No. 784,435. PATENTED MAR. 7, 1905.

R. H. RUSSELL.

HYDRAULIC PUMP.

APPLICATION FILED MAR. 29, 1904.

3 SHEETS—SHEET 1.

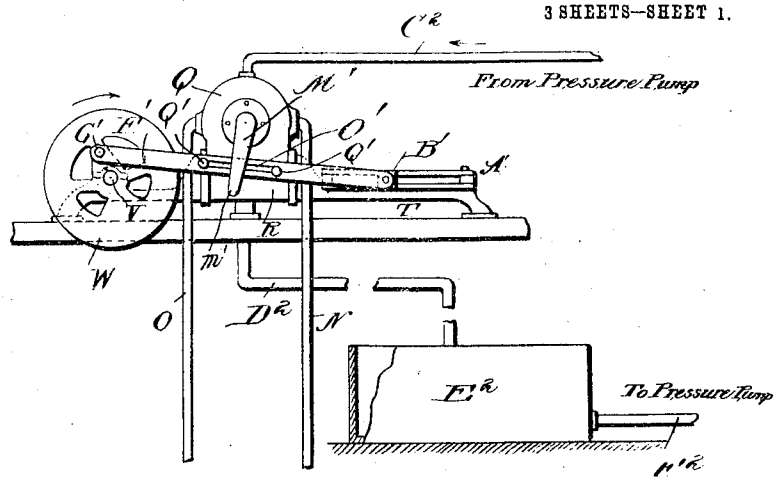
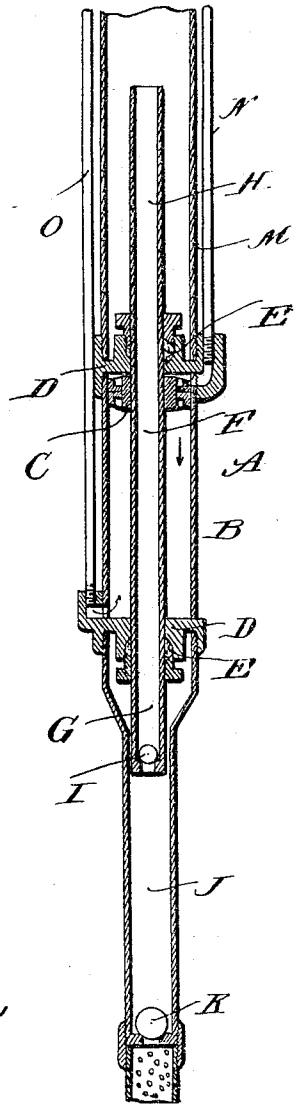


Fig. 1.



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3 SHEETS—SHEET 2.

