(No Model.) 3 Sheets—Sheet 1.

W. S. JOHNSON.

CONTROLLER FOR ELEVATORS.

No. 393,834. Patented Dec. 4, 1888.

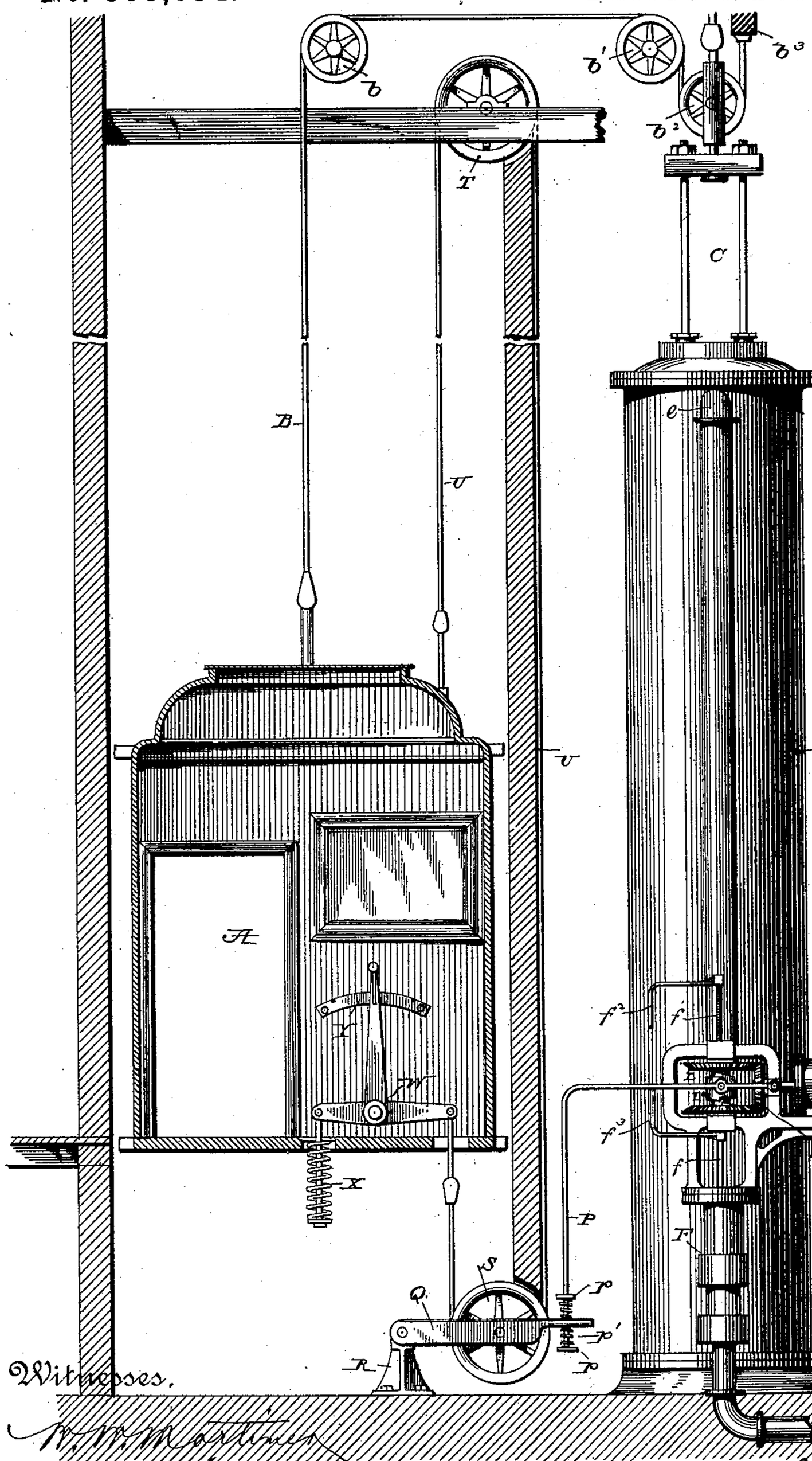

