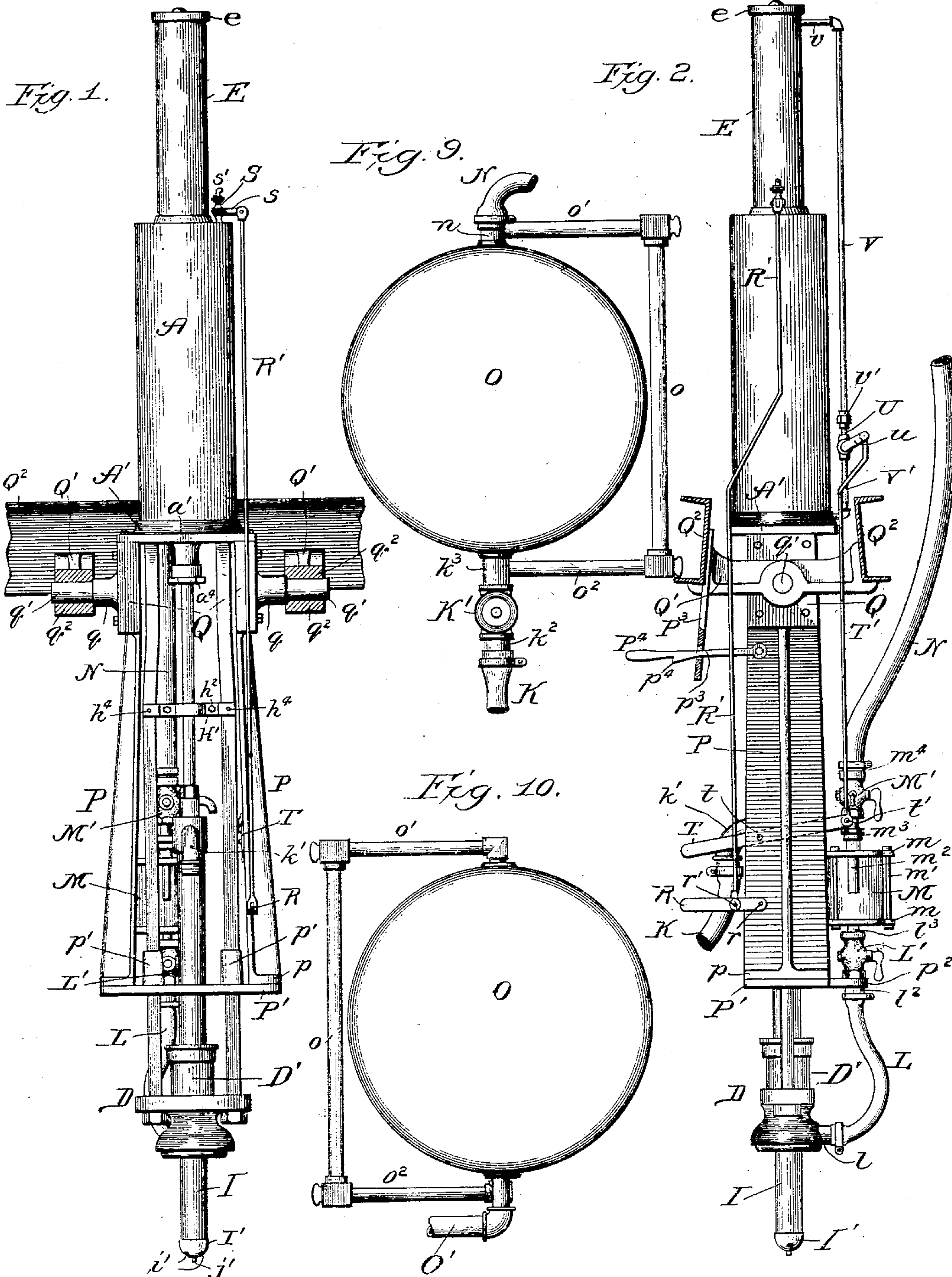


R. C. WHITE.
FILLING APPARATUS FOR LIQUIDS.

APPLICATION FILED NOV. 2, 1901.

NO MODEL.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

Fig. 3.

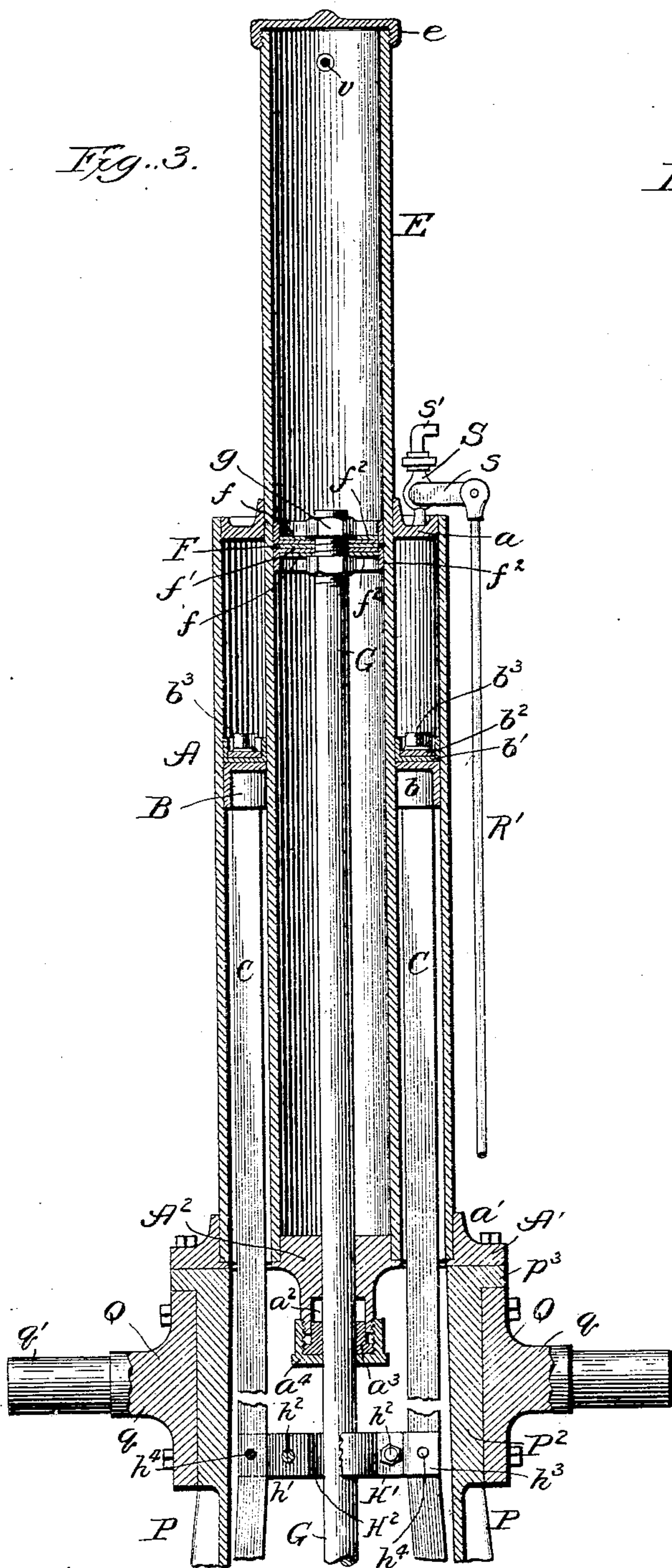
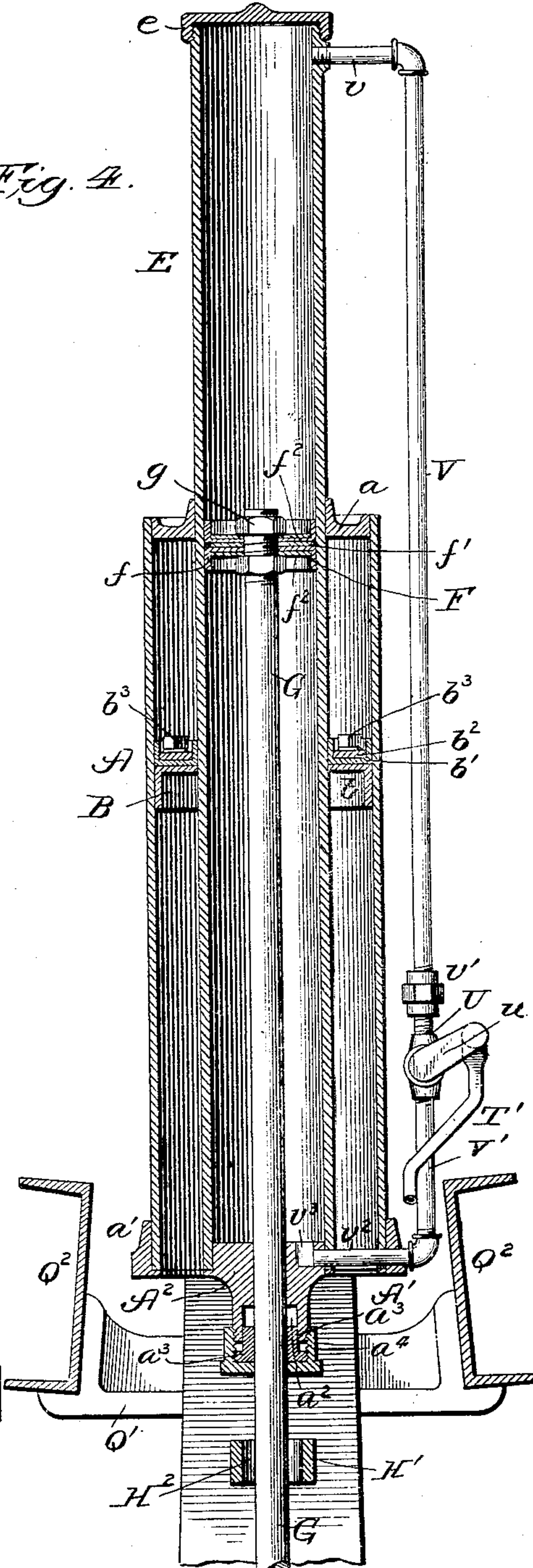


