

Aug. 17, 1926.

1,596,037

C. WARNER
PUMPING APPARATUS
Filed Oct. 3, 1923

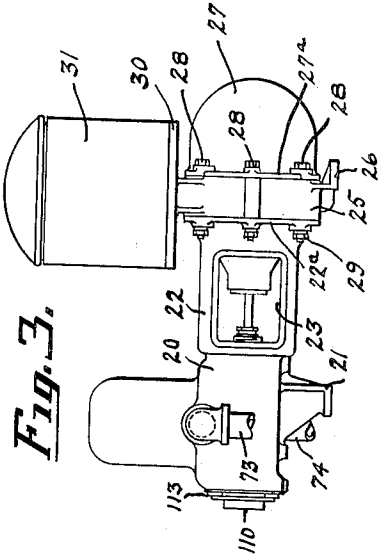


Fig. 3.

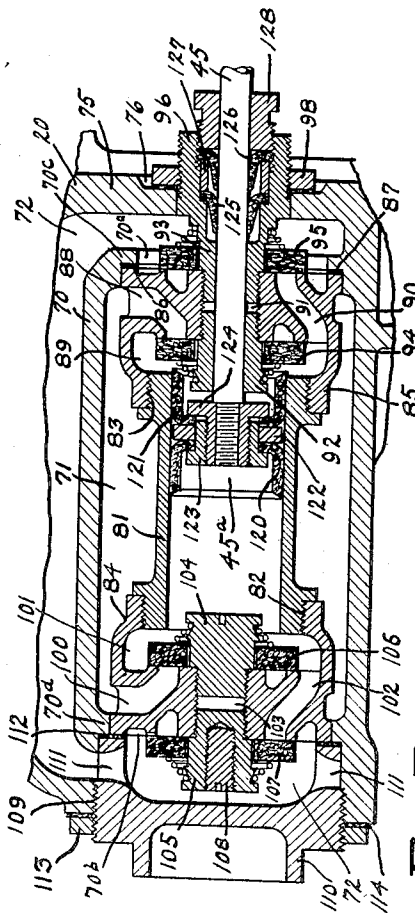


Fig. 2.

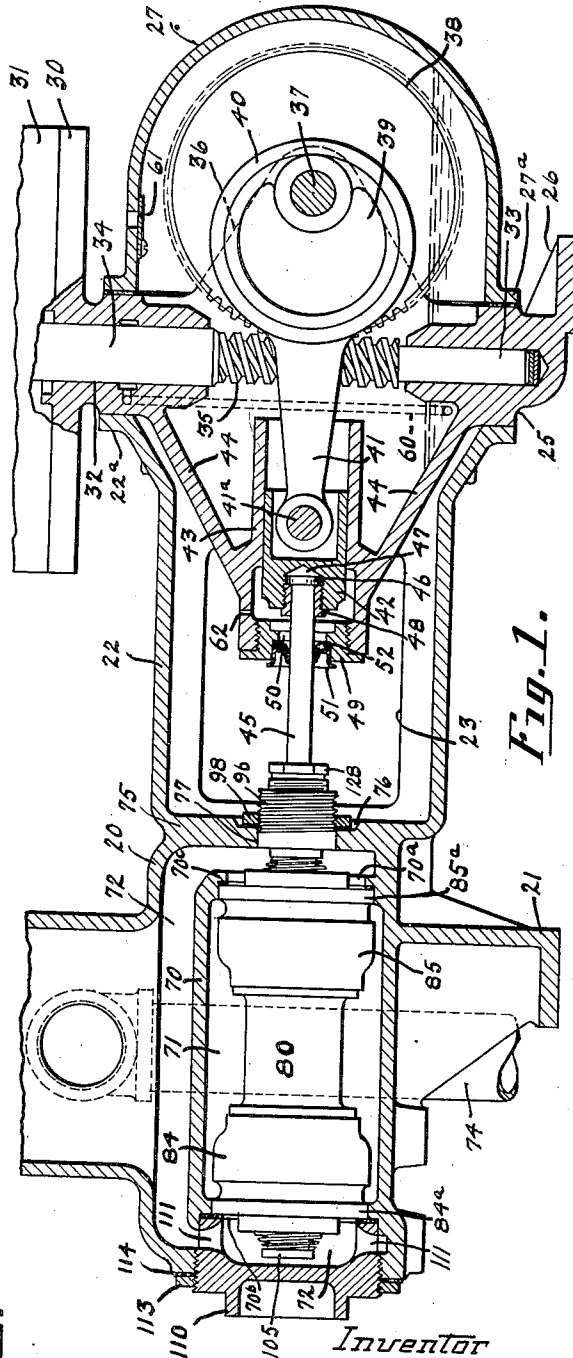


Fig. 1.