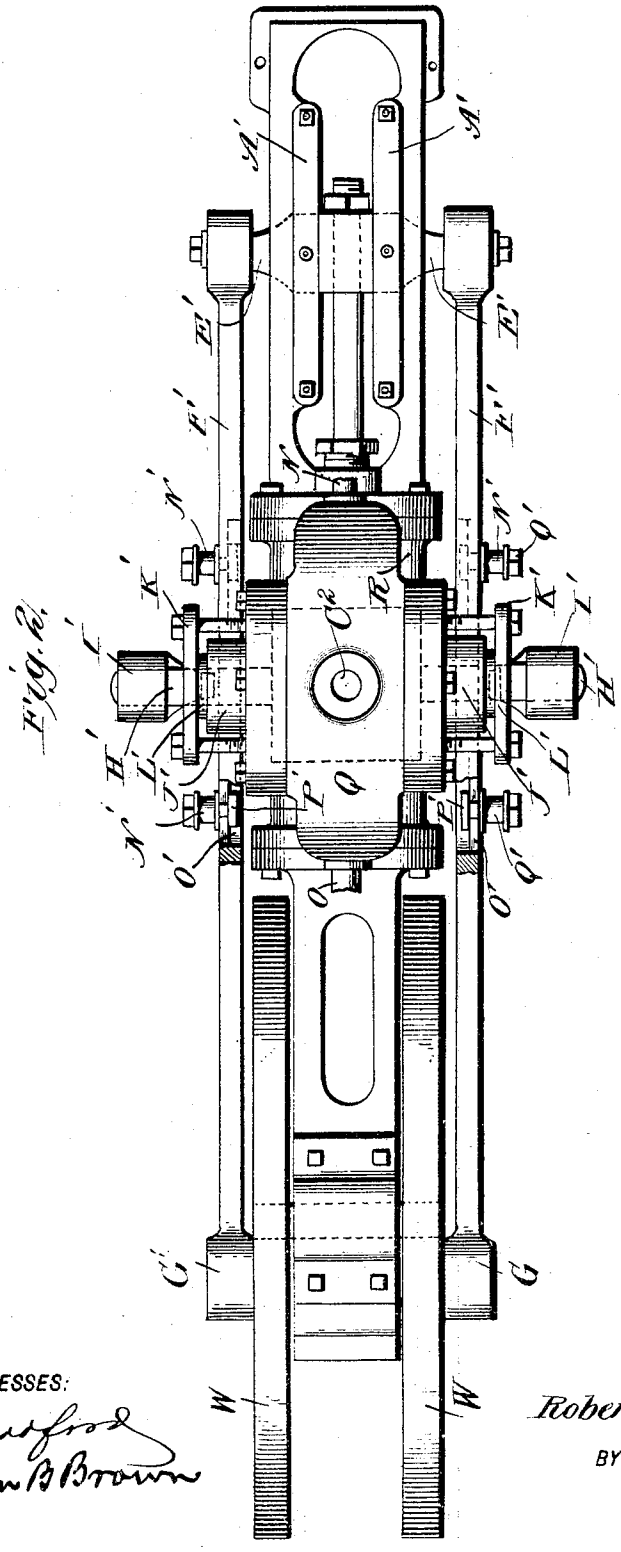

Fig. 2.

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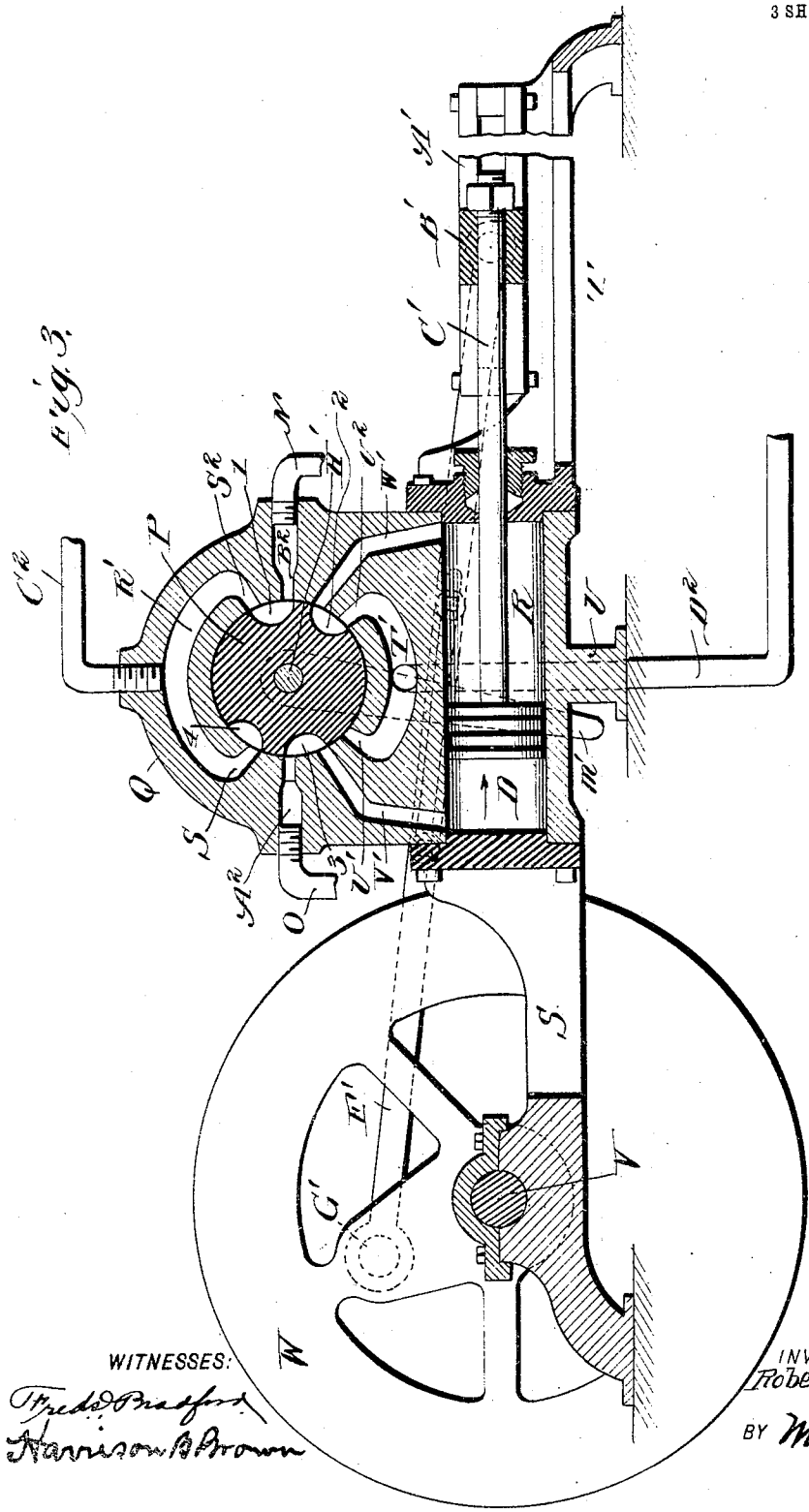
3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

