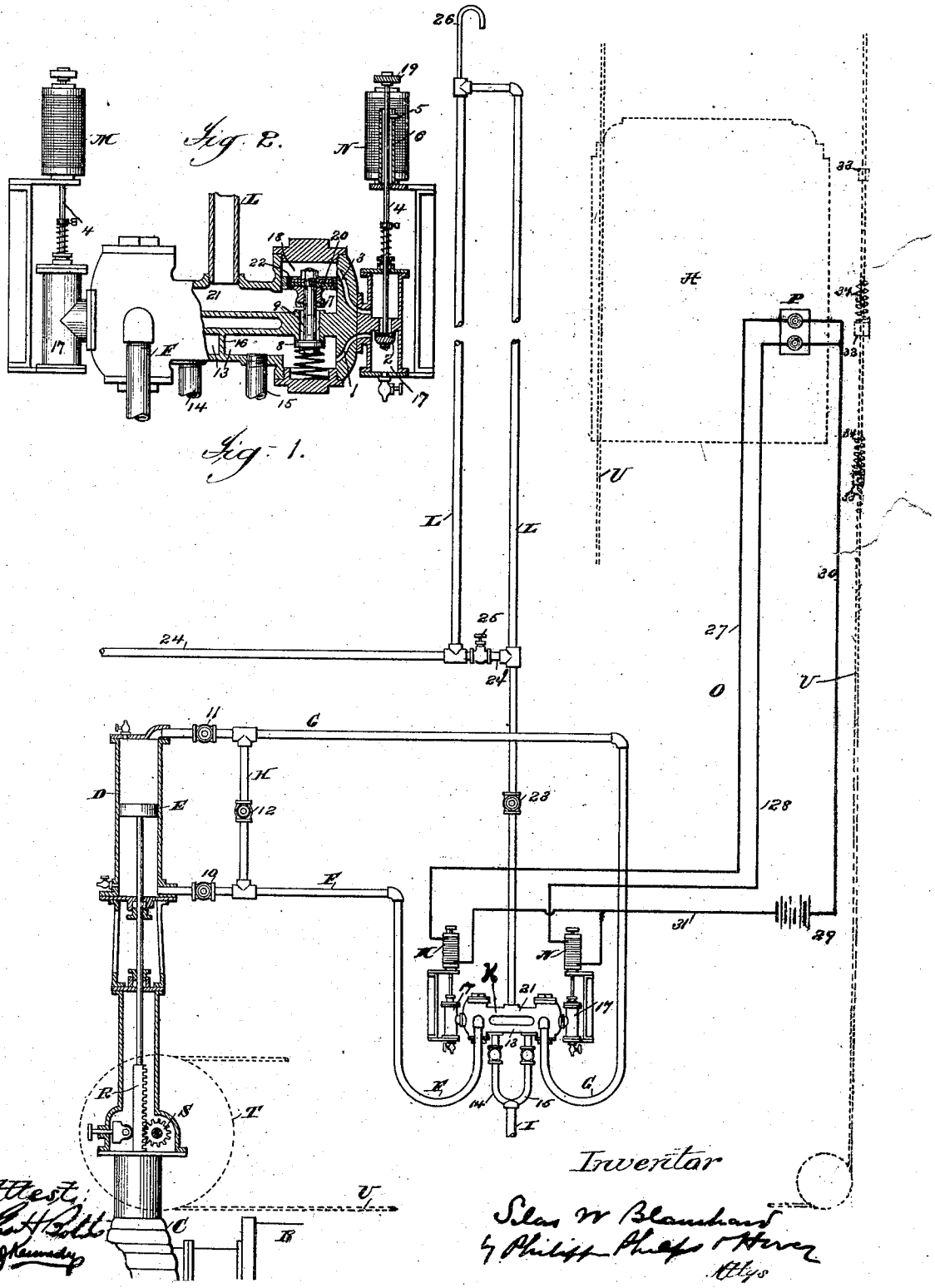
(No Model.)

S. W. BLANCHARD.

HYDRAULIC ELEVATOR.

No. 425,202. Patented Apr. 8, 1890.



UNITED STATES PATENT OFFICE.

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HYDRAULIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 425,202, dated April 8, 1890.

Application filed January 10, 1890. Serial No. 336,503. (No model.)

To all whom it may concern:

Be it known that I, SILAS W. BLANCHARD, a citizen of the United States, residing at Sheridanville, county of Allegheny, and State of Pennsylvania, have invented certain new and useful Improvements in Hydraulic Elevators, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to that class of hydraulic elevators in which the main valve or other controlling mechanism is operated by means of an auxiliary cylinder and piston provided with a system of pipes and auxiliary-valve apparatus for operating the piston in either direction, the auxiliary-valve apparatus being controlled from the car by suitable connections; and it is the general object of my invention to improve the construction of such auxiliary apparatus, rendering it more simple and efficient in action and more convenient for use.

