(No Model.) 2 Sheets—Sheet 1.

W. P. GIBSON.

VALVE MECHANISM FOR ELEVATORS.

No. 412,327. Patented Oct. 8, 1889.

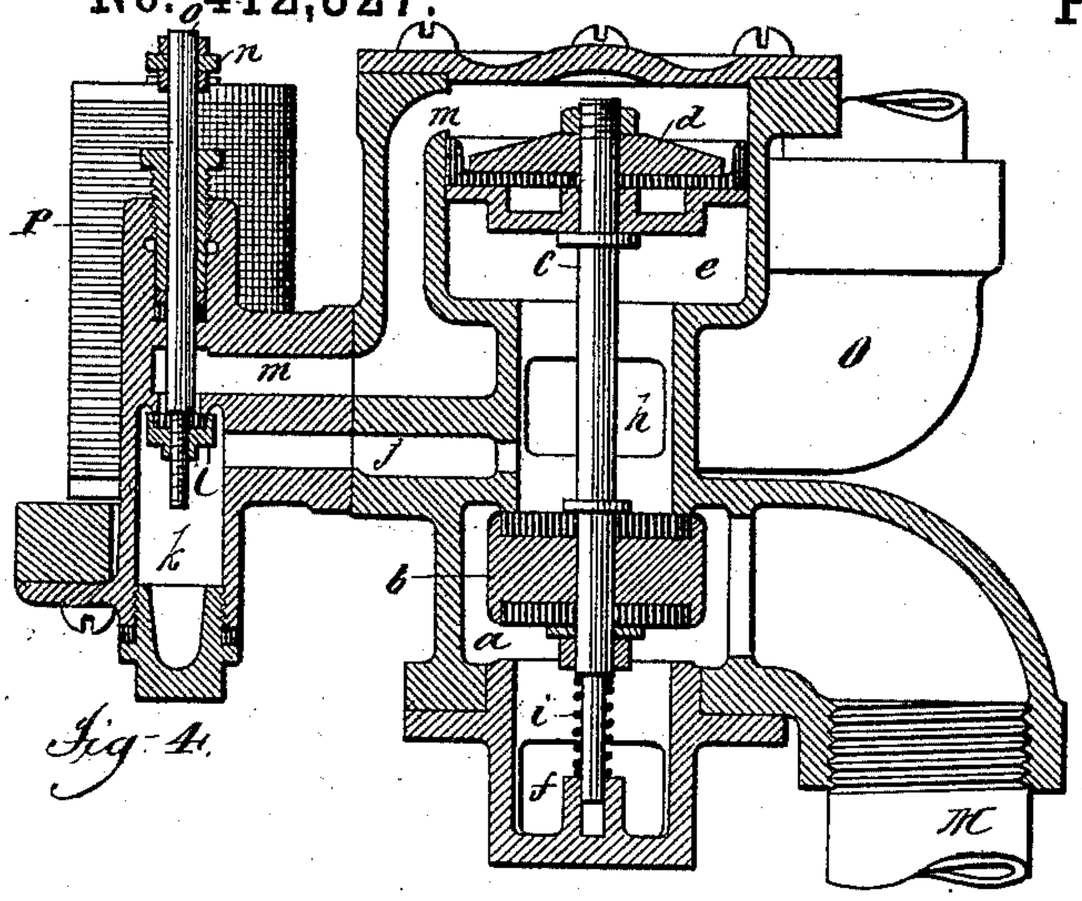


Fig. 4.

