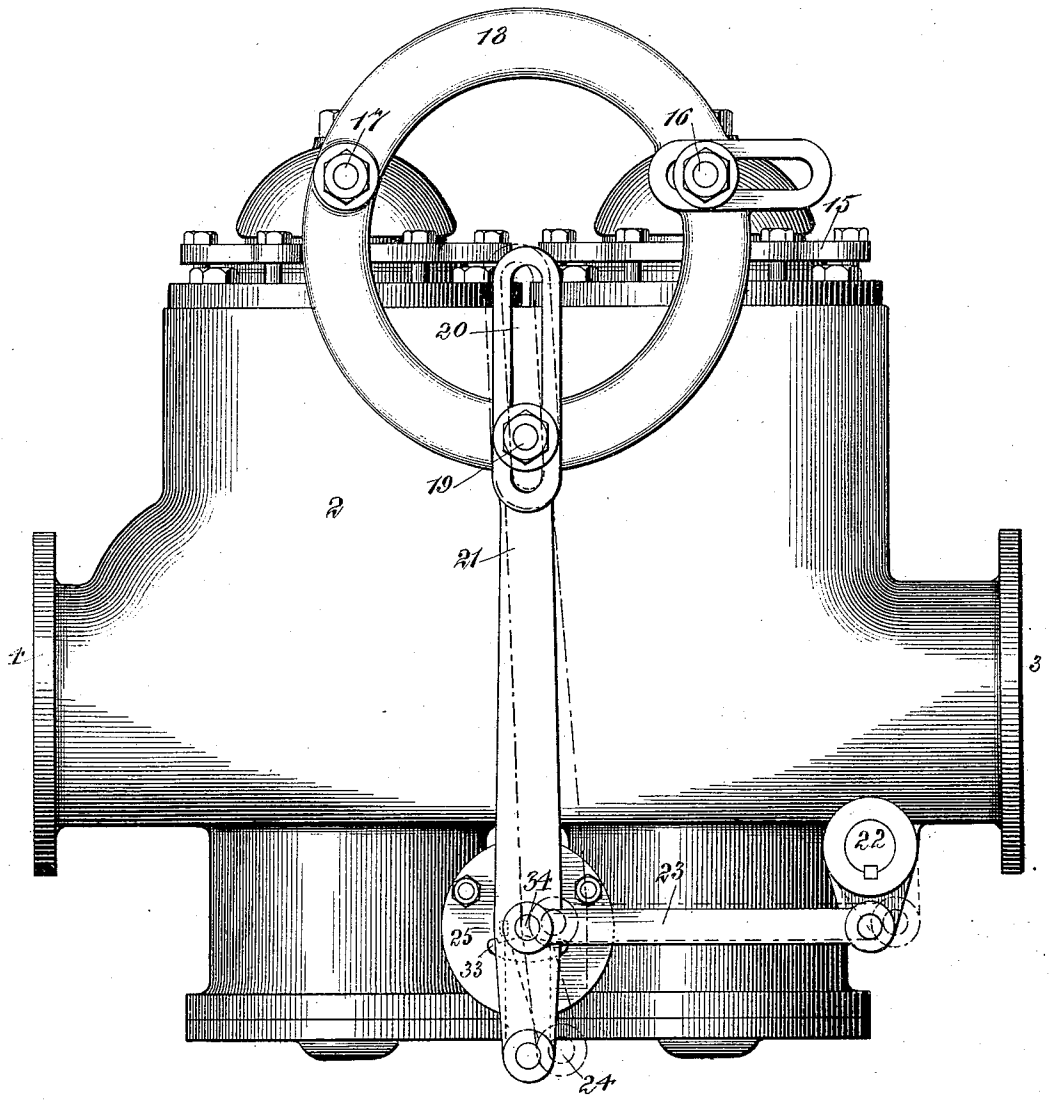
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T. W. HEERMANS.

HYDRAULIC VALVE.

No. 396,206. Patented Jan. 15, 1889.

Fig. 1.



