other support on which the apparatus as a whole is placed, and, as shown, the rod 307, at each end, is supported in a plate 309 attached by bolts, or otherwise, to the inner face of each front standard or upright 1 of the main frame. The support for the barrel, or other package, having the rollers and tilting frame and the fixed rollers mounted on a supporting rod, is of the usual and well known form of construction for such support, and is, therefore, not specifically illustrated nor described.

It has been found in practice that the hose or conduit connecting a reciprocating filling tube with a stationary supply tank is liable to and does become twisted or kinked, through the rising and falling movement of the reciprocating filling tube, preventing the free flow of beer or liquid from the supply tank into the filling tube. This kinking or twisting is overcome by connecting the supply hose or conduit with the tank and with the filling tube by means of the swiveling couplings 223 and 225 which allow the hose or conduit to maintain a perfectly operative condition, without kinks or twists irrespective of the position of the filling head and the filling tube. Each swiveling coupling 223 and 225, in the construction shown, consists of a gooseneck 310 having, at the inner end, a flange 311 which enters a channel or open recess 312 formed in the wall 184 of the filling head or the end wall 226 on the discharge valve of the tank; and in this chamber 312 is located a packing ring 313 of rubber or other suitable material, which is compressed in the chamber or channel 312 by a gland 314 and suitable tightening bolts or screws 315 or otherwise. The packing ring or gasket should be compressed sufficiently to prevent leakage at the joint, and, at the same time, permit the coupling to turn with the reciprocating movements of the filling tube and maintain the hose or conduit free of kinks or twists, leaving a clear passage for supplying beer or other liquid from the tank to the filling head to enter the filling tube when the piston valve is opened, as already described.

The operation will be understood from the foregoing description, but briefly is as follows: A barrel, or other package to be filled, is placed on a support therefor beneath the filling apparatus, for its bunghole to be on the upper side and approximately in line with the filling tube, so that with the descent of the sealing or closing head and the filling tube the seal will enter the bung-

hole, and the filling tube will enter the interior of the package. After the barrel or package has been placed in position, the valve plug 252 of the controlling valve for the air, or other medium under pressure, is turned sufficiently to admit pressure to the upper end of the cylinder 54 above the piston 53, and to vent or discharge pressure from the cylinder 54 below the piston. The pressure admitted above the piston 53 and the release of the pressure below the piston forces the piston downwardly by the pressure above and with the release of pressure below the piston, the sliding rods 70 and the sealing head carried thereby are free to descend by gravity and the weight of the sealing head, filling tube and connecting band 79 at the upper end of the rods, and such descent continues until the sealing plug or gasket 97 has entered the bunghole of the barrel or package and completely sealed and same against the escape of pressure and liquid admitted to the package.

The cam plate 161 on the valve stem 145 is located in such relation to the movement of the filling tube that, as the filling tube continues to descend after the seal has been made, such descent will bring the roller 163 into engagement with the cam flange or plate 161 and rock or turn the valve stem 145 in the forward direction to turn the valve plug in the casing 107 from the full closed position shown in Fig. 18[a], so as to bring the port 118 into alinement with the port 122, opening communication between the upper portion of the filling or supply tank 6 and the to-be filled package, by which pressure will flow from the filling or supply tank into the to-be filled package through the hose or conduit 129, pipe or tube 127, chamber 117 of the valve plug, opening 105, passage 104, and channel or passage 103, equalizing the pressure between the filling or supply tank 6 and the to-be filled package. The continued descent of the filling tube carries with it the filling head at its upper end and the piston valve on the end of the filling tube within the head, and, as the filling head descends, the rollers 162 and 163 will move therewith, for the roller 163 to pass the cam plate or flange 157 and engage the cam plate or flange 156 and turn the valve stem 145 in the forward direction to turn the valve plug in the casing or shell 107 to bring the port 118 into communication with the port 119, opening communication between the to-be filled package and the upper portion of the supply or filling tank, and closing communication through the port 122 between the filling or supply tank and the to-be filled package, shutting off the flow of pressure through the hose or conduit 129 and pipe or tube 127 from the tank into the package. As the flange 156 completes the turning of the valve stem 145 to open communication through the ports 118 and 119 the filling tube has fully entered the to-be filled package, and the flange 195 on the lower end of the piston valve has been brought into contact with the facing or projection 66 on the cross head 65, arresting the descent of the filling tube, and at this time the piston 53, has not completed its full downward movement in the cylinder 54, and with the continued descent of the piston 53 the piston stem 52, in connection with the stem or rod 216, forces down the controlling valve at the end of the stem or rod 215, carrying the sleeve 204 out from within the filling tube 203, opening the lower or discharge end of the filling tube for the liquid to discharge into the package. The engagement of the flange 195, with the facing or projection 66, with the continued descent of the cross bar 176, carries the shell or casing 174 of the filling head down so as to open communication, through the ports or passages 198, between the chamber 186 of the shell or casing 174 and the chamber 197 of the piston valve, allowing liquid to flow from the supply or filling tank 6 through the hose or conduit 224 into the chamber 186 of the filling head, to enter the filling tube 203 through the chamber 197 of the piston valve, for the liquid to enter the package at the discharge end of the filling tube. The liquid discharged into the barrel or package, as the barrel or package is gradually filled therewith, forces the pressure in the package out therefrom, the pressure passing through the channel 103, passage 104, and opening 105, into the chamber 117 of the controlling valve, and out from the chamber through the ports 118 and 119, to enter the sight glass 140 through the connection of the sight glass with the casing or shell 107 of the controlling valve, and the pressure will flow upward through the pipe or tube 142 and be returned by the hose or conduit 144 to the upper portion of the filling or supply tank, and add such return pressure to the pressure in the tank. The liquid, when the barrel or package is filled, will flow through the channel 103, passage 104, and opening 105 into the chamber 117 of the controlling valve, and will enter the sight glass 140, through the ports 118, 119 and the connection between the sight glass and the shell or casing 107 of the controlling valve, and with the appearance of the liquid in the sight glass the operator knows that the barrel or package is full.

