

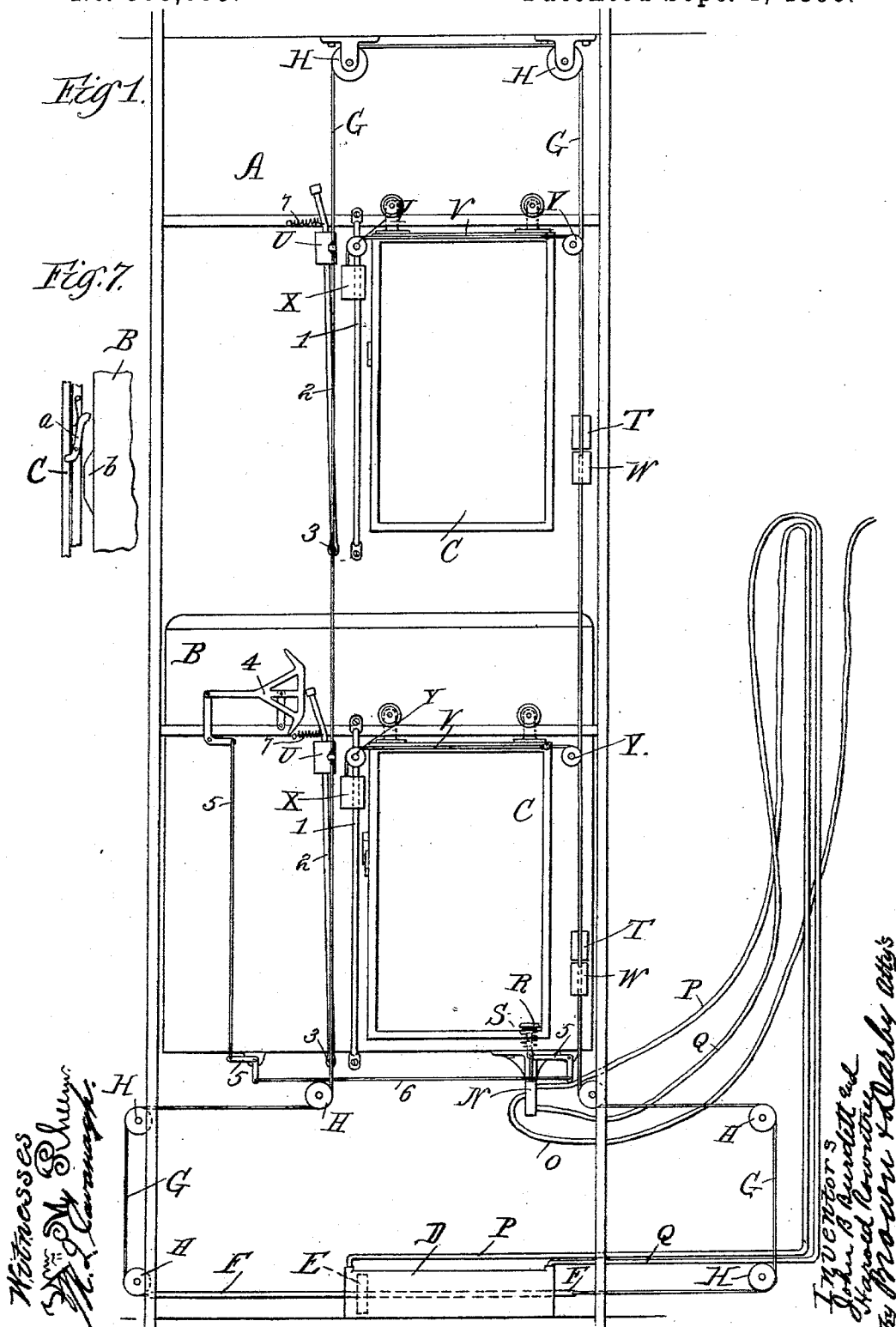
J. B. BURDETT & H. ROWNTREE.
APPARATUS FOR OPERATING ELEVATOR DOORS.

No. 566,839.

Patented Sept. 1, 1896.

Fig. 1.

Fig. 7.



