S. J. TOBIN.

FLUID OPERATED PUMPING MECHANISM.

APPLICATION FILED JULY 23, 1917.

1,304,411.

Patented May 20, 1919.

3 SHEETS—SHEET 1.

Fig. 1

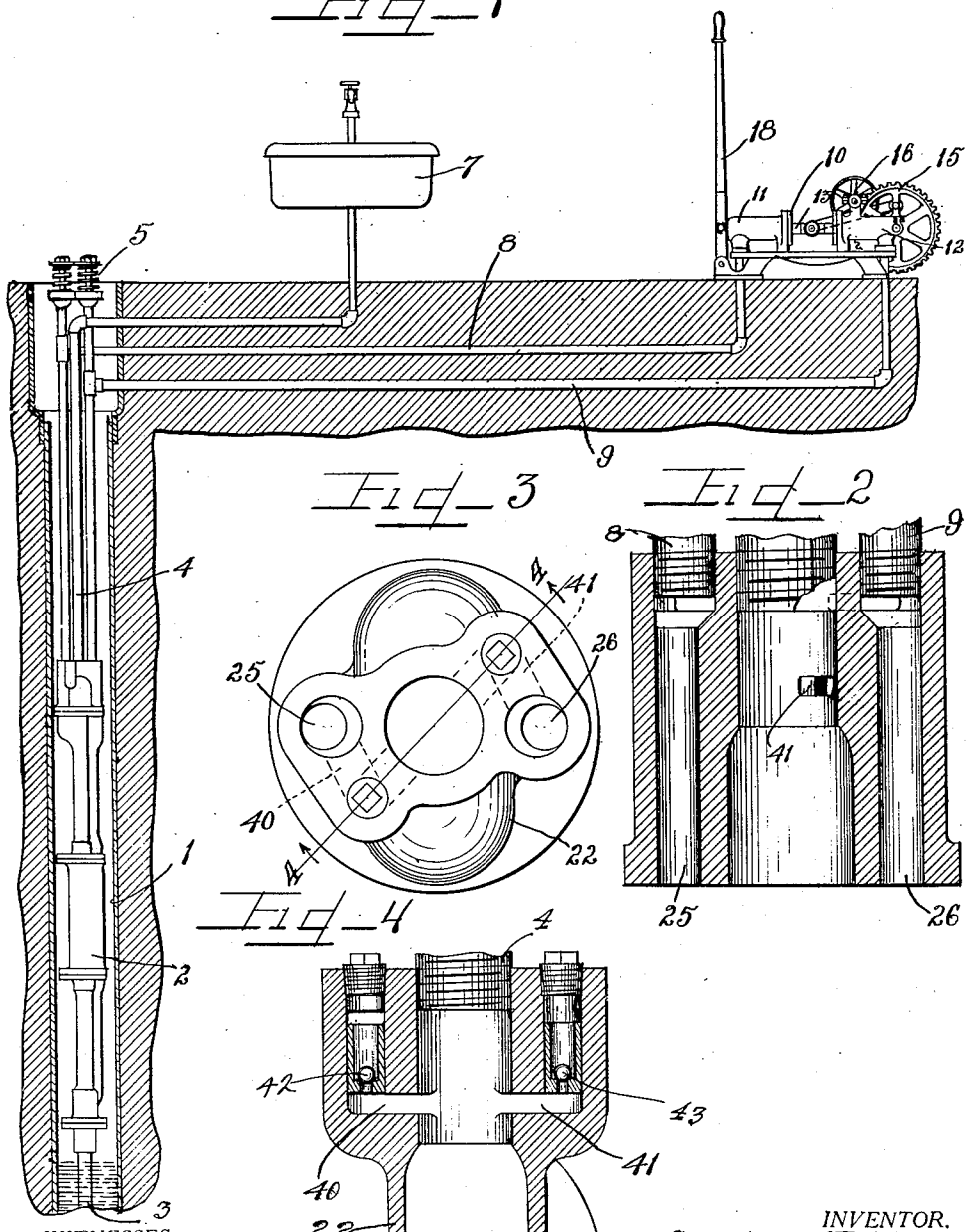


Fig. 3

Fig. 2

Fig. 4

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3 SHEETS—SHEET 2.

Fig. 5.