The operator, when the package is full, turns the plug 252 of the controlling valve for the air, or other medium under pressure, so as to admit pressure beneath the piston 53 in the cylinder 54, and vent or discharge pressure from the cylinder above the piston. The pressure admitted below the piston 53 forces the piston upward, carrying with it the piston rod 52, and with it the cross head

176 and the rod or stem 215, and with the initial upward movement of the piston rod 52 and the rod or stem 215 the sleeve or valve, at the lower end of the filling tube is carried upward or closed by the upward movement of the piston rod or stem 52 and the rod or stem 215, and when closed, is held closed by the coiled spring 216, thus preventing discharge of the liquid at the lower end of the filling tube, and at the same time, with the initial upward movement of the cross head or bar 176 the casing or shell 174 moves upwardly, closing the ports or passages 198, and shutting off the admission of the liquid into the chamber 197 from the chamber 186 of the filling head, so that any liquid remaining in the filling tube will be retained therein by the closing of the controlling valve at the lower end of the filling tube. The continued upward movement of the cross bar or head 176 carries with it the casing or shell 174; and the casing, through the engagement of the seating faces 188 and 189, carries upward the piston valve and with it the filling tube, withdrawing the filling tube from the filled package. The cross bar or head 176, as it approaches the limit of its upward movement, causes the neck or wall 182 to engage the cross head or bar 74, moving the cross head 74 upwardly, carrying with it the sliding rods 70 and the sealing or closing head and withdrawing the sealing gasket or plug 97 from the bunghole of the barrel, at which time the filling tube is also fully withdrawn from the barrel, as shown for the center filling apparatus of Fig. 1. The frame and the apparatus carried thereby, is free to self-swing rearward, leaving the bunghole clear for driving the bung and closing the filled package. The filled package is rolled from the support and a new package placed in position, and the operation above described is continued for the new package, which is filled and rolled off and a new package placed in position and the operation continued until the required number of packages have been filled.

The upward movement of the filling tube, at the start or beginning thereof, causes the roller 162 to engage the cam flange or plate 157, for the engagement to reversely turn the stem 145 and bring the port 118 into line with the port 122 and passage 123, opening communication, by the tube 127 and hose or conduit 129, with the chamber of the filling tank, for pressure to flow from the chamber and act on the top of the liquid in the filled package, holding the liquid against agitation and foaming, while the filling tube is being withdrawn and the sealing head raised. The continuous upward movement of the filling tube brings the cam flange 161 into position for the roller, with the continued upward movement of the filling tube, to complete the reversely turning valve stem 145, and such reverse turning of the valve stem 145 turns the valve plug in the shell or casing 107, to close communication between the ports 118, 119 and 122, which ports remain closed until the next full descent of the filling tube, retaining any liquid that may remain between the valve plug and the sight glass against return flow after the package has been filled and the filling tube withdrawn, thus preventing any waste of liquid at each filling of the package.

The pipe 127 and the hose 129 furnish a conduit for pressure to flow from the filling or supply tank into the to-be filled package and equalize the pressure between the tank and package, when the package is sealed; and the flow of pressure, through the conduit formed by the pipe 127 and hose 129, is shut off when the valve plug in the shell or casing 107 is turned to furnish communication with the pipe 142 and the hose 144, which furnish a conduit for returning pressure from the package, as it is filled, back to the filling or supply tank. The pressure returned to the filling tank from the package, as the liquid flows into the package, serves to furnish the requisite amount of pressure for operating the filling tube and for equalizing the pressure between the filling tank and the to-be filled package, such return pressure taking the place of the pressure vented in the operation of the motor cylinder in raising and lowering the filling tube, thus enabling the pressure returned to the filling tank to be utilized instead of being vented as it is forced from the package. The check valve between the sight glass and the controlling valve for the pressure prevents the pressure in the filling or supply tank from passing to the to-be filled package, leaving the conduit, formed by the pipe 142 and hose 144, free for the return of pressure to the tank and for retaining any liquid that may overflow after the package has been filled. The filling head, formed by the shell or casing 174, utilizes the side wall of the shell or casing as a cut off for the piston valve, in closing the valve against the inflow of liquid from the chamber of the filling head into the chamber of the piston valve to discharge at the lower end of the filling tube. The opening of the controlling valve at the lower end of the filling tube and the opening of the piston valve are practically simultaneous, so that liquid is admitted from the chamber 186 of the filling head into the chamber of the piston valve to flow through the filling tube as the controlling valve at the end of the filling tube is opened; and when the apparatus is in operation, the valve for supplying liquid to the filling head is kept open until the operation of filling the required number of packages is completed.