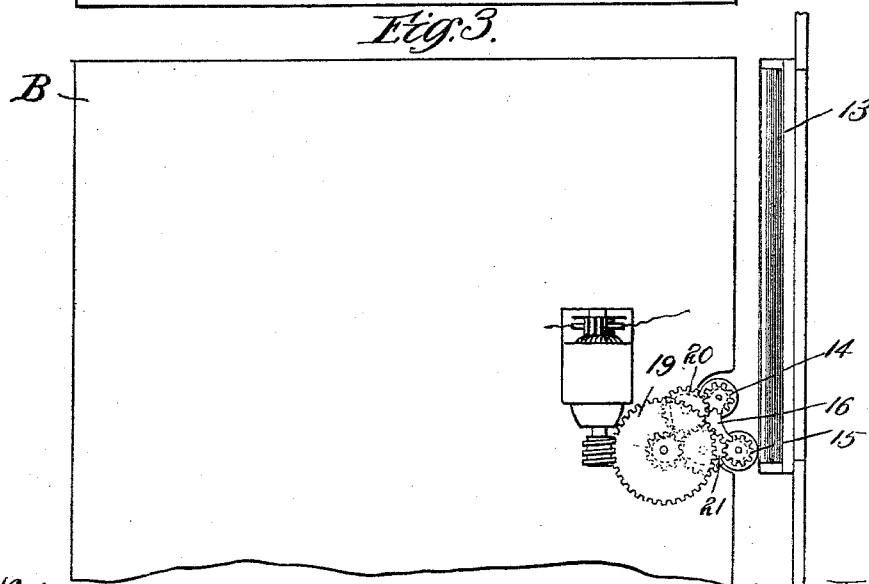
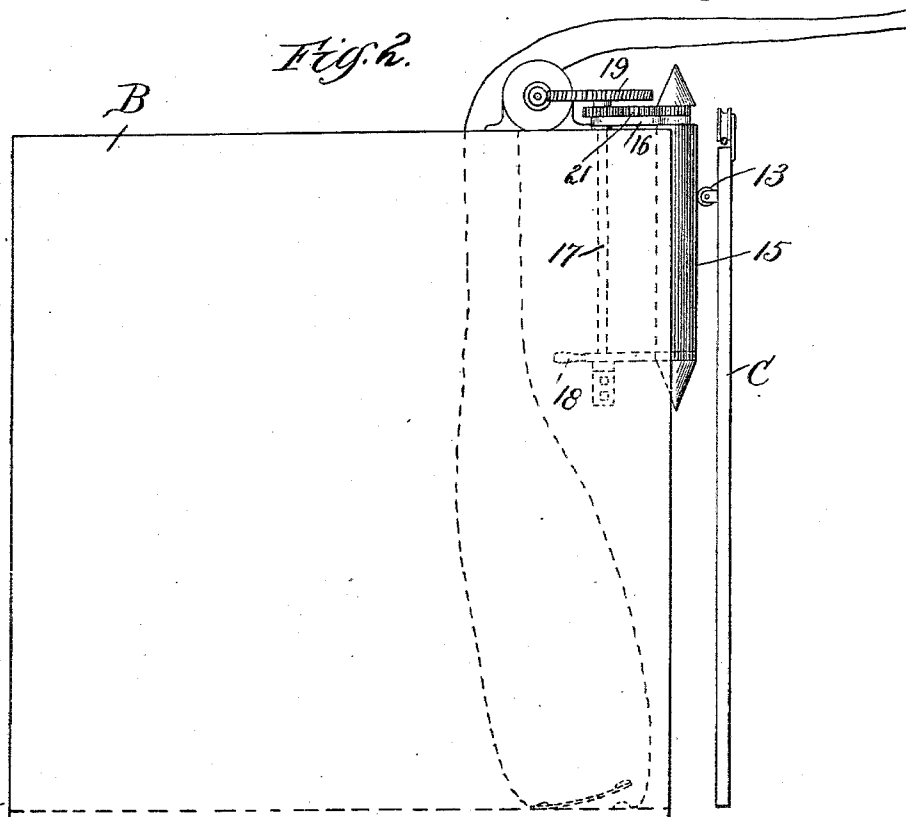
(No Model.)

4 Sheets—Sheet 2.

J. B. BURDETT & H. ROWNTREE.
APPARATUS FOR OPERATING ELEVATOR DOORS.

No. 566,839.

Patented Sept. 1, 1896.



