Aug. 16, 1932. S. P. WIEGNER 1,872,201

DOOR CONTROL MECHANISM

Original Filed Dec. 1, 1926 3 Sheets-Sheet 1

Fig. 1

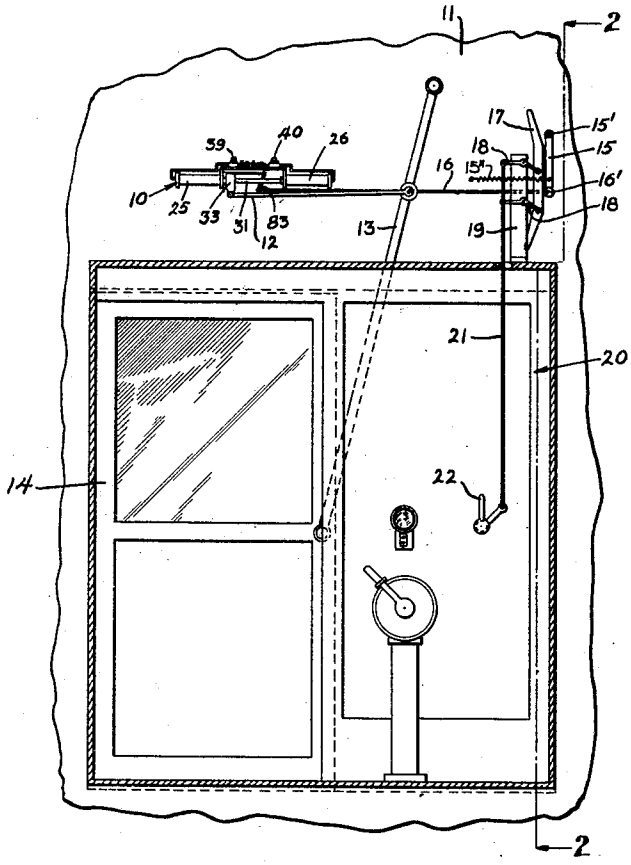


Fig. 2

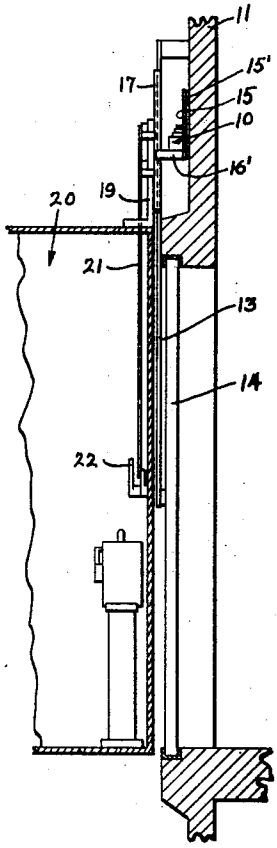
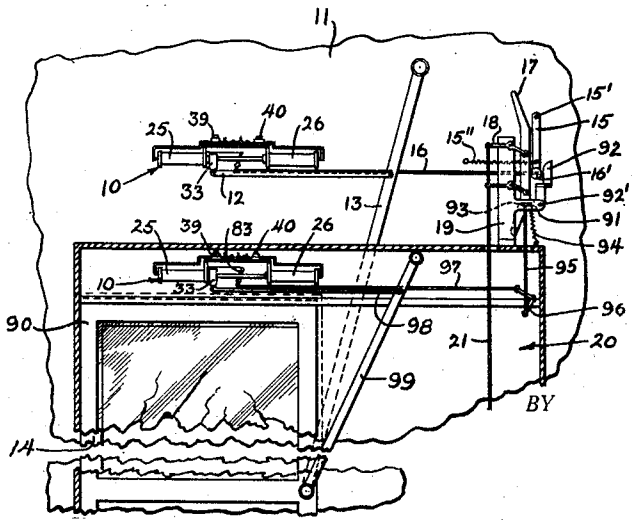