While my invention is applicable to all classes of elevators in which mechanism of the class described is employed, whatever be the connections for operating the auxiliary-valve apparatus, it is intended especially for use in connection with electrically-controlled elevators employing a system similar to that described in Letters Patent to C. E. Ongley, Nos. 410,180, 410,181, 410,182, 410,183, and 410,184, dated September 3, 1889; and it consists in part in improvements upon that system.

In elevators employing mechanism of the class described the auxiliary piston has heretofore been subjected to the full pressure of the water from the supply-tank, the source of supply for both the main cylinder and auxiliary cylinder being the same. The result of this high pressure in the auxiliary cylinder has been to produce a sudden and violent action of the main valve, by which, especially in electrically-controlled systems, it has been impossible to regulate the distance to which the valve should be opened, preventing the running of the car at any desired rate of speed and causing an unpleasant jar in stopping the car by the closing of the valve. I avoid these difficulties and greatly increase the ease and certainty of action of the device by providing a back-pressure pipe on the discharge, whereby a part of the excessive water-pressure is counterbalanced, thus causing the valves to seat quietly and slowly, producing a corresponding motion in the operating-valve and bringing the car to a smooth and gradual stop. This admits, also, of running the car at any desired rate of speed and lessens the danger of excessively-high pressure in the auxiliary cylinder in event of the connections between the auxiliary cylinder and the car failing to work, or the packings of the piston becoming worn and incapable of holding back the pressure.

For a still finer adjustment of the pressure on the auxiliary piston I introduce a by-pass between the alternating pipes by which the water is introduced into and led from either end of the auxiliary cylinder. This by-pass is so constructed that the amount of water passing through it may be adjusted, thus allowing only a sufficient amount to pass the auxiliary cylinder to move the piston at the desired velocity to give the required movement of the main valve. The by-pass also, when used in connection with the cocks in the alternating pipes, admits of cutting out the auxiliary chamber and allowing full action of all the valves in the auxiliary-valve apparatus under full working-pressure without moving the auxiliary piston, and by this means new packings put in the auxiliary valves can be brought to a perfect seat, taking out all possibility of a leak before putting the device to work on the auxiliary piston and main valve.

When used in connection with the electrically-controlled devices on the general system of the patents above referred to, my construction enables the circuit-closer of Patent No. 410,182, above referred to, to be omitted, enabling the auxiliary-valve apparatus to be controlled by two buttons inside the car or at a landing, the slow motion of the auxiliary piston and the main valve enabling the attendant to readily determine the point of stoppage of the car and to break the circuit at the exact point at which the main valve closes both of the ports of the main cylinder.

The back-pressure also tends to balance the pressure from the supply-pipe upon the primary valves, thus admitting of operating the primary valves with a smaller quantity of electricity, and thus lessening the tendency to burn the button-contacts by arcing.

A full description of my invention will now be given, reference being had to the accompanying drawings, in which—

Figure 1 is a diagram showing the connections between the elevator-car and the main cylinder and controlling mechanism, the auxiliary cylinder and piston being shown in section. Fig. 2 is a sectional elevation of the auxiliary-valve apparatus.

Referring to said drawings, A is the elevator-car, and B the motor-cylinder therefor.

C is the controlling mechanism, which may consist of the ordinary main valve controlling the induction and exhaust ports of the cylinder B, and may be of any suitable construction to allow the water to be admitted to the cylinder B to cause the car to ascend when the valve is in one position, to allow the water to escape from the cylinder for the descent of the car when the valve is reversed, and to close both the induction and exhaust ports when the valve is in an intermediate or mid position. Such cylinders and valves are in common use and need not be more fully described herein.

D is the auxiliary cylinder, in which moves the piston E, the rod of which is connected to the stem of the main valve C.

F G are the alternating induction and exhaust pipes for admitting water to and allowing the escape of water from either side of the piston E, and H is a by-pass connecting these two pipes.

I is the supply-pipe, connecting with the same source of pressure as the supply-pipe for the cylinder B.

K is the auxiliary valve apparatus-controlling the alternating pipes F and G and auxiliary cylinder D.

L is the discharge-pipe from the auxiliary-valve apparatus and forms an exhaust for both alternating pipes F G.

M N are two magnets for operating the auxiliary-valve apparatus, and O are the electrical connections for controlling the circuits and extending from the said magnets to the button-board P, carried by the car. The stem of the main valve C is provided with the usual rack R, gearing with the pinion S upon the shaft of the pulley T, from which the hand-rope U extends to the car, as is usual in this class of mechanism.

