(No Model.)

F. B. GRAVES.

VALVE MECHANISM FOR HYDRAULIC MOTORS.

No. 532,456. Patented Jan. 15, 1895.

Fig. 1.

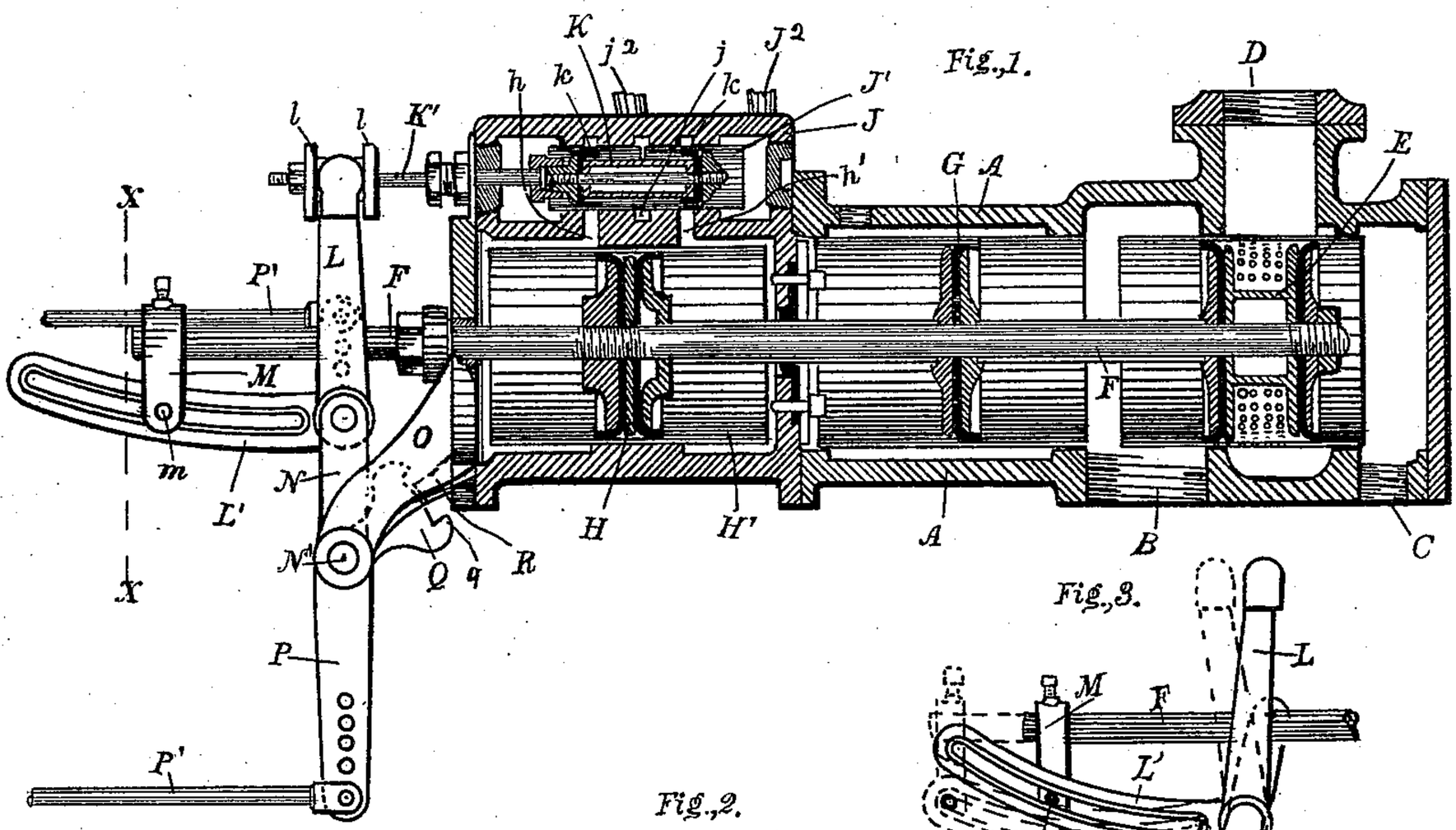


Fig. 2.