ROBERT H. RUSSELL, OF GALVESTON, TEXAS, ASSIGNOR OF ONE-HALF TO CLIFTON W. ARNOLD AND WALTER L. SHELDON, OF GALVESTON, TEXAS.

HYDRAULIC PUMP.

SPECIFICATION forming part of Letters Patent No. 784,435, dated March 7, 1905.

Application filed March 29, 1904. Serial No. 200,532.

To all whom it may concern:

Be it known that I, ROBERT H. RUSSELL, a citizen of the United States, residing at Galveston, in the county of Galveston and State of Texas, have invented a new and Improved Hydraulic Pump, of which the following is a specification.

This invention relates to peculiar and novel improvements in pumping apparatus and special means, novel in character, whereby the pump may be worked.

The object of my invention is to provide means whereby fluid may be employed and used over and over again in transmitting power for working the fluid elevating or pumping means.

With this and other objects in view I have invented the pumping apparatus which will hereinafter be fully described and the novel features pointed out in the appended claims.

While my invention is specially adapted for utilizing fluid as power-conveying medium, its broad conception comprehends the use of liquid, air, or gas placed under pressure and conveyed to the pump for working it.

Specifically stated, the invention consists of the special construction, arrangement, and combination of parts shown in the accompanying drawings, which I will describe as follows.

In my invention I employ a suitable liquid-elevating pump having a special reciprocable hollow piston, means for conveying fluid under pressure into the pump-cylinder alternately at opposite sides of its piston, and peculiar means whereby the fluid-power means is alternately fed to the pumping-cylinder through operation of a controlling-valve.

In the drawings, Figure 1 is a view, part in section, illustrating my invention. Fig. 2 is an enlarged top plan view of the valve mechanism forming a part of my invention; and Fig. 3 illustrates a longitudinal section through my valve mechanism, the same being shown in side elevation and taken substantially centrally therethrough to show its working parts.

