

T. J. JOHNSON.

PUMP.

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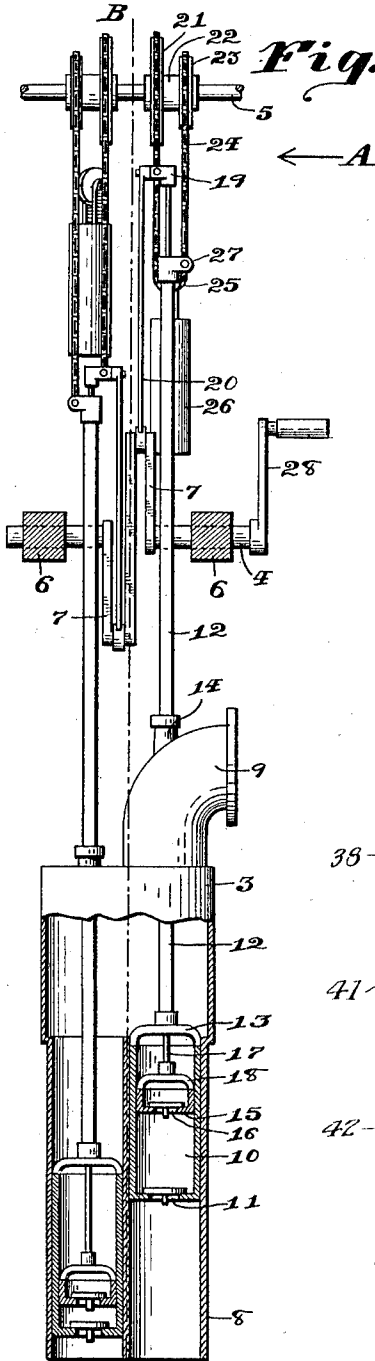


Fig. 1.

Fig. 2.

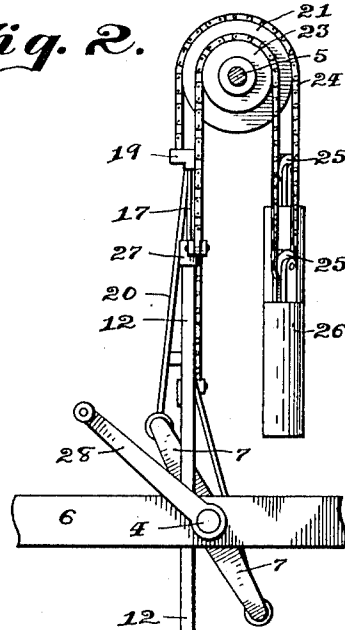
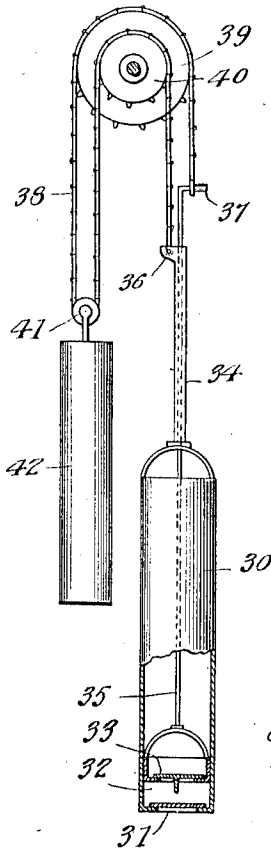


Fig. 3.



Witnesses:

L. H. Schmidt;
C. E. T. Rainer

Inventor:

THOMAS JEFFERSON JOHNSON,
BY *Mum & Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

THOMAS JEFFERSON JOHNSON, OF NORMAN, OKLAHOMA.

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To all whom it may concern:

Be it known that I, THOMAS J. JOHNSON, a citizen of the United States, and a resident of Norman, in the county of Cleveland and State of Oklahoma, have invented certain new and useful Improvements in Pumps, of which the following is a full, clear, and exact description.

My invention is an improvement in pumps, and consists of certain novel constructions, and combinations of parts, hereinafter described and claimed.

The invention aims to provide in a pump two pump factors which are put approximately in counterbalance one with the other, whereby operation of one of the factors serves to assist the operation of the other in elevating the column of water, and vice versa.

Referring to the drawings: Figure 1 is an elevation view of the improved pump, partly in section, Fig. 2 is an elevation view of the pump taken at right angles to Fig. 1, or in the direction of the arrow A of said figure, and, Fig. 3 is a side view of another embodiment of the invention.

As best shown in Fig. 1, the improved pump consists of two separate and identical pumping mechanisms, one of which is on the right-hand side of the line B—B, and the other on the left-hand side, a casing 3, crank shaft 4, and an upper shaft 5 being common to both mechanisms. The crank-shaft 4 is journaled in bearings 6, and is formed centrally into two diametrically opposed cranks 7, one crank being adapted to move the parts of one mechanism and the other crank the parts of the other mechanism.