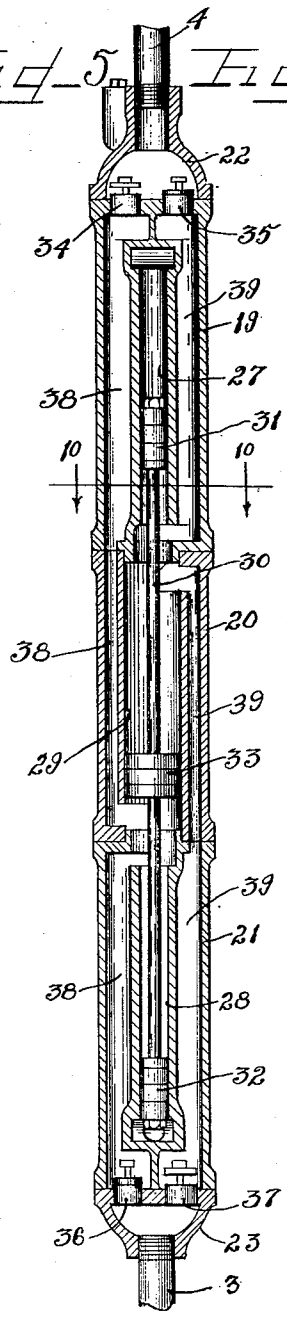


Fig. 7.

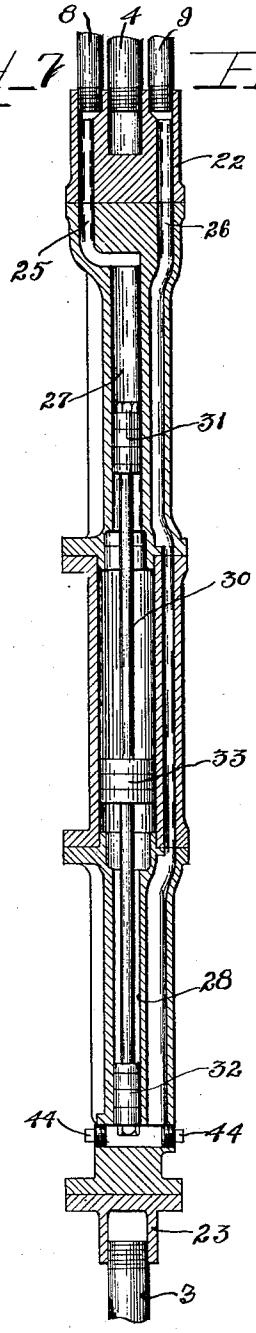
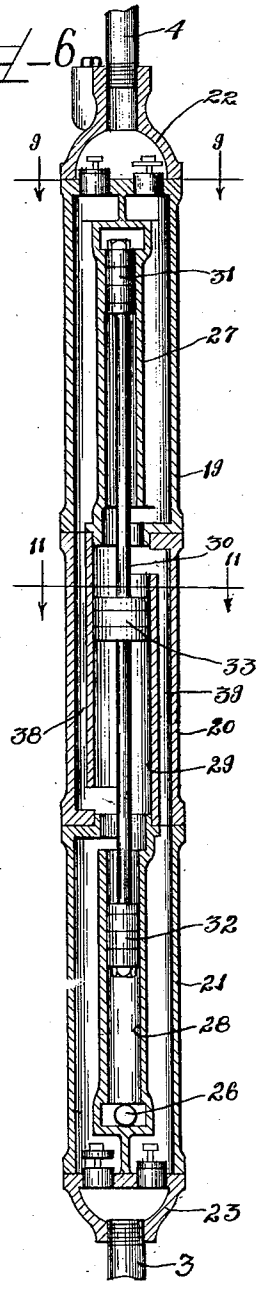


Fig. 6.



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3 SHEETS—SHEET 3.

