(No Model.) 2 Sheets—Sheet 1.

N. C. BASSETT.

VALVE DEVICE FOR HYDRAULIC ELEVATORS.

No. 390,111. Patented Sept. 25, 1888.

Fig. 6.

Fig. 1.

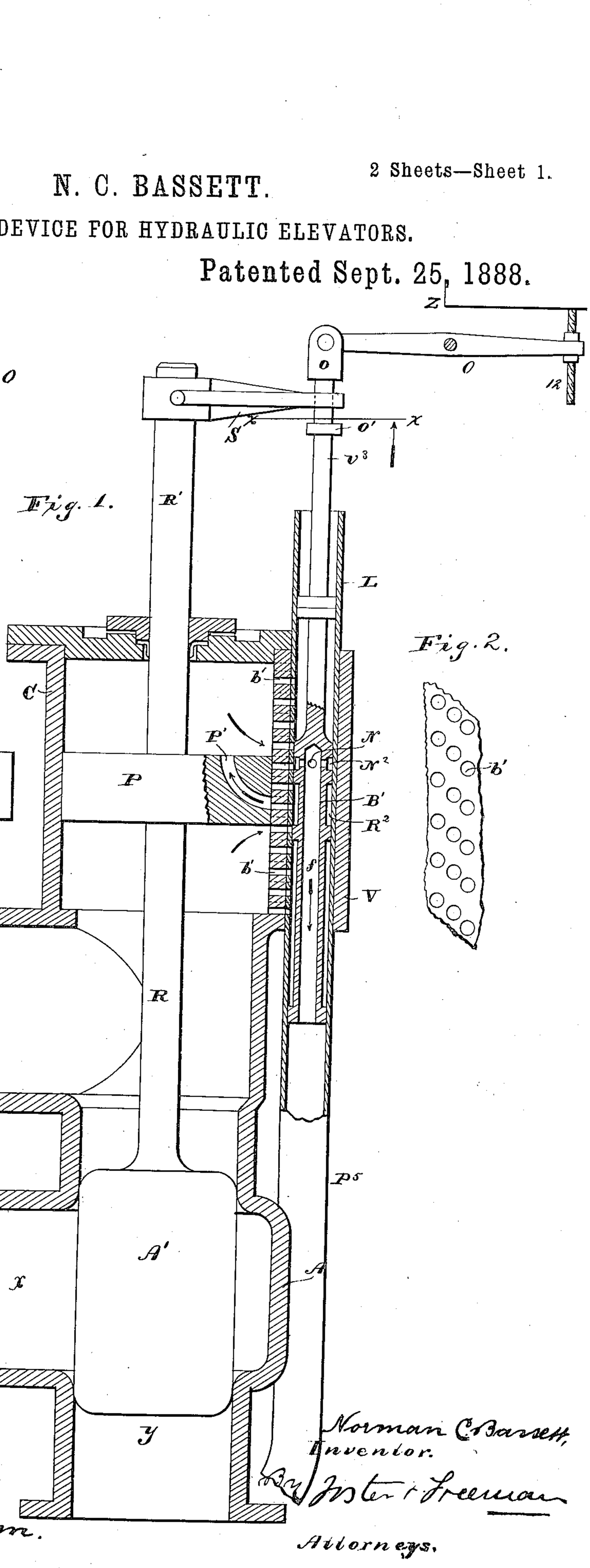

Fig. 5.

