(No Model.)

H. W. FORSLAND.

HYDRAULIC MOTOR VALVE.

No. 417,716. Patented Dec. 24, 1889.

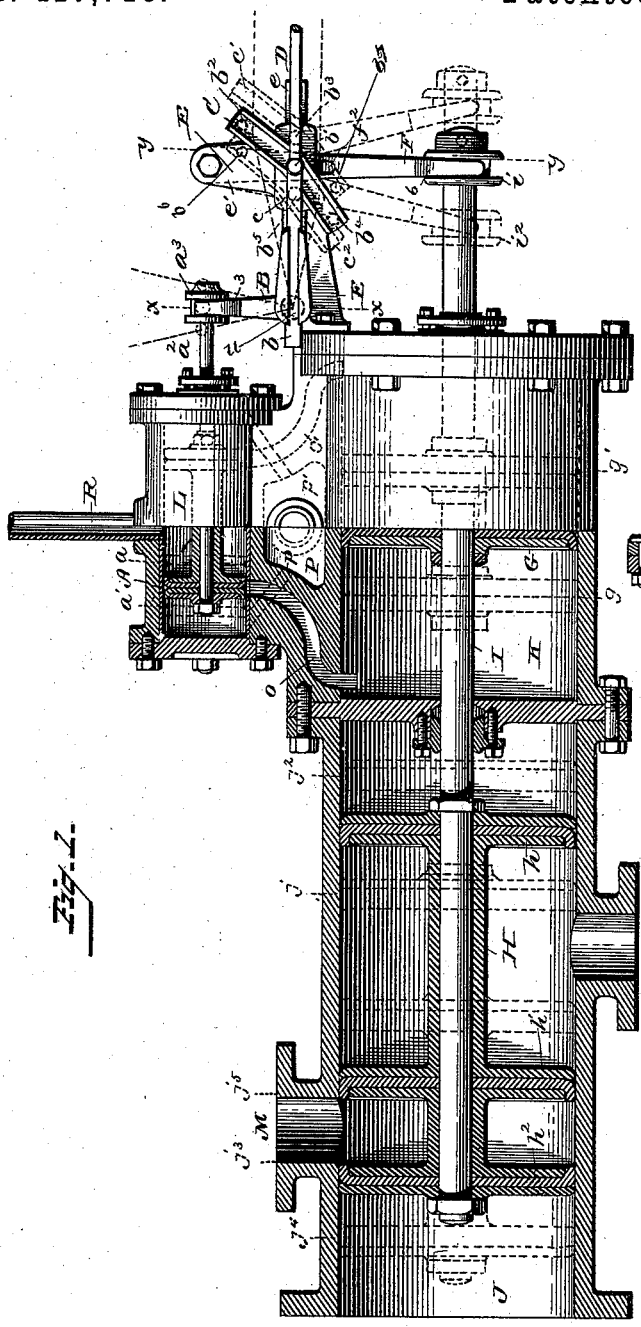

Fig. 1.

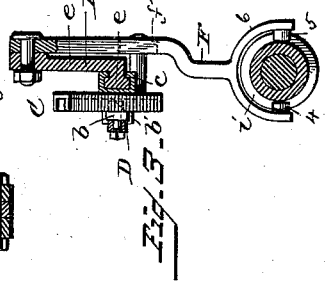

Fig. 3.

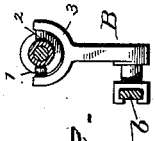

Fig. 2.

Witnesses

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HUGO W. FORSLAND, OF CHICAGO, ILLINOIS.

HYDRAULIC-MOTOR VALVE.

SPECIFICATION forming part of Letters Patent No. 417,716, dated December 24, 1889.

Application filed March 18, 1889. Serial No. 303,749. (No model.)

To all whom it may concern:

Be it known that I, HUGO W. FORSLAND, a citizen of the United States, and a resident of the city of Chicago, county of Cook, and State of Illinois, have invented new and useful Improvements in Hydraulic-Motor Valves, for which I desire to secure Letters Patent, and of which the following is a specification.

My invention relates to the auxiliary valve controlling the motor for operating the main hydraulic valve; and it consists in the use of a packed and balanced valve in connection with a stop device which will automatically secure absolute certainty of action of the main valve.