Inventor
Clarence Warner
By J. Ralph Fehn
His Attorney

UNITED STATES PATENT OFFICE.

CLARENCE WARNER, OF DAYTON, OHIO, ASSIGNOR TO DELCO-LIGHT COMPANY, OF DAYTON, OHIO, A CORPORATION OF DELAWARE.

PUMPING APPARATUS.

Application filed October 3, 1923. Serial No. 666,281.

This invention relates to pumping apparatus, and more particularly to pumps of the suction type.

The object of the present invention is to construct a pumping apparatus which will be simple and reliable, and having the parts thereof so constructed and arranged that they may be easily removed therefrom in assembled relation for repairs or replacements.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing, wherein the preferred embodiment of one form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a longitudinal sectional view of a pumping apparatus embodying the present invention, the removable cylinder and valve unit being shown in elevation.

Fig. 2 is a fragmentary sectional view of the removable cylinder and valve unit on an enlarged scale.

Fig. 3 is a view in side elevation of the pumping apparatus.

In the drawings, a pump frame 20 is provided with a supporting leg 21 and a tie member 22 forming a drip chamber 23, both preferably cast integrally therewith. Member 22 is provided with a flange 22^a. A power head frame 25, provided with a supporting leg 26, serves as a support for the free end of tie member 22 and for gear housing 27, having flange 27^a, member 22 and housing 27 being secured to the power head frame 25 by bolts 28 which pass through the flange 22^a, member 25 and flange 27^a, and nuts 29 engaging the ends of said bolts. Member 25 also provides a support 30 for vertically disposed electric motor 31, and also provides vertically aligned bearings 32 and 33 within which motor shaft 34 is journaled. A worm 35 is provided on motor shaft 34 between bearings 32 and 33. Member 25 is provided with two horizontally extending arms 36 in which adjacent the ends thereof bearings (not shown) are provided and in which is journaled a shaft 37 loosely carrying a worm gear 38 which meshes with worm 35. The worm 35 is back of the plane of crosshead guide 43. An eccentric 39 carried by worm gear 38, is engaged by an eccentric strap 40 which merges into a connecting rod 41. A cross head 42 attached to

the connecting rod 41 by pin 41^a is adapted to be reciprocated within a cross head guide 43 which is supported by cone shaped wall 44 of member 25, said wall 44 extending into the tie member 22. Pump piston rod 45 is adapted to extend into guide 43 and be detachably connected with cross head 42 being provided with an annular shoulder 46 adjacent the end thereof which fits within a tapped recess 47 in cross head 42. A hollow plug 48 surrounds rod 45 and is received by the threaded recess 47, and bearing against shoulder 46, connects rod 45 with cross head 42. Cross head guide 43 has threaded connection with a plug 49 having a central opening 50 of sufficient size to permit plug 48 to pass therethrough. Plug 49 is recessed to receive with compression fit a cup washer 51 for holding packing 52 around rod 45 in position. Cup washer 51 is of such size as to pass through opening 77 in wall 75 of pump frame 20 and to permit nut 98 to be slipped over it off the end of rod 45.

The gear casing 27 and lower portion of power head frame 25 constitutes a lubricant chamber, in which the worm gear 38 operates, thereby carrying lubricant to the worm 35. Lubricant is supplied to the bearing 32 by a small pipe 60 which has its lower end as viewed in Fig. 1, submerged in the lubricant and the upper end thereof leading to bearing 32. An air inlet valve 61 is provided in gear casing 27, and a small restricted passage 62 is provided in the cross head guide 43 serving as a vent and small enough to offer such resistance as to prevent a substantial amount of oil escaping there-through. It will be apparent that when the cross head 42 is reciprocated to the left, as viewed in Fig. 1, air will be drawn through inlet valve 61 into the gear casing 27, and upon the return stroke of cross head 42 to the right, as viewed in Fig. 1, this air will be compressed by the cross head 42, thus creating pressure on the lubricant in the lubricant chamber and forcing some of the lubricant up through pipe 60 to lubricate the bearing 32. The lubricant will then run down the motor shaft 34 and drip back into the lubricant chamber.