Witnesses.
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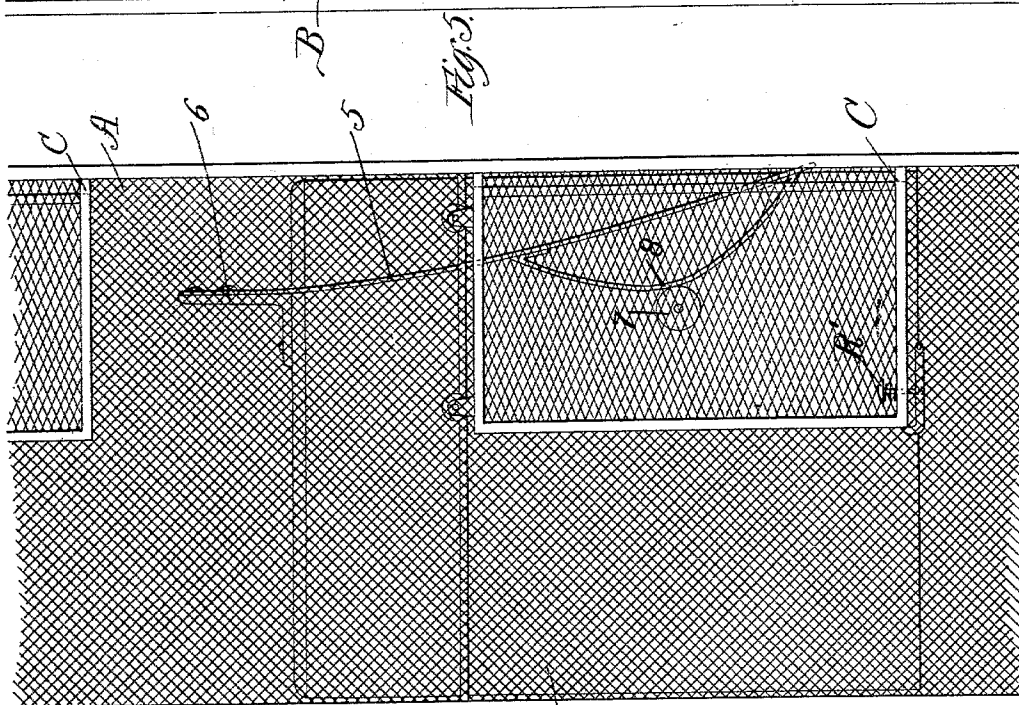
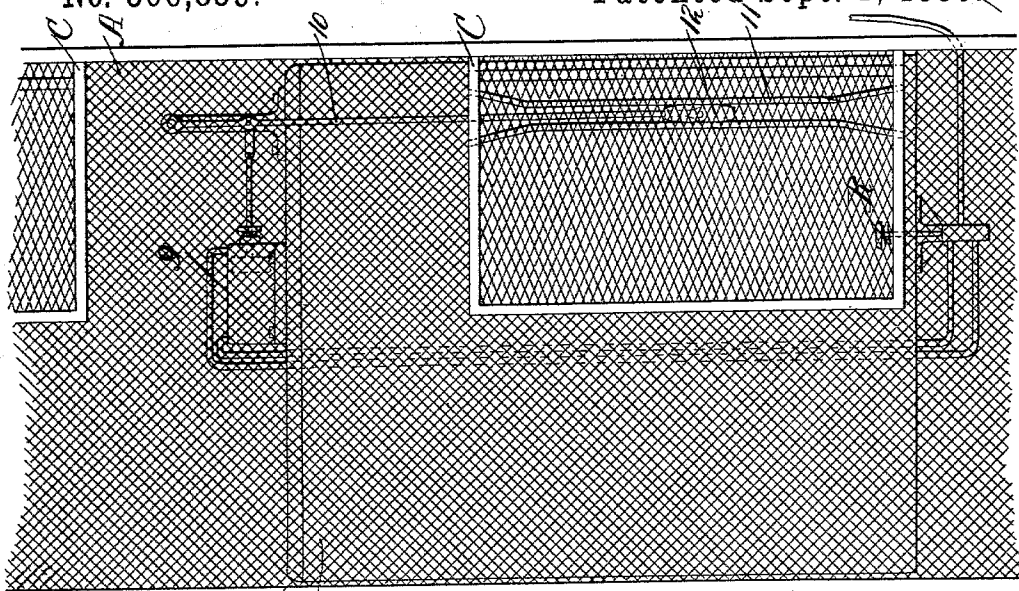
(No Model.)

4 Sheets—Sheet 3.

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Witnesses.

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Fig. 4

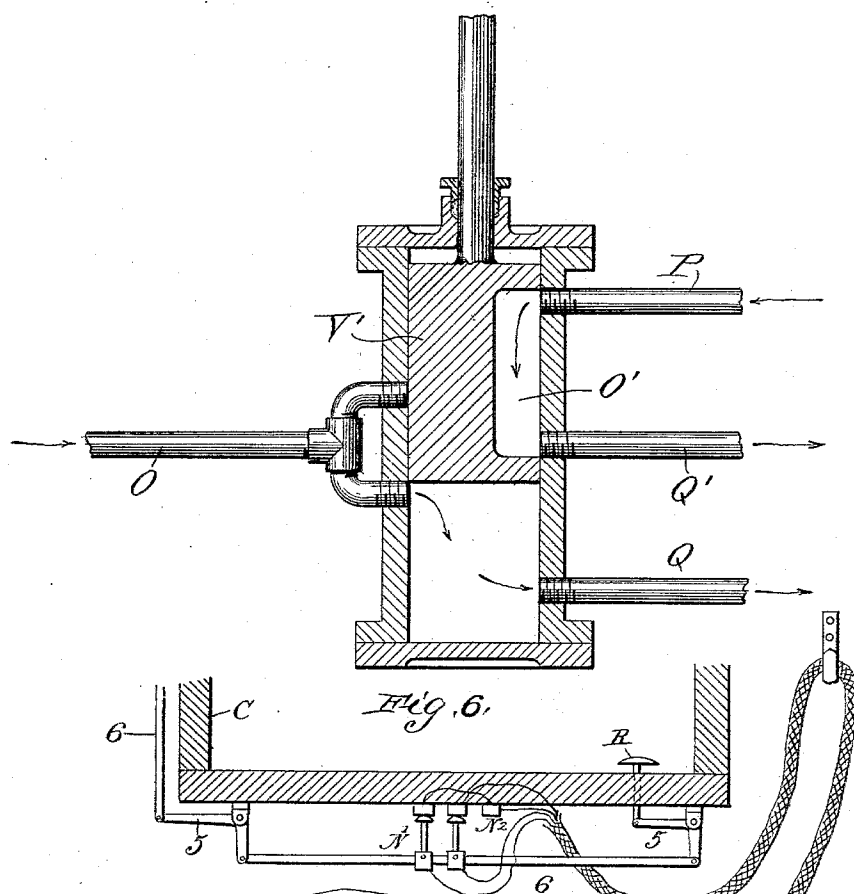
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Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN B. BURDETT AND HAROLD ROWNTREE, OF CHICAGO, ILLINOIS,
ASSIGNORS TO THE BURDETT-ROWNTREE MANUFACTURING COM-
PANY, OF SAME PLACE.