Fig. 3



INVENTOR.
SIMON P. WIEGNER

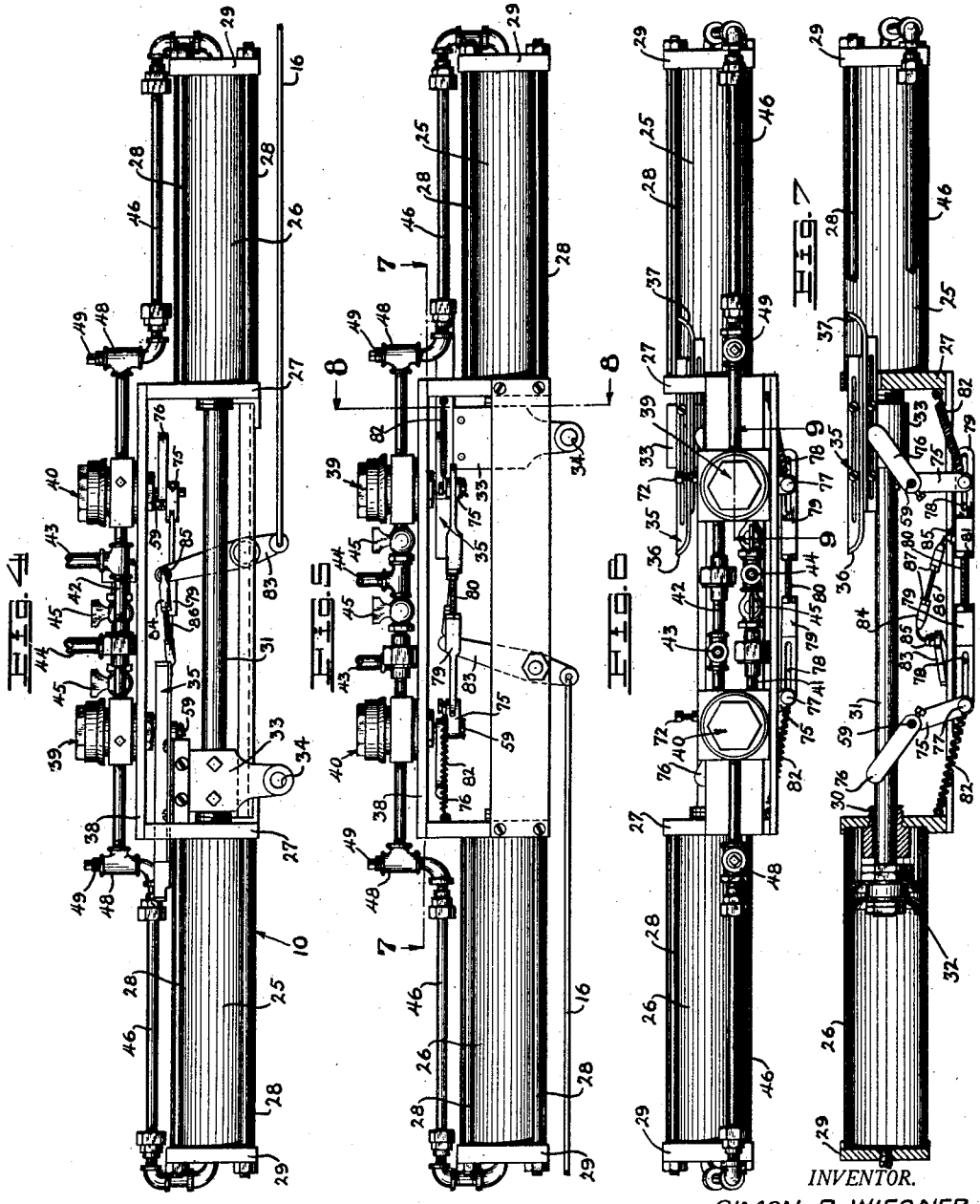
BY

ATTORNEY.