In carrying out my invention I may utilize an elevating-pump A, employing a cylinder B and reciprocable piston C, the cylinder B having closing ends D with packed opening E. The piston C is fixedly arranged on a tube F, having its ends G H elongated and adapted to extend through the packed openings E of the cylinder B, as shown in Fig. 1. The lower tube extension G has a downwardly-seating valve I, from whence the tube F has free open passage-way to and through its upper extension H.

J denotes suitable downward passage-way from the closed lower end of the cylinder B, having at a suitable point therein a check-valve K.

M denotes a conveying passage-way leading from the upper closed end of the cylinder B to any location where it is desired to deliver the liquid being pumped.

With the upper inner end of the cylinder B, I connect a pipe N, and I also connect a similar pipe O with the lower inner end of the cylinder. The pipes N O are intended for conveying fluid or other medium under pressure into and from opposite ends of the cylinder B, whereby its piston is forced into reciprocating action through means of a reversing-valve P in a suitable chest or casing Q and peculiar mechanism whereby the valve is operated. The valve chest or casing Q is arranged upon a cylinder R, having end frame extensions S T, which with an intermediately-located pillow-block U, if the latter be necessary, provide necessary support.

Upon the frame extension S, I arrange a rotatable shaft V, providing support for fly-wheels W. The extension T is fashioned into suitable guideways A′ for a cross-head B′ arranged therein. The cross-head is connected, by means of a suitable rod C′, with a piston D′, arranged in the cylinder R.

It will be noticed upon reference to Fig. 2 that the cross-head ends E′ are made projecting and connected by pitmen F′ with suitable crank-pins G′ on the fly-wheels. The location of the crank-pins is indicated in Fig. 3 by dotted lines.

The valve P (see Fig. 2) is fixedly arranged on a shaft H′, whose projecting ends may have support in suitable bearings I′. (See Fig. 3.)

J′ denotes collars on side plates of the casing Q, and K′ suitable plates and bolts, whereby suitable packing means L′ for the shaft H′ may be adjusted.

M′ denotes arms on the projecting ends of the shaft H′, extending down in the path of adjustable tappets N′. It will be noticed that the tappets are arranged in elongated slots O′ in the pitmen F′ and that they are adapted to be secured to an adjustment by means of headed bolts P′ and an exterior nut Q′, as will be understood upon reference to Fig. 2. The object of adjusting the tappets N′ is to regulate turning action imparted to the valve P through their contact with the arms M′ during operation of the pitmen F′.

A receiving-chamber R′ is formed in the casing Q, having end ports S′ S^2, and a like chamber T′ is formed in the casing at the opposite side of the valve P with end ports U′ U^2. Ports V′ W′ are provided leading to opposite ends of the cylinder R. The pipes O N lead into the valve P through ports A^2 B^2, and the ports S′, S^2, A^2, B^2, U′, U^2, V′, and W′ are respectively arranged for communication with recesses 1, 2, 3, and 4 in the valve P during operation thereof, as will appear further on.

C^2 denotes a pipe leading from any suitable pressure-producing pump, (not shown,) and D^2 a delivery or exhaust passage-way leading into a tank E^2.

The pressure-pump above referred to is made communicating with the tank E^2 through means of suitable tubing F^2.

