D. W. BLUNT & C. L. KELSO.

HYDRAULIC MOTOR.

APPLICATION FILED JAN. 14, 1915.

1,203,689.

Patented Nov. 7, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

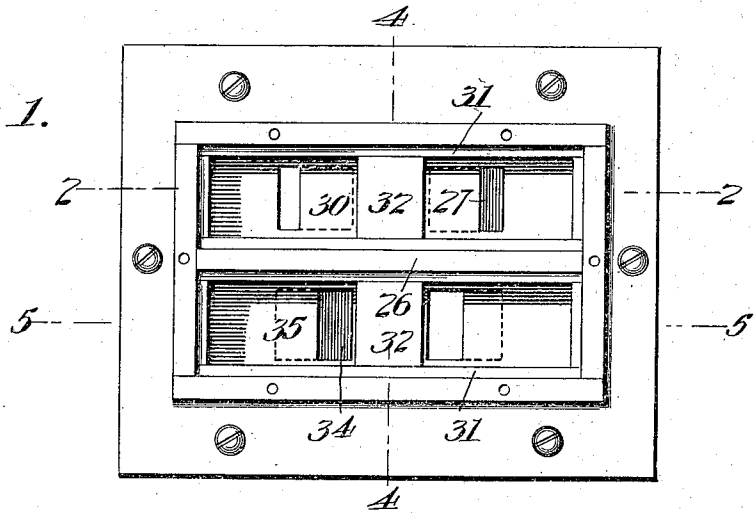


Fig. 2.

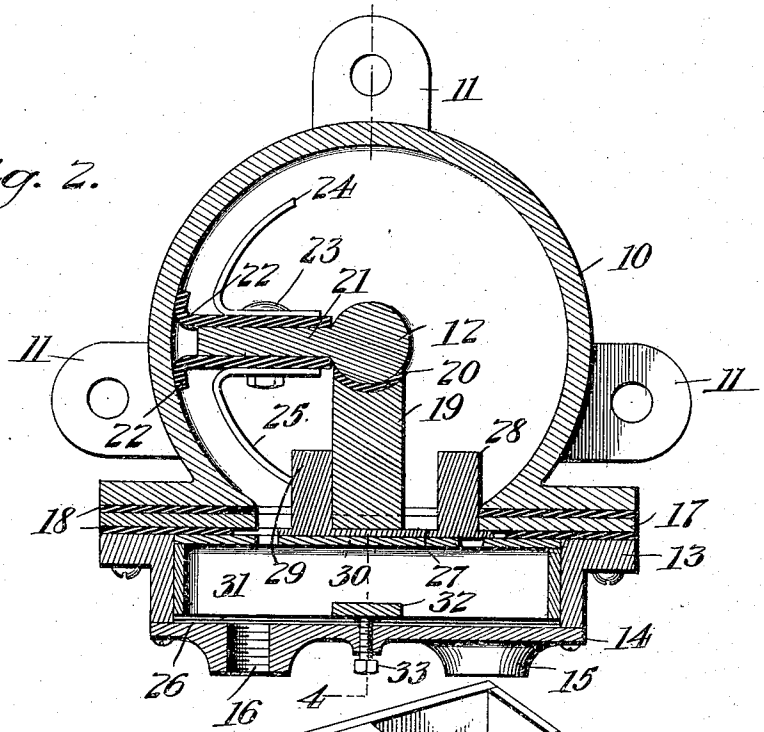
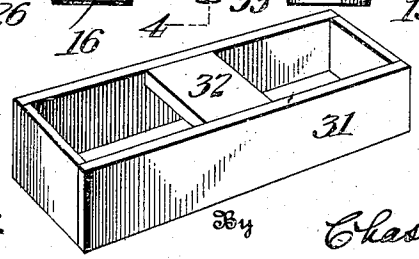


Fig. 3.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

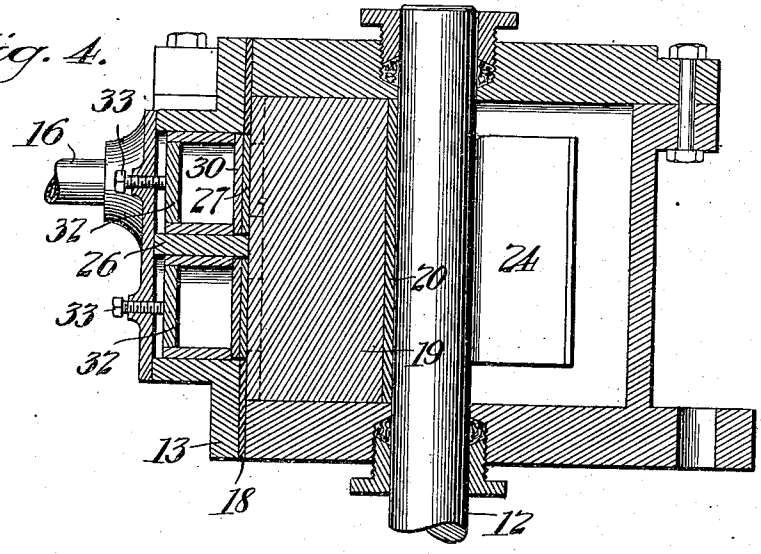


Fig. 5.