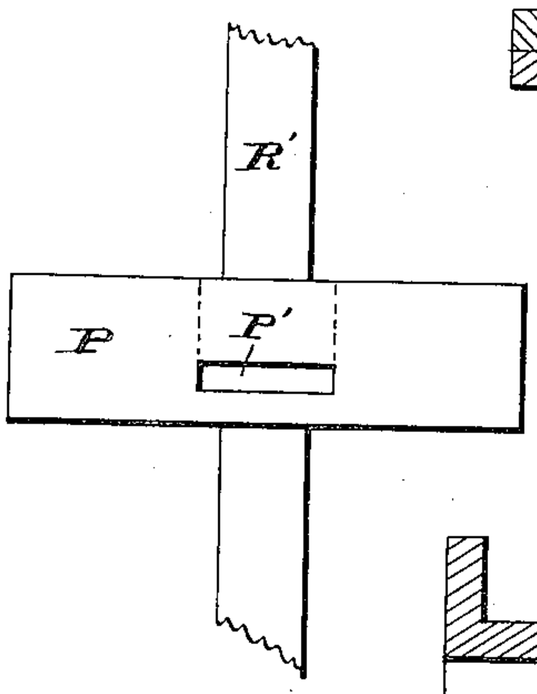

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

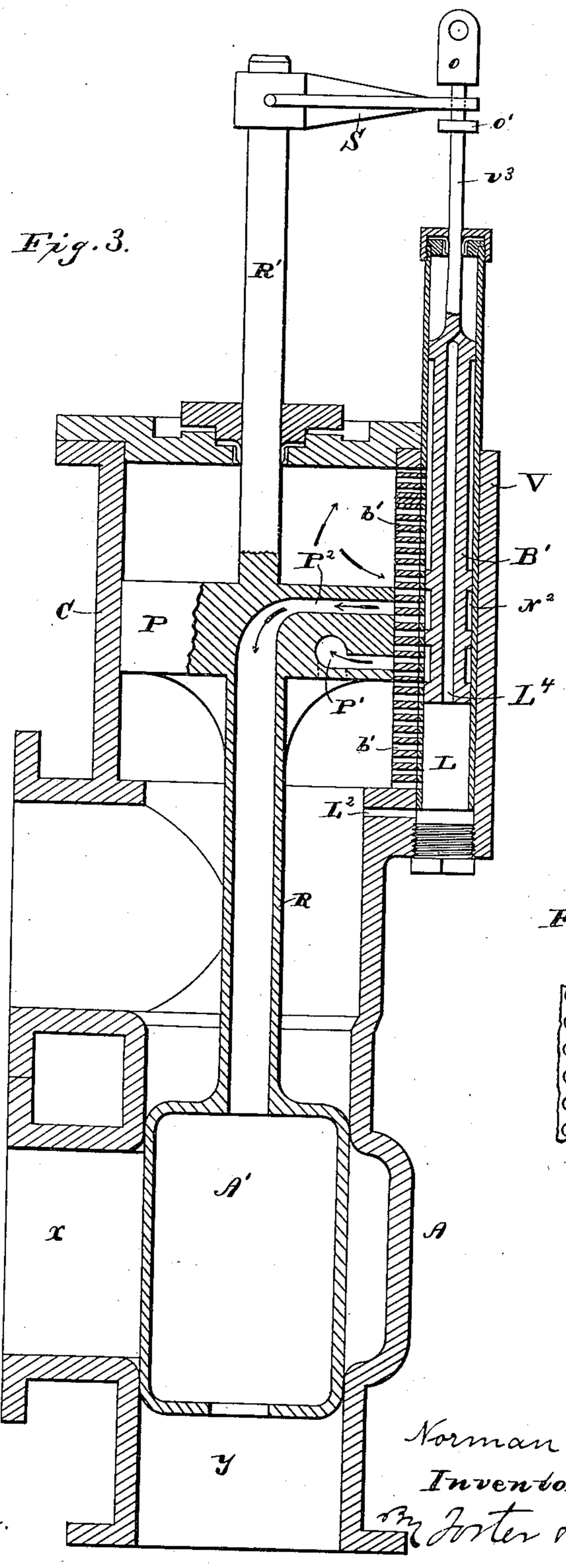
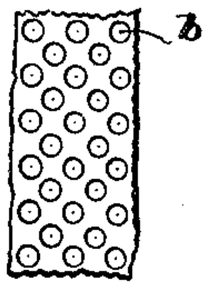


Fig. 4.



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UNITED STATES PATENT OFFICE.

NORMAN C. BASSETT, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE HYDRAULIC ELEVATOR COMPANY, OF SAME PLACE.

VALVE DEVICE FOR HYDRAULIC ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 390,111, dated September 25, 1888.

Application filed June 25, 1886. Serial No. 206,258. (No model.)

