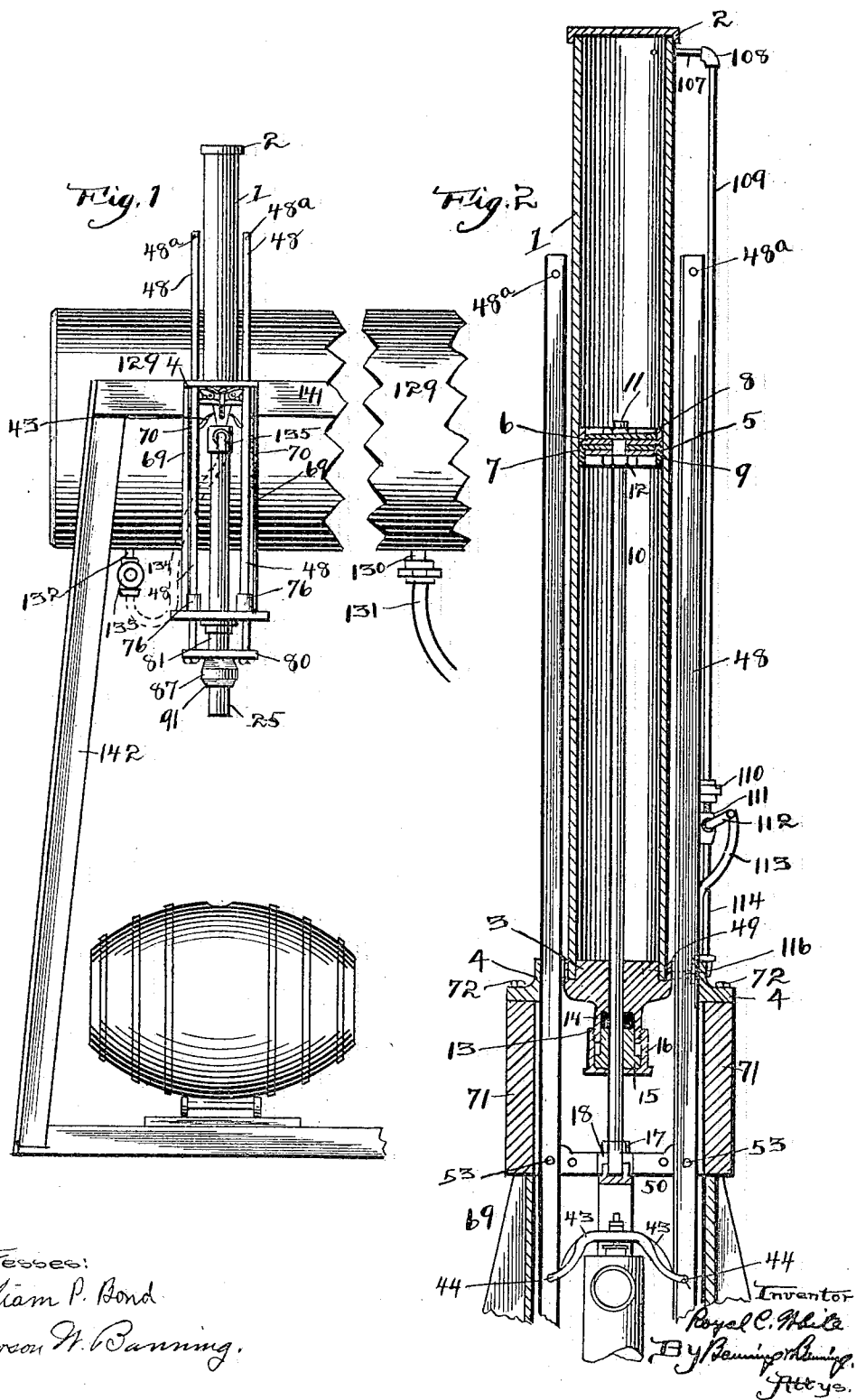


R. C. WHITE.

FILLING APPARATUS FOR LIQUIDS.

APPLICATION FILED JAN. 19, 1905.