In the accompanying drawings, which are made a part of this specification, Figure 1 represents a longitudinal sectional view, partly in elevation, of the main valve of a hydraulic motor, of the piston by means of which it is operated, and of the auxiliary valve controlling the actuating-piston, together with the device for operating the auxiliary valve. Figs. 2 and 3 show details of the device for controlling the action of the auxiliary valve.

I have not deemed it necessary to show either the hydraulic motor or the means of connecting the valve device with the elevator-carriage when used in connection with an elevator, as neither of them come within the scope of my invention, which is applicable to the usual forms of construction of these parts.

In the drawings a valve controlling the hydraulic motor is represented for the purpose of better illustrating my invention, though the invention is equally applicable to any other form of valve. Within the valve-cylinder J is fitted the balanced piston-valve H, consisting of the disks $h\,h'\,h^2$, the entire valve being carried upon the stem I.

N is the service-pipe.

M is the port communicating with the hydraulic motor.

The cylinder J is open at its outer end for the purpose of permitting the discharge of the waste water.

The drawings represent the valve H as being upon the center—that is, both the induction and eduction being cut off and the motor being stationary. If the valve H is moved toward the outer end of the cylinder J, the disk h' ceases to cut off connection between the ports N and M, and full connection is established between said ports when the disks h, h', and h^2 reach the points indicated, respectively, by $j\,j^3\,j^4$. The motion of the motor is reversed by moving the valve H to the inner end of the cylinder J, so that the disks h h^2 reach the points, respectively, j^2 j^5. The movement of the valve H is secured by the operation of the piston G within the cylinder K, which is actuated by water admitted through the channels O and o', said channels serving alternately for the purposes of induction and eduction, and for the latter purpose communicating with the waste-chamber P through the channels $p\,p'$.

The auxiliary valve consists of the cylinder L, connected at each end with the corresponding ends of the cylinder K by channels O and o'. Within the cylinder L is fitted a packed and balanced piston-valve A, consisting of two disks exactly the same distance apart as the channels O and o', carried upon a stem a^2. Between the disks of the valve A is the service-pipe R. In any suitable position, as P, is located a discharge-chamber connected with each end of the cylinder L by suitable channels p and p'.

With the valve A in the position as shown, all communication between the cylinder K and the service-pipe R and discharge-chamber P is cut off, and the piston G and valve H are necessarily stationary. When the valve A is moved to the position indicated by a', pressure is communicated to the piston G through the channel O, and the corresponding channel O′ serves as a discharge-pipe, and the main valve H is moved so that h^2 reaches the position indicated by j^5. When the valve A is carried to the position indicated by a, the movement of the piston G is reversed. The outer end of the valve-stem a^2 is provided with a grooved collar a^3, which receives the studs 1 and 2 upon the yoke 3 of the bell-crank B. (Shown in Fig. 2.) This bell-crank is pivoted, as shown by dotted lines at u, to the standard E, which is firmly attached to the end of the cylinder K. The second arm of the bell-crank B is slotted to

receive the sliding bar b, which is connected by a pivot-joint to the rod D, by which the device is controlled by the operator.

The cam C, adjusted at an oblique angle to the bar b, slides upon the arm e of the standard E, being carried by the sliding guide c, of which it forms an integral part. This cam C receives the roller b', which is carried upon the pin, pivotally uniting the bar b and the rod D, and thereby actuates the bell-crank B and the valve A when the rod D is withdrawn or receives an inthrust. The guide c is secured to the lever F, so as to slide freely in the slot f^2, the lever F being pivoted at one end to the arm e' of the standard E and connected at the other end with the valve-stem I by means of the yoke 6, carrying the studs 4 5, which slide within the groove of the collar i.

The drawings represent the entire valve scheme in position to bring the motor to a stop. When applied to an elevator, should it be desired to raise the cab the bar b is forced into the bell-crank B, and by this movement the roller b' is carried to the end of the cam C to the point indicated by b^4, the bell-crank B being correspondingly moved, so as to draw out the valve-stem a^2, thus bringing the valve A to the position shown at a.