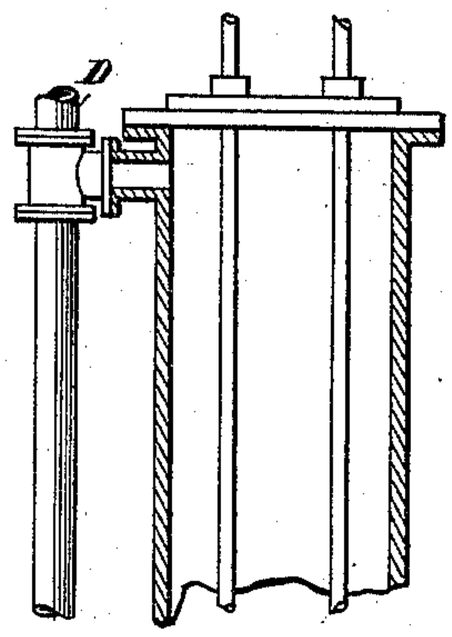
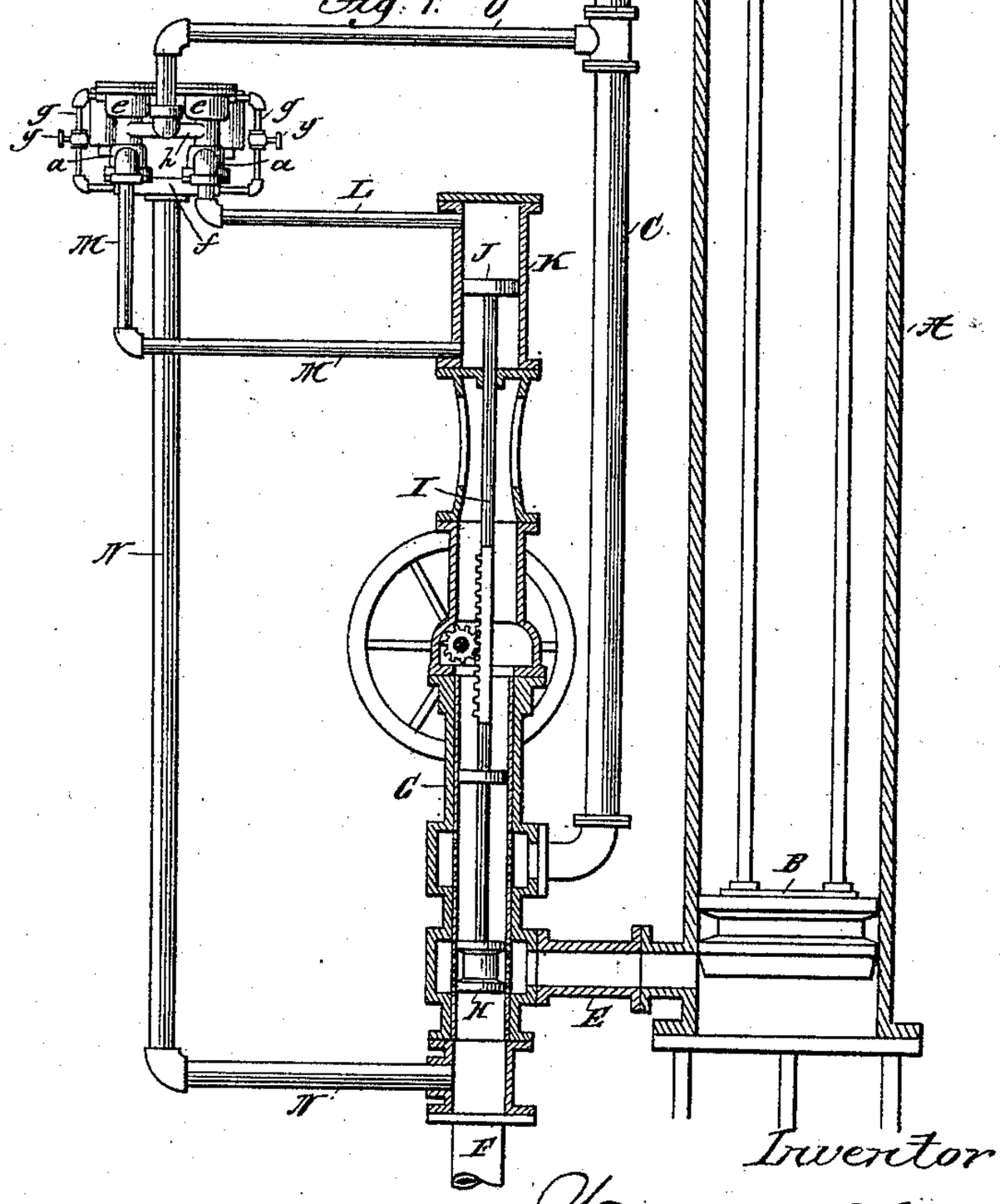


Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

W. P. GIBSON.

VALVE MECHANISM FOR ELEVATORS.

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Fig. 2.