Fig. 8

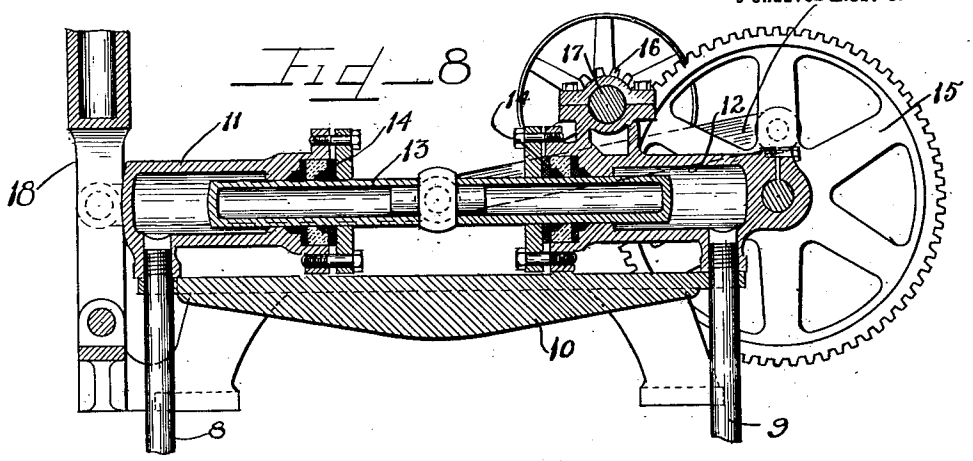


Fig. 9

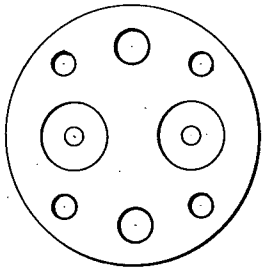


Fig. 10

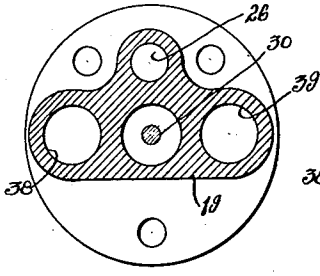


Fig. 11

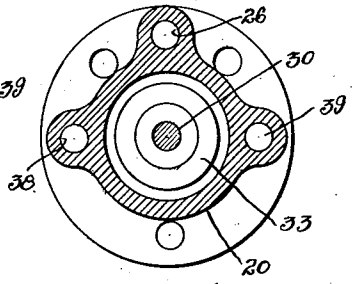


Fig. 12

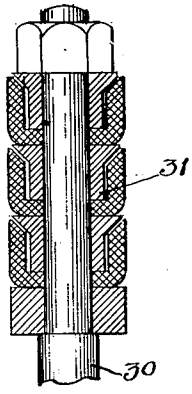


Fig. 13

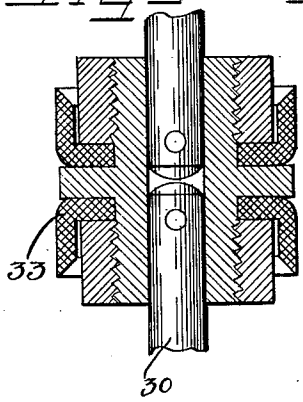


Fig. 14

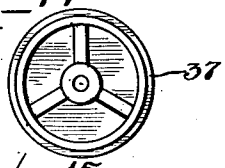
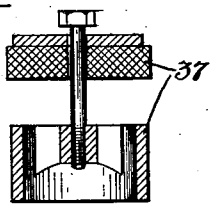


Fig. 15



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UNITED STATES PATENT OFFICE.

STEPHEN JAMES TOBIN, OF MENOMONIE, WISCONSIN, ASSIGNOR TO LAURSEN AUTOMATIC PUMP CO., OF MENOMONIE, WISCONSIN, A CORPORATION OF WISCONSIN.

FLUID-OPERATED PUMPING MECHANISM.

1,304,411. Specification of Letters Patent. Patented May 20, 1919.

Application filed July 23, 1917. Serial No. 182,159.

To all whom it may concern:

Be it known that I, STEPHEN J. TOBIN, a citizen of the United States, and a resident of the city of Menomonie, in the county of Dunn and State of Wisconsin, have invented certain new and useful Improvements in Fluid-Operated Pumping Mechanism; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates to a fluid actuated pumping mechanism which may be disposed in any suitable source of water supply such as a pipe or well, and with the primary actuating means, whereby the pump is caused to operate, conveniently situated, either for manual or power operation to effect operation of the fluid actuated pump to force the liquid from the source of supply to the point desired. Oftentimes, the source of water or other liquid supply, is remote from the point desired for use as well as remote from a point convenient for operation of pumping devices, and in such instances, a fluid actuated pump embodying the principles of my invention is particularly well adapted for use.