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

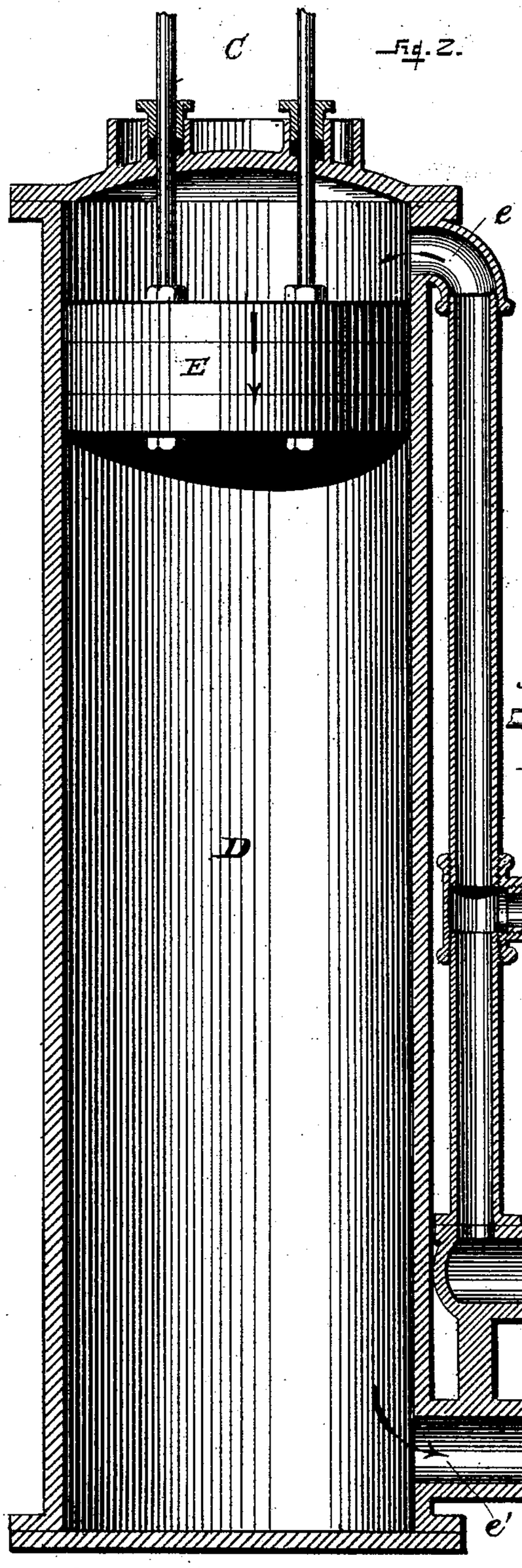

Fig. 3. ON LINE X---X

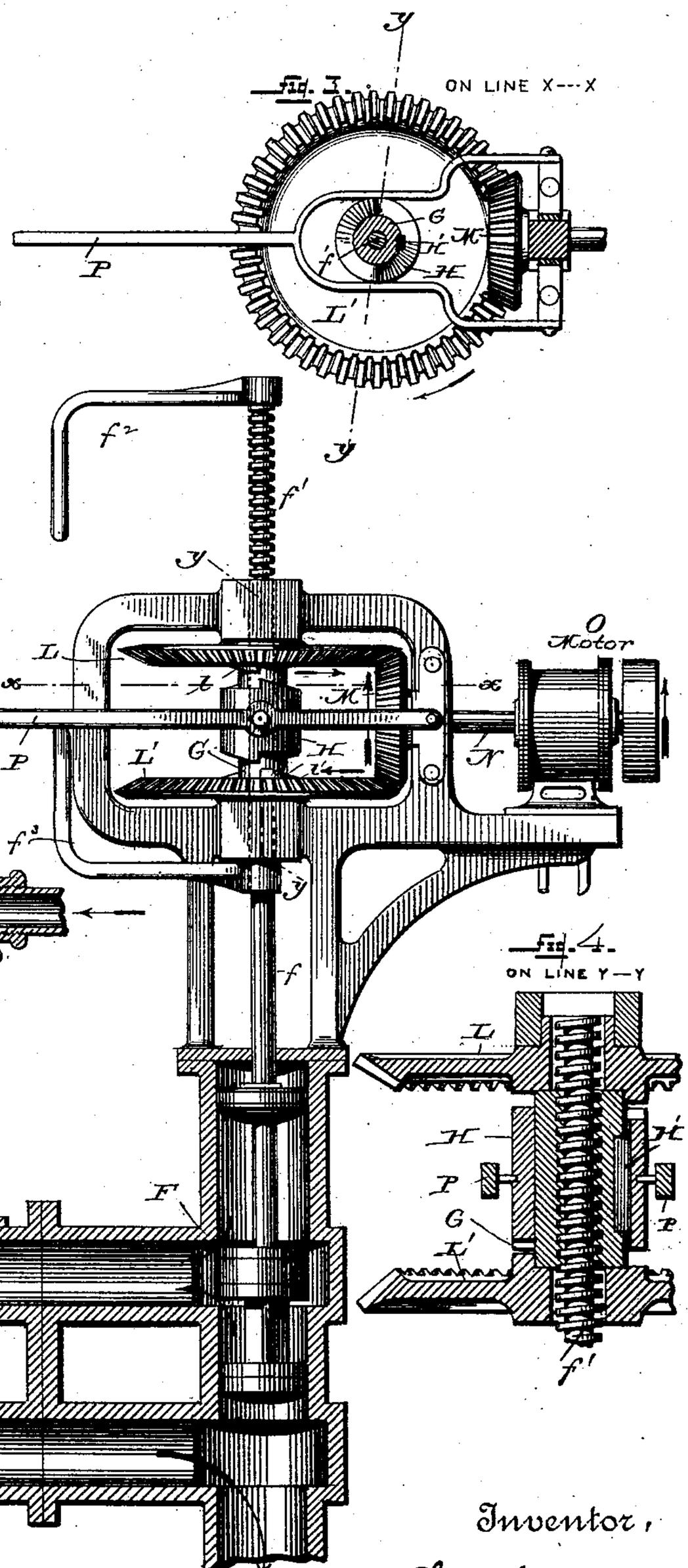

Fig. 4. ON LINE Y—Y