The pump frame 20 includes an inner wall 70 which provides a cylindrical intake chamber 71, and an outlet chamber 72 which partly surrounds the inlet chamber and ex-

tends adjacent the ends of the inlet chamber, the wall 70 being common to both the inlet and outlet chambers and provided with alined openings 70^a and 70^b in opposite end walls 70^c and 70^d respectively of the inlet chamber 71. Inlet chamber 71 is connected with inlet pipe 73 leading from a suitable source of supply such as a well, and outlet chamber 72 is connected with outlet pipe 74 leading to suitable service pipes or elsewhere. A dividing wall 75 is provided between the pump frame 20 and the tie member 22, being recessed as at 76 and provided with the opening 77.

A removable cylinder and valve unit 80, which is positioned within the intake chamber 71, comprises a cylinder 81 which is flanged at its opposite ends and is threaded as at 82 and 83 for engagement with valve head members 84 and 85 respectively. Wall 70 is recessed at 86 for receiving a gasket 87 and providing a seat for valve head member 85. Member 85 is provided with a plugging portion 85^a for closing opening 70^a in wall 70^c. Valve head member 85 is provided with communicating passages 88 and 89 leading from the intake chamber 71 to the interior of cylinder 81, while passage 90 connects the interior of cylinder 81 with the outlet chamber 72. Valve head member 85 is provided with a central threaded aperture 91 for receiving hollow plugs 92 and 93. Plug 92 provides a support for valve 94 which controls communication between the inlet chamber 71 and the interior of cylinder 81, and plug 93 provides a support for valve 95 which controls communication between the interior of cylinder 81 and the outlet chamber 72. Plug 93 is provided with an externally threaded extension 96 which passes through opening 77 in wall 75 and receives a nut 98 which when drawn up on the extension 96 fits in the recess 76 and also tends to compress the gasket 87 between the valve body 85 and the recess or seat 86, making a tight joint.

Valve head member 84 is provided with communicating passages 100 and 101 leading from the intake chamber 71 to the interior of cylinder 81, while passage 102 leads from the interior of cylinder 81 to the outlet chamber 72. Valve head member 84 is provided with a threaded central aperture 103 in alinement with aperture 91 for receiving plugs 104 and 105. Openings 70^a, 70^b, 77 and 109 are all in alinement. Member 84 is provided with a plugging portion 84^a for closing opening 70^b in wall 70^d. Plug 104 provides a support for valve 106 which controls communication between the interior of cylinder 81 and the inlet chamber 71. Plug 105 provides a support for valve 107 which controls communication between the interior of cylinder 81 and the outlet chamber 72. Plug 105 receives another plug 108 for a purpose to be described later. A threaded aperture 109 in alinement with aperture 77 in wall 75 is provided in the end of pump frame 20 adjacent the valve head member 84, and receives a plug 110 which is provided with a series of openings 111. When the plug 110 is tightened up, a gasket 112 between the end of plug 110 and the valve head member 84 is compressed, thus making a tight joint. A nut 113 engages the threaded portion of plug 110 and compresses a gasket 114 between the nut 113 and the outer surface of pump frame 20, thus making a tight joint.

The pump piston 45^a comprises cup leathers 120 and 121 spaced apart by disc 122 and held in assembled relation by nut 123 which engages threaded member 124. Pump piston rod 45 has threaded connection with member 124 and loosely passes through alined openings in plugs 92 and 93, the opposite end thereof being connected with the cross head 42 as heretofore described. Felt washers 125 and 126, spaced apart by a bushing 127 are received within the threaded extension 96 which forms a stuffing box, thereby providing suitable packing for the pump piston rod 45, and being held in position by packing nut 128.