3 SHEETS--SHEET 1.



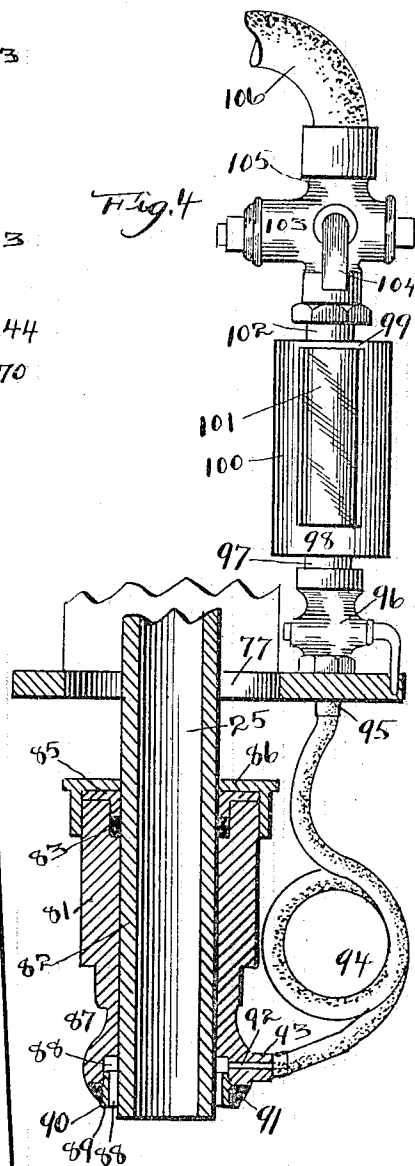
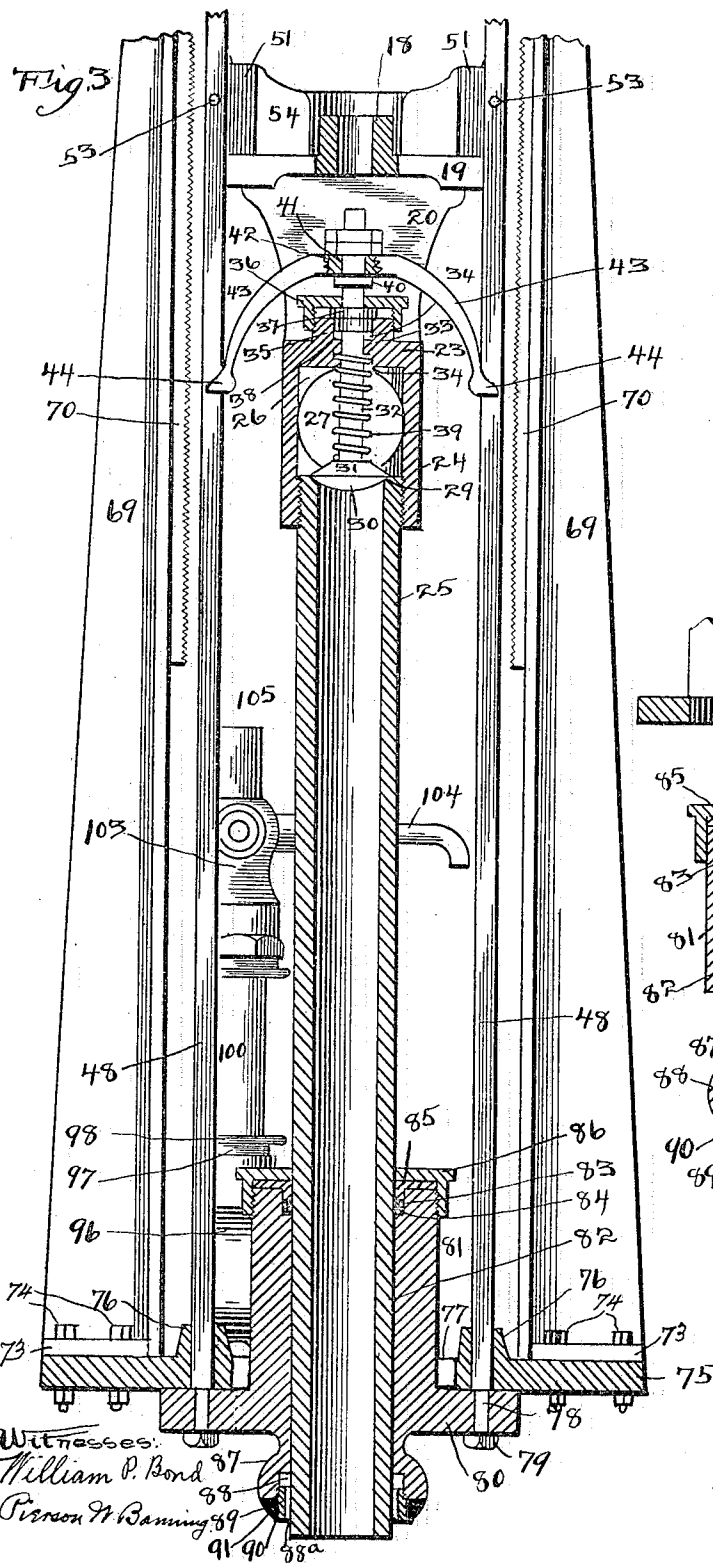
No. 809,764.

PATENTED JAN. 9, 1906.

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FILLING APPARATUS FOR LIQUIDS.

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3 SHEETS—SHEET 2.



Inventor
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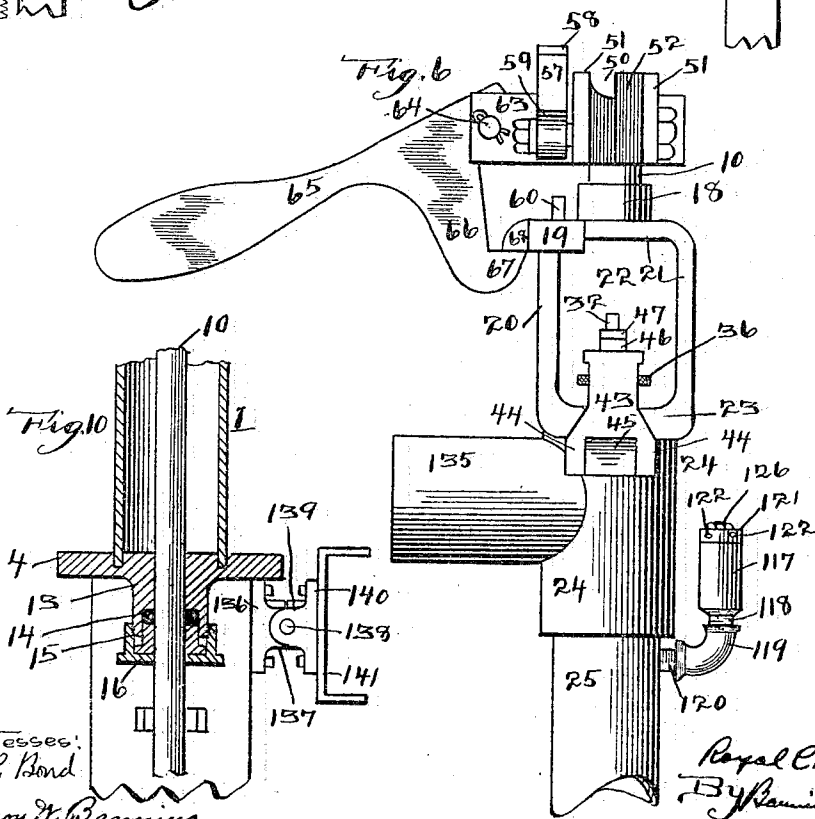
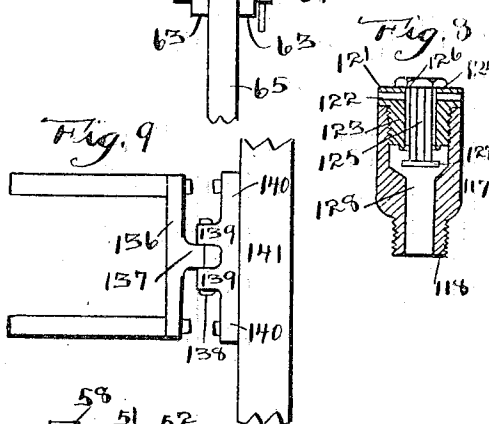
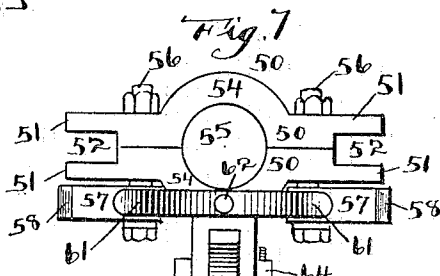
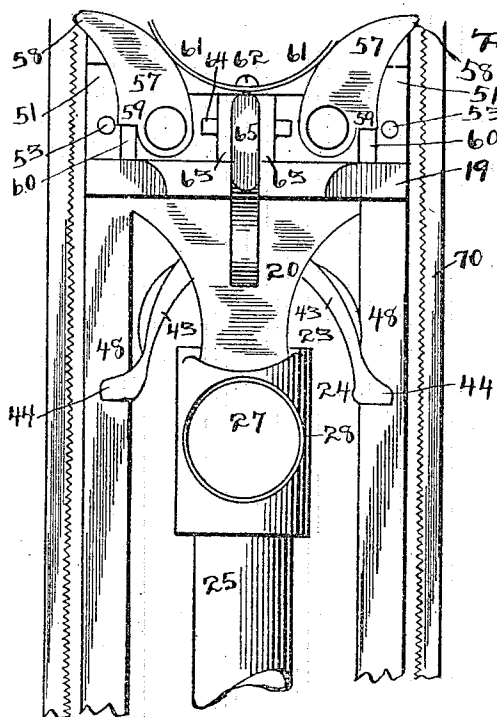
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3 SHEETS—SHEET 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