Fig. 4.



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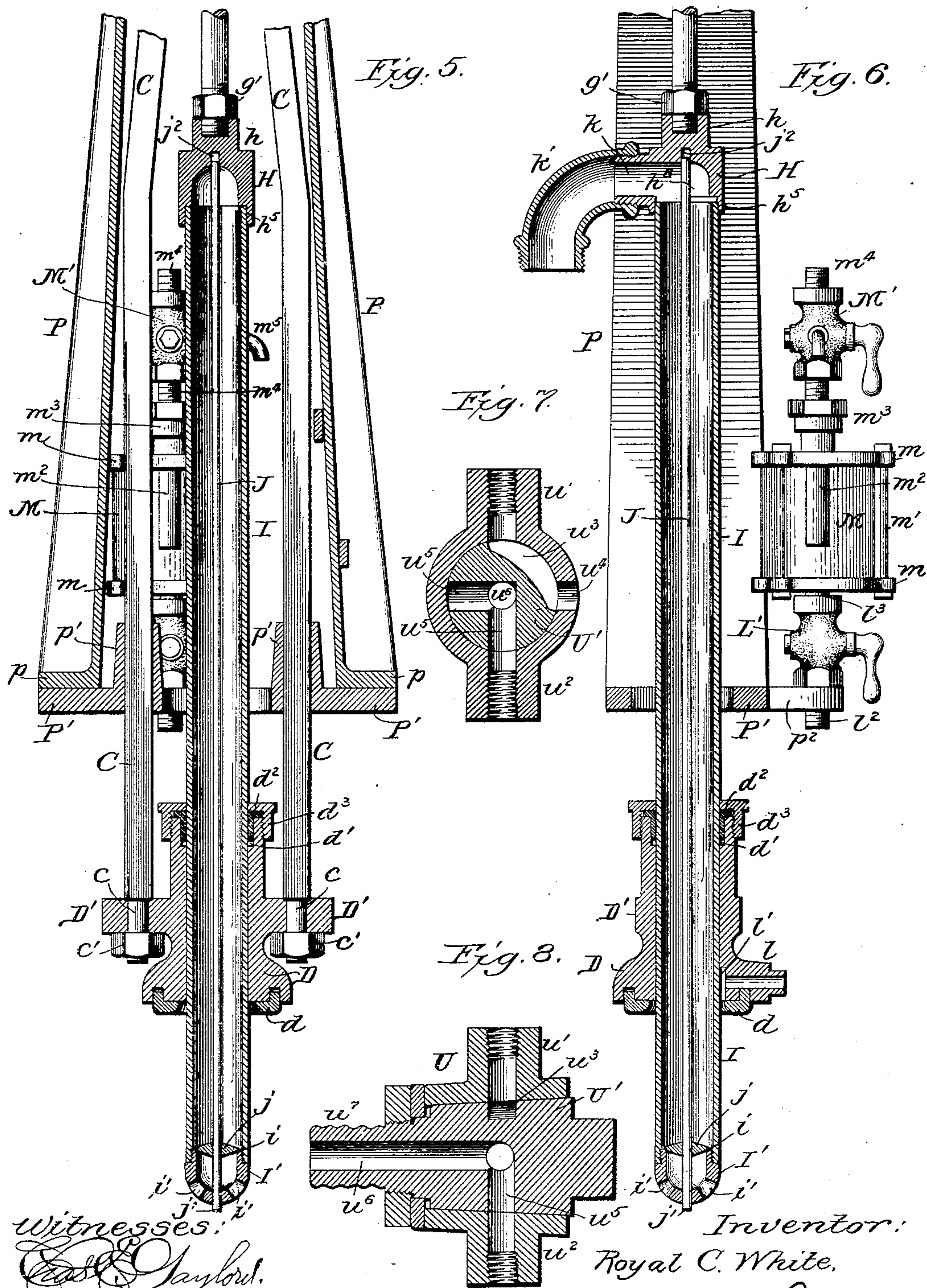
R. C. WHITE.

FILLING APPARATUS FOR LIQUIDS.

APPLICATION FILED NOV. 2, 1901.

NO MODEL.