The operating of the valve stem 145 to

turn the valve plug in the shell or casing 107 is automatically performed with the lowering and raising of the filling tube, through the engagement of the rollers 162 and 163 with the cam flanges or plates 156, 157 and 161 of the valve stem; and the opening and closing of the piston valve at the upper end of the filling tube, and the opening and closing of the controlling valve at the lower end of the filling tube, are both automatically performed by the lowering and raising of the filling tube. It will thus be seen that the vertical play of the filling tube operates the valves automatically, so that when the apparatus is once started the operator need only to pay attention to the valve controlling the supply of air, or other medium under pressure, to the motor cylinder for operating the piston in said cylinder in lowering and raising the sealing head and the filling tube, thus placing the control of the apparatus by the operator entirely under the valve controlling the supply of air, or other medium under pressure, to the motor cylinder.

The tank, when first supplied with liquid, such as beer, for instance, is empty except for the atmospheric air contained therein, and the beer or other liquid is forced into the tank under pressure and, as the tank is filled with the beer, or other liquid, the gradual rise of the liquid in the tank compresses the air contained therein; and, inasmuch as the tank is sealed, all of the filling tubes being elevated, it follows that the air in the tank is compressed to the amount or height of the inflowing liquid, which compression continues until the air in the tank has been compressed above the liquid sufficiently to furnish a counterpressure against the inflow of the liquid; and, if the tank is filled with the liquid one-half full, the air contained in the tank will be compressed as a natural sequence one-half, making compressed air in the upper portion of the tank. This compressed air, derived from the inflow of the liquid, has sufficient force to operate the piston 53 in the cylinder 54, when the controlling valve for the cylinder is opened so as to admit pressure above and below the piston 53 and exhaust pressure below and above the piston 53 as already described.

The sealing of the to-be filled package by the sealing head and the opening of the conduit for pressure to flow from the tank into the to-be filled package to equalize the pressure between the tank and the package of necessity compresses the air contained in the empty package such compression adding the air in the package to the volume of compressed air in the tank, when the controlling valve between the tank and the to-be filled package is opened for the return of pressure to the tank from the package. The liquid, discharged into the package from the filling tube, forces the compressed air in the package out as the beer, or other liquid, gradually fills the package; and as both the tank and the package are sealed, the escaping air from the package must return to the tank and add to the compressed air in the tank the volume of air contained in the package, it being understood that the beer or other liquid in the tank is maintained at the same level during the outflow of beer, or other liquid, from the tank into the package. This return pressure from the package into the tank will produce an excess of pressure in the tank over the desired regulated pressure, and such excess of pressure can escape through the reducing valve and the hose or conduit 301 for use in operating a pump or other apparatus, or for storage in a reservoir as may be desired. The pressure returned to the tank by the inflow of liquid into the package produces sufficient pressure for operating the motor cylinder as well as giving an excess of pressure over what is required for the operation of the motor cylinder, so that, after the empty tank has received its first charge of beer, or other liquid, and the air has been compressed in the tank by the inflowing liquid, the added pressure from the to-be filled package will maintain a regulated pressure in the tank for supplying the necessary amount of pressure to operate the motor cylinder, and this without the use of an air compressor, or other appliance for producing pressure. It will thus be seen that the necessary amount of air under pressure for operating the motor cylinder in raising and lowering the sealing head and filling tube is self-supplied to the tank by compressing the air in the tank with the inflow of liquid, and by adding the air, under pressure in the package, from the flow of liquid into the package to the air contained in the tank, thus making the apparatus self-operating as regards the production of the necessary amount of regulated pressure for operating the sealing head and filling tube.

The trunnions or bearing pins 36 of the supporting frame or table are located below the under plane of the frame or table, and this locating of the trunnions or bearing pins, in connection with the sliding weight or band at the upper end of the rod 70, furnishes an off center bearing for the frame or table, which, when the weight or band 79 is elevated, will cause the support or table to tip forward, carrying the sealing head and filling tube, when clear of the package, rearward, so that the frame and the motor cylinder, with the sealing head and filling tube, selfswing rearwardly, leaving a perfect clearance for the operator to drive the bung. This selfswing of the sealing head and filling tube rearward is controlled by the slotted links or bars 288 and requires no effort on

the part of the operator to force the sealing head and filling tube rearward, making it only necessary for the operator to swing the sealing head and filling tube forward into alinement with the bunghole of the package for sealing and filling the package. The packing ring or gasket 212, when entered into the mouth of the sleeve 93, seals both the passage 103 and the lower end of the filling tube, so that the liquid cannot escape from the filling tube or from the passage 104 in the raising of the filling tube and sealing head to clear the package, and such sealing occurs before the sealing head is initially raised from the package, thus preventing any waste of liquid in filling the package.

What I claim as new and desire to secure by Letters Patent is:

1. In a filling apparatus for liquids, the combination of a supporting frame, a cross head at the lower end of the supporting frame, slidable rods passing through the cross head of the supporting frame, a sealing head carried by the slidable rods, a reciprocating filling tube passing through the cross head and sealing head, a hollow piston valve at the upper end of the filling tube and having around its upper end a projecting seating face, a casing for the hollow piston valve vertically movable with and independent of the valve, and having on one side an inlet for liquid with an interior seating face below the inlet coacting with the seating face of the hollow valve, a slidable cross bar carrying the casing and vertically movable on the slidable rods, a piston rod connected with the slidable cross bar, a piston connected with the piston rod, a cylinder in which the piston reciprocates, and means for admitting pressure to and discharging pressure from the cylinder above and below the piston, substantially as described.