Referring now to the details of construction thus briefly outlined, the alternating pipes F and G are provided, respectively, with cocks 10 11, by which these pipes may be cut off from the cylinder D, and the by-pass H is provided with a cock 12, by which the amount of water passing through said by-pass may be graduated or the by-pass entirely closed. The auxiliary-valve apparatus K is substantially the same in construction and operation as that of Patent No. 410,181, above referred to, but has been modified in details of construction to simplify its action and reduce it to smaller compass. The supply-pipe I passes into the auxiliary valve-chamber 13 by two arms 14 15, provided with stop-cocks by which the amount of water passing into the valve-chamber from each arm may be accurately adjusted, the valve-chamber being divided into two parts by means of the partition 16, as shown in Fig. 2. This arrangement enables the pressure upon the two sides of the piston E to be so adjusted that that upon the lower side of the piston will be sufficiently in excess of that produced upon the upper side to compensate for the weight of the piston and the parts attached thereto, thus producing a uniform motion of the piston in both directions.

Referring now to Fig. 2, in which one side of the auxiliary-valve apparatus is shown in section, it is to be understood that the two sides of the apparatus are the same in construction and but one need be described. The chamber 13 connects by a small passage 1 with a side chamber 17, consisting of upper and lower chambers, connection between which is closed by the primary valve 2, the upper chamber connecting by a small passage 3 with a chamber 18, in which moves the piston of the auxiliary valve. The primary valve-rod 4 passes upward through a suitable support, and is connected to armature 19, acted upon by the magnets N, the action of the magnets drawing down the valve-rod 4 and opening the primary valve. As shown, the valve-rod 4 is guided in its movement by a pin 5, passing through a slotted tubular guide 6, thus preventing the armature and valve-rod from turning. The auxiliary valve consists of two valves 7 8, adapted to close the opposite ends of a valve-chamber 9, with which connects one of the alternating pipes of the auxiliary cylinder. The auxiliary valve has connected thereto a piston 20, working in cylinder or chamber 18, previously referred to, and adapted to be operated by the pressure of the water from the supply as it passes through the chamber 17 and passage 3 on the operation of the primary valve 2. This piston exceeds in area the valve 8, thus increasing the amount of pressure at that end of the valve-rod and producing a movement of the auxiliary valve on the opening of the primary valve.

The discharge-pipe L connects, as shown in Fig. 2, directly with the upper chamber 21 of the auxiliary-valve apparatus, which chamber is normally in connection with the alternating pipes of both cylinders, the auxiliary valve 9 being held in the position shown in Fig. 2 by means of the pressure of the water from the supply-pipe. The primary valve is also held closed by the pressure of the water from the supply-pipe, and both these valves, as shown, will preferably be provided with springs to assist in holding them in position

and to retain them in place when the pressure is removed by cutting off the supply. The piston 20 will be provided with a by-pass 22, allowing the circulation of water between chambers 18 and 21.

The discharge-pipe L, as shown, extends from the auxiliary apparatus K upward to such a height as to produce the proper amount of back-pressure upon the piston E. The height to which the discharge-pipe is carried will depend upon the amount of pressure in the supply-tank. The discharge-pipe, as shown, is preferably then brought downward to a point near the rest of the apparatus, where the exhaust 24 is located.

The discharge-pipe L is provided with a cock 23, by which it may be cut off, when desired, from the auxiliary-valve apparatus, and a short pipe 24′, controlled by a cock 25, connects the upwardly-extending part of the discharge-pipe directly with the exhaust, by which means the back-pressure may be largely removed, when desired. An open pipe 26 connects with the upper end of the discharge-pipe for the purpose of admitting air and preventing any siphonic action, the upper end of this pipe being preferably bent downward, as shown, to prevent foreign substances entering the pipe.

Referring now to the electrical connections, it will be seen that each one of the magnets M N is connected to a button on the board P, the magnet M being connected by wire 27 and magnet N by wire 28. From the battery 29 a wire 30 extends upward to the elevator-car, and is connected by two branches with the buttons on the board P. From the opposite pole of the battery a wire 31 extends to the two magnets M N, pressure upon either of the buttons upon the board P thus serving to close the circuit through the corresponding magnet. It will be understood that with this construction, also, circuit-closers may be placed at the landings, if desired, as well as upon the car, as in Patent No. 410,184, above referred to.