APPARATUS FOR OPERATING ELEVATOR-DOORS.

SPECIFICATION forming part of Letters Patent No. 566,839, dated September 1, 1896.

Application filed August 6, 1894. Serial No. 519,556. (No model.)

To all whom it may concern:

Be it known that we, JOHN B. BURDETT and HAROLD ROWNTREE, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Apparatus for Operating Elevator-Doors, of which the following is a specification.

This invention relates to door-operating devices, and is particularly adapted for operating the doors in elevator constructions.

The object of the invention is the provision of means for moving two or more doors, one at a time, from the same motor.

A further object of the invention is the provision of means for moving two or more doors, one at a time, as, for instance, the doors of an elevator-well, said means being wholly under the control of the elevator-conductor.

A further object of the invention is the provision of means for moving two or more doors, one at a time, as, for instance, the door of an elevator-well, from a single motor or prime mover arranged upon the car, said motor being under the control of the elevator-conductor.

Other objects of the invention will more fully appear hereinafter.

With these objects in view the invention consists, substantially, in the arrangement, combination, and relative location of parts, all as will be more fully hereinafter set forth, as indicated in the accompanying sheets of drawings, and as finally pointed out in the appended claims.

Reference is now had to the accompanying sheets of drawings, forming part hereof, and to the various views and reference-signs appearing thereon, and wherein—

Figure 1 is a view in elevation of a form of apparatus embodying our invention as applied to elevator-well doors. Fig. 2 is a view in side elevation of another form of apparatus embodying our invention. Fig. 3 is a plan view of the construction illustrated in Fig. 2. Fig. 4 is a view in side elevation of another form of apparatus embodying the principles of our invention. Fig. 5 is a view in side elevation of a modified construction embodying the principles of our invention.

Fig. 6 is a view showing a form of electric motor for actuating the door-opening mechanism and connections for controlling said motor. Fig. 7 is a detail view of a door-locking device. Fig. 8 is an enlarged detail view, in longitudinal section, of a form of valve device adapted for use in connection with our invention.

Similar reference-signs are used throughout the drawings to indicate similar parts wherever they occur.

In the drawings we have shown our invention as applied to the operation of elevator-well doors, and we have illustrated the principles of our invention as applied in a variety of forms of apparatus.

Reference-sign A designates an elevator well or shaft. B designates an elevator-car, and C doors of the elevator well or shaft arranged at different landings.

One form of apparatus embodying the principles of our invention is shown in Fig. 1, wherein reference-sign D indicates a motor of suitable construction. Any suitable form or type of motor may be employed, that shown in this view being an air or hydraulic motor. The motor D may be arranged either at the top or bottom of the elevator-well, and the piston E thereof is provided with a piston-rod F, arranged to project through the ends of the cylinder.

It is one of the objects of this invention to provide means which are under the control of the elevator-conductor and are adapted to be operated by a single motor for moving any one of a series of doors, as may be desired. Any suitably-arranged means for accomplishing this purpose may be provided. In Fig. 1 we have shown one form of apparatus embodying this idea; but we desire it to be distinctly understood that we do not limit ourselves thereto. In this form a cable, cord, or similar device G is arranged in the elevator-well to extend the height and depth thereof and in any convenient location relative to the elevator-well doors, and is secured at the ends thereof to the projecting piston-rod F. The bight of the cable G is led around suitable guide-pulleys H in such a manner as to have the runs thereof extend vertically from top

to bottom of the well. The runs may be arranged in any suitable location and may or may not be made to pass through the car. In the form shown the runs of the cable are arranged adjacent to the edges of the several doors; but it is evident that one or both runs may be arranged along the side or end wall of the shaft or well. Mounted upon to travel with the runs of the cable, cord, or other similar device G and arranged adjacent to each door are stops T U.