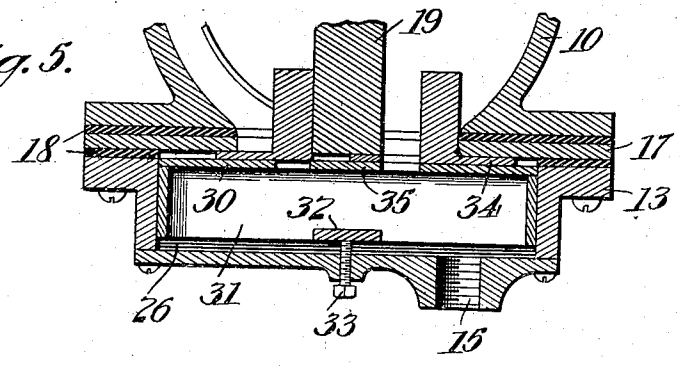
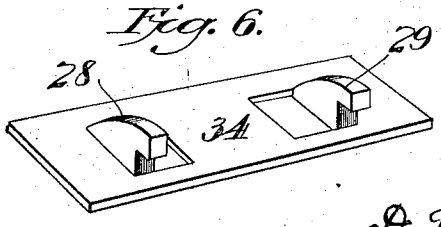


Fig. 6.



Witnesses

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HYDRAULIC MOTOR.

1,203,689. Specification of Letters Patent. Patented Nov. 7, 1916.

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To all whom it may concern:

Be it known that we, DAVID W. BLUNT and CHARLES L. KELSO, citizens of the United States, residing at South Cle Elum and Cle Elum, respectively, in the county of Kittitas and State of Washington, have invented certain new and useful Improvements in Hydraulic Motors; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to hydraulic motors. Its especial object is to provide an efficient valve construction for an oscillating hydraulic motor. To this end it comprises the combinations of parts recited in the appended claims.

In the drawings Figure 1 is a side elevation with the cap removed; Fig. 2 is a horizontal section on the line 2—2 of Fig. 1; Fig. 3 is a detail perspective of a part to be hereinafter described; Fig. 4 is a central vertical section on the line 4—4 of Figs. 1 and 2; Fig. 5 is a horizontal section in part on the line 5—5 of Fig. 1; and Fig. 6 is a detail perspective of a part to be hereinafter described.

In these drawings, illustrating a preferred form of our invention, 10 represents the cylinder of a hydraulic motor having projecting perforated ears 11 to enable the motor to be conveniently attached to any support or machine. In the present example it may be supposed to be secured to the top of a machine so that the drawings represent the motor as it will be seen from one side with the water pipes leading up vertically and turning at an angle to supply and exhaust the water as desired.

12 represents a shaft of the motor journaled in the walls of the cylinder and having the customary stuffing boxes as shown in Fig. 4. We do not dwell upon the details of the conformation and fittings of the cylinder, shaft, etc., because these may have a wide range without departing from the spirit of our invention, as is true of other mechanical details of the motor and its parts.

13 represents a detachable water chest having a removable cap plate 14 and on opposite sides openings 15 and 16 for the inlet and outlet of water, as hereinafter described, these being appropriately threaded to receive the customary inlet and outlet pipes. Between the cylinder and the water chest lies a separating plate 17 and on each side of this plate we prefer to place gaskets as illustrated, for example, at 18. We have not thought it necessary to fully detail this central plate because its location and construction are sufficiently indicated in Figs. 2 and 5 and particularly in Fig. 1. It is obvious that this plate lying at the bottom of the cylinder must be perforated to permit the ingress and egress of water. It, therefore, in its construction has four perforations substantially square or rectangular in form, as indicated in dotted lines in Fig. 1, and it is across these perforations of this plate that the valves about to be described operate.

19 represents a vertical partition extending across the cylinder so that it makes a water tight division. The top of the partition is grooved to conform to the cylindrical shape of the shaft and carries a gasket or packing as shown at 20 so that the shaft turning in the groove may closely fit to prevent the passage of water. The shaft carries a piston wing 21 to which are secured strong sections 22 of some flexible material, such as leather, which wipe against the inner circumference of the cylinder in operation, both of the sections being secured to the piston wing by a bolt 23 which serves also to secure to the piston wing bent valve operating wings 24 and 25.

The water chest is divided by a partition 26, as especially shown in Figs. 1 and 4, so that two chambers are formed, one of which is an inlet chamber and the other an outlet chamber. Each of these divisions or chambers has a separate valve construction, which, while substantially the same in principle, are here illustrated as somewhat different in details of construction. Our purpose in this illustration is to show modified forms of a valve construction operating in the same way and upon the same principle. In Fig. 2, at 27, is shown a slide valve which is imperforate and which carries upwardly projecting arms 28 and 29 extending over the intervening plate 17. These arms lie in the path taken by the wings 24 and 25 as they sweep from side to side of the cylinder. These wings alternately wipe the upwardly projecting arms 28 and 29 and reciprocate the valve. The valve base is shorter than the space in which it plays.