The operation of the device will be readily understood from a brief description. If the main valve C is to be moved upward to open the valve for an upward movement of the elevator, pressure upon the upper button in the car will close the circuit through magnet M, and by opening the primary valve 2 will produce pressure upon the piston 20, thus closing the valve 9 and opening the valve 8, allowing the water to pass from the supply-pipe 14 to the alternating pipe F, the cocks 10 and 11 being open and the cock 12 in the by-pass adjusted as desired. The auxiliary valve corresponding to the magnet M thus being opened, the valve upon the other side of the auxiliary-valve apparatus corresponding to the magnet N is in the position shown in Fig. 2, thus allowing the free passage of the water from the upper side of the piston through the alternating pipe G and the chamber 21 to the discharge-pipe L. The piston will therefore be operated against back-pressure due to the pipe L to open the valve C by pressing the button until the car has attained the desired speed, when the contact will be broken by releasing the button. On breaking the circuit the primary valve 2 will be immediately returned to position by the pressure of the water from the supply-pipe 14 and the valves 7 and 8 will be likewise returned to the position shown in Fig. 2, thus equalizing the pressure upon the two sides of the piston through the similar connection of their alternating pipes with the chamber 21, the piston thus being brought to a stop in the position it has reached. When it is desired to stop the car or to operate it in the opposite direction, the lower button will be pressed, thus closing the circuit through the magnet N and producing an action of the piston E opposite from that previously described as produced by the closing of the circuit through magnet M. If it be desired only to stop the car, the circuit will be broken as soon as the car reaches a stop, the operator being enabled to do this without difficulty on account of the slow operation of the piston E and the main valve C, and consequently of the car. To reverse the movement of the car, pressure upon the button will continue until the car has attained the desired speed, when the circuit will be broken and the auxiliary valves returned to position as before. When it is desired to adjust the packings in the auxiliary-valve apparatus, the cocks 10 11 will be closed, thus cutting out the auxiliary cylinder and piston, and the cock 12 in the by-pass will be fully opened, thus allowing the circulation of the water from the alternating pipes to the valve apparatus and discharge-pipe L without operating the main valve of the motor-cylinder. The packings may now be tested by playing with the fingers upon the armatures of the two magnets M N, thus operating in succession the primary and secondary valves at opposite sides of the valve apparatus. This, as is apparent, may be done without interfering in any way with the motion of the elevator-car or the main valve, which may be operated meanwhile by the hand-rope U, pulley T, and the pinion S, as usual in this class of mechanism.

To avoid the shock incident to a full opening of the main valve of the motor-cylinder, a system of cut-outs has previously been provided, as shown and described in Patent No. 410,183, above referred to. I avoid the necessity of this construction by passing the hand-rope U through a guide 32 and providing it with stops 33, these stops being provided with springs 34, by which the stoppage of the main valve is rendered gradual and all shock obviated.

It will be understood that my invention is not limited to any special form or system of motor and mechanism for controlling its movements, nor to the auxiliary-valve apparatus shown and described, as all these may be of

any other suitable construction. The electrical connections for operating the auxiliary-valve apparatus from the car may also be varied, and it is evident that mechanical connections may be substituted, if preferred. Moreover, it is apparent that the construction and arrangement of the back-pressure pipe and by-pass may readily be modified by one skilled in the art and without departing from my invention.

What I claim is—

1. The combination, with the mechanism for controlling the movements of an elevator, of an auxiliary cylinder and piston for operating said mechanism, a supply-pipe and auxiliary-valve apparatus for controlling said piston, and a back-pressure discharge-pipe acting to partially counterbalance the pressure upon the piston from the supply-pipe, substantially as described.

2. The combination, with the mechanism for controlling the movements of an elevator, of an auxiliary cylinder and piston for operating said mechanism, a valve for controlling said piston, constructed to open against the pressure of the supply-pipe, and a back-pressure discharge-pipe communicating with the valve and acting to partly counterbalance the pressure from the supply-pipe, substantially as described.

3. The combination, with the mechanism for controlling the movements of an elevator, of an auxiliary cylinder and piston for operating said mechanism, induction and exhaust pipes for the auxiliary cylinder, and a by-pass connecting the pipes, whereby part of the water may be cut off from the auxiliary cylinder and the pressure on the piston reduced, substantially as described.

4. The combination, with the mechanism for controlling the movements of an elevator, of an auxiliary cylinder and piston for operating said mechanism, induction and exhaust pipes for said cylinder, and an adjustable by-pass connecting said pipes, whereby the pressure upon the piston may be adjusted, substantially as described.

5. The combination, with the cylinder D and a supply-pipe, discharge-pipe, and auxiliary-valve apparatus therefor, of the alternating induction and exhaust pipes F G, having cocks 10 11, and the by-pass H, having cock 12, substantially as described.

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

SILAS W. BLANCHARD.

Witnesses:
C. J. SAWYER,
J. J. KENNEDY.