ROYAL C. WHITE, OF CHICAGO, ILLINOIS.

FILLING APPARATUS FOR LIQUIDS.

No. 809,764.

Specification of Letters Patent.

Patented Jan. 9, 1906.

Application filed January 19, 1905. Serial No. 241,862.

To all whom it may concern:

Be it known that I, ROYAL C. WHITE, 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.

This invention relates to filling-machines for filling packages with liquid under pressure.

The objects of the invention are to raise and lower the filling-tube through a pressure-cylinder having a piston therein with a piston-rod connected with the supply-head of the filling-tube; to control the discharge of the liquid from the filling-tube into the package at the upper end of the filling-tube and have the control automatic with the movements of the filling-tube; to open the controlling-valve for the filling-tube at the time the discharge end of the filling-tube is at the limit of its descent into the package, or approximately so, and to close the valve for the filling-tube at the initial upward movement of the tube; to furnish a relief or vent for the filling-tube which will be closed against the admission of air when the filling-tube is discharging liquid and which will open to the air with the withdrawal of the filling-tube, thereby insuring the discharge of the liquid that is in the filling-tube below the controlling-valve; to furnish a sealing-head adapted to enter the bung or filling hole of the barrel and tightly seal such hole against the escape of pressure from the package or barrel and at the same time allow pressure to enter the package or barrel to equalize the pressure between the supply-tank and the liquid and the package or barrel; to retain the sealing-head in its sealing position during the descent and ascent of the filling-tube; to interlock the sealing-head and the filling-tube during the downward movement and until the sealing-head has reached its sealing position, after which the interlock can be broken for the filling-tube to descend to its discharging position; to automatically release the sealing-head by the ascent of the filling-tube as the filling-tube approaches the limit of its upward movement, and so that with the further upward movement of the filling-tube the sealing-head will be raised from its sealing position; to enable the escape of the liquid into the sight-glass to be shut off when the liquid appears in the sight-glass and not having the closing of the escape-passage interfere with the raising of

the filling-tube out of the package, and to improve generally the construction and arrangement of the several elements which enter into the filling 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 a single appliance; but it is to be understood that in practice two or three, or more, of the filling appliances can be applied to and used with a single liquid-containing tank; Fig. 2, a sectional elevation showing the pressure-cylinder, the piston therein, the piston-rod, and the upper portion of the sliding rods and the head of the filling-tube; Fig. 3, an elevation, partly in section, showing the main frame, the sliding rods, the filling-head, the filling-tube, and the sealing-head; Fig. 4, a detail, partly in section, showing the sealing-head and the sight-glass; Fig. 5, a detail in elevation, showing the upper end of the filling-tube and the cross-head and pawls for locking the sealing-head; Fig. 6, a side elevation of the parts shown in Fig. 5 with the sliding bars and framework omitted; Fig. 7 a plan view of the cross-head and locking-pawls for the sealing-head; Fig. 8, a detail in section of the vent-valve at the upper end of the filling-tube for discharging the liquid with the ascent of the filling-tube; Fig. 9, a detail showing the hinge connection for the frame with the cross-beam for permitting the filling apparatus to swing out of line with the filling or bung hole of the package; and Fig. 10, a detail, partly in section, showing the hinge for the frame, the lower end of the pressure-cylinder, and the upper end of the frame.