Aug. 16, 1932. S. P. WIEGNER 1,872,201

DOOR CONTROL MECHANISM

Original Filed Dec. 1, 1926 3 Sheets-Sheet 2



INVENTOR.
SIMON P. WIEGNER

BY

ATTORNEY.

Aug. 16, 1932. S. P. WIEGNER 1,872,201

DOOR CONTROL MECHANISM

Original Filed Dec. 1, 1926 3 Sheets-Sheet 3

Fig. 8

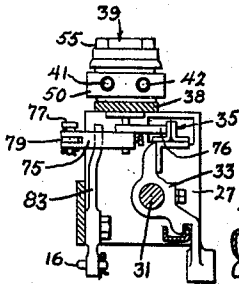


Fig. 9

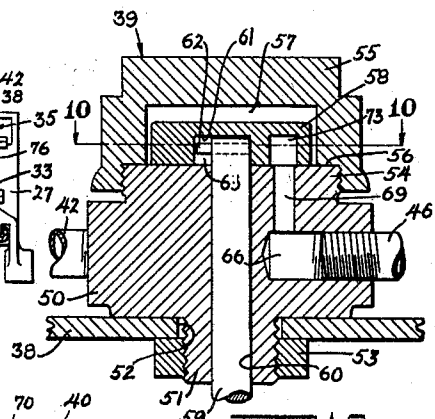


Fig. 10

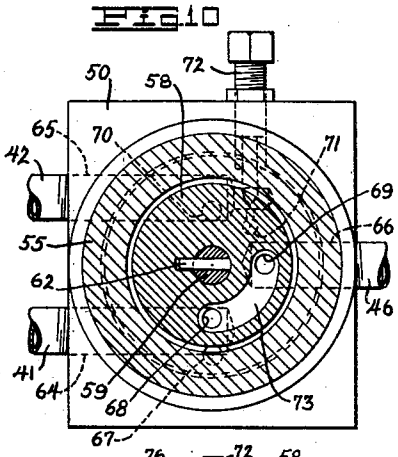


Fig. 12

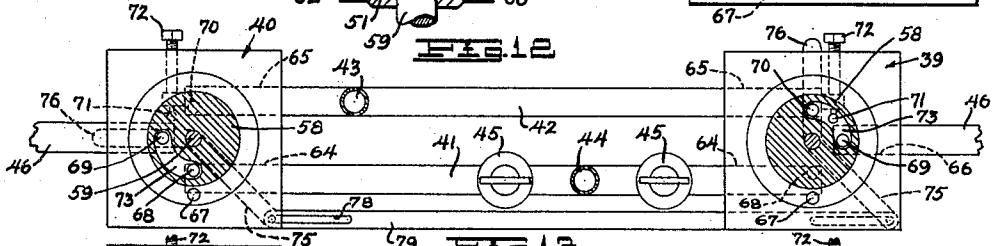


Fig. 13

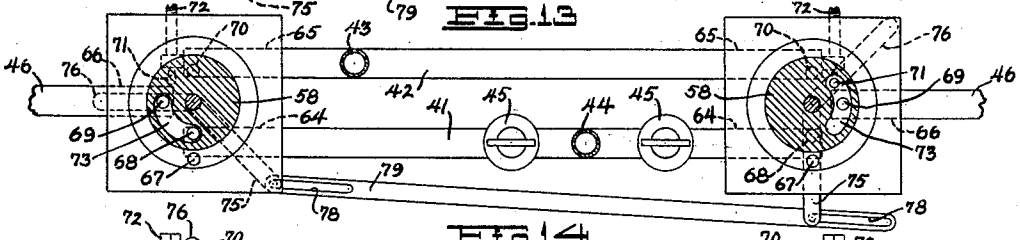


Fig. 14

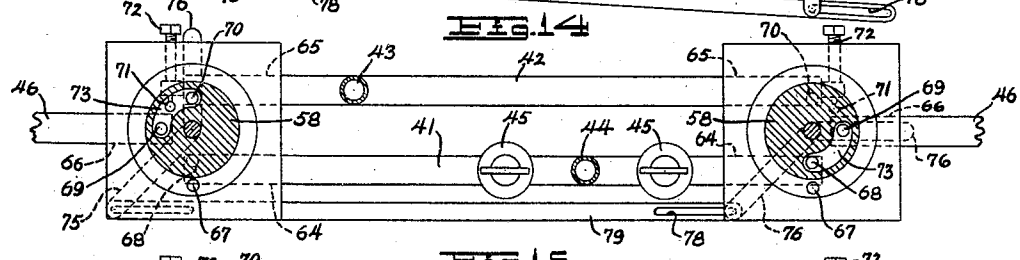


Fig. 15

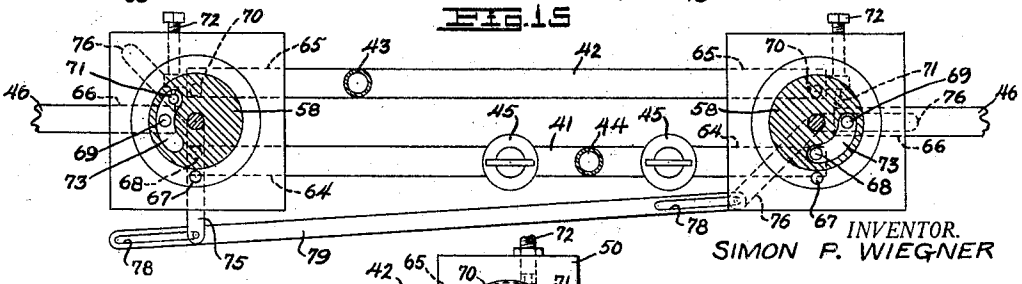
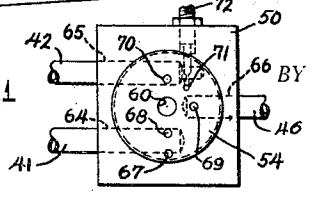


Fig. 11



INVENTOR.
SIMON P. WIEGNER

BY

ATTORNEY.

Patented Aug. 16, 1932 1,872,201

UNITED STATES PATENT OFFICE

SIMON P. WIEGNER, OF LOS ANGELES, CALIFORNIA

DOOR CONTROL MECHANISM

Application filed December 1, 1926, Serial No. 151,891. Renewed January 22, 1932.

This invention relates to door control mechanism.

The general object of the invention is to provide an improved door opening and closing device.

A specific object of my invention is to provide an improved mechanism for controlling the movement of a door wherein fluid under pressure is employed, and wherein a novel type of fluid pressure control is provided.

A further object of my invention is to provide a novel means for stopping the movement of a fluid controlled door.

Another object of the invention is to provide automatic adjustable cushioning means for stopping a moving door.

A further object of my invention is to provide improved means for synchronously actuating an elevator shaft door and a door mounted on the elevator.

Another object of the invention is to provide a plural cylinder door control mechanism with means to regulate the flow of fluid to each cylinder independently of the other cylinder.

A further object of the invention is to provide a door control device having fluid controlled mechanism operable without stuffing boxes or one-way valves.

Other objects and advantages of this invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

Fig. 1 is a vertical section of a part of an elevator looking toward the door and shows my improved door operating mechanism.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Fig. 3 is a view similar to Fig. 1 showing the manner of installing two of my door operating devices, one for actuating the floor door and one for actuating the elevator door.

Fig. 4 is an enlarged side elevation of the door actuating mechanism shown in Fig. 1.

Fig. 5 is a view similar to Fig. 4 showing the other side of the mechanism.