To all whom it may concern:

Be it known that I, NORMAN C. BASSETT, a citizen of the United States, and a resident of Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Valve Devices for Hydraulic Elevators, of which the following is a specification.

My invention relates to that class of hydraulic elevators in which the main valve of the elevating-engine is operated by an auxiliary engine; and my invention consists in certain devices, fully set forth hereinafter, for insuring a positive and accurate movement of the main valve of the elevating-engine.

In the drawings, Figure 1 is a sectional elevation showing the main valve and operating-engine. Fig. 2 is a plan view of the valve-ports. Fig. 3 is a section illustrating a modification of the apparatus shown in Fig. 1. Fig. 4 is a plan illustrating the arrangement of the valve-ports in the apparatus shown in Fig. 3, and Fig. 5 is an edge view of the piston of the valve-operating engine shown in Fig. 1. Fig. 6 is a sectional view on the line *x x* of Fig. 1, looking in the direction of the arrow, and showing the means employed to prevent rotation of the main valve-rod.

The valve-casing A contains both the main valve and the piston of the operating-engine. The valve A′, which is not shown in detail, slides vertically within the lower portion of the casing, so as to close the inlet-port *x* or discharge *y*, or both, according to its position, and is of such length or has a lap as to permit a limited movement in either direction opposite the port *x* without uncovering the same.

The piston P of the valve-operating engine is connected to the valve A′ by a rod, R, and a rod, R′, extends through the head of the cylinder or casing and is provided with a lateral arm, S, for the purpose described hereinafter.

Attached to or forming part of the casing, or that portion, C, which constitutes the cylinder of the valve operating engine, is a valve-casing, V, with an internal lining, L, of brass or other suitable material, projecting in the form of a tube beyond the ends of the casing, and within this lining slides or is fitted the auxiliary valve B′, which controls the movement of the piston of the engine.

Transverse ports *b′ b′* afford a communication between the cylinder C and the valve-casing V, and are arranged along the length of the cylinder C for the distance that the piston P is to travel therein. These ports are shown as arranged in rows of three upon diagonal lines, one above the other, so that as the valve moves in either direction it will uncover only one port at a time. (See Fig. 2.)

A port or passage, P′, extends from the upper face of the piston P to the periphery of the same at a point opposite the ports *b′ b′*, and is of such width as to extend across the series of ports.

The auxiliary valve B′ contains a central channel or passage, *f*, which communicates through holes N with a circumferential recess, N^2, of the valve, so that upon lifting the valve to uncover any of the ports above the upper face of the piston P the water will flow from the space above the piston through the recess N^2, holes N, and channel *f* to the lower or discharge end of the valve-chest. There is another and wider circumferential recess, R^2, so arranged that when its lower edge is carried below the bottom of the piston P a communication will be formed through the uncovered ports *b′* and through said recess R^2 with the passage P′, which permits the water under pressure from the supply-reservoir to pass from beneath to the top of the piston.

The stem *v″* of the valve is provided with shoulders *o o′*, between which extends the arm X, the shoulders being so far apart as to permit the requisite play of the valve independent of the piston to uncover the ports above or below the latter whatever may be its position in the cylinder C, but sufficiently near together to prevent the recess R^2 from being raised above or carried below the passage P′.

The operation of the entire apparatus is as follows: To raise the car the valve B′ is moved upward by vibrating a lever, O, connected to the hand-rope 12, extending through the cage Z. The instant a part of one of the ports above the upper face of the piston P is uncovered water from the upper end of the cylinder C passes through said port and through the

