

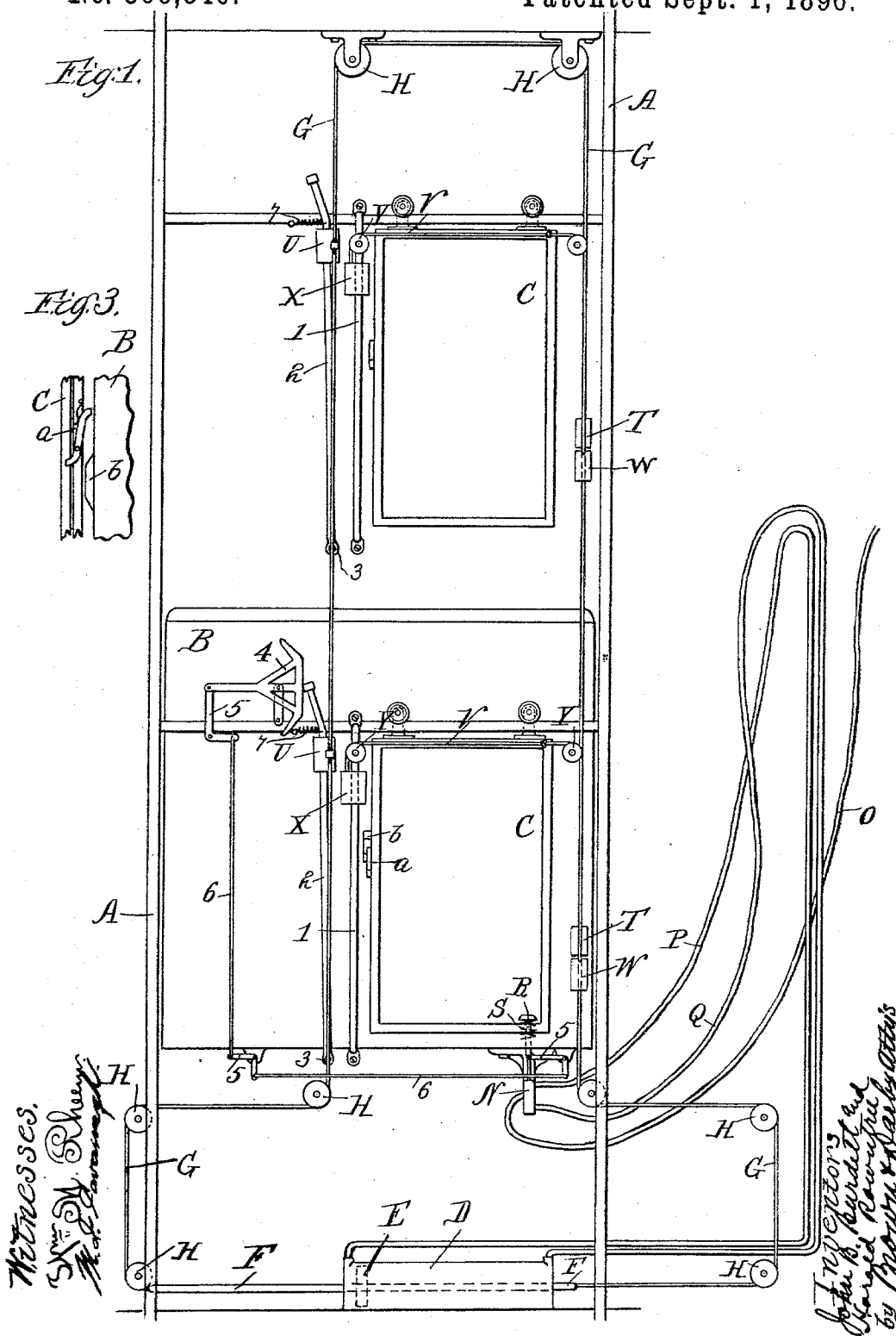
(No Model.)

2 Sheets—Sheet 1.

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

No. 566,840.

Patented Sept. 1, 1896.



(No Model.)