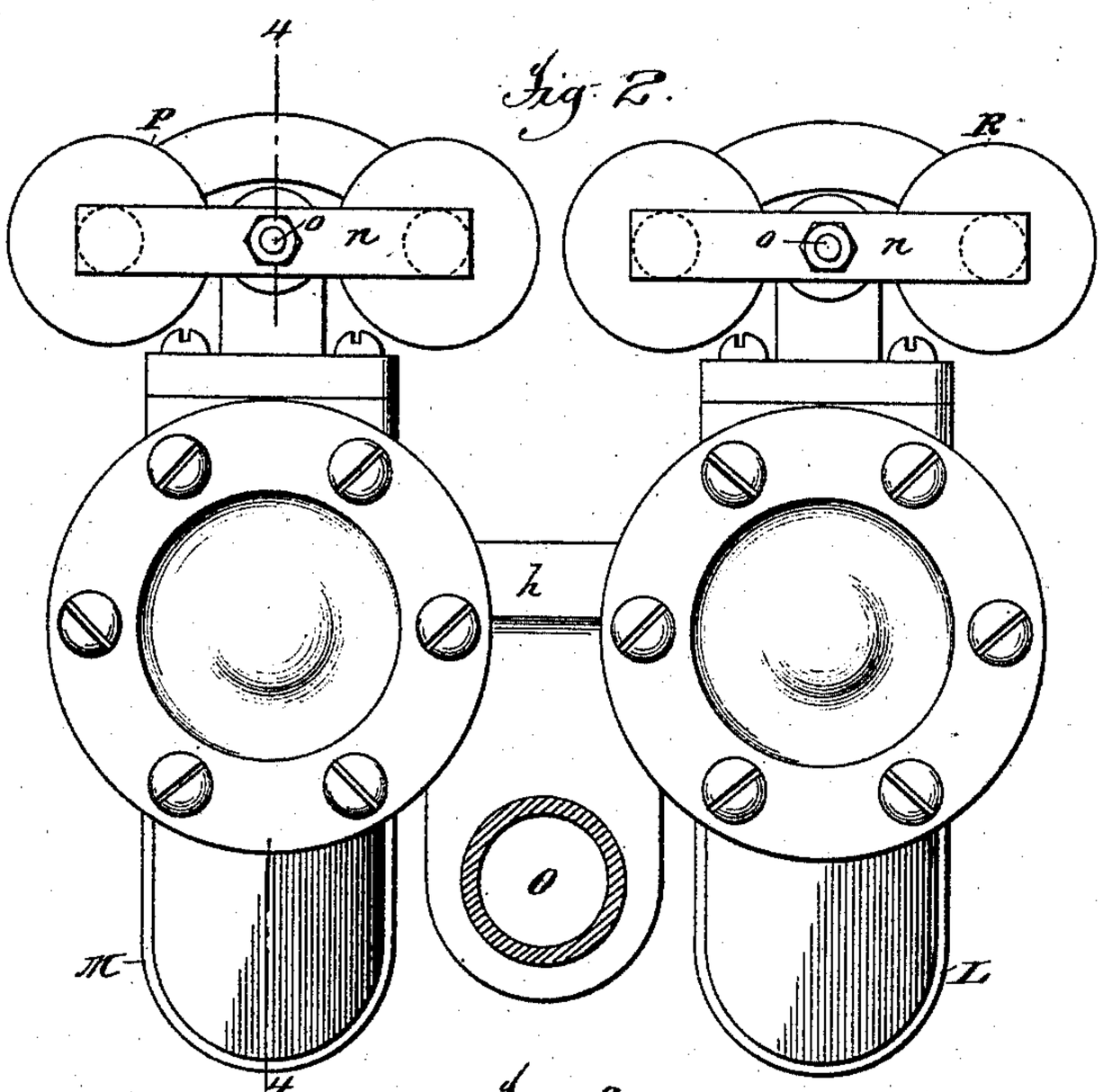
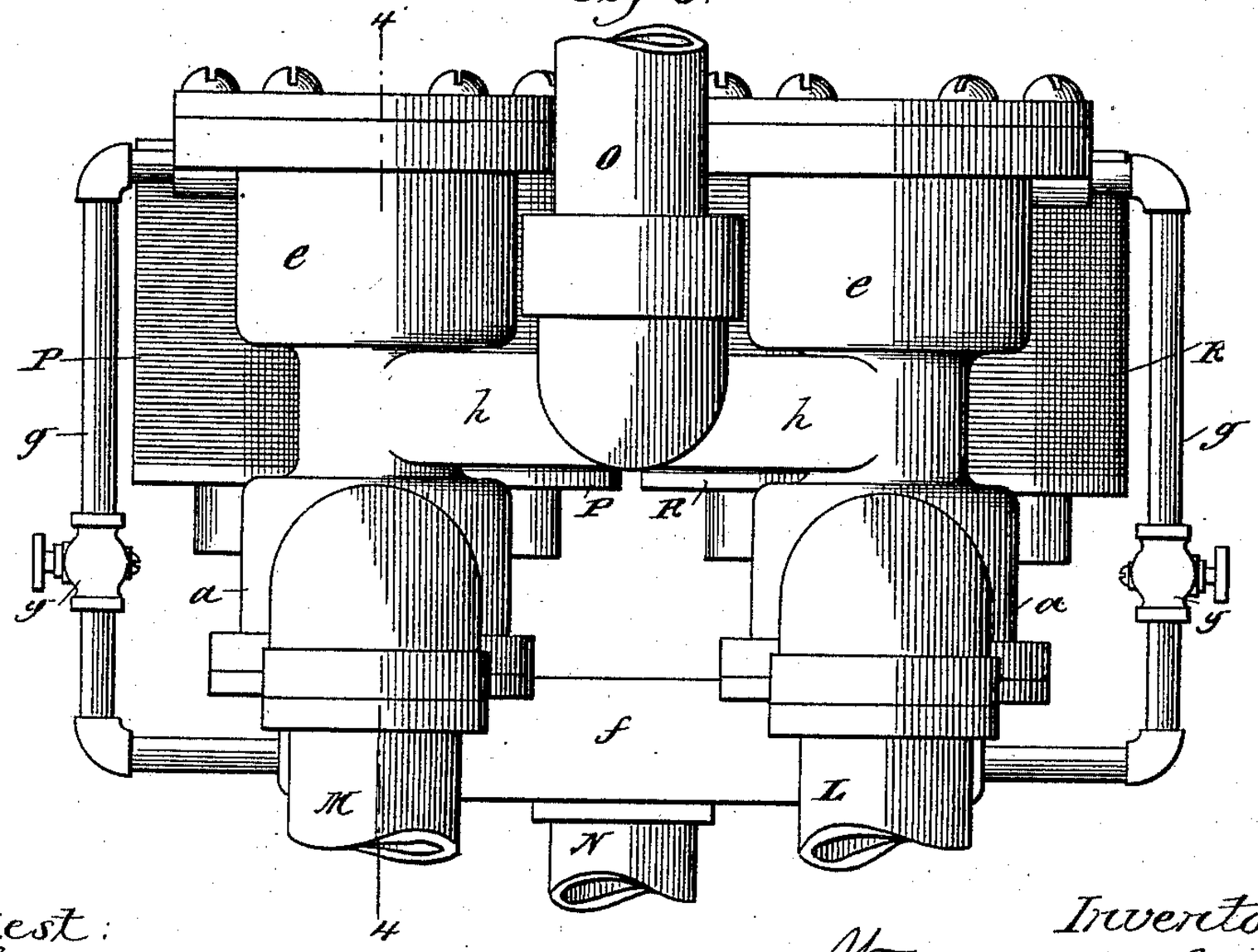