recess N^2 and holes N into the channel *f* of the auxiliary valve and is carried by a connecting-pipe, P^5, from the valve-chest V into the discharge-pipe. As the area of the piston P is greater than that of the valve A′, there is an excess of pressure upon the under side of the piston, which will cause the latter to rise with the valve B′, carrying with it the main valve A′, and this upward movement of the piston will continue so long as the valve B′ is moved upward or is in a position to uncover any of the ports above the piston. If during the upward movement of the piston P it is desired to arrest the same to hold the valve A′ in the position which it then occupies, this may be effected by carrying the valve B′ downward until all the ports above the piston are cut off from communication with the recess N^2. When the piston P is raised, so as to lift the lower edge of the valve A′ above the bottom of a port, *x*, the water will flow into the port *x* from below the main piston, which will begin to descend and raise the cage. If during the upward movement of the cage it is desired to arrest the same by closing the main valve, this is effected by carrying the lever O to a horizontal position, which will bring the valve B′ to a central position within its chest, the recess R^2 as the valve B′ descends uncovering the ports below the piston and permitting the water to flow under pressure through the ports *b′ b′*, recess R^2, and passage P′ to the top of the piston, when the latter will descend in consequence of the pressure upon the top of the valve A′, the pressures upon the opposite faces of the piston P being equal. As the valve B′ has been brought to a mid-position in the chest the piston P will descend to the position shown in Fig. 1 and the valve A′ will be arrested in the position closing the discharge. When the cage is to descend, the valve B′ is moved downward and the water will flow to the top of the piston P and lower the latter with the valve A′ until the water in the working-cylinder can pass above the valve A′ through the port *x* and circulate from the top to the bottom of the working-cylinder as the main piston rises therein by the weight of the car, as in the "Baldwin" elevator. The upward movement of the main piston is arrested by bringing the valve B′ to a mid-position, when the escape of water from above the piston P will permit the latter to ascend under pressure from below until it is in a central position in the cylinder C and the valve A′ closes the port *x*.

It will be seen that by the construction described a slight movement of the auxiliary valve B′ in either direction will instantly be followed by a corresponding movement of the piston P in the same direction, which movement will be continued as the movement of the valve B′ is continued, and will be arrested almost simultaneously with the stoppage of the said valve, so that the attendant by manipulating the devices connected with the valve B′ has positive control of the main valve A′, and may lift or lower it to any desired extent and arrest it at any point with certainty, but without the labor which is occasioned by having said valve connected directly with the operating mechanism in the cage.

The movement of the piston and main valve will be almost coincident with that of the auxiliary valve as to time and extent, providing the ports *b′ b′* and passages are large enough to permit the water to flow with the desired rapidity. It is, however, desirable to limit the speed at which the main valve can be moved, to prevent a too sudden stopping or starting of the car. To this end the area of the ports is regulated or limited to permit the water to flow at such a speed as will secure the desired rapidity of movement of the main valve. The necessary area of the ports is found by experiment to bear a very small ratio to that of the main valve, so that the auxiliary valve may be of a small size, and will require but a very small effort on the part of the attendant in the car to operate it.

The arm S not only serves in conjunction with the stops *o o′* to connect the auxiliary piston and main valve directly to the auxiliary valve and to limit the throw of the auxiliary valve in respect to the piston, so that the two will move together except for a slight lost motion permitted by the stops, but it also prevents the latter from turning to carry the passage P′ away from the line of the ports by its bearing against the valve-stem v^3, which extends through an opening in the arm S.

In Fig. 3 I have shown a modification in which the discharge-passage from above the piston P is through the stem of the main valve A′ and through said valve directly into the discharge-pipe. The port P′ (indicated partly by dotted lines) in this case extends to one side of a second passage, P^2, leading from the edge of the piston opposite the row of ports *b′ b′*, through the stem and valve A′, as shown. The valve-chest V in this case is closed at the lower end and is packed at the upper end around the rod v^3, and the discharge water from above the piston P passes from the recess N^2 into the port P^2 instead of being discharged into the channel of the valve B′. A channel, L^1, extends completely through the valve B′, so that the latter is nearly balanced by nearly equal pressure upon the opposite ends, and a hole, L^2, affords a communication between the interior of the casing A and the bottom of the valve-chest V to allow water to escape from the valve-chest as the valve B′ approaches the lower extremity of its travel.

The valves B′, as well as the pistons P shown in the two modifications, are represented without packings, which may be used, however, if desired; but they are not thought necessary, because should any leakage occur from above the piston P it would rise and uncover the ports below it sufficiently to permit a supply of water to pass above and arrest the movement. If any leakage should occur from the lower to the upper side of the piston the latter

will gradually move downward until the flow of water from above the same through the uncovered ports will cause it to rise. These movements will not open the main valve, in consequence of the extra length or lap of the latter permitting a limited play without opening the discharge pipe or port *x*.