When the motor 31 is operated, the worm 35 drives worm gear 38 which in turn drives the eccentric 39 and eccentric strap 40, thus reciprocating the connecting rod 41 and causing the cross head 42 to be reciprocated in the cross head guide 43. This reciprocating motion is transmitted from the cross head 42 to the pump piston rod 45, thus reciprocating the pump piston 45^a within the cylinder 81. As the pump piston is moved to the left, as viewed in Fig. 2, a vacuum will be created in cylinder 81, causing valve 94 to open, whereupon water will flow from the intake chamber 71, through passages 88 and 89 into the cylinder 81. At the same time the water that may be in the cylinder 81 on the left side of the pump piston as viewed in Fig. 2, will be forced through passage 102, valve 107 into the discharge chamber 72 and out into the service line. On the return stroke of the pump piston to the right, as viewed in Fig. 2, the valves 94 and 107 will be closed and valves 95 and 106 will be opened, thus forcing the water to the right of pump piston that was drawn in on the previous stroke of the pump piston out through passage 90 and valve 95 into the discharge chamber 72 into the service pipes, and drawing water from the inlet chamber 71 through passages 100 and 101 and valve 106 into the cylinder 81. On the next stroke to the left of the pump piston, this water just drawn in will be forced out into the discharge chamber 72 as described before. It will thus be apparent that for each stroke of the pump piston there

will be a discharge and an intake of water, thus securing a double acting effect.

From the foregoing description it will be noted that the power head member 25 has a variety of functions. It provides a support for the motor 31 and also vertically disposed bearings for the motor shaft 34, as well as providing one of the supporting legs 26. This member 25 also supports the cross head 42 and provides a bearing support for the shaft 37 which carries worm gear 38. The member 25 also provides a convenient support for tie member 22 and gear housing 27, the wall 44 of member 25 and the housing 27 also providing a suitable lubricant chamber in which the driving mechanism is located.

The cylinder and valve unit 80 may be easily removed from the pump frame in assembled relation. The cup washer 51 is first pried loose from plug 49 by means of a screw driver or other suitable tool, then the plug 49 is loosened from the cross head guide 43 and slipped together with washer 51 back on the rod 45. Plug 48 is then loosened from cross head 42 and together with the end of rod 45 is pulled away from the cross head 42. The plug 49 may then be slipped off over the plug 48 and the end of rod through means of opening 50 in plug 49. This will leave the plug 48 and cup washer 51 still remaining on the rod 45. The nut 98 may then be removed from the threaded extension 96 of plug 93 and slipped over the washer 51, plug 48 and the end of pump piston rod 45. Plug 110 is then removed from pump frame 20 and plug 108 is removed from plug 105. A suitable pulling tool having a threaded end may then be inserted into plug 105 in place of plug 108 and the entire cylinder and valve unit 80, including the pump piston and piston rod 45 may be pulled out through the threaded opening 109 in pump frame 20, the washer 51 readily passing through opening 77 in wall 75. After the cylinder and valve unit has been removed from the pump frame, the same may then be repacked or repaired and again inserted into the pump frame 20.

The driving connections between the motor 31 and the cross head 42 are easily accessible for repairs or replacements. Removal of bolts 28 permits removal of the gear housing 27, and permits lifting the power head supporting member 25, motor 31, worm gear 38, eccentric 40, connecting rod 41, cross head 42 and cross head guide 43 as a unit away from the tie member 22, after the piston pump rod 45 has been disconnected from the cross head 42. Upon removal of the gear housing 27 from the power head frame 25, the shaft 37 may be removed endwise from its bearings, thereby making it possible to remove the worm gear 38, eccentric 39, eccentric strap 40, connect-

ing rod 41 and cross head 42 from the member 25 in a direction away from the cylinder and valve unit 80, after the pump rod 45 has been disconnected from the cross head 42. It will be apparent that these parts may be removed independent of the worm 35, and also the worm 35 and motor shaft 34 may be removed independently of the worm gear 38 and the parts connected therewith just described.

While the form of mechanism herein shown and described constitutes a preferred embodiment of one form of the invention, it is to be understood that other forms might be adopted and various changes and alterations made in the shape, size, and proportion of the elements therein without departing from the spirit and scope of the invention.

