

E. N. MILLS.
PNEUMATIC ELEVATOR DOOR CONTROLLER.
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1,064,847.

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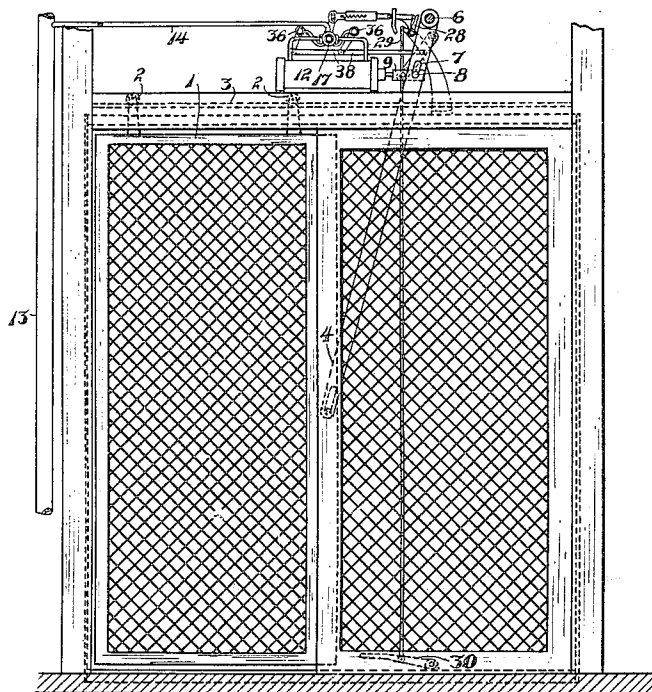


Fig. 1.

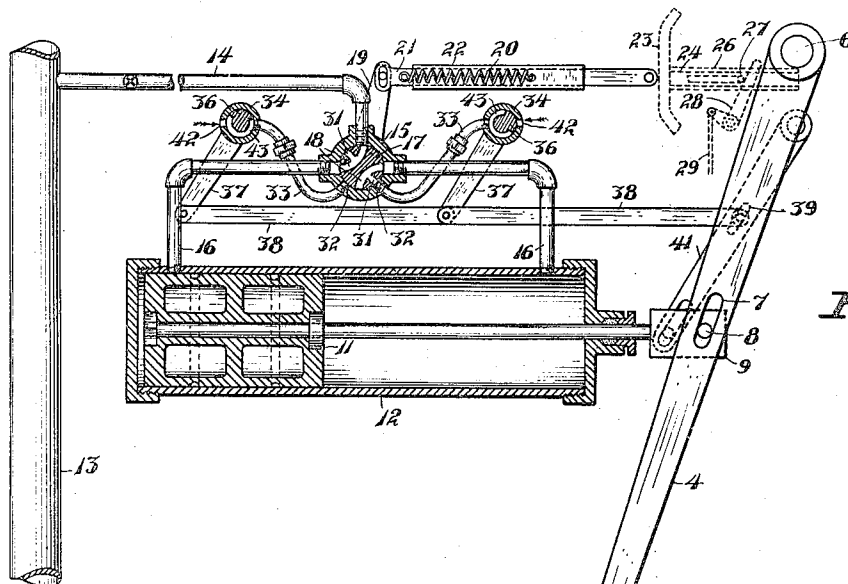


Fig. 2.

WITNESSES

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EDWARD N. MILLS, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO WESTERN DOOR CONTROL COMPANY, OF BRENTWOOD, CALIFORNIA, A CORPORATION OF CALIFORNIA.

PNEUMATIC ELEVATOR-DOOR CONTROLLER.

1,064,847.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed July 3, 1912. Serial No. 707,495.

To all whom it may concern:

Be it known that I, EDWARD N. MILLS, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Pneumatic Elevator-Door Controllers, of which the following is a specification.

The present invention relates to improvements in pneumatic controllers for elevator doors.

One object of the invention is to provide a device of this character having a cylinder and a piston therein, which needs practically no lubrication, and in which no dust or dirt will collect on the surfaces of the piston and cylinder, so that there is no danger of the piston clogging up in the cylinder.

A further object of the invention is to provide such a controller that the door will resist being opened or closed, unless the proper appliance for that purpose is operated.

In the accompanying drawing, Figure 1 is a front view of an elevator door equipped with my invention; Fig. 2 is an enlarged vertical sectional view of my invention, detached, the parts carried by the car being shown in dotted lines.