4 SHEETS—SHEET 3.



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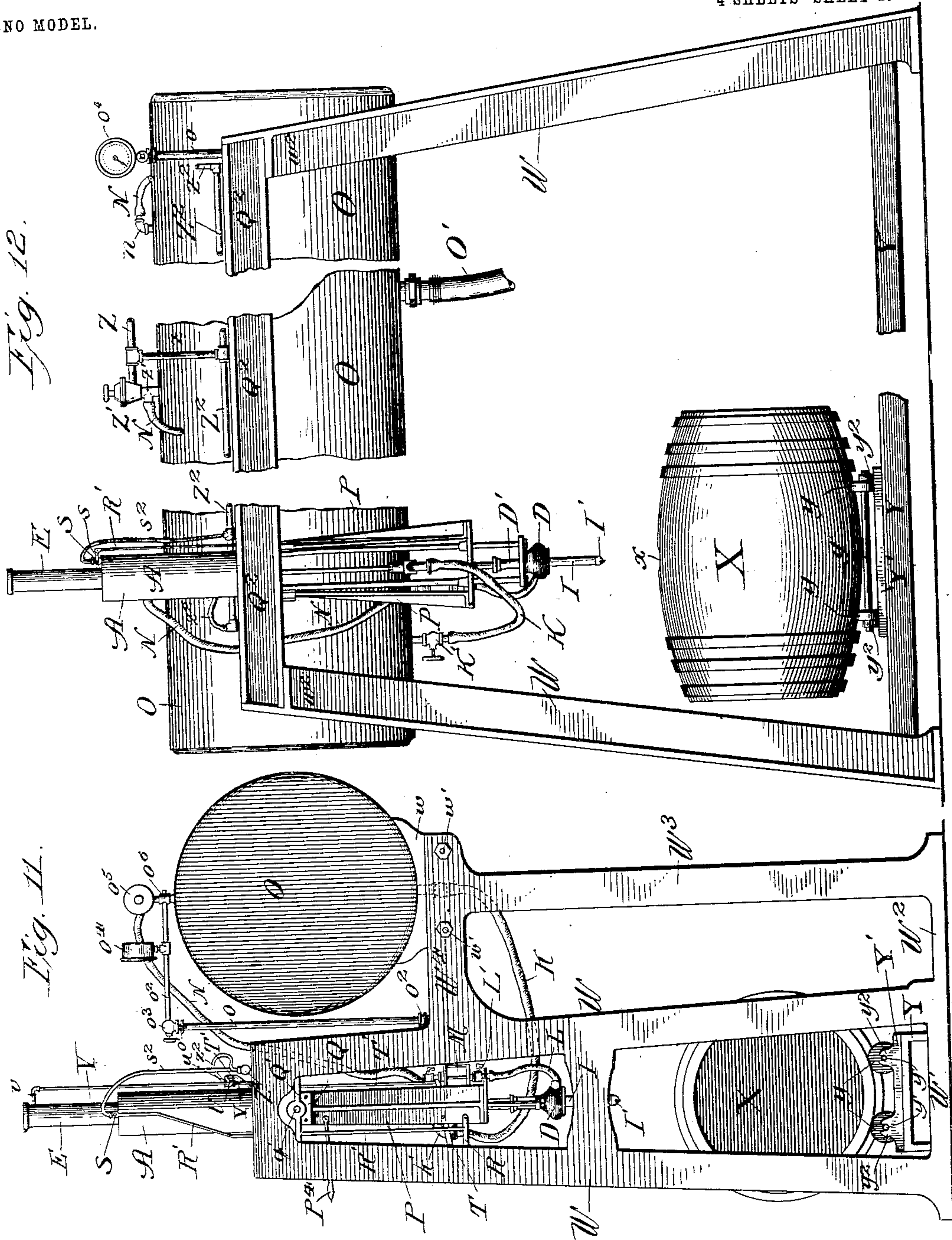
No. 738,138.

PATENTED SEPT. 1, 1903.

R. C. WHITE.
FILLING APPARATUS FOR LIQUIDS.
APPLICATION FILED NOV. 2, 1901.

4 SHEETS—SHEET 4.

NO MODEL.



Witnesses:
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UNITED STATES PATENT OFFICE.

ROYAL C. WHITE, OF CHICAGO, ILLINOIS.

FILLING APPARATUS FOR LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 738,138, dated September 1, 1903.

Application filed November 2, 1901. Serial No. 80,903. (No model.)

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, more especially intended for use in breweries in the filling of barrels, kegs, or other receptacles, but which is adapted for use and can be used in other places for filling packages with liquids under pressure.

The object of the invention is to improve the construction and operation of filling-machines of that class which operate in filling the packages without exposing the liquid during any part of the operation to the surrounding atmosphere, avoiding waste and preventing the foaming of beer or other charged liquids; to have the construction and operation of a nature to make the apparatus practically automatic in use; to employ only one connection for admitting the pressure into the package and discharging the pressure with the admission of the liquid and for the liquid to rise as the package fills; to improve the valve or cock for controlling the induction and eduction of pressure into and out of the cylinder for the filling-tube, and to improve generally the construction and operation of the parts which enter into the apparatus as a whole.

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

In the drawings illustrating the invention, Figure 1 is a front elevation of the complete apparatus, showing the journal-boxes in section; Fig. 2, a side elevation of the same; Fig. 3, a front sectional elevation showing the outer cylinder containing the piston for operating the sealing-head, the inner cylinder containing the piston for operating the filling-tube and showing the support for the cylinders; Fig. 4, a side sectional elevation of the parts shown in Fig. 3 and in the same position as in Fig. 3; Fig. 5, a sectional elevation showing the sealing-head and its carrying or suspending rods, the filling-tube, and a portion of the supporting-frame; Fig. 6, a side sectional elevation of the parts shown in Fig. 5 and in the same position as in Fig. 5;

Fig. 7, a detail in cross-section of the controlling-valve for inducting and educting pressure into and out of the opposite ends of the inner or filling tube cylinder; Fig. 8, a longitudinal section of the valve of Fig. 7; Fig. 9, an end elevation of the tank containing the beer or other liquid; Fig. 10, an end elevation of the tank for containing the beer or other liquid, showing the opposite end to Fig. 9; Fig. 11, an end elevation of the apparatus and its supporting-frame, and Fig. 12 a side elevation showing the frame of the apparatus and the filling-tank broken in two places and showing one of the filling-tubes with a barrel in position therefor.

The outer cylinder A, containing the piston for operating the sealing-head, can be made of metal or other suitable material and of the requisite length and diameter for the work for which it is intended. The piston B for the cylinder A, as shown, is formed of a metal base or body *b*, the parts of which have a right-angle relation, so as to form a base-plate and a circumferential flange fitting the interior of the cylinder, and the base-plate has secured thereto a packing *b'*, preferably of leather, cup-shaped and held in place between the base-plate of the body of the piston and a retaining-ring *b²* by screws or bolts *b³*, or in any other suitable manner, so that the packing will form an air-tight joint between the piston and the cylinder. The upper end of the cylinder A is closed by a suitable cap or head *a*, and the lower end of the cylinder is open and entered into a supporting-ring A', having a flange *a'* to receive the lower end of the cylinder. The piston B is located and operates in a chamber between the outer cylinder and an inner cylinder, which chamber, between the piston and the cap *a*, is pressure-tight, so that with the admission of pressure into the chamber above the piston the piston will be forced downward, and with the release of the pressure the piston can be carried upward, the piston traversing back and forth in the chamber. The piston B is connected to the upper ends of carrying or suspending rods C in any suitable manner, and the carrying or suspending rods at their lower ends have attached thereto the sealing-head, so that with the traverse of the piston the head will be

raised and lowered. The sealing-head D has, as shown, an annular groove in its under face to receive a suitable sealing or packing ring d of a diameter to fit around the bung-hole or filling opening of the barrel or other receptacle or package and tightly close the bung-hole or filling opening when the head is down and the sealing or packing ring is in close contact with the surface of the barrel or package around the bung-hole or filling opening. The head D has, as shown, on opposite sides projecting ears or lugs D' , through which the lower ends of the carrying-rods C pass, and, as shown, the ends c of the carrying-rods are of less diameter than the body, forming a shoulder to abut against the upper face of the lug, and the extreme end of each end c is screw-threaded to receive a nut c' , by means of which the head is attached to the rod. The upper end of the head has therein a chamber d' to receive a packing, which can be compressed around the filling-tube by a follower or gland d^2 , advanced by a cap d^3 , screw-threaded onto the end of the head, so as to make a tight joint between the head and the filling-tube, which passes through the head.