2. In a filling apparatus for liquids, the combination of a supporting frame, a cross head at the lower end of the supporting frame, slidable rods passing through the cross head of the supporting frame, a sealing head carried by the slidable rods, a reciprocating filling tube passing through the cross head and sealing head, a hollow piston valve at the upper end of the filling tube, a casing for the hollow piston valve vertically movable with and independent of the valve, a slidable cross bar carrying the casing and vertically movable on the slidable rods, a piston rod connected with the slidable cross bar, a piston connected with the piston rod, a cylinder in which the piston reciprocates, a controlling valve at the discharge end of the filling tube, a stem for the controlling valve upwardly extending in the filling tube and connected with the piston rod and having a limited vertical movement independent of the vertical movement of the filling tube, and means for admitting pressure to and discharging pressure from the cylinder above and below the piston, substantially as described.

3. In a filling apparatus for liquids, the combination of a sealing cross head having a longitudinal passage opening at one end through the cross head, a sealing plug carried by the cross head, a filling tube passing through the cross head and forming a channel around the exterior of the filling tube, with the channel opening into the longitudinal passage of the cross head, a controlling valve at the open end of the longitudinal passage in the cross head and formed of a casing having two ports and a valve plug having a single port, a tube in communication with each port of the valve casing, each tube leading to a filling tank, and means for turning the valve plug for opening and closing communication with the ports of the valve casing, substantially as described.

4. In a filling apparatus for liquids, the combination of a sealing cross head having a longitudinal passage opening at one end through the cross head, a sealing plug carried by the cross head, a filling tube passing through the cross head and forming a channel around the exterior of the filling tube, with the channel opening into the longitudinal passage of the cross head, a controlling valve at the open end of the longitudinal passage in the cross head and formed of a casing having two ports and a valve plug having a single port, tubes in communication with each port of the valve casing, each tube leading to the filling tank, a valve stem connected at its lower end with the valve plug, a double cam flange around the lower end of the valve stem, a single cam flange around the upper end of the valve stem, and means, operating through the rising and falling movements of the filling tube, for engaging the cam flanges and turning the valve plug into open and closed positions, substantially as described.

5. In a filling apparatus for liquids, the combination of a sealing cross head having a longitudinal passage opening at one end through the cross head, a sealing plug carried by the cross head, a filling tube passing through the cross head and forming a channel around the exterior of the filling tube, with the channel opening into the longitudinal passage of the cross head, a controlling valve at the open end of the longitudinal passage in the cross head and formed of a casing having two ports and a valve plug having a single port, tubes in communication with each port of the valve casing, each tube leading to the filling tank, a valve stem connected at its lower end with the valve plug, a double cam flange around the lower end of the valve stem, a single cam flange

around the upper end of the valve stem, and rollers carried by the filling tube at its upper end and engaging and operating the cam flanges on the valve stem for turning the valve plug into open and closed positions, substantially as described.

6. In a filling apparatus for liquids, the combination of a swinging supporting frame, a cross head at the lower end of the swinging supporting frame, slidable rods passing through the cross head of the swinging supporting frame, a sealing head carried by the slidable rods, a reciprocating filling tube passing through the cross head and sealing head, a hollow piston valve at the upper end of the filling tube and having around its upper end a projecting seating face, a casing for the hollow piston valve vertically movable with and independent of the valve and having on one side an inlet for liquid with an interior seating face below the inlet coacting with the seating face of the hollow valve, a slidable cross bar carrying the casing and vertically movable on the slidable rods, a piston rod connected with the slidable cross head, a piston connected with the piston rod, a cylinder in which the piston reciprocates, and means for admitting pressure to and discharging pressure from the cylinder above and below the piston, substantially as described.

7. In a filling apparatus for liquids, the combination of a swinging supporting frame, a cross head at the lower end of the swinging supporting frame, slidable rods passing through the cross head of the swinging supporting frame, a sealing head carried by the slidable rods, a reciprocating filling tube passing through the cross head and sealing head, a hollow piston valve at the upper end of the filling tube, a casing for the hollow piston valve vertically movable with and independent of the valve, a slidable cross bar carrying the casing and vertically movable on the slidable rods, a piston rod connected with the slidable cross head, a piston connected with the piston rod, a cylinder in which the piston reciprocates, a controlling valve at the discharge end of the filling tube, a stem for the controlling valve upwardly extending in the filling tube and connected with the piston rod and having a limited vertical movement independent of the vertical movement of the filling tube, and means for admitting pressure to and discharging pressure from the cylinder above and below the piston, substantially as described.

8. In a filling apparatus for liquids, the combination of a sealing cross head having a longitudinal passage opening at one end through the cross head, a sealing plug carried by the cross head, a filling tube passing through the cross head and forming a channel around the exterior of the filling tube, with the channel opening into the longitudinal passage of the cross head, a controlling valve at the open end of the longitudinal passage in the cross head and formed of a casing having two ports and a valve plug having a single port, a tube in communication with one port of the valve casing and leading to a filling tank for inducting pressure from the tank into a to-be filled package, a second tube in communication with the other port of the valve casing and leading to the filling tank for educting pressure from a to-be filled package back to the tank, and means operative by and with the descent of the filling tube for turning the valve plug and first opening communication through the pressure induction tube and then opening communication through the pressure eduction tube and operative by and with the ascent of the filling tube for turning the valve plug and closing communication through both tubes, substantially as described.