From the foregoing description it is evident that when the motor is put into action, that is, when, as in the form of motor shown in Fig. 1, piston E is moved in one direction or the other, the stops T or U may be caused to travel up or down, as the case may be. Arranged and adapted to be engaged by the stops T U are similar stops W X, suitably connected to the doors in any convenient manner, as, for instance, by being secured to the respective ends of a cord or other suitable connection V, which is attached intermediate its ends to the door, it being understood that a similar connection is made with each door and that each door is provided with a similar set of stops W X. By giving the connection V a suitable lead from the door it will be seen that when the door-moving means, as, for instance, the cable or other suitable device G, is actuated, the stop W or X will be engaged by stop T or U, respectively, according to the direction in which said door-moving device is caused to travel, and consequently the door will thereby be positively moved to its open or closed position, as the case may be.

In the practical application of our invention to elevator-well doors, as in the form of apparatus shown, wherein the doors are normally held in their closed position, it is important that the members of each set of stops, as above described, which are employed to move each door to its open position, be normally out of alinement with each other, so that the door-moving device, as, for instance, the cable G, may be actuated to travel in a direction that would otherwise cause all the doors to open simultaneously without opening any of the doors.

From the foregoing description it will be seen that the door-moving means are normally in inoperative relation with respect to all of the doors. It is desirable that suitable devices be provided for bringing the door-moving means into operative relation with respect to the particular door to be moved and that the devices for making the door-moving means operative to open the door be under the control of the elevator-conductor, that is, in the particular form of mechanism shown illustrating our invention it is important that the devices for causing the members of the particular set of stops designed to open any particular door, to aline with each other, be controlled from the car. A suitable and convenient form of mechanism for accomplishing this result is shown, wherein

the stops are suitably mounted to slide upon suitable guide-rods 1 2, one of which may be fixedly mounted, while the other is pivoted at one end and is adapted to be rocked or swung about its pivot to bring the stop carried thereby into alinement or carry it out of alinement with the stop carried by its companion rod.

Any suitable form of means for rocking the rod may be provided. We have shown a simple and convenient form of mechanism for accomplishing this result, wherein a shoe or similar device 4 is mounted upon to travel with the car and is mounted to slide or to be projected against the free end of the pivoted rod. Any suitable connections 5 6, conveniently arranged to be under the control of the car-conductor, is provided for moving the shoe 4 back and forth.

From the foregoing description it will be seen that by the car-conductor suitably manipulating the connections 5 6 as the car approaches or after it has arrived at the particular landing the door of which he desires to open the door-moving means is thrown into operative relation to effect an opening of the door when the said door-moving means are suitably actuated by the motor.

It will also be seen from the foregoing that movement of all the doors is wholly under the control of the elevator-conductor, and that it is at the will of the conductor which particular door, if any, is to be moved, and that the devices for making operative the door-operating means for moving the door may be brought into action as the car arrives adjacent to the particular door to be moved or after the car has arrived adjacent thereto.

It is important that the action of the motor be controllable from the car, in order that the door-moving means, as well as the devices for making the door-operating means operative, may be under the control and at the will of the car-conductor. In order to embody this idea, any suitable or convenient form of motor-controlling means may be provided whereby the action of the motor may be controlled from the car. We have shown a form of means for accomplishing this result, but do not desire to be limited or restricted to any particular or specific form of motor-controlling means. In the form shown a suitable valve device N is mounted upon the car and arranged and adapted to control the action of the motor.

We have shown in Fig. 8 a well-known type of valve device which may be employed in connection with our invention and wherein the motor-operating fluid is admitted to the valve-casing through connection O and thence delivered to either end of the motor through connections P and Q, arranged in communication with the valve-casing at the respective ends thereof. An exhaust connection Q' also communicates with the valve-casing, and the valve V' is provided with a

passage O', arranged to open communication between exhaust connection Q' and either one or the other of connections P Q, according to the position of said valve. The specific construction and arrangement of the valve device is not important, however, and forms no part of the present invention.

In case a hydraulic or pneumatic motor is employed the valve device N is arranged and adapted to control the admission and exhaust of the operating medium to and from the motor-cylinder, the supply-pipe O being suitably connected to the valve device, and the pipes P and Q arranged to open connection between the valve device N and the respective ends of the motor-cylinder, as shown. The arrangement of the valve device N is such that one of the pipes P or Q is normally opened and one normally closed, whereby the piston in the particular form of the motor illustrated in Fig. 1 is normally maintained at one limit of its movement. In the adaptation of our invention to elevator-well doors this arrangement is useful and important, for thereby all the doors of the shaft or well are held in their closed position. Any other suitable form of arrangement and apparatus for accomplishing the same result is intended to be included in the present invention, and we have merely shown an illustrative form of apparatus adapted to secure the desired result.