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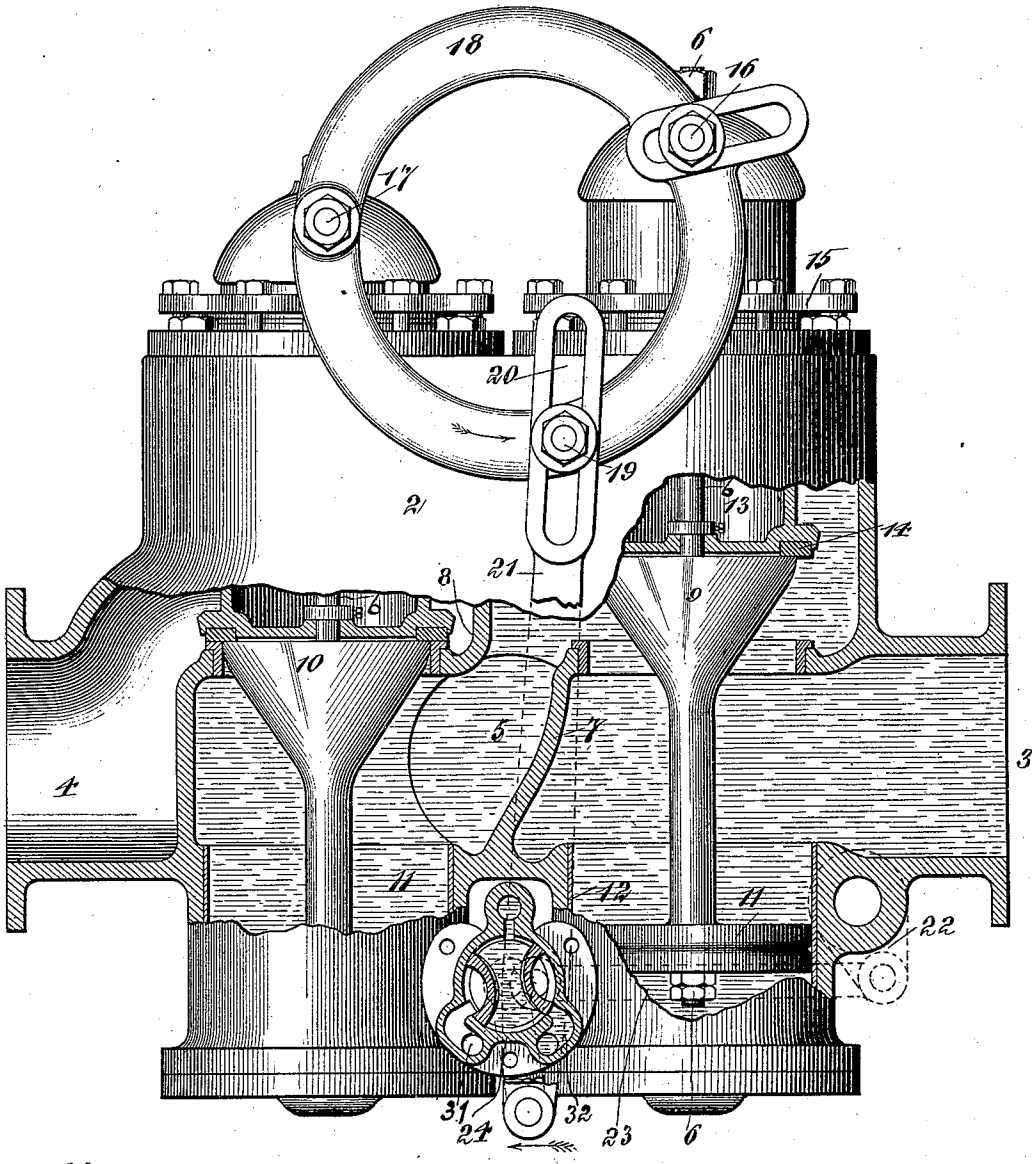
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Fig. 2.