The use of my invention will be understood from the following description: In the position of parts as illustrated fluid under pressure flowing through the pipe C^2 and into the chamber R′ will pass through the recess 1, port B^2, down the pipe N, and thence into the upper end of the cylinder B above the piston C. The fluid being under pressure, obviously the piston C will be forced downward and during its downward movement force fluid from the lower end of the cylinder B, up the pipe O′, through the port A^2, recess 3 in the valve, and through the port V′, leading into the rear end of the cylinder R. It will be understood that the liquid now entering the cylinder R should be under sufficient pressure to force the piston D′ forward, as indicated by the arrow, (see Fig. 3,) and thereby through the piston-rod C′, cross-head B′, and the pitmen F′ effect rotation of the fly-wheels W. I would here say that the valve P has an intermittent oscillating movement imparted through means of the tappets N′ contacting the arms M′ and that the tappets are spaced apart, so that the valve will not be shifted until the piston D′ is near the end of its stroke and the pump-piston C is forced down to substantially the lower end of its cylinder B. When the valve P is shifted as just described, its recess 4 will be adjusted into registering position with the ports A^2 S′ and its recess 3 into register with the ports U′ V′. At the same time the valve-recess 2 will be adjusted into register with the ports B^2 W′. Now with the valve adjusted as just described obviously fluid under pressure in the chamber R′ will flow through the port S′, recess 4, port A^2, and down the pipe O to the under side of the pump-piston C, forcing it upward in reverse direction indicated by the arrow. During upward movement of the piston C the liquid being pumped will be drawn into the pipe J, as will be understood, and held therein by the check-valve K. It is apparent that when the valve P is adjusted from the position shown in Fig. 3, as last described, its recesses 4, 3, and 2 will be in position providing for conveying pressure to the under side of the piston C and at the same time for exhaust from the rear end of the cylinder R through the port V′, recess 3 in the valve P, the port U′, chamber T′, and the pipe D^2, leading into the tank E^2. Conjointly with the action of parts just described the liquid in the cylinder B above its piston C will be forced up the pipe N, through the port B^2, the recess 2, port W′, and into the cylinder R with pressure sufficient to force the piston D′ in opposite direction indicated by the arrow. Before the piston D′ reaches the end of its rearward stroke the arm M′ will be engaged by the approaching tappet, and thereby adjust the valve P back to the position shown in Fig. 3.

With the construction and arrangement of features above described and shown by my drawings the cylinder R, its piston D′, the fly-wheels W, and their connecting devices provide a motor adapted for continuous intermittent operation of the valve P during flow of the operating fluid through the pipe C^2.

It will be noticed that according to my invention the operating fluid after serving its use in working the pistons D C is discharged into a suitable receiver or tank E^2, adapted to be conveyed back to the pressure-pump. (Not shown.)

Obviously a suitably-elevated source of liquid-supply could be employed instead of the pressure-pump above mentioned and in which case the liquid-power medium may be discharged upon the ground after serving its use.

It will be observed that my invention comprehends, in its broad conception, fluid-operated devices for lifting liquid; being the lifting-pump, a controller for the feed and exhaust of the fluid from the lifting means or pump; being the special valves and means operated by the feed and exhaust of the fluid from the lifting means whereby to shift the feed and exhaust controller.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus substantially as described, means for lifting liquid, fluid-oper-

ated devices for actuating said lifting means, a controller for the feed and exhaust of the fluid to the lifting means, and means operated by the exhaust of said fluid from the device which actuates the lifting means, whereby to shift the said controller.

2. In an apparatus substantially as described, means for lifting liquid consisting of a pump, means conveying fluid under pressure to the lifting means, a controller for the fluid-conveying means operated by exhaust of the lifting means, and means which actuates the lifting means, whereby to shift the said controller.

3. In an apparatus substantially as described, the combination of a fluid-lifting pump having a free piston, a tube carried by the piston having its ends extended through the pump-cylinder ends, feed and exhausting pipes leading into the pump-cylinder ends, wherethrough to convey fluid under pressure, passage-ways leading to and from the pump, wherethrough to convey the fluid being pumped, a controller in communication with the said feed and exhausting pipes, adapted to be shifted and thereby reverse action of the fluid flowing therethrough, and motor means adapted to shift the controller and reverse the action of the lifting means substantially as described.

4. The combination with a fluid-lifting pump of the character described, of passage-ways adapted for conveying fluid under pressure to and from the said pump, a controller at the receiving ends of said passage-ways, consisting of a suitable casing containing an oscillating valve, and exhaust and feed ports, means for conveying fluid under pressure to and from the said controller, and motor means operated by direct pressure of the exhaust-flow from the pump whereby to shift said controller and thereby through its connecting means with the lifting-pump, reverse the action of the feed and exhaust of the fluid-lifting means, substantially as described.

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