The piston G is carried to the position indicated by g, and the valve H is correspondingly moved, connection being thus opened between the ports N and M. As the piston G moves toward g the collar i is carried toward the position indicated by i^2, moving the lever F with it, whereby the cam C is carried toward the position indicated by c^2. This movement of the cam necessarily brings the roller b' back to the center of the cam, as indicated by b^5, thus restoring the bell-crank to the position as shown in the drawings, and bringing the auxiliary valve A to the center, as shown, shutting off both the induction to and eduction from the cylinder K, holding the piston G securely at g and maintaining the pressure through the ports N and M until the operator again moves the auxiliary valve by means of the rod D.

When the elevator is ascending and the cam C is in the position marked c^2, if the bar D be raised to stop the movement of the elevator the roller b' will be carried to a point b^6 in the position C^2 of the cam C; and, likewise, if the cam C is in position c' and the elevator descending the movement of the bar D will carry the roller b' to a point b^7 in the position c' of the cam.

The elevator is stopped by withdrawing the rod D, so as to carry the roller b' to the position indicated by b^6. This movement by the action of the bell-crank B moves the valve A to the position indicated by a', and the piston G is carried toward the line g'. When it has reached the position as shown in the drawings, the action of the cam will have restored the valve A to the position as shown, and the movement is stopped. The elevator is lowered by again withdrawing the rod D, so as to force the roller b' to the point b^2, by which action the piston G is carried on toward the line g', and when it reaches that point the cam C will have been carried to the position indicated by c', the roller b' to the point marked b^3, bringing the valve A again to the center, securely holding the piston G at g' and continuing the port M in connection with the open end of the cylinder J. The elevator is again brought to a stop by driving in the bar b until the roller b' reaches the point indicated by b^7, so that the valve A is brought to the position a, and the piston G and valve H are moved to the position as shown in the drawings, when the valve A will have been returned to its center, as shown.

It will be seen that by the automatic action of my device the auxiliary valve is invariably returned to its central position after every movement of the operating-rod D, and the operator can at will attain either the maximum speed of the motor or any less degree of speed he may desire, and that the initial speed will be automatically maintained until further movement of the rod D by the operator.

I claim—

1. In combination with the auxiliary valve of a hydraulic motor, an actuating bell-crank, a slide-bar carried by and longitudinally movable in the free or power-receiving arm of the bell-crank, and a cam set obliquely to the slide-bar and engaging it by means of a suitable stud and roller, whereby a lateral movement is imparted to said slide-bar, and thence to the arm of the bell-crank, when the slide-bar is given a forward or backward thrust, substantially as described, and for the purpose set forth.

2. In combination with the auxiliary valve of a hydraulic motor, an actuating bell-crank, a slide-bar carried by and longitudinally movable in the free or power-receiving arm of the bell-crank, and a cam set obliquely to the slide-bar and engaging it by means of a suitable stud and roller and sliding upon a fixed standard in line of the direct thrust of the slide-bar, whereby a lateral movement is imparted to the said slide-bar and communicated to the arm of the bell-crank by the backward or forward movement of either the cam or the slide-bar, substantially as described, and for the purposes set forth.

3. In combination with the auxiliary valve of a hydraulic motor, an actuating bell-crank, a slide-bar carried by and longitudinally movable in the free or power-receiving arm of the bell-crank, a cam set obliquely to the slide-bar and engaging it by any suitable means and sliding upon a fixed standard in line with the direct thrust of the slide-bar, whereby a lateral movement is imparted to the slide-bar and communicated to the arm of the bell-crank by the backward or forward movement of either the cam or the slide-bar, and a swing-

ing lever pivotally fulcrumed in a fixed standard and engaging with and moved by the stem of the main valve of the hydraulic motor, and being pivotally attached to and carrying said cam, substantially as and for the purposes described.

4. In combination with the actuating-piston of the main valve of a hydraulic motor and with its auxiliary valve, the bell-crank B and slide-bar *b*, the standard E, the lever F, having one of its ends pivotally attached to said standard and its opposite end engaged in the collar *i* of the valve-stem I, and the cam C, sliding upon the arm *e* and carried by the lever F and engaging, by a suitable projecting pin, the slide-bar *b*, all substantially as described.

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Witnesses:
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