The appliance or apparatus is constructed with a cylinder 1, closed at its upper end by a cap 2 and at its lower end by a plug 3 on a plate 4, which is supported on the main frame, so that the cylinder 1 will be held in place. The cylinder 1 has therein a piston 5, which, as shown, is formed of an upper cup-leather 6, a lower cup-leather 7, and a plate 8 within the wall of the upper cup-leather and a plate 9 within the wall of the lower cup-leather. The upper end of a piston-rod 10 passes through the cup-leathers and plates of the piston, and the piston is attached to the end of the piston-rod by an upper jam or lock nut 11 and a lower jam or lock nut 12, so that with the reciprocation of the piston in the cylinder 1 the piston-rod 10 will be advanced and receded to raise and lower the filling-

tube. The piston-rod passes through a hole therefor in the plug 3 and plate 4 and through a boss or wall 13, depending from the plate 4, and have therein a chamber 14 for the reception of a packing compressed by a gland 15, held in position and advanced to compress the packing by a cap 16, threaded onto the exterior of the wall 13, and through which cap and the packing and gland the piston-rod passes, the packing in the chamber 14 making a tight joint around the piston-rod against leakage. The lower end of the piston-rod 10 is screw-threaded and has thereon a jam or lock nut 17, which abuts against the end face of a wall 18, having a threaded hole into which the end of the piston-rod is entered.

A cross-bar 19 has depending therefrom a plate 20, and extending outward and downward from the cross-bar on one side is a plate 21, on the upper or horizontal portion of which is the wall 18, into which the end of the piston-rod is threaded, so that the cross-bar and the plates 20 and 21 move with the piston-rod. A space 22 is formed between the plates 20 and 21, and the plates 20 and 21 at their lower end are united with the head-plate 23 of a cylinder or shell, the wall 24 of which at its lower end on the interior is screw-threaded to receive the threaded end of a filling-tube 25, leaving a chamber 26 within the wall 24 between the head 23 and the end of the filling-tube. A passage 27 in a nozzle 28 opens into the chamber 26 for supplying liquid to the chamber to flow down through the filling-tube. The upper end of the filling-tube has formed thereon a seating-face 29, which coacts with the acting face 30 of a valve 31, attached to a stem 32, which stem extends up through a cross-wall 33, on the upper side of which is a chamber 34 in the head 23 and a wall 35, which wall has an exterior screw-thread. The wall of a cap-plate 36 threads onto the exterior of the wall 35, and within the chamber of the cap 36 is a gland 37, extending into the chamber 34 to compress a packing 38 around the stem 32. The upper end of a spring 39 bears against the cross-wall 33, with the lower end of the spring bearing against the upper face of the valve 31, so that the valve is held normally seated. The stem 32 of the valve passes through the wall 33 and cap 36 and above the cap is screw-threaded to receive a stop-nut 40, furnishing a support for the lifting means for the valve. The stem 32 passes through a hole 41 in a plate 42, extending downwardly from which on each side are arms 43, each arm terminating in a foot 44, each foot having a slot or opening 45, into which enter the rods or bars carrying the sealing-head. The arms 43 are adjusted to properly position the feet to act and raise the valve 31 from its seat as the filling-tube reaches the limit of its descent, and this adjustment is attained by advancing or reced-

ing the stop-nut 40, and when adjusted the arms are held in their adjusted position by a jam-nut 46 and a lock-nut 47, threaded onto the end of the stem 32 in the arrangement shown.

Sliding bars 48 are located on opposite sides of the cylinder 1, each bar passing through a slot 49 therefor in the cross-plate or head 4, so that the bars are free to be raised and lowered, and, as shown, the upper end of each bar 48 has therein a stop-pin 48^a, which strikes the upper face of the cross-head or plate 4 and limits the descent of the bar. A cross-head 50, formed of two companion plates, connects the two sliding bars 48, each companion plate having an ear 51, with a channel 52 between the ears to receive the bar 48, and through which ears and the bar 48 a pin or bolt 53 passes, securing the cross-head to the sliding bars in the arrangement shown. The two companion plates of the cross-head 50 have a circular center 54, with a central hole 55, into which the wall or socket 18 can pass, so that the cross-bar 19 can be made to abut against the cross-head 50 and furnish the means for raising the sliding bars 48 to their normal position. The piston-rod 10 extends up and is free to slide through the hole 55 of the cross-head 50, so that the filling-tube can be raised and lowered in operation.

The two companion plates of the cross-head 50 are held together by cross-bolts 56, and these bolts furnish the pivot each for a dog or pawl 57, the acting end 58 of which projects above the top face of the cross-head 50 and has an outward throw under a spring-tension. Each dog or pawl 57 on its outer edge face has a lug 59, which when the cross plate or bar 19 is in engagement or abuts against the cross-head 50 strikes a pin or projection 60, by which the acting end 58 of the dog or pawl is thrown out of its engaging position with its cooperating rack. The pawls are held under spring tension in the form shown by a flat plate-spring 61, attached at its center by a screw 62 to the upper face of one plate of the cross-head, so that each free end of the spring bears against the upper edge face of each pawl and acts to throw the acting end of the dog or pawl downward and outward and into engagement with its rack. A pair of ears 63 project outward from one of the plates of the cross-head 50, and through these ears a pin or pivot 64 passes on which is mounted the end of a lever or handle 65, projecting down from which is a pendant 66, having a catch 67, which engages with a catch 68, outwardly extending from the cross bar or plate 19, so that when the catches 67 and 68 are engaged the cross-head 50 will be carried down with the descent of the filling-tube, carrying with it the sliding bars 48, and such downward movement of the cross-head 50 and sliding bars 48 will continue so long as

the catches 67 and 68 are engaged, but with the disengagement of the catches 67 and 68 by the operator of the apparatus the cross-head 50 and the sliding bars 48 remain stationary, leaving the filling-tube free to be carried down by the further descent of the piston-rod.

The sliding bars 48 are located and operate between side posts 69, one on each side and forming the side posts of the frame. Each side post has on its inner face a rack 70, with the teeth of which the acting ends 58 of the pawls 57 engage, the engagement being one which allows the sliding bars 48 to freely descend, but prevents the ascent of the bars until the acting ends of the pawls are released from the racks. Each side post or bar 69 has an upper end 71, to which is attached by bolts 72 the cross head or plate 4, carrying the pressure-cylinder 1 and through which the sliding bars 48 pass. Each side post or bar 69 at its lower end has a flange 73, through which bolts 74 pass, securing a cross-plate 75 to the side posts, and this plate 75 in the arrangement shown has two guides or lugs 76, through which the sliding bars pass, giving the bars a straight-line movement in connection with the slots in the cross head or plate 4, thereby insuring a direct horizontal positioning of the sealing-head, and between the lugs 76 in the arrangement shown is a hole 77 for the admission of the upper portion of the sealing-head.