Fig. 6 is a top plan view of the door actuating mechanism shown in Fig. 5.

Fig. 7 is a section taken on line 7—7 of Fig. 5 with parts broken away to more clearly illustrate the same.

Fig. 8 is a section of the device taken on line 8—8 of Fig. 5.

Fig. 9 is a vertical section of one of the control valves taken on line 9—9 of Fig. 6.

Fig. 10 is a plan section of a control valve taken on line 10—10 of Fig. 9.

Fig. 11 is a top plan view of a control valve with the cap and rotor member removed to more clearly show the passages in the body member.

Fig. 12 is a diagrammatic top plan view corresponding to Fig. 6 showing the relative position of the valve parts when the doors are being closed.

Fig. 13 is a similar view showing the valve parts in their respective positions when the doors are closed.

Fig. 14 is also a view similar to Fig. 12 showing the relative positions of the valve parts when the doors are being opened, and

Fig. 15 is a similar view showing the relative positions of the valve parts when the doors are fully opened.

Referring now to the drawings I have indicated my device generally at 10 as mounted on a wall 11 of an elevator shaft and connected by means of a rod 12 to a door actuating lever 13 which is pivoted at one end to the wall 11 and at the other end to an elevator door 14. The actuating mechanism for my device may be of any approved type. In Fig. 1 I show a very simple construction which consists of an arm 15 pivoted to the wall 11 at 15′ and connected at its other end to the valve actuating mechanism by a rod 16.

The arm 15 has a projecting roller 16′ by which it is adapted to be swung to the right by a bar 17 which is pivotally supported by pivoted arms 18 on a standard 19 which is secured to the top of an elevator 20. The arms 18 are adapted to be moved for actuating the bar 17 by a rod 21 connected to a hand lever 22 mounted within the elevator 20. Attached to the arm 15 and anchored to the wall 11 I provide a coiled spring 15″ which is adapted to normally resiliently hold the arm 15 in its initial position and to bring

the arm 15 back to its initial position after it has been actuated by the bar 17.

The door actuating means 10 comprises spaced cylinders 25 and 26 mounted on a frame 27 and secured thereto by bolts 28 and end plates 29. Each of the cylinders 10 has a piston rod bushing or guide 30 which is secured to the frame 27. A piston rod 31 passes through each bushing or guide and is provided at each of its ends with a piston 32 (see Fig. 7). The piston 32 may be of any desired construction, and the details thereof as well as the details of the manner in which the front of the cylinder is bled form no part of my present invention. Secured to the piston rod 31 I show a block 33 having a downwardly extending arm apertured as at 34 for pivotal engagement with the door actuating lever 13 and having on its top surface a valve actuating cam 35 which consists of two adjustable arms 36 and 37.

Secured to a top member 38 of the frame 27 I show pressure or cylinder control valves 39 and 40 having a common inlet pipe 41 and a common exhaust pipe 42. The exhaust pipe 42 is provided with a T for communication with a pipe 43 which leads to an exhaust line (not shown). The inlet pipe 41 is also provided with a T for communication with a pipe 44 from the pressure tank (not shown), and on either side of the inlet T I provide shutoff valves 45 for controlling the pressure to either of the valves 39 or 40. Communication is afforded between each of the valves 39 and 40 and the far end of the cylinders 25 and 26 by means of pipes, 46, each of which is provided intermediate its length with a T 48 which may have one of its openings closed by a screw plug 49. This T 48 is for testing and lubricating purposes, since to test the device it is only necessary to remove the plug 49 and replace it with a pressure gauge.

The valves 39 and 40 are exactly similar in construction, and each comprises (see Fig. 9) a body portion 50 having on its under surface a screw threaded stem 51 which extends through an aperture 52 in the top plate 38 of the frame 27, and is adapted to be clamped to the plate 38 by a nut 53. The top of the body 50 is provided with a boss 54 having its outer periphery threaded for the reception of a cap member 55. On the top surface 56 of the boss 54 and within a recess 57 of the cap 55 I show a rotor member 58 adapted to be rotated by a shaft 59 which extends through a bore 60 in the body 50 and into a cylindrical recess 61 of the rotor member 58.