It is an object therefore of this invention to construct a fluid operated service pump adapted to pump fluid from any source to a point of supply, and with the service pump operated from a remote point by fluid means through the piping connections to the pump.

It is also an object of this invention to construct a fluid service pump of small compact dimensions, adapted to be disposed in a source of fluid supply, and actuated from a remote point by a power pump connected thereto so that fluid may be pumped to any desired point of use from said source.

It is furthermore an object of this invention to construct a double acting compact, fluid operated pump, adapted to pump a fluid to any point of supply and operable by fluid pressure from a remote source.

Other and further important objects of the invention will be apparent by the disclosure in the drawings and specification.

The invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a diagrammatic view illustrating installation of a pumping system embodying the principles of my invention.

Fig. 2 is a detail section taken through the fluid actuated pumping mechanism at the upper end thereof.

Fig. 3 is a top plan view of the mechanism shown in Fig. 2.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 3.

Fig. 5 is a central longitudinal section taken through the fluid actuated pump.

Fig. 6 is a similar view therethrough with the parts in another position of adjustment.

Fig. 7 is a central vertical section taken through the pump in a plane at right angles to the section shown in Figs. 5 and 6.

Fig. 8 is a longitudinal central vertical section taken through the fluid actuating means or source of fluid head for the pump.

Fig. 9 is a plan view of the upper end of one of the pump sections taken on line 9—9 of Fig. 6.

Fig. 10 is a sectional detail on line 10—10 of Fig. 5.

Fig. 11 is a sectional detail on line 11—11 of Fig. 6.

Fig. 12 is a central section through one of the power pistons of the fluid actuated pump with parts in elevation.

Fig. 13 is a central section through the working piston of the fluid actuated pump, with parts in elevation.

Fig. 14 is a plan view of one of the check valves of the fluid actuated pump.

Fig. 15 is a central sectional detail taken therethrough with the valve shown in open position.

As shown on the drawings:

Referring to Fig. 1, the reference numeral 1, indicates a well or shaft leading to a source of fluid supply, and mounted therein is a fluid actuated service pump embodying the principles of my invention, denoted as a whole by the reference numeral 2. A suction pipe 3, leads from the pump 2, into the water supply within the shaft, and a discharge or delivery pipe 4, leads from the upper end of said pump and is connected to a

sink 7, or other point of use for the water. Two pressure pipes 8 and 9, respectively, communicate with the upper end of the fluid actuated pump 2, and both lead to an actuating or power pump 10, by which an actuating fluid head is induced through the pipes 8 and 9, upon the fluid actuated pump 2. Connected in each of the pressure pipes 8 and 9, is a safety valve 5, as clearly shown in Fig. 1. The primary fluid actuating means or source of head for the power actuating fluid for the pump may be of any type or design, but I have shown a duplex single acting pump 10, with two horizontally opposed cylinders 11 and 12, and a single plunger or piston 13, for reciprocation in both thereof. Suitable packing members, denoted as a whole by the reference numeral 14, are provided on each of said cylinders, and the pipe 8, communicates with the cylinder 11, and the pipe 9, with the cylinder 12.

Journaled on one end of the pump is a large driving gear 15, which may be connected to the central portion of the plunger 13, by a detachable connecting rod 15ª. A power drive may be imparted to said gear 15, by a pinion 16, secured upon a small drive shaft 17, journaled at one end of the pump. The pump may also be manually actuated, and for this purpose a long actuating handle 18, is pivoted at one end thereof, and may be connected by the detachable connecting rod to the central portion of the plunger 13.