9. In a filling apparatus for liquids, the combination of a sealing cross head having a longitudinal passage opening at one end through the cross head, a sealing plug carried by the cross head, a filling tube passing through the cross head and forming a channel around the exterior of the filling tube, with the channel opening into the longitudinal passage of the cross head, a controlling valve at the open end of the longitudinal passage in the cross head and formed of a casing having two ports and a valve plug having a single port, a tube in communication with one port of the valve casing and leading to a filling tank for inducting pressure from the tank into a to-be filled package, a second tube in communication with the other port of the valve casing and leading to the filling tank for educting pressure back from a to-be filled package into the tank, a valve stem connected at its lower end with the valve plug, a double cam flange around the lower end of the valve stem, a single cam flange around the upper end of the valve stem, and means, operative by and with the initial descent of the filling tube, for first engaging the upper cam flange and turning the valve plug to open communication through the pressure induction tube and operative by and with the finish of the descent of the filling tube to open communication with the pressure eduction tube and operative by and with the ascent of the filling tube to close communication through both the pressure induction and the pressure eduction tubes, substantially as described.

10. In a filling apparatus for liquids, the combination of a sealing cross head having a longitudinal passage opening at one end through the cross head, a sealing plug carried by the cross head, a filling tube passing through the cross head and forming a chan-

nel around the exterior of the filling tube, with the channel opening into the longitudinal passage of the cross head, a controlling valve at the open end of the longitudinal passage in the cross head and formed of a casing having two ports and a valve plug having a single port, a tube in communication with one port of the valve casing and leading to a filling tank for inducting pressure from the tank into a to-be filled package, a second tube in communication with the other port of the valve casing and leading to the filling tank for educting pressure from a to-be filled package back into the tank, a valve stem connected at its lower end with the valve plug, a double cam flange around the lower end of the valve stem, a single cam flange around the upper end of the valve stem, and rollers, carried by the filling tube at its upper end for the rollers by and with the initial descent of the filling tube to engage and operate the upper cam flange on the valve stem, and turn the valve plug to open communication through the pressure induction tube and operative by and with the finish of the descent of the filling tube to open communication with the pressure eduction tube and operative by and with the ascent of the filling tube to close communication through both the pressure induction and the pressure eduction tubes, substantially as described.

11. In a filling apparatus for liquids, the combination of a supporting frame, a cross head at the lower end of the supporting frame, slidable rods passing through the cross head of the supporting frame, a slidable bar movable on the slidable rods, a reciprocating filling tube carried by the slidable rods and the slidable bar, a filling head at the upper end of the filling tube and carried by the slidable bar, a hollow piston valve at the upper end of the filling tube and operative in the filling head, and opened with the descent of the filling tube by the engagement of the hollow piston valve with the cross head of the supporting frame, substantially as described.

12. In a filling apparatus for liquids, the combination of a supporting frame, a cross head at the lower end of the supporting frame, slidable rods passing through the cross head of the supporting frame, a slidable bar movable on the slidable rods, a reciprocating filling tube carried by the slidable rods and the slidable bar, a filling head at the upper end of the filling tube and carried by the slidable bar, a hollow piston valve at the upper end of the filling tube and operative in the filling head, and opened with the descent of the filling tube by the engagement of the hollow piston valve with the cross head of the supporting frame, a piston rod connected with the slidable cross bar, a piston connected with the piston rod, a cylinder in which the piston reciprocates, and means admitting pressure to and discharging pressure from the cylinder above and below the piston, substantially as described.

13. In a filling apparatus for liquids, the combination of a supporting frame, a cross head at the lower end of the supporting frame, slidable rods passing through the cross head of the supporting frame, a slidable bar movable on the slidable rods, a reciprocating filling tube carried by the slidable rods and the slidable bar, a filling head at the upper end of the filling tube and carried by the slidable bar, a hollow piston valve at the upper end of the filling tube and operative in the filling head and opened with the descent of the filling tube by the engagement of the hollow piston valve with the cross head of the supporting frame, a piston rod connected with the slidable cross bar, a piston connected with the piston rod, a cylinder in which the piston reciprocates, a controlling valve at the discharge end of the filling tube, a stem for the controlling valve upwardly extending in the filling tube and connected with the piston rod and having a limited vertical movement independent of the vertical movement of the filling tube, substantially as described.

14. In a filling apparatus for liquids, the combination of a vertically reciprocating cross bar, a filling head movable with the cross bar, a hollow piston valve within the filling head opened by the final descent of the filling head, a fixed stop limiting the descent of the hollow piston valve, and a filling tube depending from the hollow piston valve, substantially as described.

15. In a filling apparatus for liquids, the combination of a vertically reciprocating cross bar, a filling head movable with the cross bar, a hollow piston valve within the filling head opened by the final descent of the filling head, a fixed stop limiting the descent of the hollow piston valve, a filling tube depending from the hollow piston valve, a controlling valve at the lower end of the filling tube and opened by the final descent of the filling head, substantially as described.

16. In a filling apparatus for liquids, the combination of a vertically reciprocating cross bar, a filling head movable with the cross bar, a piston valve within the filling head opened by the final descent of the filling head, a fixed stop limiting the descent of the hollow piston valve, a filling tube depending from the hollow piston valve, a controlling valve at the lower end of the filling tube, a stem for the controlling valve connected with the vertically movable cross bar and opening the controlling valve by

the final descent of the filling head, and means for vertically moving the cross bar, substantially as described.

17. In a filling apparatus for liquids, the combination of a vertically reciprocating cross bar, a filling head movable with the cross bar, a piston valve within the filling head opened by the final descent of the filling head, a fixed stop limiting the descent of the hollow piston valve, a filling tube depending from the hollow piston valve, a controlling valve at the lower end of the filling tube, a stem for the controlling valve connected with the vertically movable cross bar and opening the controlling valve by the final descent of the filling head, a piston rod connected with the cross bar, a piston connected with the piston rod, a cylinder in which the piston reciprocates, and means admitting pressure to and discharging pressure from the cylinder above and below the piston, substantially as described.