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CONTROLLER FOR ELEVATORS.

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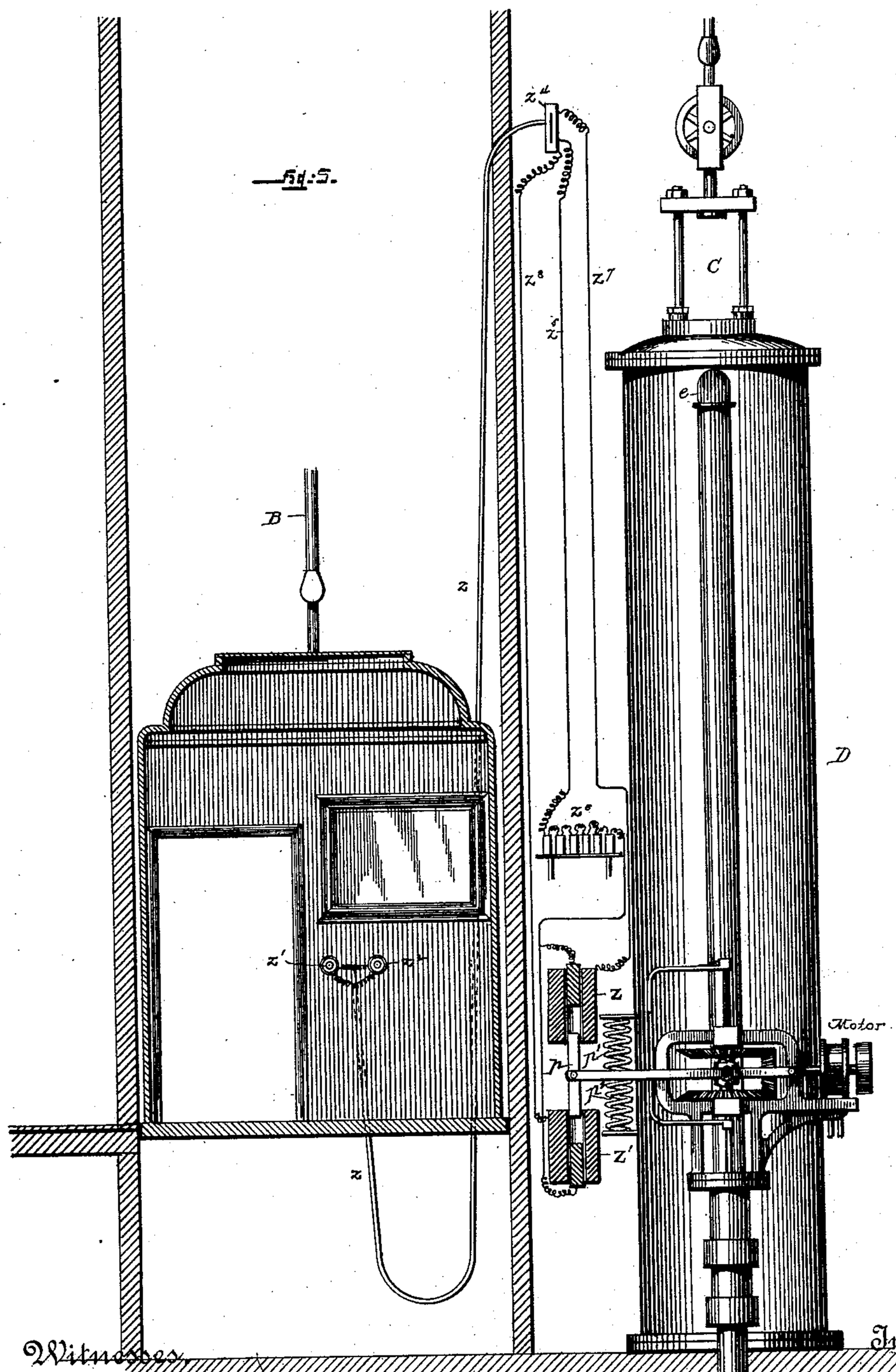
Fig. 5.