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM P. GIBSON, OF NEW YORK, N. Y.

VALVE MECHANISM FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 412,327, dated October 8, 1889.

Application filed December 31, 1888. Serial No. 294,995. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. GIBSON, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Valve Mechanism for Elevators, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in auxiliary valves for operating the main valve or valves controlling the movements of the power-piston of an elevator mechanism. The invention is particularly applicable and will be hereinafter described as applied to a hydraulic elevator.

It may be remarked in passing that the improvements constituting the present invention, though illustrated in the drawings, and hereinafter described as applied to an elevator mechanism having a power-cylinder of the vertical type, the improvements are equally applicable to elevator mechanisms containing a horizontal cylinder or in which the power-piston has an oscillating motion, as in my companion application filed January 5, 1889, Serial No. 295,548.

In the accompanying drawings, Figure 1 is a vertical sectional elevation of an elevator mechanism embodying my improvements. Fig. 2 is a plan view, upon an enlarged scale, of the auxiliary-valve mechanism. Fig. 3 is a side view of the same, also upon an enlarged scale. Fig. 4 is a vertical section of the same, taken on the lines 4 of Figs. 2 and 3.

Referring to Fig. 1, it will be understood that A represents the power-cylinder, and B the power-piston, of an ordinary hydraulic elevator; C, its circulating-pipe; D, its supply-pipe, and E its discharge-pipe, communicating with the discharge-outlet F, all of which parts are of the usual and well-known constructions, and therefore need no further description here. The supply and discharge of the motor-fluid to and from the cylinder and its circulation from the upper to the lower end thereof are controlled in the usual manner by means of the valve H, mounted upon the lower end of a vertical rod I, contained within a valve-casing G. The rod I is extended beyond the valve-casing G, and carries at its upper end a piston J, working in a cylinder K, mounted upon the upper end of the valve-casing G. The upper and lower ends of the cylinder K communicate with the auxiliary-valve mechanism by means of pipes L M, respectively. The auxiliary-valve mechanisms for both of these pipes being exact duplicates as to construction and mode of operation, a description of the construction and operation of one will suffice for an understanding of the present invention.