The cylinder A incloses the lower portion of a cylinder E, which cylinder passes through the cap or head a and extends beyond the end of the cylinder A, and its outer end is closed by a cap e , screw-threaded onto the end. The inner end of the cylinder E fits onto a plug or head A^2 , and the plug or head A^2 has therein a chamber a^2 for a packing, which can be compressed around the piston-rod of the piston of the cylinder E by a follower or gland a^3 , advanced by a cap a^4 , screw-threaded onto the end of the plug or head. The cylinder E has operating therein a piston F, which, as shown, consists of a central plate f' , on each side of which is a cup-leather packing-ring f^2 , held in place between the central plate and washers f by nuts g on the end of the rod G of the piston, the nuts being on opposite sides of the piston as a whole and engaging the washers in the construction shown. The piston-rod G passes through the head or plug A^2 and is encompassed by the packing-box, so as to have a tight joint to prevent the escape of pressure around the rod at the lower end of the cylinder, and the piston F furnishes a tight joint to prevent the escape of pressure between the piston and the cylinder, so that the cylinder has a pressure-chamber on each side of the piston for the application of pressure to act on the piston and move it back and forth in the cylinder.

The lower end of the piston-rod G is screw-threaded into a neck h of a head H and has thereon a lock-nut g' to abut against the end face of the neck and hold the rod and head connected. A cross-head H' , having therein an opening H^2 for the admission of the lock-nut g' and neck h , is secured to the carrying or suspending rods C at the proper point to be contacted by the end face of the head H

around the neck h and furnish a means for raising the sealing-head by the upward movement of the piston F to the limit of the upward raising of the head. This cross-head H' , as shown, is formed of two similar pieces of metal or other suitable material h' , secured together by bolts h^2 or otherwise and having spread ends h^3 to pass over the carrying-rods and be secured thereto by rivets h^4 or otherwise, so as to have a fixed relation on the carrying-rods and be held firmly for contact by the head H to raise the sealing-head into its highest elevated position. The head H has on its lower end a flange or rim h^5 to receive the filling-tube I, extending downward from the head and passing through the sealing-head D and the stuffing-box thereon. The filling-tube at its upper end communicates with a chamber h^6 in the head H, and its lower end has thereon a cap I' , with openings or passages i' , which cap is screw-threaded into the end of the tube in the construction shown, and the upper face of the cap, as shown, forms a seat i for a controlling-valve. A rod J extends the length of the filling-tube, and adjacent to its lower end has thereon a valve j , which will seat on the face or seat i of the discharge-cap I' , as shown in Figs. 5 and 6. The extreme lower end j' of the rod J projects beyond the face of the cap I' when the valve is seated and the parts are in normal position and the upper end of the rod J enters a hole j^2 therefor in the head H of a sufficient depth to permit the upward movement of the rod when the end j' thereof contacts the inside of the package to raise the valve j from its seat i for the liquid to pass through the filling-tube and discharge through the openings i' into the interior of the barrel or package. The head H has on one side a nipple k with a passage communicating with the chamber h^6 , and screw-threaded onto this nipple is a coupling k' , connected to which is a supply-pipe K, leading to a tank containing the liquid with which the barrel or package is to be filled. The supply-pipe K, as shown, connects to a nipple k^2 of a stop-cock or controlling-valve K' , attached to and connected by a pipe or nipple k^3 with the filling-tank, so that with the cock or valve open the liquid is free to pass through the supply-pipe from the tank to the filling-tube.

A pipe or hose L is attached at one end to a nipple l , having therein a passage which communicates with a port or opening l' in the filling-head, through which pipe and port pressure is admitted to the interior of the barrel or package before filling, and as the barrel or package is filled the pressure can pass back through the port or opening l' of the nipple and the pipe, hose, or tube L into the filling-tank, and the beer or other liquid can enter the pipe or hose when the package is filled. The opposite end of the tube or hose L is connected to a nipple l^2 of a shut-off cock or valve L' , which cock or valve is connected by a nipple l^3 with the interior of a cup or cyl-

inder M, either wholly of glass or having a portion of its body of glass or other transparent material, so that the liquid passing into the pipe or hose L can when the shut-off
 5 cock is properly turned enter the cup or cylinder M, and thereby show when the barrel or package is filled. The cup or cylinder M is supported between an upper and lower plate or disk m , united one to the other by
 10 tie-rods m' , and a pipe m^2 is entered into the interior of the cylinder M, passing through a stuffing-box m^3 and connected with a shut-off cock or valve M' , having a nipple m^4 and provided with a relief spout or nozzle m^5 in
 15 the construction shown. The pipe m^2 is adjustable in the stuffing-box, so that its end in the cylinder or cup can be adjusted higher or lower, as required in filling different-sized packages, to indicate when the package is
 20 filled to the limit, the smaller the package the farther in the end of the pipe or tube m^2 must extend. The nipple m^4 has attached thereto one end of a pipe or hose N, leading to a liquid-containing tank O and connected
 25 therewith by a nipple or pipe n , so that fluid-pressure in the tank O can pass through the pipe or hose N into the cylinder M and thence through the hose or pipe L into the barrel or package and create a uniform pressure in the
 30 tank and in the barrel or package. The tank O can be of any suitable construction adapted to contain beer or other liquid under pressure, and, as shown, a sight-glass o is located on one side of the tank and is connected at
 35 its upper end with the top of the tank by a pipe o' and at its lower end with the bottom of the tank by a pipe o^2 , so that the pressure in the upper part of the tank will enter the sight-glass through the pipe o' , and the liquid in
 40 the tank will also enter the glass to the height of the liquid in the tank through the pipe o^2 , thus determining the height of liquid in the tank. The tank is to be under a pressure of air from a suitable compressor (not shown)
 45 or other source of supply, as is the practice in filling packages from a tank with liquid under pressure.

On opposite sides of the carrying-rods and the filling-tube are standards P, each having
 50 at its lower end a foot-piece p for the attachment thereto of a cross-plate P' , having thereon guides p' , through which the carrying-rods C pass, and, as shown, the plate P' on one edge has an extended shelf p^2 for the support of the
 55 shut-off cock or valve L' , the nipple l^2 of which projects through the shelf for the attachment of the hose or pipe L in the arrangement shown. The upper ends of the standards P each have a head-piece P^2 , as shown, for the
 60 attachment and support of the ring A' , and attached to the side face of each head-piece P^2 is a plate Q, extending out from which is a stud q , each stud terminating in a trunnion or spindle q' , which enters a box or bearing
 65 q^2 on a cross-piece Q' , attached at each end to a channel-beam Q^2 , which beams are to be suitably supported from a framework or other-

wise in the room or place where the filling operation is carried on. The standards carry
 70 the entire apparatus, consisting of the two cylinders, the filling-tube, and the parts connected therewith, so that the frame as a whole can be swung on the journals or trunnions by which it is supported to carry the sealing-head and the filling-tube clear of the barrel
 75 or package and to swing the sealing-head and the filling-tube in line with the bung-hole or opening in the barrel or package for sealing and filling purposes. The frame when swung so as to have the sealing and filling tube out
 80 of line with the filling-opening in the barrel or package is held in its swung position by a bar P^3 , fixedly attached at its upper end to one of the channel-beams and having in its
 85 body at the lower end a slot p^3 , through which passes a catch handle or arm P^4 , pivoted at its inner end on one of the standards P and having a catch p^4 , which as the frame and the cylinders are swung backward will en-
 90 gage with the body of the bar P^3 adjacent to the end of the slot p^3 and hold the frame and cylinders in their rearward-swung position.

A lever or handle R is pivotally attached at its inner end by a pin or pivot r to one of the standards P and has attached thereto by
 95 a pin or pivot r' the lower end of a rod R' , the upper end of which is pivotally attached to the handle or lever s of a shut-off cock or valve S, having a nipple s' for the attachment thereto of a pipe or hose leading to a source
 100 of fluid-pressure supply, so that when the shut-off cock or valve is turned properly compressed air or other fluid-pressure will enter the chamber between the cylinder A and the cylinder E back of the piston B and force
 105 such piston, with the carrying-rods and sealing-head and filling-tube, down to seal the package around the filling-opening thereof, and with the turning of the shut-off cock or valve in the opposite direction the admission
 110 of fluid-pressure will be stopped and the shut-off cock or valve will be opened to relieve the pressure in the cylinder for the piston to be returned.