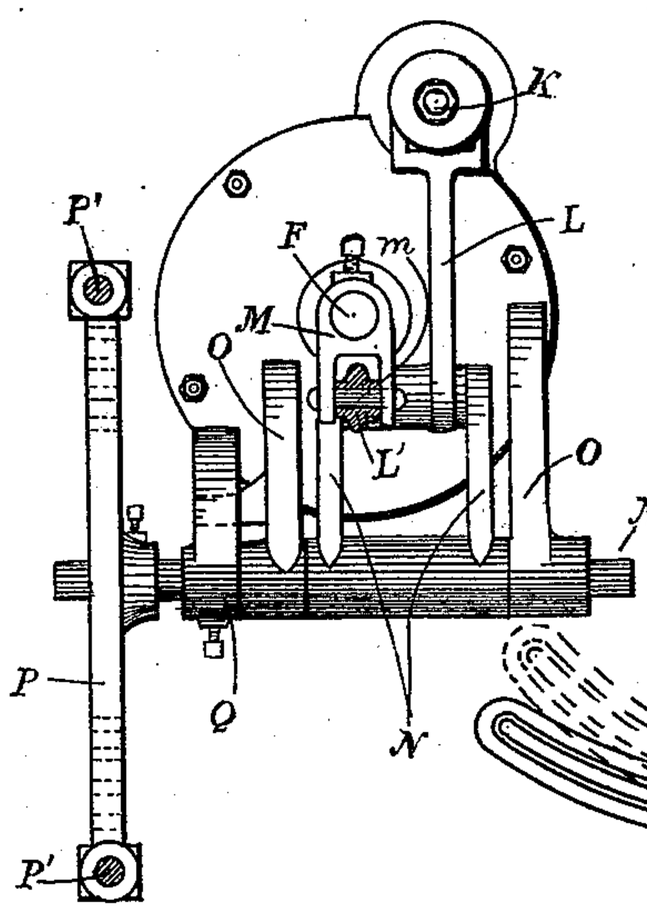


Fig. 3.

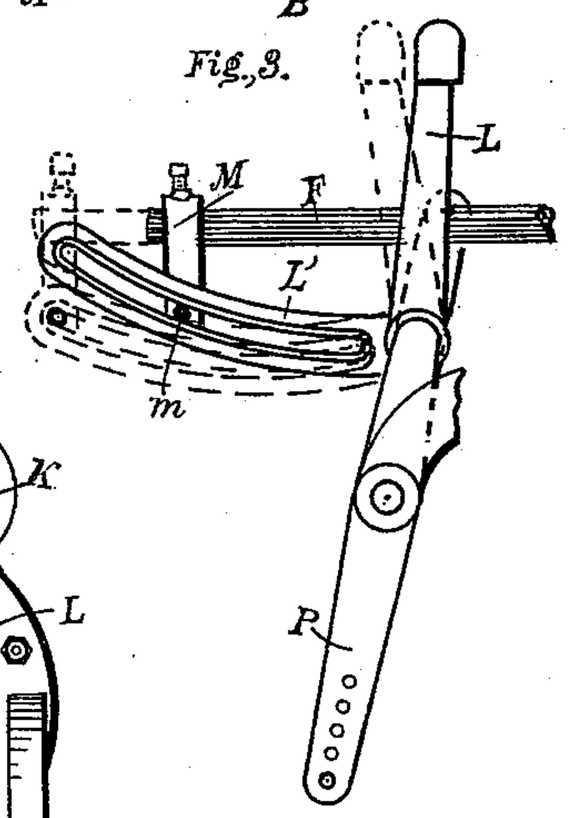
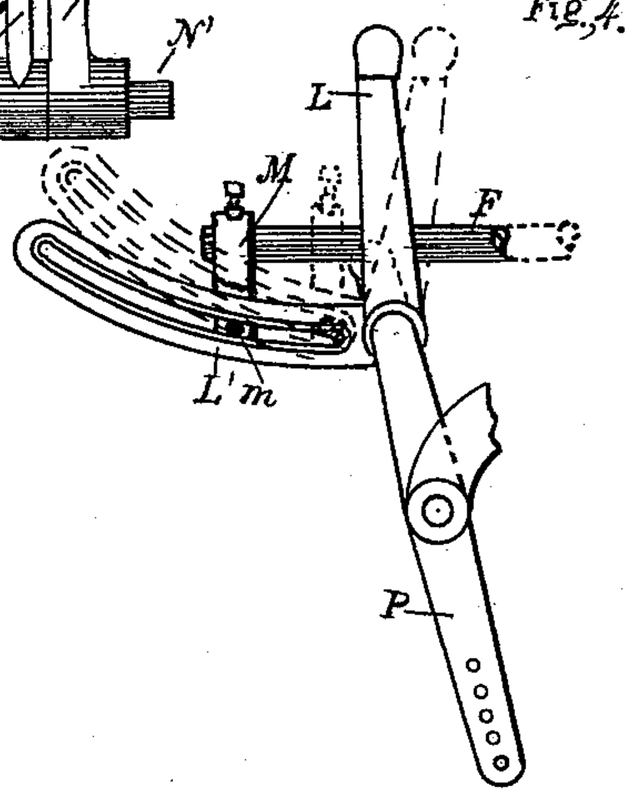