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UNITED STATES PATENT OFFICE.

WARREN S. JOHNSON, OF MILWAUKEE, WISCONSIN.

CONTROLLER FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 393,834, dated December 4, 1888.

Application filed July 27, 1888. Serial No. 281,178. (No model.)

To all whom it may concern:

Be it known that I, WARREN S. JOHNSON, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain Improvements in Controllers for Elevators, of which the following is a specification.

My invention relates to that class of hydraulic elevators in which the car-sustaining cable is connected with and operated by a piston moving in a cylinder and controlled in its movement by a valve which governs the admission and discharge of the fluid. The controlling-valve is commonly operated by the direct application of power on the part of the attendant through connecting devices extending to and moving with the car. In practice it is found that the labor of operating the approved forms of valve with frequency is very serious and objectionable. The aim of my invention is to lessen the labor required by combining with the valve, through the medium of suitable gearing, an operating-motor, which is in turn connected with suitable operating appliances on the moving car, the arrangement being such that it is only necessary for the attendant to adjust or reverse the position of the gear in order that the motor may change the position of the valve as required.

My invention is susceptible of embodiment in different forms which are mechanical equivalents, and two of which are illustrated in the accompanying drawings, in which—

Figure 1 represents in elevation an elevator provided with my improvements, the car being represented in vertical section. Fig. 2 is a vertical central section through the main cylinder and its controlling-valve with the attendant motor and gearing shown in side elevation. Fig. 3 is a central section on the line $x\ x$ of Fig. 2, looking downward. Fig. 4 is a vertical cross-section on the line $y\ y$ of Figs. 2 and 3. Fig. 5 is an elevation, partly in section, showing an elevator with my controlling devices in a modified form.

Referring to Figs. 1, 2, and 3, A represents an elevator-car arranged to move vertically in a suitable shaft or well, and suspended by a cable, B, which is extended thence over suitable guide-pulleys and connected with the upper end of a duplex piston-rod, C, projecting through the upper end of a vertical stationary cylinder, D, which contains the piston E, attached to the lower end of the piston-rod. I have shown the car-sustaining cable as carried over stationary guide-pulleys $b\ b'$, beneath a pulley, b^2, attached to the upper end of the piston-rod, and thence upward to a stationary or other support, b^3; but it may be applied in any other appropriate manner for communicating motion from the piston to the car. The cylinder is provided with suitable eduction and induction pipes, $e\ e'$, leading from its two ends to a reciprocating piston-valve, F, which will communicate with a source of water-supply, and with a suitable drainage tank or pipe. The valve, as shown in Fig. 2, is adapted by movement in an axial direction to direct the water into and out the two ends of the cylinder alternately, for the purpose of effecting the elevation and depression of the piston.