The lower end of each sliding bar 48 terminates in a pin 78, threaded to receive a nut 79, and these pins have entered thereonto a cross-plate 80, which is held in place by the nuts. The cross-plate 80 has extending up from its top face a wall 81, in which and the plate is a hole 82 for the passage of the filling-tube, and the upper end of the wall 81 has therein a chamber 83 to receive a packing 84, compressed by a gland 85, held in place by a cap-plate 86, having a depending side wall which threads onto the exterior of the wall 81, so that a tight joint is formed around the filling-tube against the escape of pressure and liquid. A head or wall 87 depends from the plate 80, and this wall has formed therein, adjacent to the filling-tube, a chamber 88, into which pressure can enter. A nozzle or wall 89 is threaded or otherwise detachably secured in the lower end of the head or wall 87 with an interior diameter, so as to leave an open space 88^a between its inner face and the outer face of the filling-tube. The exterior face of the entered nozzle or wall 89 at the lower end has a bead or flange 90, and between this bead or flange and the end face of the head or wall 87 and around the exterior of the nozzle or wall 89 is a gasket 91, of rubber or other suitable sealing material, which will act and seal the bung or filling hole of the barrel or package when the sealing-head is forced down for the packing to

enter the bung or filling hole. A passage 92 in the head or wall 87 and a nipple or nipple 93 leads laterally from the chamber 88, and to the nipple 93 is attached, by a suitable coupling, a hose or flexible tube 94, the other end of which is attached, by a coupling or otherwise, to a nipple 95, secured in an ear extending out the plate 75, furnishing a flexible connection permitting the rising and falling movement of the sealing-head. A valve 96 has its wall at one end threaded onto the nipple 95, and the other end of the wall has entered thereinto a nipple 97 on a plate 98, connected to a plate 99 by side walls or plates 100 and forming a closure in which is located a sight-tube 101, and the plate 99 has a nipple 102, onto which is entered the lower end of the shell or casing of a valve 103, having a vent or discharge spout 104, through which when the plug of the valve is properly turned pressure and liquid can discharge or vent. The other end of the casing or shell of the valve 103 has a nipple 105, to which is attached, by a suitable coupling or otherwise, the end of a tube or hose 106, the other end of which is attached to the filling-tank, so as to have communication with the upper portion of the tank containing pressure. The pressure from the interior of the tank when the plugs of the valves 103 and 96 are properly turned is free to flow through the hose or tube 106, valve 103, sight-glass 101, valve 96, hose or tube 94, and passage 92 into the chamber 88 and escape through the space 88^a into the package. The liquid as the barrel or package becomes filled forces the pressure in the barrel back through the space 88^a into the chamber 88 to escape through the passage 92 and be returned to the tank by the same route in which it flowed into the package or barrel, and with the completion of the filling of the package or barrel with the liquid the liquid flows into the chamber 88 through the space 88^a and escapes through the passage 92 and flows through the hose or tube 94 and the valve 96, making its appearance in the sight glass or tube 101, and when the presence of the liquid is observed in the sight glass or tube the plug of the valve 96 is closed, shutting off the flow from the package or barrel.

A tube 107 leads from the upper end of the cylinder 1 and is connected by a coupling 108 with a tube 109, the lower end of which is connected by a coupling 110 with the shell or casing of a valve 111, having a plug provided with a handle or arm 112, to the outer end of which is connected the upper end of a rod 113, which extends down and is attached to a lever pivotally mounted on one of the posts 69, so as to be within reach of the operator. A tube or pipe 114 is attached to the shell or casing of the valve 111 and is connected by a coupling 115 with a pipe or tube 116, leading into the cylinder 1 at its lower end. The

valve 111 is connected by a tube or hose with a pressure-supply pipe, so as to receive pressure thereinto from the pipe, and the pressure is admitted to either the upper end of the cylinder 1 to force the piston 5 down or to the lower end of the cylinder 1 to force the piston 5 upwardly. The admission of pressure to the upper and lower ends of the cylinder 1 is controlled by the operator, the operator adjusting the valve 111 for the pressure to flow upwardly through the pipe 109 and pipe 107 into the upper end of the cylinder and to flow downwardly through the pipe 114 and the pipe 116 into the lower end of the cylinder, accordingly as it is desired to move the piston 5 downwardly or upwardly.

The liquid flowing through the filling-tube 25 into the package or barrel when the package or barrel is filled will remain in the filling-tube and is to be discharged therefrom into the package or barrel as the filling-tube is withdrawn, the amount of liquid in the filling-tube and in the hose or tube 94 being approximately sufficient to fill the barrel and compensate for the space occupied by the filling-tube in the barrel. The withdrawal of the filling-tube from the barrel allows the liquid therein to discharge into the package or barrel, and such discharge should be free and rapid, owing to the quick withdrawal of the filling-tube. This free and rapid discharge of the liquid from the filling-tube is attained by providing a vent at the upper end of the filling-tube. The vent shown is formed of a shell or casing 117, attached to a nipple 118, entered into a coupling 119, attached to a nipple 120, which enters the wall of the filling-tube and has communication with the interior of the filling-tube. A flange or cap 121, having lateral holes 122, carries a plug 123, which threads into the end of the shell or casing 117, and through the plug and cap is a hole 124, in which is a stem 125, having a head 126 on its outer end and a valve-disk or plate 127 on its inner end, which is free to rise and fall in the chamber of the shell or casing 123 and when down allow air to flow through the passages 122 and passage 124 into the chamber of the shell or casing 117 and escape through a port 128 to flow into the filling-tube above the liquid and assist the discharge of the liquid from the filling-tube as the filling-tube ascends. The pressure as it initially enters the filling-tube with the equalization of the package acts against the under face of the valve disk or plate 127, causing such disk or plate to rise and close the passage 124 against the escape of the admitted pressure and shutting off the admission of external air through the vent, thus insuring the flow of the liquid into the package without having external air mixed therewith. This vent at the upper end of the filling-tube insures a perfect operation in discharging the liquid into the package when the filling-tube

is withdrawn and greatly facilitates the filling of the package with the liquid, as it prevents any appreciable amount of foaming during the filling operation and the withdrawal of the filling-tube from the barrel or package.

