

UNITED STATES PATENT OFFICE.

WILLIAM BRIGGER, OF ST. BERNARD, OHIO.

HYDRAULIC MOTOR.

1,058,718.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM BRIGGER, citizen of the United States, residing at St. Bernard, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Hydraulic Motors, of which the following is a specification.

My invention relates to fluid motors of the class in which a reciprocating piston is actuated in a cylinder by fluid supplied under pressure.

The especial object of my improvements is to provide a motor in which the valves are arranged vertically in a horizontally moving piston so that the action of gravity aids the seating of the valves and the removal of grit from the valve-seats, and in which there are no springs within the cylinder or directly connected with the valves.

A further object of my invention is to reduce the number of moving parts so that excessive wear, breakage and leakage will be avoided.

In the accompanying drawing which forms a part of this application, I have illustrated my invention in a preferred form in the following views:—

Figure 1 shows my motor with outside connections commonly employed, and with a portion of the cylinder broken away to show the piston; Fig. 2 is an enlarged longitudinal section through my improved motor on the line 2—2 of Fig. 3; Fig. 3 is an elevation of one end of the cylinder, and Fig. 4 is a cross-sectional view taken through the piston, showing the piston valves and their actuating devices.

Referring to the details of the drawing, 5 represents a metal cylinder the ends of which are closed by rectangular heads 6, 6, connected by rods 7 having nuts 8 on their ends outside the heads.

9 represents generally a cup-shaped piston which is slidably mounted in the cylinder 6. This piston is cast with parallel divisional walls 9^a, 9^b, and a cross wall 9^c, which divide the interior of the piston transversely into induction and eduction chambers 9^d. In the walls 9^a, 9^b, on one side of the partition 9^c, are opposed openings which form seats for a double valve 10 having tapering heads 10^a, 10^b, corresponding to the bevel of the walls of the valve seats. In the walls 9^a, 9^b, on the opposite side of the partition 9^c, are other openings to re-

ceive the heads 11^a, 11^b, of a valve 11, the taper of said heads being opposite to that of the heads of the valve 10, but in both valves, the respective heads are so formed that when one is seated the other is unseated, as clearly shown in Fig. 4.

Pivotally mounted within the piston 9, and transversely thereof, are two valve-operating crank-arms 12, 13, arranged to strike the opposite ends of the valves 10, 11, respectively. The crank 12 is formed with a central extension 14^a, and with two arms 14, 14, at substantially right angles to the extension 14^a, the arms being so spaced as to lie opposite the valve heads 10^b, 11^b, respectively. The crank 13 is identical in form with 12, and has a central extension 15^a, and two side arms 15, 15, arranged to engage the heads 10^a, 11^a, of the valves 10, 11, respectively.

At each side of the center of the piston 9 are two cylindrical extensions or bosses 9^e (only one of which is shown) which are interiorly threaded. In one of the bosses 9^e is screwed the inner end of an eduction pipe 16 which slidingly fits a sleeve 17 which is screwed into a collar 18 which in turn is screwed into the cylinder head 6. Other pipe connections 19, 20 and 20^a, may be fitted to the sliding pipe 16 and sleeve 18, as may be desired. In the other boss, corresponding to 9^e, is screwed an induction pipe 30, which passes through a collar 30^a on the cylinder head, and said pipe is supplied with fittings corresponding to those shown and described with respect to the pipe 16. The pipes 16 and 30 and their connections are identical, but one is a fluid supply pipe and communicates with the chamber 9^d on one side of the partition 9^c, while the other is a discharge pipe and communicates with the opposite chamber 9^d. In the center of the piston on the side opposite the bosses 9^e is a boss 9^e into which is screwed a piston rod 21 which passes through a stuffing box 23 screwed into a collar 22 on the cylinder head 6. To the free end of the piston rod 21 is connected a rack-bar 24 having teeth 24^a which mesh with the teeth 25^a of a pinion 25 when it is desired to convert the reciprocating movement of the piston into rotary motion. On each cylinder head, a cage 26 is screwed into a suitable threaded opening provided therefor. In the outer end of the cage is a screw-plug 27 having a recess 27^a in its inner wall to receive the outer end of

the trip pin 29, the inner end of which projects into the cylinder, and is yieldingly held in such projected position by an expansion spring 28 arranged within the cage and held under compression by the plug 27 and a disk 29^a fixed on the pin 29. Each of the pins 29 projects into the cylinder 6 in the path of the movement of the extensions 14^a, 15^a, of the crank-arms 12, 13, respectively, as the piston reciprocates in the cylinder, so that the arms will be alternately pushed inwardly or tripped, thus rocking the cranks on their bearings and causing the arms 14, 15, to strike the head of the valve adjacent thereto, thereby opening and closing the valves alternately.

Water entering the pipe 30 under pressure, and the valve 10 being in the position shown in Fig. 2, will cause the piston to travel toward the left-hand end (as shown) of the cylinder until the extension 14^a of the crank-arm 12 is struck and tripped by the trip-pin 29 at that end of the cylinder, the excess water-pressure being relieved around the unseated valve 10^b and through the eduction pipe 16. When the arm 14 strikes the valve 10^b, the latter will be seated, and the valve 10^a unseated, and the same movement of the trip arm will open the valve 11^b and close the valve 11^a, whereupon the water pressure will force the piston toward the right hand end of the cylinder and the excess will be relieved around the open valves in the reverse direction to the eduction pipe 16. Should grit, dirt or other impurities enter the piston chambers the valves will be self-clearing owing to their vertical arrangement and the action of the water in passing through the valve passages, and such arrangement also facilitates the seating and even wearing of the valves. The tension of the springs 28 and hence the pressure they exert on the tripping crank-arms

12, 13, may be easily regulated by the caps 27 in a manner well understood in valve control devices. The piston 9 is supplied with the usual annular packing-ring 31.

Having thus described my invention, what I claim is:—

1. In a fluid motor, a cylinder, a piston reciprocatingly mounted in said cylinder, said piston having an inlet and an outlet chamber formed therein, induction and eduction pipes connected with said piston and communicating respectively with said inlet and outlet chambers, valves vertically arranged in said piston and controlling inlet and outlet openings in said piston, and means for alternately tripping said valves at the ends of the stroke of said piston.

2. In a fluid motor, a cylinder, a piston reciprocatingly mounted in said cylinder, said piston having an inlet and an outlet chamber formed therein, induction and eduction pipes connected with said piston and communicating respectively with said inlet and outlet chambers, valves vertically arranged in said piston and controlling inlet and outlet openings in said piston, and means for alternately tripping said valves at the ends of the stroke of said piston, said means consisting of crank arms rockably mounted in said piston and having extensions adapted to engage said piston valves, and trip pins adjustably and yieldingly mounted in the heads of said cylinder and adapted to engage the crank arms alternately and rock them in their bearings, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM BRIGGER.

Witnesses:

JOS. S. EVANS,

WM. J. PHELAN.