Referring to the drawing, 1 indicates an elevator door, suspended in the usual manner from rollers 2 which can roll upon a track 3. To said door 1 is pivotally attached a lever 4, pivoted, as shown at 6, to the frame of the elevator shaft, and having a slot 7, which is engaged by a pin 8, extending from a head 9, secured upon the outer end of a piston 11 reciprocable in a cylinder 12 secured in any suitable manner upon the frame of the elevator shaft above said door.

13 indicates a vertical vacuum pipe extending up the elevator shaft and having connected therewith branch pipes 14 for the respective doors, one only being here shown, each of which leads to a valve casing 15, from which casing 15, pipes 16 lead to opposite terminal portions of the cylinder 12, and connect therewith at a short distance from their ends. In said valve casing is a rotary valve 17, having formed therein two conduits 18, and having an arm 19 adapted

to be rocked by a bar 21 sliding in a guideway 22 and retracted by a coiled spring 20 and having at one end pin and slot connections with said arm 19. When a car arrives opposite to the elevator door, the other end of said bar is adapted to be engaged by a cross head 23 carried by a sliding piece 24 sliding on a suitable guide 26 carried by the car and having a pin 27 engaged by an arm of a lever 28 pivoted upon the car, said lever having an arm to which is attached a cord 29 connected to a treadle 30 adapted to be depressed by the operator of the car. A downward movement of said cord causes the lever 28 by its engagement with the pin 27 to move the sliding piece 24 to move the bar 21 to operate the arm 19 and turn the rotary valve 17 through a quarter turn. When the downward pull on the cord 29 ceases, or the cross head 23, owing to the movement of the car, moves out of engagement with the bar 21, the coiled spring 20 retracts the bar 21 and the rotary valve 17 turns back a one-quarter turn. In one position of said valve, one of the conduits 18 forms a connection between the vacuum pipe 13 and the pipe 16 leading to one end of the cylinder, while the other conduit 18 communicates at one end with the pipe 16 leading to the other end of the cylinder. From each conduit 18 a branch conduit 31 leads to one of two apertures 32 formed in the casing 15 and connected respectively by pipes 33 with valve casings 34 in which can rotate valves 36 rotated by crank arms 37, the other ends of which are attached to a pitman 38, attached by a pin and slot connection 39 to a lever 41, pivoted upon the casing of the elevator shaft and the outer end of which is attached to the head 9 secured to the piston rod. Said casings 34 are formed with apertures 42 to admit air thereinto. Said apertures 42 are so formed that, when either conduit 18 forms a communication between the vacuum pipe 13 and the pipe 16 to one end of the cylinder, one aperture 42 is in communication with the branch conduit 31 connected with the other conduit 18, which is in communication with the pipe 16 leading to the other end of the cylinder. Upon the rocking of said valve through a quarter turn these arrangements

are reversed. Each rotary valve 36 is formed with a conduit 43 extending more than half way around the valve.

The following is the mode of operation of my improved controller: Supposing that the parts are in the position shown in the drawing, and that the operator depresses the cord 29, the result is that the rotary valve 17 is so moved that the pipe 16 leading to the right-hand end of the cylinder is placed in communication with the vacuum pipe 13 and the left-hand end of the cylinder is open to the atmosphere by means of the other pipe 16, branch conduit 31, conduit 18, pipe 33, conduit 43, and aperture 42 on the left. The right-hand end of the cylinder is exhausted of air, while the left-hand end is open to atmospheric pressure, and the piston then begins to move to the right causing the door to open. As the piston moved to the right, the lever 41 is rocked to the right, and therefore also the arms 37 and the valves 36 are turned. This movement of the valve 36 on the left causes the conduit 43 to be cut off from atmospheric air when the piston has moved through about two-thirds of its stroke. During the remainder of the stroke of the piston, the pressure of the air in the left-hand end of the cylinder is reduced. When the piston passes the end of the pipe 16 at the right-hand end of the cylinder, communication with exhaust is cut off. The piston continues to move to the right, compressing the residual air in the right hand end of the cylinder until the air at the right of the piston is so compressed that the pressure is equal to, or greater than, the pressure of the residual air in the left-hand end of the cylinder, whereupon the piston will be arrested and the parts will be in a position similar to, but reversed from, the arrangement shown in Fig. 2. Upon the cord 29 being released from its downward pull the coiled spring 20 draws the arm 19 to the right. The parts then return into the position shown in Fig. 2, the stoppage of the piston incurring in like manner as before described, just before the piston reaches the left hand end of the cylinder. It will be observed that, in this latter position, the piston is contained between two bodies of air both under pressure much less than atmospheric. If, then, it be attempted to open the door by hand, or otherwise than by the pneumatic controller, the result will be, that as soon as the piston passes the entrance to the pipe 16 on the left, which is then in communication with exhaust, the difference of pressure will exert a powerful backward pull upon the piston, preventing the door being opened.