18. In a filling apparatus for liquids, the combination of a vertically reciprocating cross bar, a filling head movable with the cross bar, a piston valve within the filling head opened by the final descent of the filling head, a fixed stop limiting the descent of the hollow piston valve, a filling tube depending from the hollow piston valve, a hollow controlling valve at the lower end of the filling tube, a stem for the controlling valve connected with the vertically movable cross bar and opening the controlling valve by the final descent of the filling head, a piston rod connected with the cross bar, a piston connected with the piston rod, a cylinder in which the piston reciprocates, and means for supplying pressure to and venting pressure from the cylinder above and below the piston and a coil spring within the hollow controlling valve at the lower end of the filling tube, for returning and holding the valve normally seated, substantially as described.

19. In a filling apparatus for liquids, the combination of a vertically reciprocating cross bar, a filling head movable with the cross bar, a piston valve within the filling head opened by the final descent of the filling head, a fixed stop limiting the descent of the hollow piston valve, a filling tube depending from the hollow piston valve, a controlling valve at the lower end of the filling tube, a stem for the controlling valve connected with the vertically movable cross bar and opening the controlling valve by the final descent of the filling head, a piston rod connected with the cross bar, a piston connected with the piston rod, a cylinder in which the piston reciprocates, and a pressure controlling valve between the cylinder and the filling tank for admitting pressure to the cylinder from the tank and venting pressure from the cylinder above and below the piston, substantially as described.

20. In a filling apparatus for liquids, the combination of a vertically reciprocating cross bar, a filling head movable with the cross bar, a piston valve within the filling head opened by the final descent of the filling head, a fixed stop limiting the descent of the hollow piston valve, a filling tube depending from the hollow piston valve, a piston rod connected with the cross bar, a piston connected with the piston rod, a cylinder in which the piston reciprocates for moving the cross bar and filling head downwardly and upwardly, and coiled springs located between the filling head and the piston valve for closing the valve, substantially as described.

21. In a filling apparatus for liquids, the combination of a vertically movable cross head, a filling tube movable with the cross head and having a seating face at its lower end, a hollow piston valve on the upper end of the filling tube, a casing depending from the movable head and inclosing and movable with the hollow piston valve, and having a vertical movement independent of the piston valve, a fixed cross head through which the filling tube passes, a stop on the upper face of the cross head adjacent to the filling tube, a power cylinder, a piston for the power cylinder, a piston stem connected with the movable cross head for reciprocating the filling tube and the casing, a controlling valve at the lower end of the filling tube and having a body entering the lower end of the filling tube, and a seating face and packing ring below the seating face, the seating face coacting with the seating face on the lower end of the filling tube, a stop at the upper end of the filling tube engaging the stop on the cross head and limiting the descent of the filling tube, and a rod connecting the controlling valve at the lower end of the filling tube and the movable cross head, for opening the valve with the final descent of the piston to discharge liquid from the filling tube, substantially as described.

22. In a filling apparatus for liquids, the combination of a vertically movable cross head, a filling tube movable with the cross head and having a seating face at its lower end, a hollow piston valve on the upper end of the filling tube, a casing depending from the movable head and inclosing and movable with the hollow piston valve, and having a vertical movement independent of the piston valve, a fixed cross head through which the filling tube passes, a stop on the upper face of the cross head adjacent to the filling tube, a power cylinder, a piston for the power cylinder, a piston stem connected with the movable cross head for reciprocating the filling tube and the casing, a controlling

valve at the lower end of the filling tube and having a body entering the lower end of the filling tube, and a seating face and packing ring below the seating face, the seating face coacting with the seating face on the lower end of the filling tube, a stop at the upper end of the filling tube engaging the stop on the cross head and limiting the descent of the filling tube, a rod connecting the controlling valve at the lower end of the filling tube and the movable cross head, for opening the valve with the final descent of the piston to discharge liquid from the filling tube, and a coiled spring for returning and seating the controlling valve at the lower end of the filling tube, substantially as described.

23. In a filling apparatus for liquids, the combination of a sealing head having a passage for communication with a to-be filled package, a controlling valve for the passage mounted on the sealing head and having two ports, a tube for each port of the valve, each tube leading from the valve to the top of a filling tank, and means for automatically opening and closing the valve with the downward and upward movement of a reciprocating filling tube, substantially as described.

24. In a filling apparatus for liquids, the combination of a sealing head having a passage for communication with a to-be filled package, a controlling valve for the passage mounted on the sealing head and having two ports, a tube for each port of the valve, each tube leading from the valve to the top of a filling tank, a valve stem connected at its lower end with the plug of the controlling valve, a double lower cam on the valve stem, a single upper cam on the valve stem, and means engaging the cams with the reciprocating movement of a filling tube and automatically opening and closing the valve, substantially as described.

25. In a filling apparatus for liquids, the combination of a sealing head having a passage for communication with a to-be filled package, a controlling valve for the passage mounted on the sealing head and having two ports, a tube for each port of the valve, each tube leading from the valve to the top of a filling tank, a valve stem connected at its lower end with the plug of the controlling valve, a double lower cam on the valve stem, a single upper cam on the valve stem, a contact vertically movable in unison with a reciprocating filling tube and engaging the cams of the stem and automatically opening and closing the valve from the reciprocating movements of the filling tube, substantially as described.