For imparting rotation from the shaft 59 to the rotor 58 I provide a pin 62 on the shaft 59. This pin extends into an aperture 63 of the rotor member 56. The body 50 is provided with a threaded bore 64 (see Fig. 11) for engagement with the inlet pipe 41 and a threaded bore 65 for the reception of the exhaust pipe 42. On the side opposite from the inlet and outlet bores another bore 66 is provided in each body 50 for the reception of a pipe 46 which communicates with each cylinder.

Extending upwardly from the bore 64 to the surface 56 I provide two smaller bores 67 and 68, and extending upwardly from the bore 66 I provide another small bore 69. Similarly I provide a small bore 70 extending upwardly from the bore 65 to the surface 56 and I also provide a bore 71 smaller than the bore 70, extending through the top surface 56 and having communication with the bore 65. The passage of fluid from the bore 71 into the bore 65 is regulated by an adjustable needle valve 72. In the under side of the rotor member 58 I provide an aperture 73 of a length sufficient to embrace the bores 68 and 69 or the bores 70 and 69.

To rotate each shaft 59 I provide an arm 75 adjacent its lower end. The shafts 59 each have another arm 76 adjustably secured thereto. The arm 75 has a pin 77 thereon which fits in a slot 78 in a bar 79 to allow the arm 75 to move independently of the bar 79 at times, also the bar 79 is adjustable as to length by means of a screw threaded stud 80 and lock nuts 81. The arms 75 have coil springs 82 attached thereto to normally retain the pins 77 against the outer extremities of the slots 78. Upon a movement of the bar 79 the arms 75 will be moved thereby and rotate the shafts 59 to cause one of the valves 39 to assume an intake position and the other to assume an exhaust position.

For imparting movement to the bar 79 I provide an arm 83 connected to the bar 79 by a link 84. The link 84 engages the arm 83 and the bar 79 by ball and socket connections as at 85 and is adjustable as to length by a threaded stud 86 and lock nuts 87. The arm 83 is actuated by a rod 16 from the pivoted arm 15 mounted on the elevator shaft wall.

Assuming the pressure by which the elevator door actuating means 10 is operated to be air, as is generally the case, and referring to Fig. 12 of the drawings which is a diagrammatic view, it will be seen that the bar 79 has been moved to cause the arms 75 to turn the shaft 59 and the members 58 so that the valve 39 is in an exhaust position and the valve 40 is in an intake position. When the valves are in these positions the members 58 are turned so that in the valve 39 the recess 73 forms a communicating passage from the bore 69 to the bores 70 and 71, and in the valve 40 the recess 73 forms a communicating passage between the bores 69 and 68.

When the valve 40 is in this position the air pressure will pass from the supply pipe 41 into bore 64 through the bore 68 and into the recess 73 of member 58 and thence through bore 69 into bore 66 to the pipe 46 and to the cylinder 26, to thereby cause the piston rod 31 to move. At the same time the pressure is

coming through bore 68 it also comes through the bore 67 and at all times into the recess 57 of the cap 55. As the area of the top surface of the rotor member 58 is greater than the area of the recess 73 there will be more pressure on the top of the member 58 than there is on the under side of the same and thus the rotor member will be kept seated on the top surface 56 of the boss 54.

When the valve 39 is in the position shown in Fig. 12, the exhaust air from cylinder 25 will pass through the pipe 46 into bore 66 through the bore 69 and into the recess 73 of the rotor 58, and thence through the bores 70 and 71 into the bore 65 and through the pipe 42 to the pipe 43 and thence to the exhaust line (not shown).