The fluid actuated pump consists of three casing members 19, 20 and 21, respectively, all secured to one another, with an upper end cap 22 and a lower end cap 23. The outlet discharge pipe 4, communicates with the upper end cap 22, and the suction inlet pipe 3, for the fluid to be pumped, communicates with the lower end cap 23. Formed within the assembled pump cylinders, are passages 25 and 26, with which the respective pipes 8 and 9, communicate at the upper end of the pump, the passage 25, terminating in a pump cylinder 27, in the upper portion of the pump in the casing section 19, and the passage 26, leading downwardly to the lower end of the pump and communicating with a pump cylinder 28, in the casing section 21. A cylinder 29, which is larger in diameter than the respective cylinders 27 and 28, is formed in the central pump section 20, and extending axially through all of said cylinders is a piston rod 30, with a power piston 31, in the cylinder 27, a power piston 32, in the cylinder 28, and a working piston 33, in the cylinder 29. Mounted in the upper end of the upper pump section 19, are outlet check valves 34 and 35, controlling communication between said section and the interior of the cap 22, which communicates with the discharge pipe 4. Similarly mounted at the lower end of the pump are inlet check valves 36 and 37. A passage 38, extends throughout the three pump sections, and communicates with the lower end of the large cylinder 29, and with the upper end of the small cylinder 28, and the check valve 34, controls the outlet from said passage 38, while the inlet end of said passage is controlled by the check valve 36. Another passage 39, extends throughout said three pump sections, and the outlet therefrom is controlled by the check valve 35, and said passage 39, communicates with the lower end of the small cylinder 27, and with the upper end of the large cylinder 29, and at its lower end the inlet to said passage is controlled by the check valve 37.

As shown clearly in Figs. 2, 3 and 4, passages 40 and 41, provided with check valves 42 and 43, respectively, afford communication between the respective passages 25 and 26, at the upper end of the pump, and the central outlet passage with which the pipe 4, communicates. At the lower end of the pump, drain apertures closed with plugs 44, are provided.

The operation is as follows:

The means for actuation of the pump 2, is obtained from the pump 10, which serves to impress a pressure effect upon certain of the pistons within the pump 2, but no actual exchange of the fluid takes place between the pump 10, and the pump 2, other than that occurring by leakage, and this is automatically replaced through priming passages and valves for the purpose. In other words, the pipe line fluid connection between the actuating pump 10, and service pump 2, is merely a means of transferring a pressure effect with a slight flow movement of the fluid transferring such pressure, but substantially the same fluid is used over and over. That is, the quantity of fluid pumped from the cylinder 11, of the pump 10, through the pipe 8, flows into the service pump 2, and upon a retracting movement of the plunger 13, flows back from the service pump 2, through the pipe 8, into the cylinder 11. Of course, the reverse operation takes place in the cylinder 12 and pipe 9, that is, with a pressure stroke in the cylinder 11, by the plunger 13, a suction stroke takes place within the cylinder 12, so that a quantity of the actuating fluid is drawn upwardly through the pipe 9, as the fluid in the pipe line 8, is forced out of the cylinder 11, into the service pump 2. For instance, when a pressure movement of the plunger 13, takes place within the cylinder 11, the fluid is forced outwardly through the pipe 8, and downwardly to the service pump, entering through the passsage 25, into the upper end of the small cylinder 27, thereby forcing the piston 31, downwardly. Of

course, owing to the fact that the piston 32, is on the same piston rod 30, the fluid within the small cylinder 28, is forced upwardly through the continuous passage 26, of the service pump, outwardly through the pipe 9, and into the cylinder 12, of the power pump, as the plunger 13, operates through a suction stroke. The downward movement of the piston rod 30, of course, imposes a downward movement of the piston 33, in the large cylinder 29, thus setting up a suction in said cylinder which is communicated to the passage 39, which communicates with the upper end of the cylinder 29, and as a consequence, fluid is drawn upwardly through the pipe 3, through the check valve 37, into said passage 39, and into the cylinder 29. Of course, the check valve 35, connected in the upper end of the passage 39, is held closed by suction, so that no fluid may flow backwardly from the outlet pipe 4, into the passage 39, during the downward suction stroke of the piston 33. Then upon a reverse reciprocating movement of the plunger 13, of the pump 10, the fluid within the cylinder 12, is forced outwardly under pressure through the pipe 9, and enters the service pump through the passage 26, flowing downwardly therethrough to the lower end of the pump and upwardly beneath the small power piston 32, forcing the same upwardly in its cylinder 28. Of course, the fluid in the cylinder 27, and pipe line 8, flows back through the pipe 8, into the cylinder 11, of the pump 10, with a suction stroke of the plunger 13, therein. The upward movement of the piston 33, forces the fluid which has been drawn into said cylinder section, upwardly and outwardly into the passage 39, and the check valve 37, being closed, due to the pressure of the fluid, the check valve 35, opens, and the fluid is expelled upwardly through the outlet pipe 4. Coincident with the upward movement of the piston 33, an additional charge of fluid is sucked upwardly through the pipe 3, through the check valve 36, into the passage 38, and thus into the large cylinder 29, beneath the piston 33, the check valve 34, connected in the upper end of the passage 38, remaining closed, due to the suction effect on one side thereof and pressure effect on the other.