A tank 129 of the required length to accommodate the number of filling appliances desired is provided for containing liquid and pressure, and liquid is supplied to the tank through a nipple 130, having coupled or otherwise attached thereto one end of a supply-hose 131, leading from the source of supply for the liquid. A nipple 132, having a valve 133, has attached thereto a hose 134, leading from the valve to a coupling 135, attached to the nozzle 28 for supplying liquid from the tank to the head of each filling-tube.

At the upper end of the posts 69 is a cross-plate 136, extending out from which is an ear 137, through which passes the pivot-pin 138, which pin also passes through ears 139, between which the ear 137 is located. The ears 139 each project from a plate 140, attached by bolts or otherwise to a beam 141, supported in end standards 142, which standards also support the liquid-tank. The posts 69 and the parts carried thereby, including the pressure-cylinder, the filling-tube, and the sealing-head, are supported by the ears 137 139 and pivot 138, so that the parts can swing fore and aft, and inasmuch as the pivot 138 is off center in relation to the weight of the frame and parts it will be seen that with the filling-tube and sealing-head raised the parts will swing rearward, carrying the filling-tube and sealing-head out of line with the bung or filling hole of the package or barrel, so that the operator can insert and drive the bung. The frame and parts supported thereby will swing rearward naturally and will so remain until the operator swings the frame forward and in position to bring the filling-tube and sealing-head in line with the bung or filling hole of the package or barrel.

The operation is as follows: A barrel or package is placed in position with the sealing-head and filling-tube raised and in the normal position shown in Fig. 1, in which the dogs or pawls are out of engagement with the racks 70. The operator through the rod 113 turns the plug of the valve 111 to admit pressure to the upper end of the cylinder 1 for the pressure to act and force the piston 5 downwardly, and such downward movement of the piston through the piston-rod 10 moves the cross-bar 19 and the filling-tube downward, causing the catch 68 to engage the catch 67 and interlock the cross-head 50 with the cross plate or bar 19, so that the cross-head will move with the cross bar or plate, and with the initial downward movement of the cross-bar 19 the stops 60 are withdrawn from engagement with the lugs 59, allowing the spring 61 to act and throw the acting

ends 58 of the pawls or dogs 57 into engagement with the racks 70 as the cross-head 50 descends. The interlock between the cross-head 50 and the bar 19 is maintained until the cross-head has descended the required distance to carry the sliding bars 48 down until the sealing-head has descended to a point where the packing enters the filling or bung hole of the package or barrel and seals the same, and with the engagement of the sealing-head with the package or barrel further descent of the sealing-head, the sliding bars 48, and the cross-head is stopped by the resistance of the barrel or package against the cross-plate of the sealing-head. At the completion of the sealing the catches 67 and 68 are disengaged by the operator raising the arm or lever 65, which leaves the filling-tube free for further descent and holds the sealing-head in its fixed position and against ascent by the engagement of the dogs or pawls with the racks, so that on the withdrawal of the filling-tube the sealing-head will be held in its sealing position until the upward movement of the cross-bar 19 causes the stops 60 to engage the lugs 59 and throw the acting ends 58 of the pawls 57 out of engagement with the rack, leaving the sealing-head free to move upward simultaneously with the upward movement of the filling-tube to clear the barrel or package. The disengagement of the stops 67 and 68 by the operator allows the pressure which has been admitted to the upper end of the cylinder to act on the piston and force the piston 5 downwardly, carrying with it the piston-rod and entering the filling-tube into the package or barrel. The valve 31 remains closed during the descent of the filling-tube and until the feet 44 of the arms 43 abut against the lugs 76, causing the arms 43 to raise the stem 32, and with it the valve 31, opening the end of the filling-tube to the admission of liquid from the chamber 26 therein to flow down into the package, and such flow of the liquid into the package is continued until the liquid makes its appearance in the sight glass or tube 101, when the plug of the valve 96 is closed, shutting off the flow of liquid into the sight glass or tube. At this time the operator through the rod 113 and arm 112 reverses the position of the plug of the valve 111, so that pressure will flow through the tubes 114 and 116 into the lower end of the cylinder 1 to act on the piston 5 and raise the piston, and with it the piston-rod 10 and the filling-tube, and with the admission of pressure to the lower end of the cylinder pressure vents from the upper end of the cylinder through the valve 111, as with the admission of pressure to the upper end of the cylinder pressure is vented through the valve 111 from the lower end of the cylinder. The upward movement of the piston 5, carrying with it the piston-rod 10 and the filling-tube 25, withdraws the filling-tube from the