When the valves are in the position as just described and as shown in Fig. 12, the piston rod starts its travel from the cylinder 26 toward the cylinder 25 and carries with it the block 33 and the cam tracks 35, and as the cam track 37 approaches the cylinder 25 it forces the arm 76 of valve 39 inwardly thereby rotating the shaft 59 which causes the rotor member 58 to assume the position shown in Fig. 13. When in this position the recess 73 forms a communicating passage from the bore 69 only to the bore 71. Heretofore the exhaust has been free so that the piston rapidly moves the door, but in this new position all the air being exhausted must pass by the needle valve 72 before entering the bore 65 and pipe 42.

In this way the air from cylinder 25 is not allowed a free passage and consequently the speed of the piston rod is slowed down. This slowing down of the piston rod damps the movement and prevents a slamming of the door at the end of its travel. In this manner a cushioning effect is obtained. The amount of this cushioning effect is readily adjustable by means of the needle valve 72 and the arms 36 and 37.

In Fig. 14 I have diagrammatically illustrated the valve mechanism as in a reverse position from that shown in Fig. 12, that is the bar 79 has been moved to cause the valve 39 to assume an intake position and the valve 40 to assume a full exhaust position. In Fig. 15 the valve 39 is still in an intake position while the valve 40 has been caused by the cam track 36 of the cam member 35 to assume an intermediate or partial exhaust position to produce a cushioning effect.

From the foregoing description it will be apparent that when the operator moves the lever 22 to the right the bar 17 will be moved upward and to the right and will cause the pivoted arm 15 to swing to the right. As the arm 15 swings to the right it pulls the rod 16 and thereby imparts movement to the arm 83 of the door actuating means 10. The arm 83 by its linked connection to the arms 75 of the valves 39 and 40 causes the valve 39 to assume an intake position and the valve 40 to assume a full exhaust position as shown in Fig. 14. When the valves are in this position the piston rod 31 and the block 33 are forced to the right, and as the door operating lever 13 is attached to the block 33 by the rod 12 it will be moved to the right to cause the door 14 to open. The door will open rapidly until the bore 70 is closed when it will slow down due to the smaller exhaust.

When the operator moves the lever 22 back to the position shown in Fig. 1 the bar 17 will be retracted and the pivoted arm 15 will be forced by a spring 15″ to assume its normal position and thereupon cause actuation of the valves 39 and 40, so that the valve 40 will assume an intake position and the valve 39 to assume an exhaust position. When the valves are in this relation the piston rod 31 and the block 33 will be forced to the left and cause the arm 13 by means of rod 12 to close the door 14.

In Fig. 3 I have shown one of my devices 10 as mounted on the elevator shaft wall 11, the same as in Fig. 1, for operating the elevator shaft door 14, and another of my devices 10 as mounted within the elevator 20 for actuating a door 90 of the elevator. I also show a lever arrangement for operating both of the door actuating devices 10 simultaneously. The valve actuating means for the device 10 which is located within the elevator 20 consists of providing the standard 19 with an arm 91 on which a lever 92 is pivoted at 92′. This lever 92 is on the oppposite side of the arm 15 from the bar 17 and is provided with an arm 93 extending at right angles to the body of the lever adjacent its pivotal point. The lever 92 is retained in the position shown in Fig. 3 by a spring 94. Attached to the arm 93 of the lever 92 I show a downwardly extending rod 95 connected at its lower end to one arm of a bell-crank 96. The other arm of the bell-crank 96 has pivotally secured thereto a rod 97 which is attached at its other end to the valve actuating arm 83 of the device 10.

It will be seen that as the bar 17 is operated to cause the pivoted arm 15 to swing to the right as previously described, the arm 15 will cause the lever 92 to move to the right and it will, through the medium of the arm 93, rod 45, bell-crank 96, and rod 97, cause the valve actuating arm 83 through its linked engagement with the valves 39 and 40 to set the valve 40 in an exhaust position, and the valve 39 in an intake position, and thus cause the piston rod 31 and the block 33 to move to the right. And as the block 33 is connected by means of a rod 98 to a pivoted elevator door actuating lever 99 the elevator door 90 will be opened.