It is readily apparent, therefore, that the reciprocations of the respective power plungers 31 and 32, effect reciprocations of the piston 33, whereby fluid is pumped upwardly through the outlet pipe 4, to a point of supply such as the sink 7. The only purpose of the pump 10, is to effect a reciprocating movement of the respective power pistons 31 and 32, by transmitting the movements thereto from the pump 10, which is situated at a convenient point, through the fluid from the fluid lines 8 and 9. The check valves 42 or 43, as the case may be, open automatically to allow a certain quantity of the fluid being forced outwardly through the outlet line 4, to flow into the respective lines 8 and 9, when a suction exists in either of said lines 8 or 9. In view of the fact that the operating fluid lines 8 and 9, are assured of being filled with fluid at all times, and since the fluid, where water is used, is practically incompressible, a substantially instantaneous and positive movement of the respective pistons in the service pump will take place coincident with actuation of the plunger 13, in the power pump. With this type of installation, the power pump may be mounted at any convenient point within the dwelling and the service pump 2, lowered into a well or shaft and connected by suitable pipe lines or line 4, to the point of delivery 7, where the fluid pumped is to be used. The safety valves 5, are provided in the pressure lines 8 and 9, for the reason that when there is excessive pressure in the delivery pipe line 4, there is a still greater pressure in the pressure pipes 8 and 9. Said excessive pressure in the pressure pipes tends to operate the safety valves 5, thereby permitting the water under excessive pressure to issue through the safety valves, thus preventing the transmission of pressure to the pistons 31 and 32, of the service pump, which is thereby rendered inactive as long as the excessive pressure exists in the pressure pipes.

I am aware that various details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted otherwise than necessitated by the prior art.

I claim as my invention:

1. In a device of the class described the combination of a pump, comprising two end sections and an intermediate section having alining chambers with connected pistons therein and a pair of corresponding passageways, which afford communication from end to end of the pump, and with the opposite ends of the piston chamber of the intermediate section, an inlet valve for each passageway at one end of the pump and an outlet valve for each passageway at the other end of the pump, a pair of fluid conduits, one of which is connected to the outer end of the piston chamber in one of the end sections and the other of which is connected to the outer end of the piston chamber in the other end section, and means operable at a distance from the pump for creating fluid pressure alternately in said conduits.

2. In a device of the class described the combination of a pump comprising an elongated casing having a piston chamber at each end and an intermediate piston chamber and connected pistons in said chambers,

said casing having three passageways extending from end to end thereof, two of which communicate respectively with opposite ends of the intermediate piston chamber and are provided with inlet valves at one end of the pump and outlet valves at the other end of the pump, and the third of which said passageways communicates with the outer end of the piston chamber at the lower end of the pump, a pair of fluid conduits connected with the upper end of the pump, one of which communicates with said third passageway and the other of which communicates with the outer end of the piston chamber at the upper end of pump, and means operable at a distance from the pump for creating fluid pressure alternately in said conduits.

3. In a device of the class described the combination of a pump comprising an elongated casing having a piston chamber at each end and an intermediate piston chamber and connected pistons in said chambers, and having a short and a long passageway leading from the upper end of the casing, the former of which communicates with the piston chamber at the upper end of the casing and the latter of which communicates with the piston chamber at the lower end of the casing, said casing being also provided with a pair of passageways extending from end to end of the casing and communicating respectively with the opposite ends of the intermediate piston chamber, and having inlet valves at the lower ends and outlet valves at their upper ends, a cap secured to the upper end of the casing and divided into an intermediate and two outer compartments, the former of which communicates with the upper ends of the last mentioned passageways and has a discharge pipe leading therefrom, and the latter of which communicate with the said long and short passageways respectively and have valves to admit fluid thereto from the intermediate compartment, and means operable at a distance from the pump and connected with the said outer compartments for creating fluid pressure alternately in said compartments.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

STEPHEN JAMES TOBIN.

Witnesses:
HUBERT W. QUILLING,
EDNA LENTZ.