The valve device N may be operated in any suitable or desirable manner. One simple and convenient form of operating means for operating the valve device N is shown, as merely illustrative of the idea involved, wherein a pedal or tread or other suitable device R is arranged in the car in a position and location convenient to the car-conductor, and is suitably connected to the stem of the valve device N. The tread or pedal R is arranged to be held in any suitable manner, as by a spring S, in a position such that the valve device N is held thereby in its normal position, for instance, to admit the motor-operating medium at one end of the motor-cylinder, as in the form shown in Fig. 1. By the car-conductor suitably operating the tread or pedal R the valve device N is moved or shifted to admit the operating medium to the opposite end of the cylinder, thereby causing the door-moving means to move, as will be readily understood. If during the movement of the door-moving means the devices are operated for bringing the door-moving means into operative relation with respect to any particular door, as by the conductor suitably operating connections 5 6, when the car approaches or has arrived adjacent to the particular door to be moved, that particular door will be opened. By arranging the connections 5 6 to be operated by the same means that are employed to operate the motor-controlling means, that is, by simultaneously operating the valve device N and the connections 5 6 from the same tread or pedal R, the operation of the motor and the bringing into opera-

tion of the devices for making the door-operating means operative is simultaneously effected by one and the same movement of the car-conductor. The spring S serves to return valve device N and also shoe 4 to their normal positions. When the pressure of the shoe 4 on the guide-rod 2 is relieved, the said rod is returned to its normal position to maintain the stop carried thereby out of alignment with its corresponding stop, and hence in inoperative relation relative to each other, by any suitable means, as by a spring, as shown.

It will be evident that any desired form of motor may be employed in carrying out the principles of our invention, and we do not desire to be limited or restricted to any particular form or style of motor. We have shown in Fig. 6 a form of electric motor which, if desired, may be employed instead of the form of motor shown in Fig. 1, and wherein, instead of a reciprocating piston, a rack J may be suitably operated by the motor-shaft through gearing K L M, and the door-moving means, as, for instance, cable G, may be secured at the ends thereof, respectively, to the respective ends of the rack. In this form of motor it is evident that the rack J operates in the same manner as the piston and piston-rod in the form of motor shown in Fig. 1, and the motor may be controllable from the car in any suitable or convenient manner, as by means of the switch N' and contacts N².

From the foregoing description it is evident that all the doors of an elevator well or shaft are moved by a single motor and that the movement of each door is wholly under the control of the elevator-conductor. This idea may be embodied in a variety of forms and arrangements of apparatus. In the form shown in Fig. 4 the single motor is carried by the car and comprises a spring 5, rigidly secured at one end to the car, as shown at 6. To the opposite end of said spring is secured a bow-shaped piece 7. Rigidly mounted upon each door in the elevator-well is a shoe, roller, or other device 8 in position to be engaged by the bow-shaped piece 7 when the car approaches the door. The spring 5, operating as the motor, is arranged to be normally in line to be engaged by the stationary shoe, roller, or other device 8, whereby said spring is deflected and placed under a strong tension when the car arrives adjacent to the door. In this form of apparatus illustrative of the principles of our invention each door of the elevator-well is held normally closed in any suitable way, as by means of a catch operated by a spring-pressed treadle R', similar in all respects to treadle R, as shown in Fig. 1. The operation of this form of mechanism illustrative of the principles of our invention is as follows: When the car arrives adjacent to the particular door which it is desired to open, a tension is imposed on spring 5 by said spring coming in contact

with the shoe or roller 8 on the door, which tension has a tendency to throw the door to its open position. This tendency is opposed by reason of the fact that the door is normally locked in its closed position by the catch. If it is desired to open the door, the conductor operates the pedal R' to release the catch, whereupon the door flies open. A weighted cord, spring, or any other suitable closing device may be employed to close the door. In case the door is not to be opened the conductor refrains from operating the catch-releasing device and the car continues on its travel without effecting a movement of the door.

It will be seen that the underlying principle of operation of the form of mechanism shown in this view of the drawings and hereinafter described is the same as that described with reference to the form of apparatus shown in Fig. 1, namely, that all the doors of the elevator well or shaft are moved from a single motor or prime mover, which, in the particular form shown in said Fig. 6, is mounted upon the car, and that said motor is controlled from the car. In this form of apparatus it will be observed that the spring 5 and its bow-shaped attachment 7 includes generically both the motor and the door-moving means, and the catch and its operating device R' includes generically both the motor-controlling means and the devices for making the door-moving means operative.