package or barrel, and with the initial upward movement of the filling-tube the feet 44 of the arms 43 are withdrawn from engagement with the guides or lugs 76, allowing the spring 39 to act and close the valve 31, shutting off the flow of liquid from the chamber 26 into the filling-tube. The upward movement of the filling-tube discharges the liquid in the filling-tube into the barrel, such discharge of the liquid being rendered free and rapid by means of the vent, as already described. The upward movement of the filling-tube with the cross-bar 19 continues independent of the cross-head 50, leaving the seal intact until the stops 60 on the cross-bar 19 engage the lugs 59, releasing the dogs or pawls from the racks, after which the further upward movement of the filling-tube carries with it the sealing-head through the upward movement of the sliding bars 48 from the cross-head 50, engaged by the cross-bar 19, and such upward movement of the filling-tube and sealing-head continues until the parts reach their normal position, (shown in Fig. 1,) when the bung can be inserted in the barrel or package and the barrel or package rolled off or removed from its filling position and a new barrel or package placed in position to be filled, and such new package or barrel can be filled, as hereinbefore described. The operations can be continued until the required number of packages or barrels have been filled. It is to be understood that when the liquid appears in the sight-glass, showing that the package is filled, the valve 96 is to be closed, and this valve remains closed during the period of withdrawal of the filling-tube, the liquid in the filling-tube discharging by reason of the vent at the upper end thereof, and when a new package has been placed in position for filling and the seal made the valve 96 is opened for equalizing the pressure between the package and the filling-tank, the small amount of liquid in the sight-glass being blown back into the package, so that the sight-glass will be clear of any liquid. It is necessary that the filling-tube and sealing-head be swung out of operative position in order to enable the bung or closing-plug to be inserted into the barrel or package, and such swinging of the parts out of position is attained through the rear hinge or pivot of the supporting-frame to the cross-beam of the main frame.

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

1. In a filling apparatus for liquids, the combination of a fluid - pressure cylinder closed at the top and bottom, a piston in said cylinder, a piston-rod downwardly extending from the piston and passing through the closed lower end of the cylinder, a cross-bar attached to the lower end of the piston-rod, a supply-head for liquid connected with the cross-bar, a filling-tube entered at its upper end into the liquid - supply head, a valve

within the liquid-supply head controlling the admission of liquid to the filling-tube, a stem for the valve, and means carried by the stem for raising the stem and valve at the limit of the descent of the filling-tube, substantially as described.

2. In a filling apparatus for liquids, the combination of a fluid - pressure cylinder closed at the top and bottom, a piston in said cylinder, a piston-rod downwardly extending from the piston and passing through the closed lower end of the cylinder, a cross-bar attached to the lower end of the piston-rod, a supply-head for liquid connected with the cross-bar, a filling-tube entered at its upper end into the liquid-supply head, a valve within the liquid-supply head controlling the admission of liquid to the filling-tube, a stem for the valve, a yoke mounted on the stem and engaging a fixed stop at the limit of the descent of the filling-tube for raising the stem and valve, substantially as described.

3. In a filling apparatus for liquids, the combination of a fluid - pressure cylinder closed at the top and bottom, a piston on said cylinder, a piston-rod downwardly extending from the piston and passing through the closed lower end of the cylinder, a cross-bar attached to the lower end of the piston-rod, a supply-head for liquid connected with the cross-bar, a filling-tube entered at its upper end into the liquid-supply head, a valve within the liquid-supply head controlling the admission of liquid to the filling-tube, a stem for the valve, a yoke mounted on the stem, a rest for the yoke on the stem, and a lock holding the yoke against upward movement for the yoke to engage a fixed stop and raise the stem and valve at the limit of the descent of the filling-tube, substantially as described.

4. In a filling apparatus for liquids, the combination of a fluid - pressure cylinder closed at the top and bottom, a piston in said cylinder, a piston-rod downwardly extending from the piston and passing through the closed lower end of the cylinder, a cross-bar attached to the lower end of the piston-rod, a supply-head for liquid connected with the cross-bar, a filling-tube having its upper end entered into the liquid-supply head and provided with a seating-face, a valve within the liquid-supply head seating against the face of the filling-tube and controlling the admission of liquid to the filling-tube, a stem for the valve, a spring encircling the stem and holding the valve normally seated, a yoke carried by the stem and adapted to engage a fixed stop and raise the valve and stem against the resistance of the spring as the filling-tube reaches the limit of its descending movement, substantially as described.

5. In a filling apparatus for liquids, the combination of a filling-head having a chamber to receive liquid, a nozzle opening into the chamber of the filling-head for supplying

liquid to the chamber, a filling-tube having its upper end entered into the supply-head and in communication with the chamber of the supply-head, a valve seating around the end of the filling-tube in the supply-head and controlling communication between the chamber of the supply-head and the filling-tube, a spring holding the valve normally seated, a stem for the valve, and a yoke carried by the stem and operating to lift the stem and valve at the limit of descent of the filling-tube, substantially as described.

6. In a filling apparatus for liquids, the combination of a cylinder closed at the top and bottom, a piston in said cylinder, a piston-rod downwardly extending from the piston and passing through the closed lower end of the cylinder, a cross-bar attached to the lower end of the piston-rod, a supply-head for liquid and a filling-tube carried by the cross-bar, sliding bars one on each side of the cylinder, a cross-head connecting the sliding bars, a sealing-head carried by the sliding bars and through which the filling-tube passes, and a breakable connection between the cross-bar carrying the supply-head and filling-tube and the cross-head of the sliding bars for operating the sealing-head with the initial movement of the filling-tube, substantially as described.

7. In a filling apparatus for liquids, the combination of a cylinder closed at the top and bottom, a piston in said cylinder, a piston-rod downwardly extending from the piston and passing through the closed lower end of the cylinder, a cross-bar attached to the lower end of the piston-rod, a supply-head for liquid and a filling-tube carried by the cross-bar, sliding bars one on each side of the cylinder, a cross-head connecting the sliding bars, a sealing-head carried by the sliding bars and through which the filling-tube passes, a catch on the cross-bar, an arm pivotally mounted on the cross-head and a catch carried by the arm for making and breaking the connection between the cross-bar and the cross-head, substantially as described.

8. In a filling apparatus for liquids, the combination of a cylinder closed at the top and bottom, a piston in said cylinder, a piston-rod downwardly extending from the piston and passing through the closed lower end of the cylinder, a cross-bar attached to the lower end of the piston-rod, a supply-head for liquid and a filling-tube carried by the cross-bar, sliding bars one on each side of the cylinder, a cross-head connecting the sliding bars, a sealing-head carried by the sliding bars and through which the filling-tube passes, a breakable connection between the cross-bar and cross-head for operating the sealing-head with the initial downward movement of the filling-tube, pawls carried by the cross-head, and fixed racks with which the pawls engage for holding the sealing-head

against upward movement, substantially as described.