It has been my experience in controllers for elevator doors operated by compressed air, that, after being operated for some time,

they become inoperative, and the reason is found to be that there are introduced into the cylinder with the compressed air, particles of dust, which, mixed with the lubricating oil necessary therein, eventually clog up the piston, so that it will not reciprocate in the cylinder. The more lubrication is applied to facilitate its movement the worse the condition of the parts eventually becomes. By using exhaust instead of compressed air to operate the piston, I avoid these evil results, for the tendency of the exhaust is to withdraw from the cylinder any particles of dust or foreign matter, and thus maintain the interior of the cylinder clean.

As a further improvement I form the piston of aluminum. It is found that a piston formed of this metal, reciprocating in a cast iron cylinder, requires practically no lubrication. However, should slight lubrication be needed, this is easily furnished by introducing into the cylinder powdered graphite, as by applying it to the air inlet apertures 42, from which it is drawn into the cylinder with the streams of air flowing therethrough.

I claim:—

1. A controller for elevator doors comprising a cylinder, a piston reciprocable therein, and operatively connected to the elevator door to reciprocate the same, an exhaust air pipe, means for placing said latter pipe in communication with either end of the cylinder selectively and the other end in communication with atmospheric air, and means for shutting off the atmospheric air after the piston has moved through a portion only of its stroke.

2. In combination with a door, a cylinder, a piston therein operatively connected to said door, an air-exhaust pipe, pipes leading to opposite terminal portions of the cylinder and either adapted to be selectively connected to said air-exhaust pipe, their connections with the cylinder being such that communication between said cylinder and either pipe is shut off before the piston arrives at the end of the cylinder.

3. In combination with a door, a cylinder, a piston therein, operatively connected to said door, an air exhaust pipe, and means for placing said air exhaust pipe in communication with either end of the cylinder selectively, and for closing said communication before the piston arrives at the end of its stroke.

4. In combination with a door, a cylinder, a piston therein, operatively connected to said door, an air exhaust pipe, means for placing said air exhaust pipe in communication with either end of the cylinder selectively, and for closing said communication before the piston arrives at the end of its stroke, and means for opening communica-

tion between the other end of the cylinder and atmospheric air, said means being adapted to close automatically before the piston has arrived at the ends of its stroke.

5 5. In combination with a door, a cylinder, a piston therein, operatively connected to said door, an air exhaust pipe, means for placing said air exhaust pipe in communication with either end of the cylinder selectively, and for closing said communication 10 before the piston arrives at the end of its stroke, and means for opening communication between the other end of the cylinder and atmospheric air, said means being 15 adapted to close automatically when the piston has completed two-thirds of its stroke.

6. In combination with a door, a cylinder, a piston reciprocable therein, an exhaust air pipe, pipes leading to the respective terminal portions of the cylinder, and communicating with said cylinder at points spaced 20 from its ends, a rotary valve arranged selectively to connect said exhaust air pipe with one of said latter pipes, means under the control of the operator for operating said 25 rotary valve, and means whereby the other of said latter pipes can be caused to com-

municate with atmospheric air, said means being operated by the movement of the piston in the cylinder.

7. In combination with a door, a cylinder, a piston reciprocable therein, an exhaust air pipe, pipes leading to the respective terminal portions of the cylinder, and communicating with said cylinder at points spaced 30 from its ends, a rotary valve arranged selectively to connect said exhaust air pipe with one of said latter pipes, means under the control of the operator for operating said rotary valve, and means whereby the other 35 of said latter pipes can be caused to communicate with atmospheric air, comprising a rotary valve, operatively connected with said piston to be rocked thereby, such valve being formed with a circumferential conduit, and forming a communication between 40 one of said pipes and the atmosphere.

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

EDWARD N. MILLS.

Witnesses:

FRANCIS M. WRIGHT,
D. B. RICHARDS.