In the form of apparatus embodying the principles of our invention shown in Fig. 6 we mount any suitable, desirable, or preferred form of motor 9 upon the car, which motor may be operated from the car, similarly to the manner above described with reference to the operation of the construction shown in Fig. 1, by means of the pedal or treadle R. Pivoted upon a suitable support in the car is a rod or lever 10, which is also pivoted or suitably connected to the piston of the motor 9, as shown, whereby when the motor is actuated to reciprocate the piston thereof said rod or lever 10 is rocked back and forth upon its pivot. Mounted upon each door C of the elevator-shaft is a suitable guide device 11. As shown in Fig. 5, this guide device comprises a pair of flanges oppositely flared at the respective ends thereof. Any other suitable or convenient form of guide device may be employed without departing from the spirit or scope of our invention. Mounted upon the end of lever 10 is a shoe 12, adapted when the car approaches a door to be received in a guideway formed by the guide device 11. If it is not desired to move the door, said shoe merely traverses the guide without effecting any movement of the door. When it is desired to move the door, however, the car-conductor, when he approaches the particular door which he desires to move, operates the motor-controlling means, which, in this instance, includes the treadle R and a valve or other suitable device, as N, there-

by throwing the motor into action and hence rocking the lever 10, which, being connected to the door through the engagement of the shoe carried thereby with the guides 11, causes the door to be moved as may be desired. By releasing the motor-controlling means the piston thereof is caused to travel in the opposite direction, and hence effects a movement of the door in the opposite direction as the car continues its ascent or descent. In this form embodying the generic principles of our invention it will be observed that the motor is carried by the car, that the motor-controlling means also include generically devices for making the door-moving means operative, and that the pivoted rod or lever 10 and guides 11 comprise a form of door-moving means.

In the form of apparatus shown in Figs. 2 and 3 embodying the generic principles of our invention we provide upon each door C of the elevator well or shaft a bar, rod, or roller 13, extending transversely across the same. Preferably a roller is employed in order to reduce friction, as will be readily understood. Mounted upon each car is a pair of rollers 14 15, having conical-shaped ends, in order to facilitate the passage of the car past the door, and consequently past the roller or bar 13 thereon. These rollers 14 15 are mounted in a suitable bracket 16, pivoted upon an axis 17, as shown in the dotted lines in Fig. 2, and are adapted to be rocked therearound by any suitable means, as a handle or other device 18. Rollers 14 15 are adapted to be positively rotated in opposite directions by means of suitable gearing 19, 20, and 21, as shown. Gear 19 is adapted to be positively rotated by means of a motor mounted upon the car. This motor may be an electric motor, or any suitable, desirable, or convenient form of mechanical or fluid motor.

It is obvious from the above description that when one or the other of rollers 14 15 are rocked into contact with roller 13 the door C is moved in one direction or the other according to the direction of rotation of the particular roller in engagement therewith, and when it is desired to move a door the elevator-conductor, as he approaches a door when he desires to move or after he has arrived adjacent thereto, puts into operation the motor upon the car, in case the motor is not a continuously-operating motor, and rocks one or the other of the rollers 14 15 into position to engage roller 13, thereby moving the door in the desired direction. By rocking the other roller of the pair of rollers carried by the car into engagement with the roller upon the door said door is moved in the opposite direction.

It is obvious that instead of employing two rollers 14 15 a single roller may be employed, and the direction in which the roller is operated may be suitably reversed in any suitable and well-known manner. In this form of apparatus illustrating the principles of our

invention it will be seen that the motor-controlling means may be the same or similar to those described with reference to the form of apparatus shown in Fig. 1.

5 In Fig. 1 we have indicated a form of motor-controlling means where an electric motor is employed, and where, in place of the valve device above described, we employ an electric switch, comprising a spring-arm arranged to
10 be depressed to make contact with a button to complete the circuit through the motor from the line-wires in the usual and ordinary way, as will be readily understood.

15 The rollers correspond to the door-moving means, and the devices for making the door-operating means operative find correspondence in the means for rocking the rollers on the car into position to engage the roller on the door.

20 If desired, and as a matter of precaution, each door of the elevator well or shaft may be locked in its closed position by means of a lock or catch adapted to be released when the car arrives adjacent to the door. The
25 catch operated by pedal R' in Fig. 4 is an example. In Fig. 7 is shown another form of catch, wherein a piece *a* is pivoted in position for the end thereof to normally engage the rear edge of the door to lock the same in
30 its closed position, and is adapted to be operated in any suitable way to release the door when the car arrives adjacent thereto. A convenient means for accomplishing this result is a lug or projection *b*, mounted upon
35 the car B.

From the foregoing description it will be seen that all the doors in the elevator shaft or well are moved from a single motor, that is, a prime mover; that the operation of the
40 door-moving means, and also of the motor, are entirely independent of the car-hoisting mechanism, and hence of the movement of the car; that the movement of any particular door is wholly under the control and at
45 the will of the car-conductor, and that the door-moving means may be actuated and also placed in operative connection with the door either when the car is approaching the particular door to be moved or after it has arrived
50 at the door to be moved.

We do not claim herein the construction, combination, or arrangement set forth and claimed in our copending application, Serial No. 519,557, filed of even date herewith.