A lever or handle T is pivoted between its
 115 two ends by a suitable pin or pivot t to one of the standards P and at one end has pivoted thereto, by a pin or pivot t' , the lower end of a rod T' , the upper end of which is pivoted to the handle or lever u of a shut-off
 120 cock or valve U, which valve has its shell provided with a nipple u' and a nipple u^2 for the attachment of the fluid-pressure-supply pipe. The plug U' of the shut-off cock or valve U has therein a passage u^3 , which can be brought
 125 into communication with the passage in either nipple u' or u^2 and with a vent or opening u^4 in the shell or casing of the valve, as shown in Fig. 7, and the plug has radial passages u^5 running inwardly and connected with a lon-
 130 gitudinal passage u^6 in the body of the plug and in a nipple u' , formed by an extension of the plug, which nipple has attached thereto a hose or pipe running to a source of fluid-

pressure supply. The nipple u' has connected thereto by a screw-threaded connection and a coupling v' a pipe V, the upper end of which is connected by a coupling with a pipe v , leading into the interior of the cylinder E above the piston F, and the nipple u^2 has connected thereto a pipe V', which is connected at its lower end by a coupling with a pipe v^2 , which communicates with a port or opening v^3 , leading into the interior of the cylinder E below the piston F in such cylinder. The turning of the plug U' into a position to have one of the passages u^5 in communication with the passage in the nipple u' allows pressure to flow through the passage u^6 and passage u^5 and the passage in the nipple into the pipe V to enter, through the pipe v , the interior of the cylinder E above the piston of such cylinder, and at the same time the relief passage u^3 of the plug is turned into a position for the pressure to pass from the cylinder below its piston through the opening or port v^3 and the pipe v^2 into the pipe V' and out through the vent opening or port u^4 to the atmosphere. The turning of the plug U' in the opposite direction brings the opposite passage u^5 into communication with the passage in the nipple u^2 , so that pressure can flow through the passage u^6 and passage u^5 and tube or pipe V' and pipe v^2 to enter the interior of the cylinder E through the port or opening v^3 below the piston F of such cylinder, and at the same time the relief-passage u^3 is turned so as to release pressure from the cylinder above its piston, through the pipe v and pipe V and passage in the nipple u' , relief-passage u^3 , and the port or opening u^4 into the atmosphere. It will thus be seen that by turning the plug of the cock or valve U pressure will be supplied to either end of the cylinder E to operate the piston F in such cylinder and that with the admission of pressure to one end of the cylinder a relief will be provided for the pressure in the opposite end of the cylinder by one and the same movement of the valve-plug. The admission of pressure to the cylinder E above the piston forces the piston down, carrying with it the piston-rod G and the filling-tube, and such downward movement will continue until the extreme end j' of the valve-rod strikes the interior face of the barrel or package, raising the valve j for the beer or other liquid to flow through the filling-tube from the tank and discharge into the barrel or other package, and with the turning of the plug to admit pressure into the cylinder E below the piston the piston will be raised, carrying with it the piston-rod and raising the filling-tube for the upward movement to allow the filling-valve to close onto its seat when the end of the valve-rod J is clear of package and stop the admission of beer into the package through the filling-tube. The beer or other liquid can be constantly supplied to the tank, so as to have a supply always on hand, by pipe O' or other means leading from a suitable source of supply.

The operation is as follows: The apparatus is properly supported from the channel-beams or otherwise above a filling-rack or package-support, and as many filling-tubes can be provided as may be required for the number of barrels or packages that can be placed and held on the rack, one filling-tube and its appliances being necessary for each barrel or package. The barrel or package to be filled is placed in position on the rack or support therefor, so as to have its bung-hole or filling-opening on top vertically. The frame carrying the filling-tube and the other appliances, which was swung back and held in that position at the terminus of the previous filling operation and the placing of a new barrel or package in position, is released from its backward-swung position by raising the catch handle or lever from engagement on the bar, so that the sealing-head and the filling-tube will be directly over the bung-hole or filling-opening in the barrel or package, the projecting end of the filling-tube furnishing a guide for centering the package-opening. The lever or handle R is operated to open the shut-off cock or valve S, admitting pressure to the chamber in the cylinder A above the piston in such cylinder for the pressure to act and force down the piston, carrying with it the connecting-rods C and the sealing-head and the filling-tube, and such downward movement is continued until the packing or sealing ring d is forced against the outer surface of the barrel or package around the bung-hole or opening, tightly sealing the same against the emission or escape of pressure or liquid, with the end of the filling-tube entered into the package. The shut-off cock or valve L' is then turned so that pressure from the upper portion of the supply-tank O can flow through the pipe N into the cup or cylinder M, the shut-off cock or valve M' being properly turned for this purpose, and enter the pipe L to pass into the barrel or package, bringing the pressure on the interior of the barrel equal to the pressure in the tank, so that the filling of the barrel will be had against a pressure corresponding to the pressure in the supply-tank. When the pressure in the barrel is equal to the pressure in the tank, the lever or handle T is moved in the direction to operate the shut-off cock or valve U and have fluid-pressure from the source of supply enter and pass through the plug of the valve and through the pipes V and v into the cylinder E above the piston in such cylinder and at the same time relieving the pressure back of the piston of the cylinder, as already described. The pressure admitted to the cylinder E above the piston therein will force the piston downward, carrying with it through the piston-rod the filling-tube, and such downward movement will continue until the end of the valve-rod engages the inner surface of the barrel or package to open the valve, as already described, for the liquid to flow from the tank through the pipe K, the valve K' being open, and enter the

filling-tube to discharge in the interior of the barrel or package against the fluid-pressure, forcing such pressure out and through the pipe L and back to the filling-tank. The liquid
 5 when the barrel or package is filled will rise in the cup or cylinder M, passing up through the pipe L into the cup, and when the liquid reaches the end of the tube m^2 it will cease to rise in the cup or cylinder owing to the
 10 pressure above it, but can flow or rise in the tube m^2 and hose N until it reaches the level of the liquid in the filling-tank, and when the liquid rises in the cup to the level of the end of the tube m^2 the lever or handle T is moved
 15 in the opposite direction, turning the plug of the valve U to release the pressure above the piston in the cylinder E and to supply pressure to the cylinder below the piston for such pressure to act and raise the piston, and with
 20 it the filling-tube, through the piston-rod, and such upward movement will continue until the end face of the head for the filling-tube contacts the cross-head, showing that the filling-tube is withdrawn to the limit of its up-
 25 ward movement in the barrel, and during such movement the liquid in the cup or cylinder M will flow back through the tube L, completing the filling of the barrel. The handle or lever R is then to be moved in the
 30 opposite direction, opening the shut-off cock or valve S to release the pressure in the cylinder A above the piston in such cylinder, permitting the pressure against the under side of the piston in the cylinder E to continue its op-
 35 eration, raising the piston in the cylinder, and with it the sealing-head and the filling-tube, until these parts are clear of the barrel or package, and when the sealing-head and the filling-tube are wholly released from and clear
 40 of the barrel or package they are to be swung backward out of the way by swinging back the supporting-frame therefor and are caught and held in their swung position by the en-
 45 gaging bar and the catch handle or lever, and when out of the way the bung or other stopper can be driven into the barrel or package and the barrel or package can be rolled off or removed from the filling rack or support, leaving the rack or support in condition for
 50 the reception of another barrel or package, which is to be filled in the same manner. The operation of filling the barrels or packages and removing each one after being filled and supplying a new one can be continued until
 55 the number of packages required have been filled.