The foregoing parts are all of ordinary construction and familiar to those skilled in this art, and as they constitute no part of my invention a more detailed description thereof is deemed unnecessary.

In carrying my improvement into practice in its preferred form I provide the upper end of the main-valve spindle f with a screw-thread, f', and pass the same through a rotary nut, G, supported against end motion, so that when rotated the nut will have the effect of moving the spindle endwise and of changing the position of the main valve. The nut is passed through a rotary sleeve, H, connected thereto by a spline, H′, that it may move vertically. This sleeve is located between two horizontally beveled gears L and L′, which revolve loosely around the screw, and which are provided on their proximate faces with studs l and l', adapted to engage corresponding shoulders formed on the two ends of the sleeve, so that as the sleeve is raised or lowered it will engage one or the other of the gears, and receiving motion therefrom impart the same to the central nut. The two gears L and L′ remain in constant engagement with an intermediate pinion, M, which serves to turn them in the opposite direction, this pinion being secured to the rotary shaft N of a motor, O. This motor, which may be a hydraulic motor, an electric engine, or any other suitable motor known in the art, is arranged to revolve constantly in one direction. Hav-

ing but little labor to perform, it may be kept in constant motion at slight expense. Through its action the two gears L and L′ are revolved constantly in opposite directions, as indicated by the arrows, so that upon properly moving the sleeve or clutch H motion will be instantly communicated to the main or controlling valve in one direction or the other.

The clutch-sleeve H is provided with a circumferential groove and operated by a horizontal shipping-lever, P, pivoted at one end to a suitable support and provided with studs or plates which engage in a circumferential groove in the sleeve, as shown in Fig. 4, after a manner commonly practiced in connection with sliding clutches and familiar to every mechanic. The upper end of this shipping-lever is bent downward and passed through a second lever, Q, which is in turn pivoted at its opposite end to a stationary support, R. The lever P may be connected rigidly to the lever Q; but I prefer to provide it with collars *p* on opposite sides of the lever Q, and to introduce springs *p′* between the collars, as shown, this arrangement serving to release the parts from excessive pressure and prevent them from being unduly strained.

I mount in the lever Q a grooved pulley, S, free to move therewith to a limited extent in a vertical direction. At the top of the shaft or wellway I mount on a suitable stationary support a second pulley, T, directly above pulley S. I provide a rope, cord, or wire, U, attach the same to the car at the top or other appropriate point, pass it thence upward over the pulley T and downward beneath the movable pulley S, and thence upward into the car, where I attach it to one end of a hand-lever, W, pivoted upon the car and acted upon by a spring, X, in such manner that it tends constantly to keep the cord under tension. The weight of the pulley S and its attendant parts is such that the pulley and lever stand normally in the position shown in Fig. 1, in which position they act through the lever P to hold the clutch H out of engagement with the gear, so that the main or controlling valve of the elevator remains at rest in any position to which it may have been previously adjusted.

If the hand-lever is moved to the left, it will act through the cable to lift the pulley S and lever Q, the effect of which will be to throw the clutch upward into engagement with the gear L′, whereupon the motor will act through the intermediate parts to move the main valve in an upward direction. If, on the contrary, the hand-lever is moved to the right, it will lower the pulley S, and the clutch will be thrown into engagement with the gear L′ and the main valve will be lowered.

It will be perceived that, owing to the extension of the cord U in a vertical direction around the guide-pulleys and thence to the top and bottom of the car, the car is permitted to move vertically without affecting the tension or the length of the cord, and without in any manner affecting the position of the valve.

I provide the car commonly with a notched plate, Y, or equivalent means for securing the hand-lever in different positions. The cord serves simply as a flexible connection between the car and the clutch-operating lever, and as a means of enabling the operator on the moving car to control at will the position of the lever.

To effect the positive disengagement of the clutch when the valve has reached its proper limit of motion in either direction, I provide the valve-spindle with arms f^2 and f^3 to act upon the shipping-lever, as plainly shown in the drawings.