What is claimed is as follows:

1. A pump comprising, in combination, a pump frame provided with an inlet chamber and an outlet chamber partly surrounding said inlet chamber and extending adjacent the ends of the inlet chamber, and a cylinder and valve unit positioned within said inlet chamber but removable therefrom in assembled relation.
2. A pump comprising, in combination, a pump frame including inlet and outlet chambers, a cylinder and valve unit seated within said inlet chamber, a removable cover for an opening in said outlet chamber opposite one end of said unit, said cover including means for maintaining the unit in position, said opening being of such size as to permit removal of the unit therethrough in assembled relation.
3. A pump comprising, in combination, a pump frame having inlet and outlet chambers; a cylinder and valve unit supported in the inlet chamber and including a cylinder containing a piston having a pump piston rod adapted to reciprocate said piston in the cylinder, and valve head members secured to opposite ends of said cylinder, said members having ports communicating with the inlet and outlet chambers; valves for controlling said ports; a sealing means provided between one valve head member and the frame; and a removable cover for an opening in the frame, forming one end wall of the outlet chamber, and having provisions to seal the other valve head member with the frame, said cover being removable from the frame to permit removal of the cylinder and valve unit including the piston and pump piston rod, through the frame opening.
4. A pump comprising, in combination, a pump frame having two openings therein, a cylinder and valve unit including a piston and pump piston rod removable from said pump frame in assembled relation, one of the openings permitting passage of the pump piston rod therethrough, the other

- opening being large enough to permit the cylinder and valve unit to be withdrawn therethrough, means for sealing the opening in said frame through which the pump piston rod extends, a cover for the other opening, and means for holding the cylinder and valve unit in position within said frame.
5. A pump comprising, in combination, a pump frame having two openings therein, a cylinder and valve unit including a piston and pump piston rod removable from said pump frame in assembled relation, one of the openings permitting passage of the pump piston rod therethrough, the other opening being large enough to permit the cylinder and valve unit to be withdrawn therethrough, means for sealing the opening in said frame through which the pump piston rod extends and for holding the cylinder and valve unit in position, a cover for the other opening, and means cooperating with said cover for holding the cylinder and valve unit in position.
6. A pump comprising, in combination, a pump frame having two openings therein, a cylinder and valve unit including a piston and pump piston rod removable from said pump frame in assembled relation, one of the openings permitting passage of the pump piston rod therethrough, the other opening being large enough to permit the cylinder and valve unit to be withdrawn therethrough, means for sealing the opening in said frame through which the pump piston rod extends, a cover for the other opening, said cover including means for holding the cylinder and valve unit in position.
7. A pump comprising, in combination, a pump rod, a frame provided with an aperture through which the pump rod may extend, a cylinder and valve unit provided adjacent said aperture in the frame, a stuffing box for the pump rod, said stuffing box being carried by said cylinder and valve unit and extending through the frame, and means for sealing the connection between the frame and the stuffing box.
8. A pump comprising, in combination, a pump rod, a frame provided with an aperture through which the pump rod may extend, a cylinder and valve unit provided adjacent said aperture in the frame, a stuffing box for the pump rod, said stuffing box being carried by said cylinder and valve unit and extending through the frame, and means for sealing the connection between the frame and the stuffing box and for maintaining the cylinder and valve unit in position within the frame.
9. A pump comprising, in combination, a pump rod, a frame provided with an opening through which the pump rod extends, a cylinder and valve unit including a valve head having inlet and outlet ports and valves for controlling the ports and an aperture in the valve head for receiving the pump rod, a stuffing box attached to said valve head and extending through the opening in the frame, and means for sealing the connection between the stuffing box and frame.
10. A pump comprising, in combination, a frame provided with inlet and outlet chambers having a series of alined openings in the end walls thereof, one chamber being inside the other with a space between the ends thereof, a cylinder and valve unit within the inlet chamber removable through the openings in one end wall of said chambers, a pump rod adapted to extend through the openings in the other end wall of said chambers, means for maintaining the unit in position within the inlet chamber, said unit including mechanism for controlling the passage of water through the ends of the inlet chamber into the outlet chamber, the unit sealing direct communication with the inlet and outlet chambers through the openings in the end wall of the inlet chamber and providing valve controlled passages connecting the inlet and outlet chambers, a cover for the opening in the end wall of the outlet chamber through which the unit is removable, and means for sealing the opening in the other end wall of the outlet chamber through which the pump rod extends.
11. A pump comprising, in combination, a frame provided with inlet and outlet chambers having a series of alined openings in the end walls thereof, one chamber being inside the other with a space between the ends thereof, a cylinder and valve unit within the inlet chamber removable through the openings in one end wall of said chambers, said unit including valve heads each having passages for providing communication between the inlet and outlet chambers, said valve heads being connected by a cylinder, a piston received by said cylinder a pump rod for operating said piston, and means for closing said openings.
12. A pump comprising, in combination, a frame provided with inlet and outlet chambers having a series of alined openings in the end walls thereof, one chamber being inside the other with a space between the ends thereof, a cylinder and valve unit within the inlet chamber, said unit including valve heads, the opening in one end wall of the inlet chamber providing a seat for one of said valve head members, the other valve head member closing the opening in the other end wall of the inlet chamber, means for holding the valve head member on its seat, a removable cover for the opening in one end wall of the outlet chamber to permit removal of the cylinder and valve unit therethrough, a stuffing box carried by said seated valve head member and extending through the opening in the opposite end