26. In a filling apparatus for liquids, the combination of a sealing head having a passage for communication with a to-be filled package, a controlling valve for the passage mounted on the sealing head and having two ports, a tube for each port of the valve, each tube leading from the valve to the top of a filling tank, a valve stem connected at its lower end with the plug of the controlling valve, a double lower cam on the valve stem, a single upper cam on the valve stem, and contacting rollers vertically movable in unison with a reciprocating filling tube and engaging the cams of the stem and automatically opening and closing the valve from the reciprocating movements of the filling tube, substantially as described.

27. In a filling apparatus for liquids, the combination of a sealing head having a passage for communication with a to-be filled package, a controlling valve for the passage mounted directly on the sealing head and having a port, a tube for the port leading from the valve to the top of the filling tank for supplying pressure from the tank to the to-be filled package, an upwardly extending stem for the valve, and means for automatically turning the valve and opening and closing the valve with the downward and upward movement of a reciprocating filling tube, substantially as described.

28. In a filling apparatus for liquids, the combination of a sealing head having a passage for communication with a to-be filled package, a controlling valve for the passage mounted on the sealing head and having a port, a tube for the port leading from the valve to the top of the filling tank for supplying pressure from the tank to the to-be filled package, a valve stem connected at its lower end with the plug of the controlling valve, a cam on valve stem, and means engaging the cam with the reciprocating movement of a filling tube and automatically opening and closing the valve, substantially as described.

29. In a filling apparatus for liquids, the combination of a sealing head having a passage for communication with a to-be filled package, a controlling valve for the passage mounted on the sealing head and having a port, a tube for the port leading from the valve to the top of the filling tank for supplying pressure from the tank to the to-be filled package, a valve stem connected at its lower end with the plug of the controlling valve, a cam on the valve stem, and a contact vertically movable in unison with a reciprocating filling tube and engaging the cam of the valve stem and automatically opening and closing the valve by the reciprocating movements of the filling tube, substantially as described.

30. In a filling apparatus for liquids, the combination of a sealing head having a passage for communication with a to-be filled package, a controlling valve for the passage mounted on the sealing head and having a port, a tube for the port leading from the

valve to the top of the filling tank for supplying pressure from the tank to the to-be filled package, a valve stem connected at its lower end with the plug of the controlling valve, a cam on the valve stem, and contacting rollers vertically movable in unison with a reciprocating filling tube and engaging the cam of the valve stem and automatically opening and closing the valve from the reciprocating movements of the filling tube, substantially as described.

31. In a filling apparatus for liquids, the combination of a sealing head having a passage for communication with a to-be filled package, a controlling valve for the passage mounted directly on the sealing head and having a port, a tube for the port leading from the valve to the top of a filling tank for escaping pressure and liquid from the to-be filled package into the filling tank, an upwardly extending valve stem connected at its lower end with the plug of the controlling valve, and means for turning the valve stem and automatically opening and closing the valve with the downward and upward movement of a reciprocating filling tube, substantially as described.

32. In a filling apparatus for liquids, the combination of a sealing head having a passage for communication with a to-be filled package, a controlling valve for the passage mounted on the sealing head and having a port, a tube for the port leading from the valve to the top of a filling tank for escaping pressure and liquid from the to-be filled package into the filling tank, a valve stem connected at its lower end with the plug of the controlling valve, a double lower cam on the valve stem, a single upper cam on the valve stem, and means engaging the cams with the reciprocating movement of a filling tube and automatically opening and closing the valve, substantially as described.

33. In a filling apparatus for liquids, the combination of a sealing head having a passage for communication with a to-be filled package, a controlling valve for the passage mounted on the sealing head and having a port, a tube for the port leading from the valve to the top of a filling tank for escaping pressure and liquid from the to-be filled package into the filling tank, a valve stem connected at its lower end with the plug of the controlling valve, a double lower cam on the valve stem, a single upper cam on the valve stem, and a contact vertically movable in unison with a reciprocating filling tube and engaging the cams of the stem and automatically opening and closing the valve from the reciprocating movements of the filling tube, substantially as described.

34. In a filling apparatus for liquids, the combination of a sealing head having a passage for communication with a to-be filled package, a controlling valve for the passage mounted on the sealing head and having a port, a tube for the port leading from the valve to the top of a filling tank for escaping pressure and liquid from the to-be filled package into the filling tank, a double lower cam on the valve stem, a single upper cam on the valve stem, and contacting rollers vertically movable in unison with a reciprocating filling tube and engaging the cams of the stem and automatically opening and closing the valve from the reciprocating movements of the filling tube, substantially as described.

35. In a filling apparatus for liquids, the combination of a vertically movable filling head, a hollow piston valve within the filling head opened and closed by the movements of the filling head, a filling tube depending from the hollow piston valve and having a seating face at its discharge end, a controlling valve having a seating face coacting with the seating face at the lower end of the filling tube, and means for simultaneously opening the controlling valve at the lower end of the filling tube with the opening of the piston valve, substantially as described.

36. In a filling apparatus for liquids, the combination of a vertically movable filling head, a hollow piston valve within the filling head opened and closed by the movements of the filling head, a filling tube depending from the hollow piston valve and having a seating face at its discharge end, a controlling valve having a seating face coacting with the seating face at the lower end of the filling tube, a power cylinder, a piston in the power cylinder, a piston rod depending from the piston and connected with the filling head, and a stem connected with the piston rod and with the valve at the lower end of the filling tube for opening and closing both valves, substantially as described.