The valve base when moved to one side slides into an opening beneath the central plate 17 uncovering an orifice of the central plate on the other side so that, as illustrated in Fig. 2, for example, the water may enter to operate the piston and force it over to the other side of the cylinder. In front of this sliding valve is a perforated plate or valve seat 30 which with the central plate 17 forms a guide for the valve. The perforations of the plate 30 correspond with those of the central plate except as indicated in Fig. 1, for example. They are not quite as large, though this detail is not of material importance. In front of the plate 30 lies a skeleton frame 31 which serves to hold in place the plate 30 and, as now to be described, serves also to maintain it in the proper position to form a base plate for the operation of the valve. The frame 31 has a central cross bar 32 against which operates the end of an adjusting screw 33. The operation of this screw upon the central plate 32 serves to precisely adjust the skeleton frame against the plate 30 so as to take up the results of any wear. In Figs. 5 and 6 the other form of corresponding valve, 34, is shown, the perforations in this case being in the valve seat so that it will operate as illustrated in Fig. 5 and bring these openings in the valve into coincidence with adjacent corresponding perforations of the central plate 17 and the plate 30.

In Fig. 6 the preferred form of the projecting arms 28 and 29 is shown, that is, as having curved faces and cut away so that they fit over the central plate 17. This is not, however, an essential construction and it may be modified in many respects without departing from the spirit of our invention.

In the operation of our motor the water is admitted into one chamber and exhausts from the other chamber. As it enters, for example, through the openings when the valve is in the position shown in Fig. 2, it forces over the piston wing 21 carrying it around to the other side. The water of the previous operation must be discharged from the opposite side of the cylinder and this is done by at the same time forcing over the valve as shown in Fig. 5 to uncover the outlet opening leading into the outlet division of the water chamber. This indicates the advantage of having these two forms of valves where in a single operation of the piston wing the inlet valve is opened on one side and the outlet valve on the other side.

As the piston wing now sweeps over to the opposite side, say, of Fig. 2, operating the shaft 12, it will at the end of its throw wipe against the arm 28 carrying the valve over to the other side and thus closing the inlet in Fig. 2, opening it in Fig. 5, and likewise governing the outlets so that the water will be entering through one division of the water chamber while exhausting through the other division.

It will be observed that in this construction we employ a simple form of slide valve and that the water chest is separated from the cylinder. We are also enabled to control the wear and tear on the valve by the simple adjustment of a screw. We can readily take apart the construction and we can reach the valve plate by simply taking off a cap. In fact, all of the parts are quickly accessible and easily replaceable. There is no loss in the operation of the valves and the action is coincident so that there is a precise relation between the inlet and outlet. It is obvious also that the parts are readily assembled. The plate 17 is put against the bottom of the cylinder with an intervening gasket. The arms 28 and 29 of one valve are slipped through to the perforations on one side of the central valve while the arms 28 and 29 of the other valve are dropped through the perforations on the other side so that these several arms face each other in pairs. The valve seat plate 30 is then put in place, it being assumed that either at this time or immediately following, the water chest 13 is screwed in place. The skeleton frame 31 is placed against the seat plate 30 and then the cap 14 is secured to the top of the water chest 13, the screws 33 either being placed on at the same time with the cap or immediately following its positioning. It is obvious that the shaft and piston may be put through one end of the cylinder, the end then being secured in place, as indicated for example, in Fig. 4. It is obvious also that all of these parts can be quickly and cheaply manufactured and that at a very small cost any one of these simple parts may be replaced.

We claim:—

1. In a hydraulic motor, the combination with a cylinder and operating parts, of a separate water chest which receives the inlet and outlet water, and slide valves between the water chest and the cylinder governing the inflow and outflow.

2. In a hydraulic motor, the combination with a cylinder and operating parts, of a water chest, valves between the cylinder and the water chest, a valve seat, a skeleton frame lying within the water chest and adjusting screws engaging the frame to regulate the position of the valve seat.

3. In a hydraulic motor, the combination of a cylinder, a central partition dividing the cylinder into chambers, slide valves governing the inlets and outlets to the cylinder and having projecting arms on opposite sides, a shaft, and a piston-wing projecting from the shaft and carrying valve operating wings for engaging the arms of the valve.

4. In a hydraulic motor, the combination

with a cylinder and operating piston, of a pair of slide valves having projecting parts against which the piston operates, one of the valves having an imperforate base, the other valve having a perforated base so that when the piston strikes against the projecting arms to slide the valves an orifice will be opened on one side and closed at the other side.

5. In a hydraulic motor, the combination with a cylinder and operating parts, of a water-chest divided into chambers, valves between the cylinder and the water-chest, a valve-seat, a frame lying within the water-chest and supporting the valve-seat, and an adjusting screw operating upon the frame to provide for wear and tear.

In testimony whereof we have hereunto signed our names in the presence of two subscribing witnesses.

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Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."