wall of the outlet chamber, means cooperating with the stuffing box for sealing the joint between the stuffing box and the frame and for clamping the valve head member on the seat.

13. A pump comprising, in combination, a frame provided with inlet and outlet chambers having a series of alined openings in the end walls thereof, one chamber being inside the other with a space between the ends thereof, a cylinder and valve unit within the inlet chamber, being removable through the openings in one end wall of said chambers, including valve head members, the opening in one end wall of the inlet chamber providing a seat for one of said valve head members, the other valve head member closing the opening in the other end wall of said inlet chamber, and means for sealing the joint between the last mentioned valve head member and the end wall of said inlet chamber.

14. A pump comprising, in combination, a frame provided with inlet and outlet chambers having a series of alined openings in the end walls thereof, one chamber being inside the other with a space between the ends thereof, a cylinder and valve unit within the inlet chamber being removable through the openings in one end wall of said chambers and including valve head members, the opening in one end wall of the inlet chamber providing a seat for one of said valve head members, the other valve head member closing the opening in the other end wall of said inlet chamber, and a removable cover for the opening in the end wall of said outlet chamber adjacent said last named valve head member having means for sealing the joint between said last mentioned valve head member and the end wall of said inlet chamber.

15. A pump comprising, in combination, a frame, a container within said frame having open ends, a removable cylinder and valve unit received by said container, said unit including valve head members connected by an intermediate cylinder, each of said valve head members including a plugging portion for closing the ends of said container and ports communicating with the cylinder and the interior of the container and with the cylinder and the exterior of the container, the valve head members being provided with threaded apertures extending therethrough, disc valves in alignment with the threaded apertures, plugs threaded into said apertures, and springs included between the heads of the plugs and the valves for holding the valves normally seated.

16. A pump comprising, in combination, a frame, a container within said frame having open ends, a removable cylinder and valve unit received by said container, said

unit including valve head members connected by an intermediate cylinder, each of said valve head members including a plugging portion for closing the ends of said container and ports communicating with the cylinder and the interior of the container and with the cylinder and the exterior of the container, the valve head members being provided with alined threaded apertures extending therethrough, disc valves in alignment with the threaded apertures, plugs threaded into said apertures, springs included between the heads of the plugs and the valves for holding the valves normally seated, and a pump rod adapted to be received by the alined apertures in one of said valve head members.

17. A pump comprising, in combination, a frame, a container within said frame having open ends, a removable cylinder and valve unit received by said container, said unit including valve head members connected by an intermediate cylinder, each of said valve head members including a plugging portion for closing the ends of said container and ports communicating with the cylinder and the interior of the container and with the cylinder and the exterior of the container, the valve head members being provided with alined threaded apertures extending therethrough, disc valves in alignment with the threaded apertures, plugs threaded into said apertures, springs included between the heads of the plugs and the valves for holding the valves normally seated, one of said plugs providing a stuffing box.

18. A pump comprising, in combination, a frame provided with an outlet chamber, a container within said frame having open ends and providing an inlet chamber, a removable cylinder and valve unit received by said container, said unit including valve head members connected by an intermediate cylinder, each of said valve head members including a plugging portion for closing the ends of said container and ports communicating with the cylinder and the inlet chamber and with the cylinder and the outlet chamber, the valve head members being provided with alined threaded apertures extending therethrough, disc valves in alignment with the threaded apertures, plugs threaded into said apertures, springs included between the heads of the plugs and the valves for holding the valves normally seated, one of said plugs providing a stuffing box and provided with an extension extending through a wall of the outlet chamber and adapted for receiving a nut for clamping the cylinder and valve unit in position.

In testimony whereof I hereto affix my signature.

CLARENCE WARNER.