The apparatus as a whole is simple in construction and by its use the filling of the barrel or package is conducted with facility and
 60 despatch, and the opening of the filling-tube and the movements of such tube and of the sealing head are controlled by fluid-pressure within the cylinders, which operate, respectively, the sealing-head and the filling-tube,
 65 rendering the operation as to the essential parts thereof wholly automatic, requiring only the manipulation of the handles or levers

controlling the pressure-valves or shut-off cocks for the two cylinders and the operating of the retaining-catch, by which the cylinders
 70 are swung out of the way and held in that position. The transmission of pressure to and from the interior barrel or package and the filling-tank to have the pressure in the two uniform or equal is through the cup or
 75 cylinder M, and the completion of the filling of the barrel or package is determined through the same cup or cylinder, so that by means of this cup or cylinder and a pipe leading thereto from the sealing-head provision is
 80 made for transmitting pressure to and indicating when the barrel or package is filled, thus enabling both purposes to be attained through one and the same appliance, making
 85 the operation in these regards very simple, effective, and reliable.

The framework or support in the construction shown on which the apparatus is carried consists of two end standards W, each stand-
 90 ard having a foot or base W' , with a rearward extension W^2 , extending up from which is an upright W^3 , connected with the standard proper by a cross-piece W^4 , the several parts of the standard and upright being cast integral, if so desired, or otherwise constructed.
 95 The cross-piece W^4 in line with the upright W^3 has secured thereto, by bolts w' or otherwise, a receiver w , having a concave face fitting the exterior face of the tank, in which receivers the tank is mounted at the rear of
 100 the apparatus, as shown in Figs. 11 and 12. The channel-beams Q^2 are supported at each end on a shelf w^2 on each standard and bolted or otherwise secured in place. A base-piece Y extends from standard to standard at the
 105 bottom, and on this base-piece is located a plate or bed Y' , on which are mounted rollers y , secured to an axle y' , journaled in ears y^2 on the base-plate, two sets of rollers being provided—one set at the front and one set at
 110 the rear of the base-plate, as shown in Figs. 11 and 12—and these rollers form a carriage on which the barrel X is to be placed and adjusted for its bung-hole or opening x to be in line with the descent of the filling-tube. Only
 115 one barrel-carriage and barrel and one filling-tube are shown in Figs. 11 and 12; but it is to be understood that the number of carriages is to correspond to the number of filling-tubes employed in the apparatus—that is to say, if
 120 two filling-tubes are used two barrel-carriages will be provided, and if three filling-tubes are used three barrel-carriages are to be provided, and so on. The construction shown in Fig. 12 has the necessary attachments for the use
 125 of three filling-tubes; but as the filling-tubes and the appliances which coöperate therewith and the barrel-carriage would be the same for all only one of each is shown.

The fluid-pressure for the tank and oper-
 130 ating the pistons of the fluid-pressure cylinders is to be supplied from any suitable source, such as an air-compressor, (not shown,) and for conveying the fluid-pressure to the

tank and to the fluid-pressure cylinders a pipe Z leads from the source of supply, which pipe, as shown, enters a pressure-regulating valve Z', of any usual and well-known form of construction, connected with the tank at the top and in communication therewith by a T-coupling z' , to which is attached one end of the fluid-pressure-supply pipe N, leading to one of the cups or receptacles M, which in the arrangement shown in Fig. 12 would be the cup or receptacle for a central or middle filling-tube. (Not shown.) The pipe Z is connected by a pipe z with a pipe Z², extending longitudinally of the filling-tank O, and this pipe Z² furnishes the means for supplying fluid-pressure to the fluid-pressure cylinders, for which purpose a pipe or tube s^2 connects with the valve S of each cylinder A, and a pipe z^2 connects with the three-way valve or cock U of each cylinder E for supplying fluid-pressure to the cylinder on opposite sides of its piston to operate the piston, as already described. It will be seen that the pressure within the filling-tank and the pressure in the pipe Z² would naturally be the same, as the pressure in both cases is derived from the same source of supply through the pipe Z; but as this pressure might be too great for the filling-tank the pressure therein is governed and regulated by the pressure-regulator Z', so that in case of the withdrawal of sufficient beer to decrease the pressure within the tank below the normal pressure required the diminished pressure is at once restored to normal by means of the pressure-regulator, which will open with a reduced pressure, but with normal pressure is inoperative. The pipe or tube N for each cup or receptacle M is connected with the filling-tank by an elbow or other coupling n or otherwise, so that the pressure flowing through the pipe N to the receptacle or cup will be uniform with the pressure in the filling-tank, and with the opening of the valve L' the pressure will flow into the barrel or package until the pressure in the filling-tank and the barrel or package is equal. The valve L' is opened for the admission of pressure after the sealing-head has been set to place around the bung-hole or opening in the barrel or package, allowing the pressure from the tank to enter the barrel or package, and when the pressure is equal between the tank and the barrel or package the lever T is moved to open the valve U for admission of pressure to the upper end of the cylinder E, forcing the piston of the cylinder down, carrying with it the filling-tube, the valve of which is opened as the end of the tube strikes the inner face of the barrel, allowing beer to flow by gravity from the tank into the barrel, gradually filling the barrel and forcing the pressure therein back through the pipe or tube L, the cup or receptacle M, and pipe or tube N into the upper portion of the filling-tank. The valve L' is to remain open until the beer passes through the tube L into the cup or receptacle M, and when a

predetermined rise in the cup or receptacle has been reached the barrel or package is filled. The predetermined point of rise in the cup is controlled by the adjustment of the tube m^2 , which is entered into the cup and can be raised and lowered through its stuffing-box for its inner end to be higher or lower in relation to the bottom of the cup. This adjustment of the tube is for the purpose of operating with large and small packages—the larger the package the higher the end of the tube will be adjusted and the smaller the package the lower it will be adjusted. The beer or other liquid can only rise in the cup or receptacle to the end of the tube, because the pressure in the cup or receptacle, which escapes with the rise of the liquid, cannot escape with the beer or other liquid after the liquid reaches the end of the tube, as the liquid forms a seal and the pressure between the liquid and the top of the cup or receptacle will prevent the liquid from rising in the cup or receptacle, but the liquid is free to rise into the pipe N until it reaches a point in the tube on a level with the level of the liquid in the filling-tank. The presence of the liquid in the cup or receptacle is indicative to the operator that the package is filled, and the operator then moves the lever T in the reverse direction to admit pressure to the cylinder E below its piston for the pressure to raise the filling-tube within the barrel until the cross-head H' strikes and prevents further upward movement of the filling-tube, and during such upward movement within the barrel of the filling-tube the beer within the tube L, the cup or receptacle M, and pipe N is free to flow back into the package, filling the package to its full capacity, and when the limit of the upward movement of the filling-tube is reached the valve L' is closed, shutting off communication between the cup or receptacle and the package, at which time the filling head and tube are raised by releasing the pressure back of the piston in the cylinder A for the pressure in front of the piston in the cylinder E to raise the sealing-head and the filling-tube clear of the barrel to be swung out of the way, so that the bung or plug can be driven into the filling-opening, closing the barrel or package, which can then be rolled off from the carriage, leaving the carriage for the reception of an unfilled barrel or package. The new barrel or package is placed in position and properly centered for its bung-hole or opening to be in line with the filling-tube, the sealing-head and filling-tube are forced down for the sealing-head to close tightly around the bung-hole or opening, and the valve L' is opened to equalize the pressure, after which the barrel or package is filled with the liquid, as already described, and this operation can continue until the required number of barrels or packages have been filled.