Fig. 4.



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VALVE MECHANISM FOR HYDRAULIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 532,456, dated January 15, 1895.

Application filed October 31, 1894. Serial No. 527,543. (No model.)

To all whom it may concern:

Be it known that I, FRED B. GRAVES, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Valve Mechanism for Hydraulic Motors; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-letters marked thereon.

My present invention has for its object to provide an improved mechanism for controlling a piston and particularly one serving to actuate the main valve of hydraulic engines, and readily adapted for use in connection with hydraulic elevators, whereby when the operator in a traveling elevator car adjusts his operating cable or controlling device, the auxiliary valve will be first moved to the proper position to admit pressure to or relieve it from the piston controlling the main valve, and whereby after the main valve has reached the position desired, the auxiliary valve will be operated automatically to cut off the pressure from the piston controlling said main valve, and the invention consists in an improved construction whereby these operations may be carried out, all as will be hereinafter fully described and the novel features pointed out in the claims at the end of this specification.

In the drawings: Figure 1 is a sectional view of an elevator controlling valve and its operating piston, and the auxiliary valve, the operating mechanism for the valve being shown in elevation; Fig. 2, a sectional view on the line *x*—*x* of Fig. 1, looking toward the right; Fig. 3, a detail view showing in full lines the position in which the auxiliary-valve operating-lever is adjusted when it is desired that the controlled piston should move in one direction, and in dotted lines the position which it assumes after the controlled piston has been operated the required distance; Fig. 4, a similar view showing the parts when the auxiliary valve is to be moved in the opposite direction to that shown in Fig. 3.

Similar reference letters indicate similar parts.

It is, of course, obvious that the valve mechanism for controlling the movement of pistons, which are automatically cut off after said pistons have been moved the required distance, may be used in connection with a variety of apparatus, but I have preferred to show it in connection with a main valve controlling the operation of a hydraulic elevator, and in Fig. 1 of the drawings I have shown such a main valve, the casing of which is indicated by A,—B indicating the liquid inlet port, C the exit port and D the port or passage leading to the motor cylinder.

E indicates the double piston elevator valve, which may be of the ordinary or any preferred construction, connected to a piston rod F having also secured to it a balancing piston G, one side of which is subjected to liquid under pressure entering the inlet port B. Secured to said piston rod F is a piston H operating in a cylidder H′ for causing the movement of the piston rod F by the admission of fluid to and the exhaust from opposite sides of said piston. Upon the cylinder H′ is secured a valve chest J having a suitable lining J′, as usual, and from this valve chest ports *h*, *h*′, lead into the main cylinder, *j* indicating the inlet port to which pressure is admitted through a pipe j^2.

K indicates the auxiliary valve secured to a valve stem K′ and consisting preferably of two cup leathers *k* arranged when the valve is in normal position to cover ports *h*, *h*′, the interior of the valve casing J communicating with the exhaust pipe J^2. The outer end of the auxiliary valve stem K is provided with washers *l* between which operates the yoked upper end L of a bell-crank lever, the other arm L′ of which is extended outward and provided with a curved portion, in the present instance in the form of a slot, within which operates a pin *m* on an arm M adjustably secured to the outer end of the piston rod F. This bell-crank lever is pivoted to the upper end of a double arm N secured rigidly to a rock-shaft N′ journaled in suitable brackets O fastened to the end of the cylinder, and also secured to the rock-shaft N′ is a lever P preferably extending in opposite directions from the shaft, and to its ends are connected the pull rods or cables P′ controlled by the operator in the car, as will be described. Also

secured to the rock-shaft N′ is an arm Q having lugs *q* adapted to co-operate with a stop or projection R fastened to the cylinder and thereby limit the movement of said rock-shaft.

