

J. DAVIDSON.
HYDRAULIC PUMP.
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1,103,569.

Patented July 14, 1914.

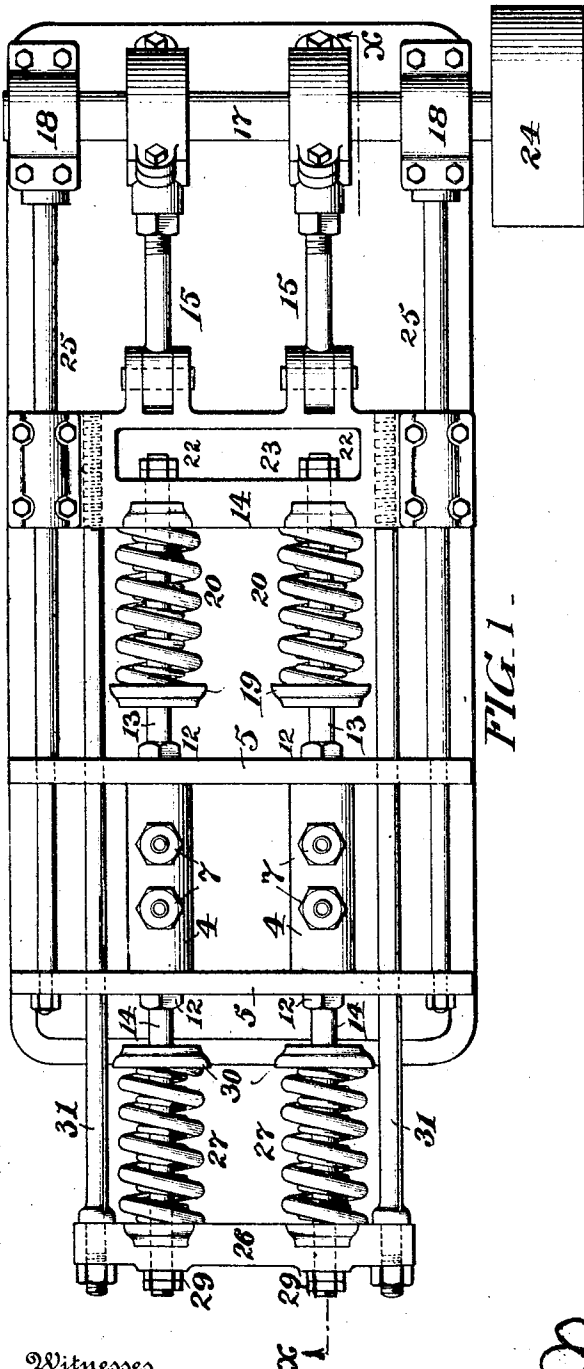


FIG. 1.

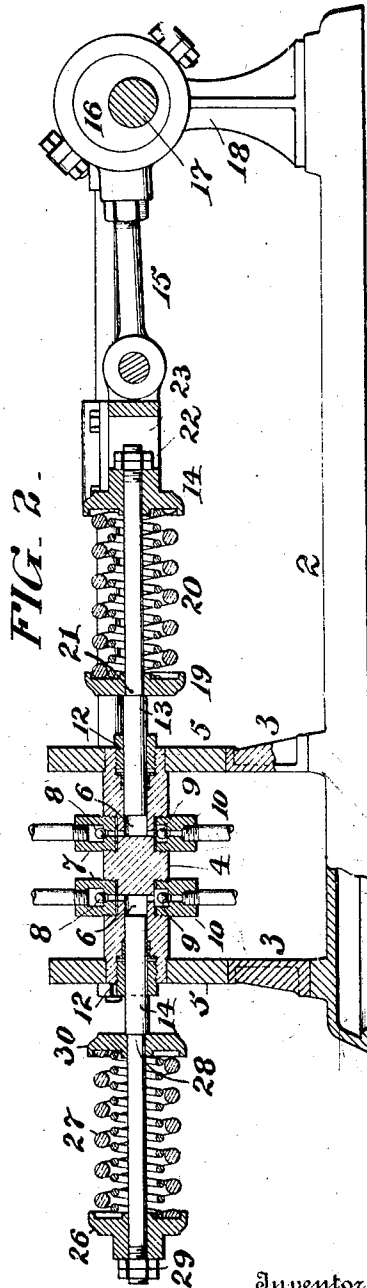


FIG. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

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HYDRAULIC PUMP.