Since the two machines are identical in the matter of their separate parts, it is only necessary to describe one of them in detail. Each mechanism consists, in part, of a tubular incasement 8, which extends downward from the main casing 3, this incasement being open at its lower end and communicating with said casing at its upper end.

The main casing 3 is provided with an outlet elbow 9, from which pipe connections may lead to any point of delivery for the water. The incasement 8 is fitted with an elongated piston 10, hereinafter referred to as the main piston, and this piston has at its lower end a valved opening 11. A tubular piston rod 12 extends from the spanning yoke 13 of this piston 10 up through and above the main casing 3, said piston rod be-

ing provided with a proper stuffing box 14, where it passes through the outlet elbow 9. The main piston 10 is provided inwardly with a smaller piston 15, which has in its bottom a valved opening 16, and this piston has a piston rod 17, extending from its spanning yoke 18, upwardly slidably through the tubular piston rod 12. The upper end of the smaller piston rod 17 is provided with a coupling head 19, and this coupling head is operatively connected with the crank 7 by a connecting rod 20. A sprocket wheel 21 is mounted loosely on the upper shaft 5, and this wheel is integral through a hub connection 22 with a smaller sprocket wheel 23, so that both said wheels move in concert. A sprocket chain 24 has one of its ends attached to the coupling head 19 of the small piston rod 17, said chain being passed over the larger wheel 21; downward from said wheel 21 and around a pulley 25 in the top of a counterweight 26; upwardly from said pulley 25 and over the smaller wheel 23; and downward from said smaller wheel to a coupling head 27 on the upper end of the tubular piston rod 12, to which it is attached. It will now be seen that if either of the piston rods 12 and 17 is raised upward it will allow the counterweight 26 to move downward, thereby causing both wheels 21 and 23 to be revolved by the chain 24 and causing the other piston rod to be raised upward. Since the wheel 21 above the piston rod 17 is larger than the wheel 23 above the piston rod 12, and since both wheels are integral and move together as above stated, the smaller piston rod 17 will move farther than the other, the traveling speed of said piston rod 17 bears the same proportion of the speed of the piston rod 12 as does the diameter of the larger wheel 21 to the diameter of the smaller wheel 23. Since the difference in diameters of the wheels 21 and 23 give them different peripheral speeds, the pulley 25 in order that said counterweight may be supported equally by or act on both portions of the chain 24 at all times.

In operation, the shaft 4 is turned by a crank 28, thus causing the connecting rod 20 of the crank 7 to move the smaller piston rod 17 upward and downward, and thus causing the tubular piston rod 12 to also be moved upward and downward, by the action of parts just described. This causes the main piston 10 to be reciprocated -

tically, and at the same time causes the smaller or inner piston 15 to be reciprocated vertically in said main piston. It will now be seen that at each upward movement of the pistons 10 and 15 the water will be drawn upward in the main piston 10 by the upper or inner piston 15 a distance equal to the total upward travel of said inner piston within the main piston, said water being drawn upward through the valved opening 11 of the upwardly moving main piston 10. On the downward movement of the pistons 10 and 15 the water is supported by the lower or main piston 10 and is let back into the incasement 8 by the downward movement of said piston a part of the distance that it was raised by the smaller or inner piston 15, said inner piston moving downward in said main piston as the water supported by the latter passes up through the valved opening 16 of said inner piston. This downward movement of the pistons 10 and 15 brings them to the lower end of their stroke, into the same position as the pistons of the opposite pumping mechanism on the left-hand side of the line B—B. Since the two pumping mechanisms are operated by diametrically opposed cranks 7 of the shaft 4 they will alternate with each other in action, so that the water delivered into and through the main casing 3 by them will move in practically a continuous flow, though the movement of neither pumping mechanism has any influence over the other. Within the meaning and intent of the invention, one pumping mechanism may be employed, and the incasement for the two pumps may be dispensed with. In this event this main piston 10 would be continued upward as a delivery pipe for the water, and it would still be given its vertical reciprocating movement with the counter-balancing weight 26.

The two counterweights on one of the double pulleys in Fig. 1, can be omitted by substituting one of the pumps as a counterbalance weight for the other pump, and hanging the cylinders of the two pumps connectedly over the smaller wheel of the remaining double pulley, and their pistons connectedly over the larger wheel of this pulley. Then, if the two pumps be oscillated, each will serve for power to help lift and operate the other. In the embodiment shown in Fig. 3, a single one of the pumps in Fig. 1 is shown with the incasement, and the other pump omitted.

The cylinder 30 is provided with a valve 31 in its bottom adapted to be opened by the upward movement of the water into the cylinder. A piston 32 is arranged in the cylinder, and is provided with a valve 33, also adapted to be opened by the upward movement of the water. The cylinder is provided

with a piston rod 34 extending upwardly therefrom, and the rod 35 of the piston passes through the rod 34. Each of the rods 34 and 35 is provided at its upper end with a lateral lug 36 and 37, respectively, and the ends of a chain 38 are connected with the respective lugs. The central portion of the chain passes over the double pulleys 39 and 40, and the said central portion is engaged by a pulley 41 on the opposite side of the pulleys 39, 40, from the cylinders and piston. A weight 42 is connected with the pulley 41.