It will be seen that the cup or receptacle furnishes a connection between the upper

portion of the tank and the barrel or package for equalizing the pressure and also furnishes a notification when the barrel or package is filled, thus enabling admission of pressure and the condition of the filling of the barrel or package to be attained by one and the same instrumentality, and the liquid will flow into the barrel by gravity against the same pressure that is in the tank, thus insuring a filling of the barrel or package without any liability of foaming of the beer or other liquid. The gravity flow of the liquid is obtained by reason of the filling-tank being at a greater height than the point at which the head of the filling-tube descends to open the valve of the tube. The filling-tank in the construction shown has the connecting-pipe o^2 for the fluid-pressure to enter the sight-glass provided with a controlling-valve o^3 , and this pipe, as shown, has connected therewith a pressure-gage o^4 , and to the coupling o^6 for the pipe o^2 is connected a pressure-relief valve o^5 , which in case of overpressure by reason of the return of the pressure from the package or barrel or from any other cause allows the excess of pressure to escape, so as to maintain a uniform pressure within the filling-tank, thereby insuring a certainty of operation in filling the barrel or package and have the filling under a predetermined regulated pressure within the tank and barrel or package.

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

1. In a filling apparatus for liquid, the combination of a sealing and filling head, a passage in the sealing and filling head, a cup or cylinder, a manually-operated controlling cock or valve at each end of the cup or cylinder, the cock or valve at the upper end of the cup or cylinder having a relief-passage therein opened for escaping pressure and foam with the closing of the cock or valve against the flow of pressure into the cup or cylinder, a pipe leading into and from the controlling cock or valve at the lower end of the cup or cylinder and having communication with the passage in the sealing and filling head, and a pressure-supply and pressure-return pipe both in one leading into and from the controlling cock or valve at the upper end of the cup or cylinder, substantially as described.

2. In a filling apparatus for liquids, the combination of a reciprocating sealing and filling head, a reciprocating filling-tube movable in the head, a passage in the sealing and filling head, a fixed cup or cylinder, a manually-operated controlling cock or valve at each end of the cup or cylinder, a pipe connected to the controlling cock or valve at the lower end of the cup or cylinder and in communication with the passage in the sealing and filling head, and a pressure-supply and pressure-return pipe both in one connected with the controlling cock or valve at the upper end of the cup or cylinder and having communication with the cup or cylinder and connected with

a filling-tank for liquids under pressure, for equalizing the pressure in the filling-tank and the package to be filled and showing the condition in filling, substantially as described.

3. In a filling apparatus for liquids, the combination of a reciprocating sealing and filling head, a reciprocating filling-tube movable in the head, a passage in the sealing and filling head, a valve-controlled pipe connected to the head and in communication with the passage, a cup or cylinder connected to and having communication with the valve-controlled pipe, a manually-operated shut-off cock or valve for the pipe located between the sealing and filling head and the cup or cylinder and controlling the communication between the cup or cylinder and the passage in the sealing and filling head, and a valve-controlled pressure-supply and pressure-return pipe both in one connected to and having communication with the cup or cylinder and connected to and having communication with a filling-tank for liquid under pressure, substantially as described.

4. In a filling apparatus for liquids, the combination of a reciprocating sealing and filling head, a reciprocating filling-tube movable in the head, a passage in the sealing and filling head, a valve-controlled pipe connected to the head and in communication with the passage, a cup or cylinder connected to and having communication with the valve-controlled pipe, a manually-operated shut-off cock or valve for the pipe located between the sealing and filling head and the cup or cylinder and controlling the communication between the cup or cylinder and the passage in the sealing and filling head, a valve-controlled pressure-supply and pressure-return pipe both in one connected to and having communication with the cup or cylinder and connected to and having communication with a filling-tank for liquid under pressure, and a manually-operated shut-off cock or valve for the pipe located between the cup or cylinder and the end of the pipe and controlling the communication between the cup or cylinder and the two-in-one pressure-supply and pressure-return pipe, substantially as described.

5. In a filling apparatus for liquids, the combination of a reciprocating sealing and filling head, a reciprocating filling-tube movable in the head, a passage in the sealing and filling head, a valve-controlled pipe connected to the head and in communication with the passage, a cup or cylinder connected to and having communication with the valve-controlled pipe from the sealing and filling head, a shut-off cock or valve controlling the communication between the pipe and the cup or cylinder located between the sealing and filling head and the cup or cylinder, a valve-controlled pressure-supply and pressure-return pipe both in one connected to and having communication with the cup or cylinder and connected to and having communication with a filling-tank for liquid under pressure, and a shut-off cock or valve located between the cup

or cylinder and the two-in-one pressure-supply and pressure-return pipe and controlling the communication between the cup or cylinder and the filling-tank, substantially as described.

6. In a filling apparatus for liquids, the combination of an outer fluid-pressure cylinder open at its lower end, a piston in such cylinder, carrying and supporting rods depending from the piston, a sealing-head at the lower end of the rods, an inner fluid-pressure cylinder closed at top and bottom, a piston in said cylinder, a piston-rod extending downward from the piston, a filling-tube attached to the piston-rod and having a perforated discharge head or cap at its lower end, a valve-stem in the filling-tube having at its lower end an upwardly - opening and downwardly - closing valve controlling the discharge from the perforated head or cap of the filling-tube and located and operating within the filling-tube, a valve-controlled pipe having communication through the filling-head with the interior of the to-be-filled package for admitting and returning pressure, a cup or cylinder connected to the valve-controlled pipe from the sealing-head, and a valve-controlled pressure-supply and pressure-return pipe both in one connected with the cup or cylinder and a source of liquid-supply under pressure, for equalizing the pressure in the package and the source of liquid-supply and showing the condition of the filling of the package, substantially as described.

7. In a filling apparatus for liquids, the combination of a fluid-pressure cylinder closed at top and bottom, a reciprocating filling-tube operated from the fluid-pressure cylinder, a supply-pipe for pressure in communication with both ends of the cylinder, and a three-way shut-off cock or valve in the pressure-supply pipe, comprising an outer shell or casing having on opposite sides ports, each port operating to both induct and educt pressure, and a plug having an axial passage for admitting pressure with radial passages leading therefrom to coact with the ports in the shell or casing and control the induction and eduction of air from the cylinder and have the induction at one end of the cylinder simultaneous and continuous with the eduction at the opposite end of the cylinder, substantially as described.

8. In a filling apparatus for liquids, the combination of a fluid-pressure cylinder closed at top and bottom, a reciprocating filling-tube operated from the fluid-pressure cylinder, a supply-pipe for pressure in communication with both ends of the cylinder, a three-way shut-off cock or valve in the pressure-supply pipe, comprising an outer shell or casing having on opposite sides ports, each port operating to both induct and educt pressure, a plug having an axial passage for admitting pressure with radial passages leading therefrom to coact with the ports in the shell or casing and control the induction and eduction of air

from the cylinder and have the induction at one end of the cylinder simultaneous and continuous with the eduction at the opposite end of the cylinder, a rod connected with the shut-off cock or valve, and a handle or lever for moving the rod and operating the valve, substantially as described.

9. In a filling apparatus for liquids, the combination of a fluid-pressure cylinder closed at top and bottom, a reciprocating filling-tube operated from the fluid-pressure cylinder, a fluid-pressure-supply pipe leading into the cylinder at each end thereof, a valve in the fluid-pressure-supply pipe having a plug with a longitudinal passage and radial passages leading to the exterior of the plug from the longitudinal passage and furnishing communication with the fluid-pressure-supply pipe for admitting pressure to either side of the piston in the cylinder and having a relief-passage in communication with a vent port or passage, for inducting pressure at one end of the cylinder and simultaneously educting pressure at the opposite end of the cylinder and reciprocating the filling-tube, substantially as described.