The method of operating the valve actuating arm 83 may be varied to suit various

conditions and forms no pertinent part of this invention.

If for any reason the elevator door 90 and the shaft door 14 do not have uniform movement when operating it is only necessary to adjust the shutoff valve 45 on either one or the other of the door actuating devices 10 to secure a uniform movement of the doors.

From the foregoing description it will be apparent that I have provided an improved door control mechanism which can be economically manufactured and which is highly efficient in use.

What I claim is:

1. In a device of the class described, a support, a pair of cylinders secured to said support, piston means in said cylinders, a common piston rod for both of said pistons, a separate valve for each of said cylinders for controlling the intake and exhaust to the respective cylinders, said valves being mounted on said support, said valves each having a common intake pipe and a common exhaust pipe, said valves being arranged to assume full inlet, full exhaust, and partial exhaust positions, shutoff valves on said intake pipe independently controlling the pressure to each of said cylinder valves, means for actuating the said cylinder valves, said means including a pair of arms secured to the valve stem of each valve, a bar, one of said arms of each valve stem being slidably connected to said bar, an arm pivoted to said bar, an arm on said support, said last mentioned arm being movable to control the said valves, means on said piston rod for intermittently engaging each of said other arms on said valve stem for causing said cylinder pistons to move from full exhaust position to restricted exhaust position.

2. In a device of the class described, a frame, a pair of cylinders secured to said frame, piston means in said cylinder, a common piston rod for both of said pistons, a separate valve for each of said cylinders for controlling the intake and exhaust to the respective cylinders, said valves being mounted on said frame, said valves each having a common intake pipe and a common exhaust pipe, said valves being arranged to assume full inlet, full exhaust and partial exhaust positions, shutoff valves on said intake pipe independently controlling the pressure to each of said cylinder valves, means for actuating the said cylinder valves, said means including a pair of arms secured to the valve stem of each valve, a bar, an arm pivoted to said bar, an arm on said frame, said last mentioned arm being movable to control the said valves, means on said piston rod for intermittently engaging each of said other arms on said valve stem for causing said cylinder pistons to move from full exhaust position to restricted exhaust position, said means consisting of two cam rails adapted to be mounted on a movable block, means to adjust each of said cam rails independent of the other, and means in said cylinder valves for adjusting the area of said restricted exhaust.

3. In a device of the class described, a pair of cylinders, piston means in said cylinders, a common piston rod for both of said pistons, a separate valve for each of said cylinders for controlling the intake and exhaust to the respective cylinders, said valves each having a common intake pipe and a common exhaust, said valves being arranged to assume full inlet, full exhaust, and partial exhaust positions, means for actuating the said valves, said means including a pair of arms secured to the valve stem of each valve, a bar, one of said arms of each valve stem being slidably connected to said bar, an arm pivoted to said bar, another arm, said last mentioned arm being movable to control the said valves, means on said piston rod for intermittently engaging each of said other arms on said stem for causing said cylinder valves to move from full exhaust position to restricted exhaust position.

4. In a door operating mechanism, a cylinder, a piston in said cylinder, a rod on said piston, a single pipe for transmitting fluid to and from said cylinder, rotatable means controlling flow through said pipe to first cause unrestricted flow of fluid to said cylinder, said rotatable means serving to thereafter cause unrestricted flow of fluid from said cylinder, said means serving to later cause restricted flow of fluid from said cylinder, an arm for controlling said rotatable means, a cam track on said piston rod, said cam track being adapted to engage and operate said arm, and means to vary the effective length of said cam track in the direction of the travel of said piston.

In testimony whereof, I hereunto affix my signature.

SIMON P. WIEGNER.