55 It is obvious that many changes and variations in the construction and arrangement of parts would readily suggest themselves to persons skilled in the art and still fall within the spirit and scope of our invention. We
60 do not desire, therefore, to be limited to any specific form of apparatus and arrangement thereof herein described embodying the principles of our invention; but,

65 Having explained the object and nature of our invention and various forms of apparatus embodying the same and illustrative of the

principles thereof and having set forth the function and mode of operation of such apparatus, what we claim as new and of our own invention, and desire to secure by Letters Patent of the United States, is—

1. In an apparatus of the class described, a car, two or more doors, a motor carried by the car, said motor being normally inactive, door-moving devices adapted to be actuated
75 by said motor, said door-moving devices arranged to be normally inoperative with respect to said doors, and devices controllable from the car for bringing said motor into action and for making operative the connection
80 between said door-operating means and the particular door to be moved; as and for the purpose set forth.

2. In an elevator a car, a plurality of doors to be moved, a motor independent of the car-moving mechanism and adapted to move all
85 of said doors, one at a time, said motor being mounted on the car, and means for controlling said motor; as and for the purpose set forth.

3. In an elevator, a car, a plurality of doors to be moved, a single motor adapted to move all of said doors, one at a time, said motor
90 being independent of the car-hoisting mechanism, and means for controlling said motor from the car; as and for the purpose set forth.

4. In an elevator a car, a plurality of doors, a motor mounted on the car, and independent of the movement thereof, means actuated
95 by said motor for moving said doors, said means adapted to be normally in inoperative relation with respect to all of said doors, and means controllable from the car for making
100 said door-moving means operative as to any particular door which it is desired to move; as and for the purpose set forth.

5. In an apparatus of the class described, a car, a motor carried thereby, a plurality of
105 doors adapted to be moved by said motor, one at a time, and means for controlling said motor from the car, whereby the doors may be moved after the car has arrived adjacent the particular door to be moved; as and for the
110 purpose set forth.

6. In an apparatus of the class described
115 a car, a plurality of doors to be moved, normally held in closed position, a motor carried by the car for opening all of said doors, and means controllable from the car for making
120 said motor operative to open any one of said doors, only when the car arrives adjacent to the particular door to be opened; as and for the purpose set forth.

7. In an apparatus of the class described, a car, a plurality of doors, means for moving
125 said doors, a single motor for controlling said door-moving means, said door-moving means being normally inoperative with respect to said doors, devices for making operative connection between said door-moving means, and
130 any particular door which it is desired to move, said devices being controllable from

the car, and means adapted to be operated from the car for controlling said motor; as and for the purpose set forth.

8. In an elevator, a car, a plurality of doors, arranged in an elevator shaft or well, means for moving said doors, a motor for actuating said door-moving means, means for controlling said motor from the car, said door-moving means being normally inoperative with respect to said doors, and devices controllable from the car for making operative said door-moving means as to any particular door it is desired to move; as and for the purpose set forth.

9. In an apparatus of the class described, a car, two or more doors, a motor carried by the car and independent of the car-moving means, adapted, when actuated, to move said doors, one at a time; as and for the purpose set forth.

10. In an apparatus of the class described, a car, a motor carried thereby, and independent of the car-moving mechanism, two or more doors, door-moving devices adapted to be actuated by said motor, and means for controlling the action of said door-moving devices; as and for the purpose set forth.

11. In an apparatus of the class described, a car, two or more doors, a motor carried by the car, door-moving devices, adapted to be actuated by said motor, said door-moving devices, arranged to be normally inoperative with respect to said doors, and devices controllable from the car for making operative the connection between said door-moving means and the particular door to be moved; as and for the purpose set forth.

12. In an apparatus of the class described, an elevator-car, a rotating part carried thereby, a motor also carried by the car adapted to impart rotary motion to said part, two or more doors, each provided with devices

adapted to be engaged by said rotary part, whereby said door is moved, and means for throwing said rotary part into and out of operative relation; as and for the purpose set forth.

13. In an apparatus of the class described, an elevator-car, a plurality of doors, means for normally maintaining said doors in closed position, a motor carried by the car, and independent of the car-hoisting mechanism, adapted to open said doors, said motor normally in inoperative relation with respect to the movement of said doors, and means for making operative connection between said motor and the particular door to be opened; as and for the purpose set forth.

14. In an apparatus of the class described, a car, a plurality of doors, a motor independent of the car-moving mechanism adapted when actuated to positively open or close said doors, one at a time, and means controllable from the car for controlling said motor; as and for the purpose set forth.

15. In an apparatus of the class described, a car, a plurality of doors, a motor, means actuated by said motor for positively opening and closing said doors, said motor normally inactive with respect to said door-moving means, and devices under the control of the elevator-conductor for bringing said motor into action with respect to said door-moving means when the car arrives adjacent to the particular door to be moved; as and for the purpose set forth.

In witness whereof we have hereunto set our hands, this the 21st day of July, 1894, in the presence of two subscribing witnesses.

JOHN B. BURDETT.
HAROLD ROWNTREE.

Witnesses:

S. E. DARBY,
M. I. CAVANAGH.