As regards the pulley S, the only requirement is that it shall be free to rise and fall under the influence of the cord U′, and that it shall be suitably connected with the shipping-lever to operate the same. The lever Q may be dispensed with by suitably forming the lever P, as shown in dotted lines in Fig. 1, to admit of the pulley being applied directly thereto. In place of the cord U′, I may adopt the flexible connection, such as shown in Fig. 5. In this form of the apparatus the car, the cylinder and piston, the gearing, and the lever for controlling the gearing are all constructed and arranged in the same manner as in the preceding figures. The shipping-lever is, however, provided with a vertical armature, *p*, the upper ends of which are arranged in the field of force of two electro-magnets, Z Z′, either within their cores, as shown, or opposite their ends, if preferred, the only requirement being that the magnets shall serve respectively to pull the armature and lever upward and downward. Two springs, *p′* and p^2, placed against the upper and lower sides serve to hold the same in its intermediate position to keep the clutch out of action when the magnets are inactive.

I mount the magnets in electric-battery circuits connected through flexible conductors *z* with buttons, switches, or equivalent controlling devices z' and z^2 on the car, so that the operator may at will cause the excitation of one or the other of the magnets. Controlling circuits and devices suitable for this use are known in the art in a great variety of forms, either of which may be employed. In the form shown three conductors—one from the button z', another from the button z^2, and a third common to the two buttons—are joined in a flexible cable and carried from the car to a support, z^4, at the top or other suitable point of the wellway, whence the common conductor z^5 is carried to a battery, z^6, and thence to the two magnets. The other conductors, z^7 and z^8, are carried one to each magnet. When, therefore, the circuit is closed on the car by the button z', the upper magnet, Z, will be excited, the clutch thrown into action, and the valve raised. On the other hand, if the button z^2 be operated, the lower magnet will be excited, the cable engaged with the lower gear, and the valve lowered. The release of

either button is followed by the opening of the circuit, the release of the shipping-lever from the ends of the magnet, and the disconnection of the clutch by one or the other of the springs.

The electric connections above described are deemed the equivalents of the flexible cord shown in the preceding figures.

While I prefer to employ the particular form of reversing-gear herein shown, it is to be understood that I may substitute any one of the other forms of reversing-gear which are now known in the art, many forms of gear controlled by a shipping-lever to reverse the motion of a part driven from a continuously-acting motor being well known in connection with other classes of machinery.

Having thus described my invention, what I claim is—

1. As an improvement in hydraulic elevators, the car, its suspending-cable, the cylinder and piston for actuating the cable, and the valve to control the action of the piston, as usual, in combination with the valve-operating screw, the reversing-gear, and nut to actuate the screw, the motor connected to said gear, and the flexible gear-controller extending from the gear to the car and movable at one end with the latter, whereby the attendant on the car is enabled to bring the motor into action for moving the valve.

2. The car, the cylinder and its car-operating piston, and the controlling-valve, as usual, in combination with the motor, the reversible gearing connecting the motor and valve to move the latter, the reversing-lever, the pulley connected therewith, and the vertical cord passed from the car over a guide-pulley at the top, and also under the lower pulley to a suitable take-up device on the car.

3. In a device for operating an elevator, the combination, with the movable car, suspending-cable, hydraulic cylinder and piston, main valve, and water-supply and waste pipes, of a motor continually in action, suitable clutches intermediate between said motor and the spindle of said main valve, and suitable operating devices for throwing said clutches into and out of connection, substantially as set forth.

4. In combination with an elevator-car, its suspending-cable, and its intermittingly-acting motor provided with a controlling-valve, a second and constantly-running motor, and intermediate reversing-gear, through which the secondary motor controls the valve of the main motor.

5. In combination with an elevator-car, suspending-cable, and a hydraulic motor for operating said car, a secondary constantly-actuated motor and intermediate clutches adapted to stop and start the main motor, substantially as set forth.

In testimony whereof I hereunto set my hand, this 1st day of June, 1888, in the presence of two attesting witnesses.

WARREN S. JOHNSON.

Witnesses:
L. F. FISH,
E. W. CHUBB.