It will be readily seen that when the pulleys 39, 40, are oscillated, a differential movement will be imparted to the cylinder and piston to operate the pump, and a counter balance weight 42 serves for power to help in this operation. Also, if a second pump be substituted for the counter balance weight, with the two pump cylinders connectedly supported by the smaller pulley wheel, and the two pistons connectedly supported by the larger wheel, then by oscillating the pulley 39, 40, each pump will serve for power to help counter-lift the other, and thereby operate the two.

It will be noticed that in all of the constructions, the pistons have relative movement with respect to each other, when the actuating mechanism is in operation. When for instance, the shaft 4 is rotated in the construction of Fig. 1, as the pistons move downward they approach each other and as they move upward they recede from each other. Each pair of pistons is balanced by the counterweight 26 and in addition one pump, that is, one cylinder and its pistons and its counterweight, counterbalances the other pump. For this reason, but little power is required to operate the device. When one pair of pistons move downward, the movement of the pistons is assisted by gravity and also by the weight of water above them, and by the suction below them. They thus assist to move the other pistons upward.

The foregoing being a full, clear, and exact description of the invention, what I claim and desire to secure by Letters Patent is:—

1. A device of the class described, comprising a plurality of cylinders, a common outlet at the top of the cylinders, a pair of pistons in each cylinder, a double pulley arranged above each cylinder, one of the members of each pulley being of greater diameter than the other, a common shaft upon which both pulleys are journaled, a piston rod connected with each piston, the rod of the lowermost piston being hollow and the rod of the uppermost piston passing through the hollow rod, a flexible connection for each pulley, said connection having one end secured to each piston rod of the pistons in the adja-

cent cylinder, said connection passing over the members of the double pulley, a counterweight on the other side of the shaft from each cylinder, a pulley on each counterweight engaging the central portion of the adjacent flexible connection, a crank shaft provided with two cranks, and a link connecting each crank with the piston rod of the upper-most piston of the adjacent cylinder.

2. A device of the class described, comprising a pump incasement or cylinder provided with an outlet, a pair of pistons in said incasement, an auxiliary incasement having a water connection with the first incasement, a pair of pistons in the auxiliary incasement, a double pulley arranged above each incasement, one member of said double pulley being of greater diameter than the other, a flexible connection for each incasement, one end of the connection being connected with each piston, said connection passing over the respective members of the double pulley adjacent the incasement, and a counterbalance connected with the connection on the opposite side of the double pulley from the incasement.

3. In a device of the class described, a pump incasement or cylinder, upper and lower pistons in the incasement, a double pulley comprising members of unequal diameter, a flexible connection having one end connected with each piston and passing over the respective members of the double pulley, and a counterweight movable on the said flexible connection on the opposite side of the double pulley from the incasement.

4. In a device of the class described, a pulley, a counterbalancing weight, a pump incasement or cylinder, upper and lower pistons in the incasement and connectedly supported over the pulley by the counterbalancing weight, and means for imparting to the pistons an up and down reciprocable movement.

5. In a device of the class described, a pair of pump incasements or cylinders, a pair of pistons in each cylinder, a double pulley arranged above each incasement, one of the members of said double pulley being of lesser diameter than the other, and a connection

between the respective pistons of each incasement, the connections passing over the members of the pulley, and means connected with one of the connections of each pump for operating them.

6. In a device of the class described, a pair of pump incasements or cylinders, a pair of pistons in each cylinder, a double pulley arranged above the cylinders, one of the members thereof being of lesser diameter than the other, and a connection between the respective pistons of each incasement, the connections passing over the members of the pulley and means for moving the pistons.

7. In a device of the class described, a pair of pump incasements or cylinders, a pair of pistons in each incasement, a double pulley arranged above the cylinder, one of the members of said double pulley being of lesser diameter than the other, and a connection between the respective pistons of each cylinder, the connections passing over the two members of the pulley.

8. In a pump, the combination with a cylinder, and upper and lower pistons working in the cylinder, of a double pulley comprising members of unequal diameter, a flexible connection having one end connected with each piston and passing over the respective members of the double pulley, and means operatively connected therewith and arranged to counterbalance the said pistons.

9. In a pump, the combination with a pair of cylinders, and a pair of pistons in each cylinder, of a double pulley mounted above the cylinders, one of the members of the double pulley being of less diameter than the other, and means for imparting reciprocatory movement in opposite directions simultaneously to the corresponding pistons of the two pairs, said means including a flexible motion-transmitting element having different portions of its length passing over the members of the double pulley, whereby the pistons of each set will have differential reciprocatory movement with relation to each other.

THOMAS JEFFERSON JOHNSON.

Witnesses:

W. F. GRAY,

E. E. FOREMAN.