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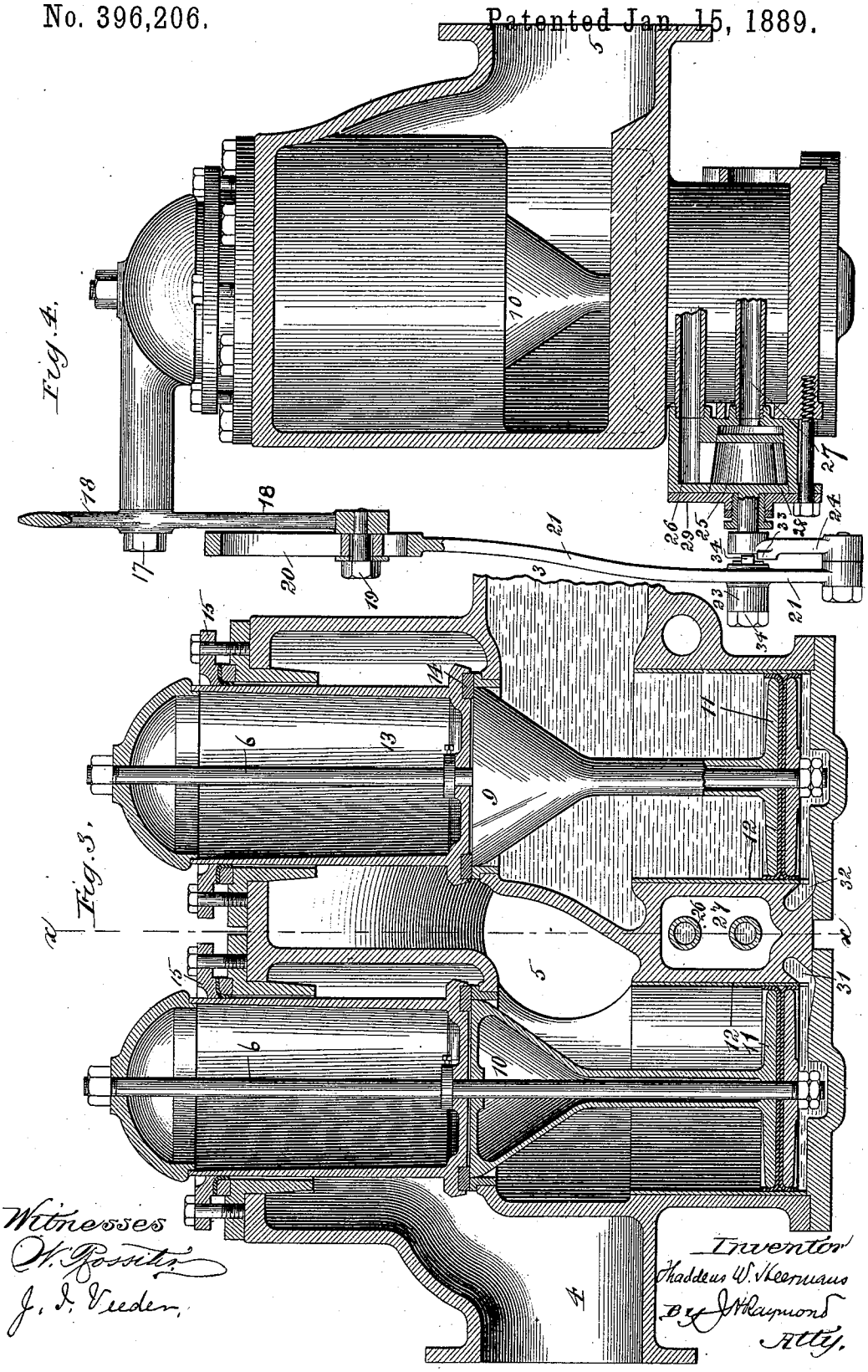
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HYDRAULIC VALVE.

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Fig. 5.

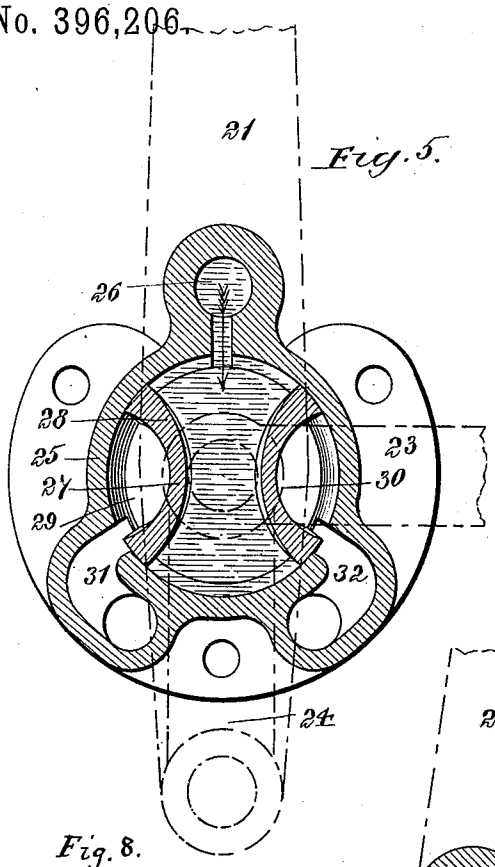


Fig. 6.