37. In a filling apparatus for liquids, the combination of a main frame, a filling tank mounted on the main frame, a fixed upper and a fixed lower rod at the front of the main frame, the upper rod located in a plane forward of the lower rod, triangular shaped side frames mounted on the rods and attached to the filling tank, each frame having a downward inclination and having a depressed front bearing in the apex of the triangle, an oscillating horizontal frame having at one end a depending ear with an off center trunnion for each ear entering into the depressed front bearing of the adjacent triangular frame, mounting the oscillating frame off center between the triangular side frames, a power cylinder upwardly extending from the horizontal oscillating frame, a sealing head and a filling tube suspended from the oscillating frame, rods depending from the oscillating frame, a pin on each

rod, and a link for each pin, each link having an inclined slot and pivotally connected with the side frame and self acting for limiting the fore and aft swing of the power cylinder, the sealing head and the filling tube in both directions, substantially as described.

38. In a filling apparatus for liquids, the combination of a main frame, a filling tank mounted on the frame, a fixed upper and a fixed lower rod at the front of the main frame, the upper rod located in a plane forward of the lower rod, triangular shaped side frames mounted on the rods and attached to the filling tank, each frame having a downward inclination and having a depressed front bearing in the apex of the triangle, a rocking support having at one end a depending ear with an off center knife edge trunnion for each ear entered into the depressed front bearing of the adjacent triangular frame mounting the rocking support off center between the side frames, a motor cylinder upwardly extending from the rocking support, a reciprocating sealing head and a reciprocating filling tube each suspended from the rocking support, whereby the forward inclination of the triangular frames, the depressed front bearing and the knife edged trunnions cause the sealing head and filling tube to self-swing rearwardly when clear of the package, substantially as described.

39. In a filling apparatus for liquids, the combination of a main frame, a filling tank mounted on the frame, a fixed upper and a fixed lower rod at the front of the main frame, the upper rod located in a plane forward of the lower rod, triangular shaped side frames mounted on the rods and attached to the filling tank, each frame having a downward inclination and having a depressed front bearing in the apex of the triangle, a rocking support having at each end a depending ear with an off center knife edge trunnion for each ear entered into the depressed front bearing of the adjacent triangular frame mounting the rocking support off center between the side frames, a motor cylinder upwardly extending from the rocking support, a reciprocating sealing head and a reciprocating filling tube each suspended from the rocking support, whereby the forward inclination of the triangular frames, the depressed front bearing and the knife edged trunnions cause the sealing head and filling tube to self-swing rearwardly when clear of the package, side rods depending one from each end of the rocking support, a pin on each side rod, and a link for each pin, each link having an inclined slot and pivotally connected at its rear end with the side frame and self-acting for limiting the swing of the sealing head and filling tube in either direction, substantially as described.

40. In a filling apparatus for liquids, the combination of a supply tank for liquid, a reciprocating filling tube, a discharge valve for the liquid from the tank, a filling head at the upper end of the filling tube, a hose between the filling head and the discharge valve for the tank, a swiveled coupling attaching the hose to the filling head, said coupling comprising a neck on the filling head and having an interior end recess and terminating in a shoulder, a neck for the end of the hose having an annular flange entering the recess of the neck of the filling head, a packing ring in the recess of the neck of the filling head and engaging the flange of the hose neck, and a follower plate entered into the recess of the filling head neck and compressing the packing, and a swiveled coupling attaching the hose to the discharge valve of the tank, said coupling comprising a neck on the casing of the discharge valve and having an interior end recess terminating in a shoulder, a neck for the hose end, said neck having an annular flange entering the recess in the neck of the valve casing, a packing ring entered into the recess of the neck of the valve casing and abutting against the flange of the hose neck, and a follower plate entered into recess of the neck of the casing and compressing the packing ring, whereby the two couplings will operate and prevent twisting and kinking of the hose with the reciprocating movement of the filling tube, substantially as described.

41. In a filling apparatus for liquids, the combination of a reciprocating cross head, an annular sleeve for a sealing gasket depending from the cross head, a reciprocating filling tube passing through the cross head and annular sleeve, an endwise slidable spring held discharge valve having a body adapted to enter the lower end of the filling tube, and a seating face to engage the lower end of the filling tube, and a sealing ring below the seating face to enter the interior of the annular sleeve and close the lower end of said annular sleeve, substantially as described.

42. In a filling apparatus for liquids, the combination of a reciprocating cross head, an annular sleeve for a sealing gasket depending from the cross head, a reciprocating filling tube passing through the cross head and annular sleeve, an endwise slidable spring held discharge valve having a body adapted to enter the lower end of the filling tube, and a seating face to engage the lower end of the filling tube, and a sealing ring below the seating face to enter the interior of the annular sleeve and close the lower end of said annular sleeve, means for limiting

the descent of the filling tube, and means for opening the valve at the discharge end of the filling tube when the limit of descent of the filling tube is reached, substantially as described.

43. In a filling apparatus for liquids, the combination of an upper reciprocating cross head, a lower reciprocating cross head, an annular sleeve for a sealing gasket depending from the cross head, a reciprocating filling tube passing through the cross head and annular sleeve, an endwise slidable spring held discharge valve having a body adapted to enter the lower end of the filling tube, and a seating face to engage the lower end of the filling tube, and a sealing ring below the seating face to enter the interior of the annular sleeve and close the lower end of the said annular sleeve, a fixed cross head, a stop on the fixed cross head, a stop on the filling tube at the upper end engaging the stop on the fixed cross head and limiting the descent of the filling tube, and a rod connecting the valve at the lower end of the filling tube with the upper reciprocating cross head, for opening the valve when the limit of descent of the filling tube is reached, substantially as described.

SIMON SCHLANGEN.

Witnesses:
OSCAR W. BOND,
WALKER BANNING.