I have not fully shown the elevator-cage and engine, as these parts are too well known to need special illustration or description.

I do not limit myself to the use of an engine the cylinder of which constitutes a part of the casing of the main valve, as the two may be separate, with such changes in the water-ports as this latter arrangement may render necessary.

It will be apparent that various arrangements of the auxiliary cylinder, piston, ports, and passages, in connection with the auxiliary valve at one side of the cylinder, may be employed to effect the result above set forth. I therefore do not limit myself to the precise arrangement described, nor to any specific mode of operating the auxiliary valve from the cage, nor to the combination of the valve operating appliances with any specific form of elevating mechanism.

I claim—

1. The combination, in a hydraulic elevator, of a cylinder having a series of ports, a valve and piston connected thereto, and an auxiliary valve constructed to regulate the flow of the actuating-fluid through said series of ports in respect to the piston, and a lever connected to said auxiliary valve and to lever-operating devices between the lever and the cage, substantially as specified.

2. The combination, with the main valve of a hydraulic elevator, of an auxiliary engine having its piston connected to said valve and arranged to traverse a series of ports, an auxiliary valve also arranged to traverse said series of ports to direct the flow of the motor-fluid to and from the opposite faces of the auxiliary piston, a passage from the face to the periphery of the piston, and connections for operating said auxiliary valve from the elevator-cage.

3. The combination, with an engine connected to the main valve of a hydraulic elevator and having a cylinder provided with a series of ports traversed by the piston, of an auxiliary valve connected to be operated from the cage of the elevator and also traversing said ports, a passage through the piston, and an exhaust-passage, all arranged substantially as described, to direct the motor-fluid to one side or the other of the piston, according to the direction in which the auxiliary valve is moved through the said ports, and to cut off the supply or discharge as the piston approaches the position assumed by the auxiliary valve, substantially as specified.

4. The combination of the main valve, actuating-piston connected thereto, cylinder having a series of ports traversed by the piston, a passage leading from one face of the piston to its edge opposite said ports, a discharge-passage, and an auxiliary valve also traversing said ports, with recesses arranged to permit the motor-fluid to be directed from one side to the other of the piston through said ports and to permit the water between the piston and the head of the cylinder to be directed to the discharge-passage according to the position assumed by the auxiliary valve, all arranged to regulate the extent and direction of the movement of the piston according to the extent and direction of the movement of the auxiliary valve, substantially as specified.

5. The combination, with the main valve of a hydraulic elevator, of an actuating-piston connected thereto, a cylinder having a series of ports along one side communicating with the chest of an auxiliary valve, an auxiliary valve in said chest provided with recesses, a passage from the face to the periphery of the piston, and a discharge-passage for the flow of the water from the space between the piston and cylinder-head to the discharge-port, all arranged to operate substantially as set forth.

6. The combination of a hydraulic elevator provided with a valve, A′, an engine provided with a piston, cylinder, and auxiliary valve connected to be operated from the cage of the elevator, a series of ports between the cylinder and auxiliary-valve chest arranged to be traversed by the piston, a water-passage through the piston from the face to the periphery, a discharge-passage leading to the discharge-pipe, and recesses in the auxiliary valve, all substantially as set forth.

7. The combination of a piston, a cylinder provided with a series of ports extending to opposite sides of the piston, a main valve connected with said piston, an auxiliary valve controlling the flow of fluid through said series of ports to and from opposite sides of the piston at any point of its stroke, and an arm and stops carried by the piston-rod and auxiliary-valve rod to engage at any point of the piston's stroke, according to the adjustment of the auxiliary valve, substantially as described.

8. The combination, with the main valve of a hydraulic elevator, of an auxiliary engine having its piston connected to said valve, a valve connected with the cage for controlling said auxiliary piston, a series of ports between the valve-casing and engine-cylinder, the auxiliary valve, auxiliary piston, and main valve being connected substantially as described, whereby the main valve is under the direct and positive control of the operator in the cage.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NORMAN C. BASSETT.

Witnesses:

ALFRED E. BARR,

C. W. ANABLE.