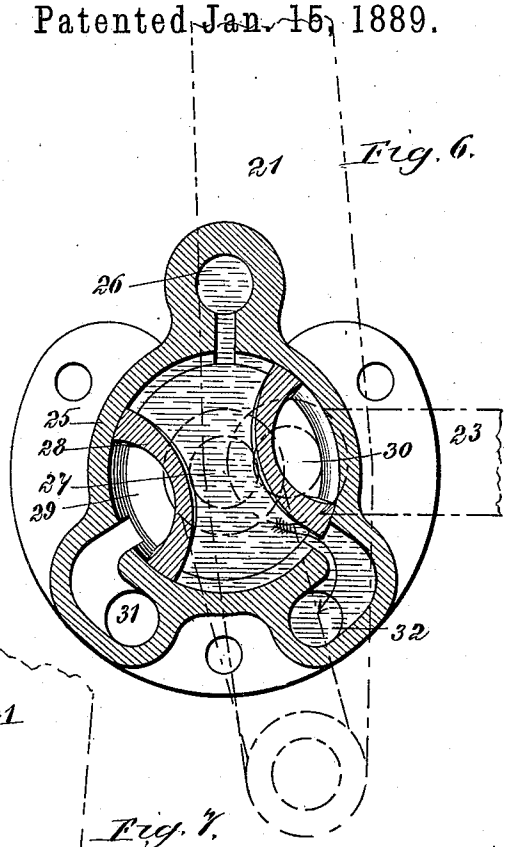


Fig. 8.

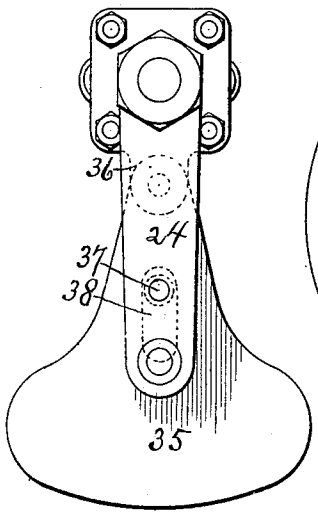
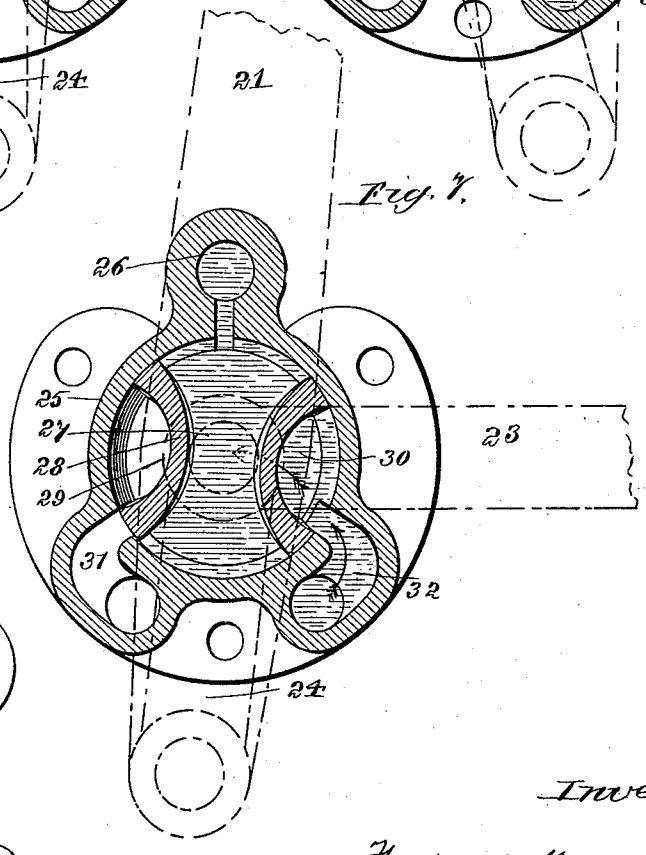


Fig. 7.



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UNITED STATES PATENT OFFICE.

THADDEUS W. HEERMANS, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE CRANE ELEVATOR COMPANY, OF ILLINOIS.

HYDRAULIC VALVE.

SPECIFICATION forming part of Letters Patent No. 396,206, dated January 15, 1889.

Application filed June 22, 1888. Serial No. 277,904. (No model.)

To all whom it may concern:

Be it known that I, THADDEUS W. HEERMANS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hydraulic Valves, of which the following is a specification.