The pipe M, through which water is admitted to the under side of the piston J, communicates with a chamber *a*, which chamber contains a valve *b*, carried by a valve-rod *c*, which has mounted upon its upper end a piston *d*, (see Fig. 4,) contained within a chamber *e*. The chamber *a* communicates with a discharge-chamber *f*, having connected to it a discharge-pipe N, communicating in turn with the discharge-outlet F. The under side of the piston *d* and the upper side of the valve *b* are kept constantly in communication with the source of water-supply by means of a supply-chamber *h*, having connected to it a supply-pipe O, communicating either directly or through the circulating-pipe of the elevator mechanism, as shown, with the supply-pipe D. (See Fig. 1.) The piston *d*, being of greater area than the valve *b*, the pressure of the water thus supplied to the space between the valve *b* and piston *d* will operate to sustain the valve *b* in its raised position, as shown in Fig. 4. The pressure of the water upon the piston *d* may be aided, if desired, by the pressure of the spring *i* counterbalancing the downward tendency of the valve and piston and the downward pressure of the water exerted upon the valve *b*. The supply-chamber *h* also communicates by means of a duct or passage *j* with a chamber *k*, containing a valve *l*, controlling communication between said duct and a duct or passage *m*, leading to the upper side of the piston *d*. (See Fig. 4.) The rod *o*, carrying the valve *l*, passes upward through the valve-casing, and upon the exterior thereof is connected to a plate *n*, forming the armature of an electro-magnet P. (See Fig. 2.) The electro-magnet P will be connected to the elevator-car by means of wires, in the usual manner, provided with push-buttons or other suitable circuit making and breaking appliances, by which said

magnet may be energized to attract the armature *n* and thus move the valve-rod *o* and its valve *l* downward and open communication between the ducts *j m*, the pressure of the water contained in the chamber *k* being sufficiently great to hold the valve *l* to its seat when the magnet P is de-energized.

As before observed, the foregoing description of the valve mechanism controlling the admission of water to the lower side of the piston J through the pipe M applies equally well to the duplicate valve mechanism controlling the supply to its upper side through the pipe L. The supply-pipe O communicates through the supply-chamber *h* with the two valve mechanisms, and the two mechanisms similarly communicate with the discharge-pipe N through the discharge-chamber *f*. The electro-magnet of the latter mechanism is, however, for the sake of convenience in describing the operation of the mechanism, lettered R.

The operation of the apparatus will now be described. When the piston B is at rest, the main valve H and its connections and the auxiliary-valve mechanisms for both sides of the piston J will occupy the positions shown in the drawings, communication being open between both sides of the piston J and the discharge-chamber *f* and closed between the same and the supply-chamber *h*. When it is desired to cause the ascent of the piston B and the descent of the car, the conductor will operate the push-button within the elevator-car and close the circuit through the electro-magnet R, thereby energizing said magnet, the armature of which will then be attracted and cause the valve *l* to move downward and open communication between the ducts *j m* of the valve mechanism controlling communication to the upper side of the piston J. Communication being thus established between these two ducts, water will pass from the supply-chamber *h* through the same to the upper side of the piston *d*, against which it will exert a pressure sufficient to move it and the valve *b* downward. The valve *b*, when it has been moved down to its seat in the lower end of the chamber *a*, will shut off communication between the upper end of the cylinder K and the discharge-chamber *f*, and open communication between it and the supply-chamber *h*, the auxiliary-valve mechanism for the under side of the piston J remaining stationary, with communication open between the under side of the piston and the discharge-chamber *f*, as shown in Fig. 4. Water will then enter the upper end of the cylinder K and move the piston J and the main-valve rod I downward until the main valve H has been moved sufficiently to open communication between the circulating-pipe C and the lower end of the cylinder A and permit the circulation of the water from the upper to the lower side of the piston in the usual manner. To arrest the upward movement of the piston B, the conductor will release the push-button and break the circuit of the magnet R, thereby de-energizing said magnet and releasing the armature *n*, the water beneath the valve *l* then raising said valve and cutting off communication between the ducts *j m*.