9. In a filling apparatus for liquids, the combination of a cylinder closed at the top and bottom, a piston in said cylinder, a piston-rod downwardly extending from the piston and passing through the closed lower end of the cylinder, a cross-bar attached to the lower end of the piston-rod, a supply-head for liquid and a filling-tube carried by the cross-bar, sliding bars one on each side of the cylinder, a cross-head connecting the sliding bars, a sealing-head carried by the sliding bars and through which the filling-tube passes, a breakable connection between the cross-bar and cross-head for operating the sealing-head with the initial downward movement of the filling-tube, pawls carried by the cross-head, a spring holding the pawls in engagement, and fixed racks with which the pawls engage for holding the sealing-head against upward movement, substantially as described.

10. In a filling apparatus for liquids, the combination of a cross-bar carrying a supply-head and a filling-tube, slidable bars carrying a sealing-head through which the filling-tube passes, a cross-head for the sliding bars and a detachable connection between the cross-bar and cross-head for operating the sealing-head with the initial downward movement of the filling-tube, substantially as described.

11. In a filling apparatus for liquids, the combination of a cross-bar carrying a supply-head and a filling-tube, slidable bars carrying a sealing-head through which the filling-tube passes, a cross-head for the sliding bars, a catch on the cross-bar, an arm pivotally mounted on the cross-head, and a catch on the arm adapted to be engaged with the catch on the cross-bar and interlock the cross-bar and cross-head to operate the sliding head with the initial downward movement of the filling-tube, substantially as described.

12. In a filling apparatus for liquids, the combination of a cross-bar carrying a supply-head and a filling-tube, slidable bars carrying a sealing-head through which the filling-tube passes, a cross-head for the sliding bars, a catch on the cross-bar, an arm pivotally mounted on the cross-head, a catch on the arm adapted to be engaged with the catch on the cross-bar and interlock the cross-bar and cross-head to operate the sliding head with the initial downward movement of the filling-tube, pawls carried by the cross-head, and fixed racks with which the pawls engage to hold the sealing-head against retraction from the upward movement of the filling-tube, substantially as described.

13. In a filling apparatus for liquids, the combination of a cross-bar carrying a supply-head and a filling-tube, slidable bars carrying a sealing-head through which the filling-tube

passes, a cross-head for the sliding bars, a catch on the cross-bar, an arm pivotally mounted on the cross-head, a catch on the arm adapted to be engaged with the catch on the cross-bar and interlock the cross-bar and cross-head to operate the sliding head with the initial downward movement of the filling-tube, pawls carried by the cross-head, fixed racks with which the pawls engage to hold the sealing-head against retraction from the upward movement of the filling-tube, a lug on each pawl, and a stop on the cross-bar for each lug, engaging the lug and releasing the pawls from engagement with the racks, substantially as described.

14. In a filling apparatus for liquids, the combination of a frame carrying a filling-tube and a sealing-head, and having at its extreme upper end a rearwardly-extending ear, a fixed plate located rearwardly of the upper end of the frame and having forwardly-extending ears in line with and receiving the ear at the upper end of the frame, and a pivot connecting the ears of the frame and plate and arranged off center in relation to the frame for automatically swinging the lower end of the frame rearwardly and out of line with the filling-hole of the package, and when in line allowing the full weight of the suspended parts to rest on the package in the act of sealing the package, substantially as described.

15. In a filling apparatus for liquids, the combination of a frame carrying a sealing-head and a filling-tube, an ear at the extreme upper end of the frame and rearwardly extending, a fixed plate located rearwardly of the upper end of the frame and furnishing a support for the ear of the frame, and a pivot connection between the ear and the fixed plate and located off center in relation to the frame for allowing the lower end of the frame with the sealing-head and filling-tube to swing automatically rearward out of line with the filling-hole of the package, and when in line allowing the full weight of the suspended parts to rest on the package in the act of sealing the package, substantially as described.

16. In a filling apparatus for liquids, the combination of a frame carrying a filling-tube and a sealing-head, a pivoting-ear at the extreme upper end of and on the rear side of the frame, a pivoting-pin for the ear, and a fixed plate located rearward of the upper end of the frame and furnishing a support for the pivoting-ear of the frame and the pivoting-pin, with the pivoting-pin off center in relation to the frame for suspending the frame at its extreme upper end and from its rear side to swing automatically rearward and clear the filling-hole of the package from the filling-tube and sealing-head, and to allow the full weight of the suspended parts to rest on the package in the act of sealing the package, substantially as described.

17. In a filling apparatus for liquids, a slid-
 able filling-tube having a free discharge at its
 lower end and closed by a valve at its upper
 end, in combination with a venting-valve lo-
 5 cated on the exterior of and adjacent to the
 upper end of the filling-tube and automat-
 ically closed by the pressure within the filling-
 tube when entered into and discharging with-
 in the package, and automatically opened by
 10 pressure of outside air for admitting air as
 the liquid discharges from the filling-tube
 during withdrawal from the package, sub-
 stantially as described.

18. In a filling apparatus for liquids, a re-
 15 ciprocating filling-tube having a free dis-
 charge at its lower end, a valve controlling

the admission of liquid at the upper end of
 the filling-tube, and a vent-valve located on
 the exterior of and adjacent to the upper end
 of the filling-tube and below the controlling- 20
 valve for admitting liquid and automatically
 closed against the admission of air by pres-
 sure within the filling-tube when entered into
 and discharging within the package, and au-
 tomatically opened by pressure of outside air 25
 to admit air with the ascent of the filling-tube
 as the liquid discharges during withdrawal
 from the package, substantially as described.

ROYAL C. WHITE.

Witnesses:

OSCAR W. BOND,
 WALKER BANNING.