10. In a filling apparatus for liquids, the combination of a fluid-pressure cylinder closed at top and bottom, a reciprocating filling-tube operated from the fluid-pressure cylinder, a fluid-pressure supply leading into the cylinder at each end thereof, a valve in the fluid-pressure-supply pipe comprising a shell or casing with ports on opposite sides, and a plug with a central longitudinal passage and radial passages leading from the longitudinal passage to the exterior of the plug and adapted for communication with the fluid-pressure-supply pipe through the ports on opposite sides of the valve and having a relief-passage in its periphery in line with both of the ports in the shell or casing and with a vent port or passage in the shell or casing for controlling the induction and eduction of air from the cylinder and having the induction at one end of the cylinder simultaneous and continuous with the eduction at the opposite end of the cylinder, a rod for turning the plug, and a handle or lever for moving the rod and operating the plug to induct and educt the pressure into and from the cylinder, substantially as described.

11. In a filling apparatus for liquids, the combination of a stationary outer fluid-pressure cylinder closed at its upper end and open at its lower end, a piston within the outer cylinder receiving pressure on its upper face only and free from pressure on its under face, a reciprocating receiving-head carried by the pistons and having a free downward movement from the pressure on the upper face of the piston unrestricted from pressure on the under face of the piston, a stationary inner fluid-pressure cylinder closed at both ends and having a piston and a piston-rod, and a stop on the piston-rod for returning the sealing-head to its normal position with the return of

the piston of the inner cylinder, a valve controlling the induction and eduction of the fluid-pressure into and from the upper end of the outer cylinder, and a two-way valve 5 controlling the induction and eduction of the fluid-pressure alternately between the upper and lower ends of the inner cylinder, substantially as described.

12. In a filling apparatus for liquids, the combination of an outer fluid-pressure cylinder, a piston in such cylinder, carrying and supporting rods depending from the piston, a sealing-head at the lower end of the rods, a cross head or bar secured to the rods below 15 the cylinder, an inner fluid-pressure cylinder, a piston in said cylinder, a piston-rod extending downward from the piston, a head on the piston-rod, and a filling-tube attached to the head, for the sealing-head and the filling-tube to be independently operated from 20 their respective cylinders in a downward direction and have the filling-tube in its upward movement, by the engagement of the carrying-head therefor with the cross head or bar, 25 operate to return the sealing-head to normal position with the return of the filling-tube to normal position, substantially as described.

13. In a barrel-filling apparatus, the combination of a reciprocating sealing-head, a reciprocating filling-tube movable in the head, 30 fluid-pressure cylinders and pistons in the cylinders for operating the sealing-head and the filling-tube, a swinging frame carrying the cylinders, the sealing-head and the filling-tube, a drop arm or handle pivotally attached at one end to the swinging frame and 35 free to move rearwardly with the frame and having a catch on its under side adjacent to its forward end free to drop into locking engagement at the desired limit of the backward swing of the frame, and a fixed retainer 40 into engagement with which the catch drops with the backward movement of the frame, holding the frame in its rearward position 45 until the arm or handle is raised to free the catch, substantially as described.

14. In a barrel-filling apparatus, the combination of a reciprocating sealing-head, a reciprocating filling-tube movable in the head, 50 fluid-pressure cylinders and pistons in the cylinders for operating the sealing-head and the filling-tube, a swinging frame carrying the cylinders, the sealing-head and the filling-tube, a drop arm or handle pivotally attached at one end to the swinging frame and free to 55 move rearwardly with the frame and having a catch on its under side adjacent to its forward end free to drop into locking engagement at the desired limit of the backward swing of the frame, and a depending bar, 60 having a slot therein for the passage of the drop arm or handle and having an inclination away from the frame with the frame in normal position, for the catch on the drop 65 arm or handle to drop into engagement with the bar at the edge of the slot with the backward movement of the frame and hold the

frame in its rearward position until the drop arm or handle is raised to free the catch from engagement with the bar, substantially as described. 70

15. In a filling apparatus for liquids, the combination of a sealing and filling head, a passage in the sealing and filling head, a cup or cylinder, a valve-controlled pipe leading 75 from the cup or cylinder and having communication with the passage in the sealing and filling head, a valve-controlled pressure-supply and pressure-return pipe both in one, leading to the cup or cylinder and constituting 80 both an induction and an eduction for pressure, a manually-operated shut-off cock or controlling-valve at each end of the cup or cylinder and located between the cup or cylinder and the connected end for each pipe with 85 the cup or cylinder, the shut-off cock or controlling-valve for the upper end of the cup or cylinder having therein a relief-passage opened for the escape of pressure and foam 90 with the closing of the cock or valve against the flow of pressure into the cup or cylinder, and an adjustable tube entering into the interior of the cup or cylinder and having connection with the upper shut-off cock or controlling-valve of the pressure supply and return pipe, substantially as described. 95

16. In a filling apparatus, the combination of a cup or cylinder intermediate between a filling-tank containing liquid under pressure and a sealing and filling head having therein a 100 passage, a pressure-supply and pressure-return pipe both in one, connecting the tank with the sealing and filling head and in communication with the passage in the head for induction and eduction pressure by the same 105 pipe, the cup or cylinder being interposed in the pipe and having at each end a manually-operated shut-off cock or valve controlling the induction and eduction of pressure between the tank and the sealing-head and indicating the completion of the filling by one 110 and the same pipe, the shut-off cock or controlling-valve for the upper end of the cup or cylinder having therein a relief-passage opened for the escape of pressure and foam 115 with the closing of the cock or valve against the flow of pressure into the cup or cylinder, substantially as described.

17. In a filling apparatus, the combination of a filling-tank, a primary pressure-supply 120 pipe entered into the tank, a second pressure-supply pipe connected with the primary pressure-supply pipe, an outer fluid-pressure cylinder open at its lower end and having a piston therein operated by pressure in the closed end 125 of the outer cylinder, a pipe from the second pressure-supply pipe leading to the closed end of the outer fluid-pressure cylinder, an inner fluid-pressure cylinder closed at top and bottom and having a piston therein, a controlling-valve for admitting pressure to either end of 130 the inner fluid-pressure cylinder, a pipe from the second pressure-supply pipe to the controlling-valve, a pipe connecting the control-

ling-valve with each end of the inner fluid-pressure cylinder, a reciprocating sealing-head operated from the piston of the outer fluid-pressure cylinder, and a reciprocating filling-tube operated from the piston of the inner fluid-pressure cylinder, substantially as described.

18. In a barrel-filling apparatus, the combination of a filling-tank, a pressure-regulator on the tank, a primary pressure-supply pipe leading to the pressure-regulator, a second pressure-supply pipe connected with the primary pressure-supply pipe, an outer fluid-pressure cylinder open at its lower end and having a piston therein operated by pressure in the closed end of the outer cylinder, an inner fluid-pressure cylinder closed at top and bottom and having a piston therein, a controlling-valve for admitting pressure to either end of the inner fluid-pressure cylinder, a reciprocating sealing-head operated from the piston of the outer fluid-pressure cylinder, a reciprocating filling-tube movable in the head and operated from the piston of the inner fluid-

pressure cylinder, a connection from the second pressure-supply pipe to the outer fluid-pressure cylinder and a connection from the second fluid-pressure-supply pipe to the controlling-valve of the inner fluid-pressure cylinder, substantially as described.

19. In a filling apparatus for liquids, the combination of a supporting-frame consisting of end standards and end uprights with a cross-piece between each standard and its companion upright, a receiver mounted on each cross-piece, a filling-tank for liquid carried by the receivers, longitudinal supports at the upper end of the standards extending from standard to standard, cross-heads between the longitudinal supports, and a filling mechanism comprising a sealing-head and a filling-tube journaled on the cross-heads, for swinging the filling mechanism out of line, substantially as described.

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