The duct *m* of each valve mechanism communicates by a small discharge-pipe *g* with the discharge-chamber *f*, and which pipe is permanently open, so that as soon as the valve *b* is closed the pressure upon the upper side of the piston *d* will be relieved by the escape of the water above the same through the pipe *g* to the discharge-chamber *f*, said piston and with it the valve *b* being raised by the pressure of the water entering the chamber *e*, aided by the spring *i*, to open communication between the pipe L and the discharge-chamber *f* and cut off communication between said pipe and the supply-chamber *h*. The conductor will at the same time operate the push-button of the circuit of the electro-magnet P, thereby energizing said magnet and causing the operation of the auxiliary-valve mechanism of the pipe M, the same as just described. Water will then enter the lower end of the cylinder K and move the piston J upward, said piston forcing the water above it to the discharge-chamber *f*. The upward movement of the piston will continue until the valve H has been restored to its central position—*i. e.*, the position in which it is shown in Fig. 1—when the piston B will be arrested. If it is desired to cause the piston B to move downward, this upward movement of the piston J and valve H will be continued until the latter has been moved sufficiently to open communication between the lower end of the cylinder A and the discharge-outlet F, when the water will escape from the under side of the piston B, and its downward movement be accomplished by the pressure of water upon its upper side in the usual manner. The discharge pipes or passages *g* are provided with adjustable valves *y*, by which the rate of the discharge of the water can be regulated to correspond to the pressure of the water in the supply-chamber *h* and thus control the speed of closing the valves *b*.

In addition to the auxiliary-valve mechanism for operating the main valve H, the rod I of said valve may be provided with the usual rack-and-pinion device for operating said valve from the elevator-car when from any cause said auxiliary mechanism fails to operate temporarily.

It is to be remarked that instead of operating the auxiliary-valve mechanism described by means of the electro-magnets P R any other form of connections—such as a hand-rope and levers—may be employed for the purpose. It is also to be remarked that the auxiliary-valve mechanism heretofore described may be used in connection with apparatus other than elevators, and may be used for purposes other than those described—as, for example, for operating a belt-shifter—

and also that instead of being operated by hydraulic pressure the piston *d* and valve *b* may be operated by pneumatic or steam pressure.

I do not herein claim the combination, with the main valve or other mechanism for controlling the movements of an elevator, of the cylinder K and piston J for operating said mechanism; an auxiliary valve for controlling said piston, which valve is normally maintained in position to allow the water to flow out of the cylinder; a piston for operating said auxiliary valve, and a valve *l* for controlling said last piston; neither do I claim the combination, with the foregoing, of a permanently-open exhaust between said last piston and said valve *l;* neither do I claim the combination, with the foregoing, of a rope connected to operate the main valve or other controlling mechanism from the elevator, as these subjects-matter and features are the invention of another.

What I claim is—

1. The combination, with the cylinder K and piston J, of valves *b*, controlling the supply and discharge of the fluid to and from the cylinder upon the opposite sides of the piston, the pistons *d*, connected to said valves *b*, and constantly subjected upon one side to the fluid-pressure to close the valves, ducts leading from the supply side of said valves to the opposite side of said pistons, valves *l*, controlling said ducts, so that the pressure can be equalized upon the opposite sides of said pistons to allow the valves *b* to open the supply and close the discharge to the respective sides of the piston J, and discharge-passages for allowing the fluid to escape to reduce the pressure upon one side of the pistons *d*, substantially as described.

2. The combination, with the cylinder K and piston J, of valves *b*, controlling the supply and discharge cf the fluid to and from the cylinder upon the opposite sides of the piston; the pistons *d*, connected to said valves *b*, and constantly subjected upon one side to the fluid-pressure to close the valves, ducts leading from the supply side of said valves to the opposite side of said pistons, and valves *l*, controlling said ducts, so that the pressure can be equalized upon the opposite sides of said pistons to allow the valves *b* to open the supply and close the discharge to the respective sides of the piston J and permanently-open discharge-passages *g* for allowing the fluid to escape from the discharge side of said valves *l*, substantially as described.

3. The combination, with the cylinder K and piston J, of valves *b*, controlling the supply and discharge of the fluid to and from the cylinder upon the opposite sides of the piston, the pistons *d*, connected to said valves *b*, valves *l*, controlling the supply of the fluid to one side of said pistons, permanently-open discharge-passages *g* for the discharge of the fluid so supplied, and adjustable valves *y* for regulating the rate of discharge, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WM. P. GIBSON.

Witnesses:
J. J. KENNEDY,
EDWARD WOOD.