1,103,569.

Specification of Letters Patent.

Patented July 14, 1914.

Application filed June 28, 1912. Serial No. 706,332.

To all whom it may concern:

Be it known that I, JOSEPH DAVIDSON, citizen of the United States, and resident of East Point, county of Fulton, and State of Georgia, have invented an Improvement in Hydraulic Pumps, of which the following is a specification.

My invention has reference to hydraulic pumps and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

The object of my invention is to provide a construction of pump which shall embody simplicity and reliability; and which will operate, within itself, to produce a gradually increasing pressure and maintain said pressure at any predetermined amount, without the use of automatic devices for governing the speed of the pump or controlling the pressure, as heretofore has been customary.

My object is also, to provide a pump which will operate economically and require the expenditure of no power beyond that actually required to raise the pressure to and maintain it at the pressure point required.

My invention consists of the improvements which are fully described hereinafter and defined in the claims; and my invention will be better understood by reference to the drawings, in which:

Figure 1 is a plan view of a pump embodying my improvements; and Fig. 2 is a sectional elevation of the same taken on line *x-x*.

2 is the bed plate and supports the cylinders 4 by the brackets 3, 3, and the transverse frames 5, 5, in which the cylinders 4 are supported. In the particular illustration, I have shown two cylinders 4, 4, each having oppositely directed plunger chambers 6, 6, so that, by way of example, I provide four single acting pumps which may be operated separately, in pairs or in multiple as desired, by simply coupling up the induction and eduction pipes in a suitable manner to secure the particular results desired. The plungers 13 work in the right hand plunger chambers 6 and are extended through the cross head 14. These plungers have inde-

pendent collars 19 resting against the shouldered portions 21 on the plungers, and between these collars and the cross head, are arranged coiled springs 20. The ends of the plungers extend into the space 23 in the cross head and have lock-nuts 22 which cause the plungers to be withdrawn positively by the cross head and may also act to adjust the tension of the springs 20. The cross head 14 is guided on the guide rods 25 extending from the transverse frames 5 to the bearings 18 for the power shaft 17. This power shaft 17 is provided with a pulley 24 to rotate it and is further furnished with the eccentrics 16 which operate eccentric rods 15, whose ends are hinged to the cross head 14. By rotating the shaft 17, the cross head and the plungers 13 are reciprocated and the pumping or compressing of the plungers is applied through the springs 20; whose power determines the pressure to be produced by the plungers. By adjusting the nuts 22 of the respective plungers, the tensions of the springs may be adjusted to yield to any pressure resistance desired which may be exerted upon the plungers. The cylinders have each a plunger chamber provided with inlet and outlet check valves. These valves are formed in plugs which are screwed into threaded apertures in the cylinder body.

7 are the outlet check plugs and have ball valves 8 seating upon valve seats in the plugs; and 10 are the inlet check plugs and are provided with the ball valves 9 seating upon valve seats in the plugs. The fluid may be supplied to the inlet plugs and conducted away from the outlet plugs by suitable pipes. By the use of the plug check valves, the construction is simple and reliable, takes up small space and the plugs are easily removed for cleaning or repair. Instead of using ball check valves, the valve pieces may be made in any other suitable manner.

The cylinders may be provided with suitable stuffing-boxes and packing as indicated at 12, through which the plungers 13 and 14 reciprocate. The second set of plungers 14 are, in all material respects, the same as the other plungers 13, being provided with the shoulder 28 against which the collars 30

rest; and having their ends loosely extending through the cross head 26 and provided with lock-nuts 29. Between the cross head 26 and the respective collars 30 are coiled springs 27 which surround the plungers. The cross head is secured to the rods 31 which are guided through the transverse frames 5 and secured to the cross head 14, as shown. It will be understood that when the cross head 14 is reciprocated, the cross head 25 is also reciprocated and as these are upon opposite ends of the cylinders 4, the plungers operated by the respective cross heads will be moved simultaneously. In this way, the fluid will be compressed in one set of plunger chambers and forced from the cylinder by the plungers 13, while it is being sucked into the other set of plunger chambers by the plungers 14, and vice versa.