My invention relates to the class of valves in which the main valve is actuated by the pressure of the water or other motor fluid, the operation of the latter upon the main valve being controlled by an auxiliary or pilot valve, the auxiliary or pilot valve being shifted by any means suited to the situation in which it is used. In valves of the class named a piston-valve or its equivalent has been used for a main valve, and has been so arranged that the exhaust on the one hand or inlet on the other was opened as the valve was moved to one side or the other of its central position. It is evident, however, that a single direct-seated valve cannot control both the inlet and exhaust, and therefore the purpose of my invention is to so combine two direct-seated valves that they may be operated in a practical manner by a single auxiliary pilot-valve, thus combining the quickness and freedom of action of the direct-seated valve with the well-known advantages of the use of a pilot-valve, while preserving the connection between the main and pilot valves, so that the latter valve is closed by the movement of the main valve when the desired amount of opening is attained.

I have designed my valve chiefly for use in connection with hydraulic elevators, and the pilot-valve in such a case is shifted by the attendant upon the elevator-car through the intervention of any of the devices known in this art. I prefer, however, some of the devices which will permit the attendant to control positively the amount of movement imparted to the pilot-valve irrespective of the movement of the car, of which devices United States Letters Patent No. 317,202, granted May 5, 1885, to George H. Reynolds, shows one type.

My invention consists in the parts and combinations hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation, the inlet and exhaust valves both being closed. Fig. 2 is a side view, the casing being broken away and the inlet-valve being raised. Fig. 3 is a vertical central section. Fig. 4 is a vertical cross-section on line *x x*, Fig. 3. Figs. 5, 6, and 7 are sections of the auxiliary or pilot valve, showing it in various positions corresponding to the different positions of the main valve shown in the preceding figures. Fig. 8 shows a safety-weight applied to the auxiliary valve.

2, Figs. 1 and 2, is the valve-casing. 3 is the inlet and 4 the exhaust passage, and 5 the opening leading to the cylinder. Partitions 7 and 8 divide the space within the casing into three parts corresponding to the passages just named, and valves 9 and 10 govern the communication of the inlet and exhaust passages, respectively, with the cylinder-passage.

As the valves 9 and 10 are alike, only one need be described. Connected to the stem of valve 9 is a piston, 11, which moves in the cylindrical part 12 of the casing 2. The piston is exposed to the same pressure of water as the valve 9, and is of somewhat greater area. A cylindrical extension, 13, of the valve 9 projects through the casing 2, and a cupped leather or other water-tight joint at 15 prevents leakage around the same. The cylindrical extension 13 is about the same diameter as the valve-seat and valve 9, so that the balance of pressure between the valve and its piston 11 shall be nearly the same whether the valve be open or shut. A bolt, 6, extends from end to end and holds all the parts of valve 9 together.

From the parts of valves 9 and 10 outside the case 2 project the studs 16 and 17, upon which the tilting lever 18 is hung. The lever 18 carries a stud, 19, out of line with the other two studs 16 and 17. The lever 18 is here shown as a ring; but any other form would suffice which would include the three points 16, 17, and 19. One of the studs 16 and 17 must work in a slotted bearing, for obvious reasons. The lever 21 (which I call a "floating" lever because in operation it shifts bodily from side to side, and it may occupy innumerable intermediate positions) has a slot, 20, in its upper end, in which the stud 19 may move. The opposite end of lever 21 is pivoted to the crank-arm 24 of the pilot-valve 25. At an intermediate point, 34, of its length the lever 21 is connected by a link, 23, to the rocker-arm 22, the last-named being placed by any suitable gear, as before mentioned, under the control of the operator or attendant.

The structure of the valve 25 will appear from Figs. 4 and 5.

An inlet-pipe, 26, admits water under pressure to the side of the valve-casing 25, and an exhaust-pipe, 27, is attached to the bottom of same.

The plug 28 of the valve is hollow and its interior is filled with water from the pipe 26. Its sides are grooved at 29 and 30, and it does not extend to the bottom of the valve-case, so that a clear passage is afforded from its grooved sides to the exhaust-pipe 27. Ports 31 and 32 in the side of the valve-casing 25 lead to the spaces beneath the pistons of the main valves 10 and 9, respectively. (See, also, Figs. 2 and 3.) The spacing of the ports 31 and 32 is such that water cannot be admitted to either port without exhausting the water from the other, as will hereinafter appear in the description of the operation. Upon the hub end of the crank-arm 24 are hooked projections 33 33, which, by the revolution of the crank-arm 24, are brought into the line of travel of the projecting end of the stud 34, thereby limiting the movement of the floating lever 21 and the crank-arm 24.