In Fig. 1 of the drawings, the parts are shown in their normal position, that is, the piston H is midway of its stroke, the main valve is closed, and the auxiliary valve is closed, and the pin on the arm M attached to the main piston is practically midway of the curved slot in the arm L′ of the bell-crank lever. If, now, the operator desires to move the main valve to the left, thereby connecting the cylinder port D′ with the exhaust port E, he pulls the lower rod or cable P′, turning the levers P, N, and L to the position shown in full lines in Fig. 3, which will cause the inward movement of the auxiliary valve piston, and said auxiliary valve will connect the inlet port *j* with the port *h′* in the cylinder, admitting pressure to the rear of the piston H and allowing the exhaust through the port *h*. As the piston rod F moves outward, the arm M operating on the bell-crank lever L, L′, moves it to the position shown in dotted lines in Fig. 3, thereby closing the auxiliary valve and holding the piston H in the position desired, the amount of movement given to the auxiliary valve determining the amount of movement of the piston-rod F. When it is desired to move said piston H in the opposite direction, it may be moved by pulling on the upper rod or cable P drawing the parts to the position shown in full lines in Fig. 4, and when the proper amount of movement has been caused, the bell-crank will be turned to the position shown in dotted lines in said figure, thereby cutting off the pressure from the piston, the amount of movement of the main piston H being in both instances governed by the amount of movement of the lever P.

As far as the construction of the main elevator valve operating devices and their control by the piston H are concerned, it is immaterial what form of main valve is employed, and also how the pressure is admitted to said piston H, as for instance, such a valve arrangement as is shown in Letters Patent No. 519,638 might be used, in which the rod operating the elevator-controlling valve is operated by pistons having differential areas.

The valve J is particularly advantageous in connection with a device of this character, because the pressure is admitted between the two cup leathers *k* thereon and the exhaust is at the outer ends of the cylinder. Consequently if there is any leakage past said cup leathers, the main piston H will not be actuated, but the fluid leaking by will pass directly into the exhaust so that there is no possibility of the main valve being operated by leakage sufficient to cause the elevator car to "creep."

I find in practice that the devices just described are admirably adapted for the purpose and that in use upon elevators, the car responds quickly to the slightest movement of the controlling device connected to the lever P, and that the speed of the car can be regulated to a nicety, the main valve being operated just the required distance and the power cut off as soon as it has moved this distance.

I claim as my invention—

1. The combination with the main cylinder, the piston, the piston rod and the valve controlling said piston, of the pivoted lever connected at one end to the valve and having the curved portion engaged by the piston rod, and the movable support on which said lever is pivoted, substantially as described.

2. The combination with the main cylinder, the piston and the valve controlling said piston, of the pivoted bell-crank lever connected to the valve on one side of its pivot and having the curved portion on the other side of its pivot, and the movable support for the pivot of said bell-crank lever, substantially as described.

3. The combination with the main cylinder, the piston, the piston rod and the valve controlling said piston, of the pivoted lever connected at one end to the valve, and having the curved arm engaged by the piston rod, the rock-shaft having the arm supporting the pivot of the lever, and means for rocking said shaft, substantially as described.

4. The combination with the main cylinder, the piston, and the valve controlling said piston, of the pivoted bell-crank lever, one arm being connected to the valve and the other provided with the slot, the rock-shaft having the arms carrying the pivot of the bell-crank lever, the lever on the rock-shaft, and the pull-rods or cables connected thereto, substantially as described.

5. The combination with the main cylinder, the piston, the piston rod, and the valve controlling said piston, of the pivoted lever connected to the valve and having the slotted arm, the adjustable arm on the piston engaging the slotted arm of the lever, the rock-shaft and the arms thereon on which the lever is pivoted, the stops on the rock-shaft, and means for rocking said shaft, substantially as described.

6. The combination with the main cylinder, the piston, the piston rod, of the valve chest, and the valve operating therein, of the cylinder head, the rock-shaft mounted thereon, the bell-crank lever mounted on the rock-shaft having the arm engaging the valve, and the slotted arm engaged by the piston rod, substantially as described.

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