The action of the pump is as follows: When the pump is working under low or moderate pressure which does not give sufficient pressure against the ends of the plungers to cause the springs to compress, the plungers make full strokes, receiving and discharging the full capacity of the cylinders. As the pressure rises, it eventually becomes sufficient to compress the springs; and while the cross head has a fixed travel, the travel of the plungers is gradually reduced, thus reducing the volume of the liquid being received and discharged, until the final predetermined pressure is reached, which is sufficient to compress the springs to the amount equal to the full travel of the cross head. When the travel of the plungers ceases and the pressure is held at the maximum point as long as desired, no more liquid will be received or delivered by the pump until the pressure is reduced. Where a number of different hydraulic presses or other machines are operated from one pump, it is intended to have a sufficient number of plungers in each pump in order that the discharge from one plunger can be connected separately to each press, each press having a separate pressure supply and is not affected by the operation of any other press in the battery. The nuts on the end of the plungers can be adjusted so as to tighten or loosen the springs, thus causing them to force the plungers against a greater or lesser pressure, as desired. The power required to compress the springs is counteracted by the power the springs give back on the return stroke, hence no power is being wasted.

It will be understood that in the pump structure shown, the plungers and their chambers may be employed to supply fluid pressure to separate pieces of machinery, or they may be operated in pairs or in multiple, as the necessities may dictate; and while I have shown the use of four plungers and chambers, a less number or a greater number may be provided and be operated from

the same shaft 17, and I do not restrict myself in this respect.

I have illustrated a construction of my invention, by way of example, which is that which I prefer in commercial practice, but I do not confine myself to the details shown, as these may be modified without departing from the spirit of the invention.

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

1. In a hydraulic pump, the combination of a base, a pair of frames supported by said base and suitably spaced apart, a cylinder fixed between said frames having a valved inlet and a valved outlet, a plunger mounted for sliding movement in said cylinder, a cross head connected to said plunger to positively actuate said plunger in one direction of movement and yieldingly connected to said plunger to actuate said plunger in the opposite direction, stationary guide rods fixed to said frames upon which said cross head is adapted to reciprocate to guide it in relation to the cylinder, and means to reciprocate said cross head having a connection therewith and supported by the stationary rods.

2. In a hydraulic pump, the combination of a base, a pair of frames supported by said base and suitably spaced apart, a cylinder fixed between said frames having a plurality of valved inlets and a plurality of valved outlets, a pair of plungers mounted for sliding movement in said cylinder and extending in opposite directions, cross heads respectively connected to said plungers to positively actuate said plungers in their suction movements and yieldingly connected to said plungers in the opposite direction, springs between the cross heads and the plungers to cause them to yieldingly move on the compression strokes, rods secured to and connecting said cross heads and slidingly mounted in said frames whereby the cross heads are simultaneously moved in the same directions, guide rods fixed to said frames upon which one of said cross heads is adapted to reciprocate and be guided, and means to reciprocate said cross head.

3. In a hydraulic pump, the combination of a cylinder having plunger chambers extending and opening in opposite directions, plungers for said chambers respectively extending beyond the cylinder at each end thereof, stuffing-boxes around the plungers, a reciprocating frame through each end of which the free ends of the plungers extend with a sliding fit, springs arranged between the frame and each of the plungers for subjecting said plungers to elastic pressure in a direction to move them into the respective chambers, lock nuts screwed upon the ends of the plungers to provide adjustable adjustments whereby the plungers may be ad-

justed in the frame and the cylinders and
the frames operate the plungers in with-
drawing them outwardly in respect to the
chambers and also for adjusting the tensions
5 of the springs to vary the maximum com-
pression, and power devices for reciprocating
the frame.

In testimony of which invention, I here-
unto set my hand.

JOSEPH DAVIDSON.

Witnesses:

B. G. KUHME,
A. M. BENSON.