In Fig. 8 is shown a weight, 35, pivoted to a lug, 36, on the valve-casing 25, and connected by a stud and slot, 37 and 38, to the crank-arm 24. The purpose of this weight is to bring the pilot-valve to its central position, and thereby close both main valves in case any of the connections operating the valve should break.

The operation is as follows: When the rocker-arm 22 is in its middle position, as shown in full lines in Fig. 1, the pilot-valve 25 is also central, as shown in section in Fig. 5. If the rocker-arm is moved to the position shown in dotted lines in Fig. 1, the pilot-valve will assume the position shown in Fig. 6, and water will be admitted beneath the piston 11 of valve 9, which will begin to rise. The rise of valve 9 will carry the lever 18 in the direction indicated by the arrow, Fig. 2, thereby causing the floating lever to turn on the pivot 34 at the end of link 23 as a fulcrum, its lower end moving in the direction of the arrow at the bottom. The attached crank-arm 24 gradually closes the pilot-valve 25, and by the time the main valve has reached the position shown in Fig. 2 the admission of water beneath the piston 12 has been cut off and the main valve brought to rest.

It is evident that if less than its full opening is given the pilot-valve it will be closed by a small rise of the main valve, the degree of such opening being thus completely in the control of the operator.

Throwing the rocker-arm in the opposite direction to that just described causes the pilot-valve to assume the position shown in Fig. 7 and allow the water to escape from beneath the piston of valve 9, the greater area of said piston compelling the valve to seat itself.

It is obvious that the rising-and-falling movement of the valves 9 and 10 could be made to operate upon the pilot-valve through a set of levers differing in arrangement from those shown in the drawings. Many such arrangements will occur to the skilled mechanic; but the essential feature of my invention is the connecting of two direct-seated valves to the pilot-valve in such a manner that while they are free to move separately from each other they are nevertheless mutually dependent upon each other, and are governed by a single pilot-valve, which function is essentially dependent on the lever 18, which is pivoted to both main valves, each pivot acting in turn as a fulcrum while the opposite valve is in motion.

I claim—

1. The combination, in a hydraulic-valve apparatus, of two valves, a lever-fulcrum to both said valves, a pilot-valve, and a floating lever having a movable fulcrum and operating the pilot-valve and connected to the first-named lever, substantially as described.

2. The combination of two valves, one controlling the inlet and the other the exhaust opening, pistons connected to said valves, a lever fulcrumed to both said valves, a pilot-valve controlling the admission of water to said pistons, and a floating lever having a movable fulcrum and operating said pilot-valve and connected to the first-named lever, substantially as described.

3. The combination of the casing 2, divided by the partitions 7 and 8 into three chambers communicating with the inlet 3, cylinder-opening 5, and exhaust 4, respectively, the valves 9 and 10, seating in said partitions, the pistons 11, connected to said valves, the pilot-valve 25, admitting water to said pistons, the lever 18, connected to pistons 9 and 10, the floating lever 21, connected to the lever 18 and the valve-arm 24, and having the movable fulcrum 34, substantially as described.

4. In a hydraulic motor for elevators, the combination, with the inlet and exhaust valves and fluid-motors for operating them and an oscillating pilot-valve for controlling the flow of fluid to said motors, of a lever having suitable pivoted connections with said inlet and exhaust valves, said connections serving alternately as fulcrums for the lever as the valves are moved, a floating lever pivoted at one end to the piston-valve to oscillate it and connected at its other end to the first-named lever by a pivotal connection constructed to permit an independent longitudinal movement of said floating lever, and a connecting-rod to which power is applied, attached to the floating lever between the ends of the floating lever and engaging stops connected to the pilot-valve and the floating lever to limit their relative movements, substantially as described.

Witnesses: THADDEUS W. HEERMANS.
J. I. VEEDER,
P. H. T. MASON.

Correction in Letters Patent No. 396,206.

It is hereby certified that in Letters Patent No. 396,206, granted January 15, 1889, upon the application of Thaddeus W. Heermans, of Chicago, Illinois, for an improvement in "Hydraulic Valves," an error appears in the printed specification requiring correction, as follows: In line 86, page 2, the compound word "lever-fulcrum" should read *lever fulcrumed;* and that the Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 22d day of January, A. D. 1889.

[SEAL.]

D. L. HAWKINS,
Assistant Secretary of the Interior.

Countersigned:

BENTON J. HALL,
Commissioner of Patents.