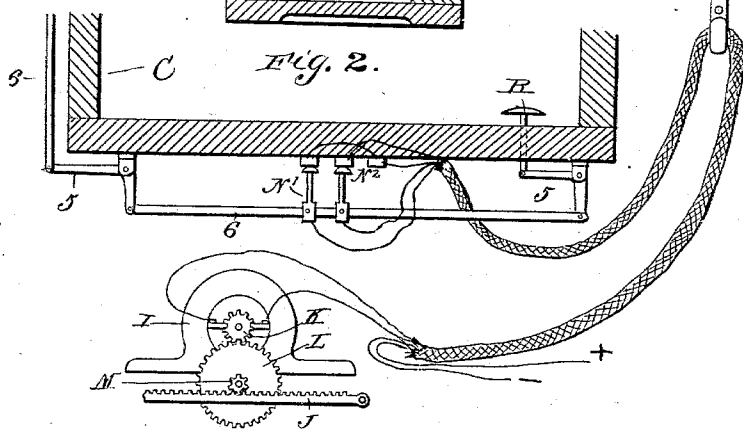
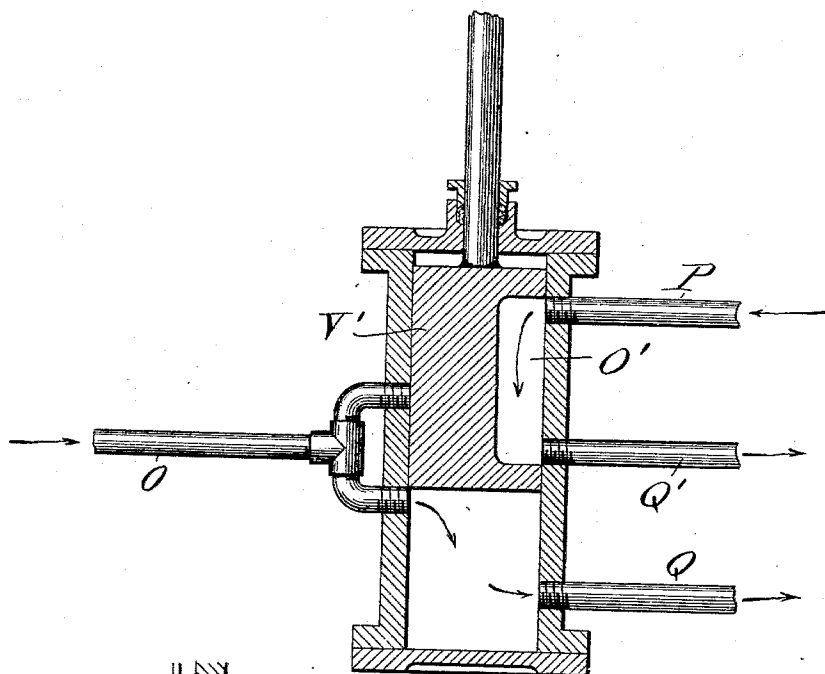
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Fig. 4



Witnesses
Wm. L. Heming
S. M. Rheem.

Inventors
John B. Burdett
& Harold Rowntree
by Brown & Darby Attys.

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. 566,840, dated September 1, 1896.

Application filed August 6, 1894. Serial No. 519,557. (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 doors in elevator constructions.

The object of the invention is the provision of means for moving a plurality of doors, as, for instance, all the doors in an elevator well or shaft, from a single stationary motor arranged either in the bottom or top of the well.

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 shaft or well, from a single motor, said motor being independent of the car-hoisting mechanism and under the control of the car-conductor.

A further object of the invention is the provision of means of a simple and effective nature, easily constructed, understood, and operated, for moving a plurality of doors, as, for instance, all the doors in an elevator shaft or well, said door-moving means being normally inoperative and adapted to be put into operative relation to effect a movement of the door as the car approaches the particular door to be moved, or after the car has arrived adjacent to the particular door to be moved.

Further objects of the invention will appear more fully hereinafter.

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

Reference is had to the accompanying drawings and to the various views and reference-signs appearing therein, and wherein—

Figure 1 illustrates in side elevation a form of apparatus embodying the principles of our invention as applied to moving doors in an elevator well or shaft, the supports for the

doors being omitted. Fig. 2 is a view showing a form of electric motor for actuating the door-operating mechanism and connections for controlling said motor. Fig. 3 is a detail view of a door-locking device. Fig. 4 is an enlarged detail view, in longitudinal section, of a form of valve device adapted for use in connection with our invention.

In the drawings, wherein we have shown our invention as applied to moving doors in an elevator well or shaft, reference-sign A indicates an elevator well or shaft.

B designates the elevator-car.

C designates doors of the elevator-shaft arranged at different landings. Suitably arranged in the top or bottom of the elevator well or shaft is a stationary motor D, which is independent of the car-hoisting mechanism. Any particular convenient or desired type or form of motor may be employed for the purposes of our invention, the particular form shown in Fig. 1 being a hydraulic or air motor, and comprises a cylinder adapted to receive a piston E, having piston-rods F arranged to project through the ends of the cylinder.

It is one of the objects of the present invention to provide means under the control of the elevator-conductor and adapted to be operated by a single stationary motor for moving any one of the series of doors arranged in the elevator well or shaft, as may be desired. Any suitably-arranged means for accomplishing this purpose may be provided. We have shown in Fig. 1 a form of apparatus illustrating this idea, but we desire it to be distinctly understood that we do not limit ourselves thereto. In the particular form illustrated the door-moving means consists of a cable, cord, or similar device G, suitably secured to be operated by the piston-rod F of the motor. In the particular form illustrated the cable, cord, or similar device G is arranged in the elevator-well to extend throughout the entire length thereof and in convenient location relative to the elevator-well doors. As shown, this cable G is attached at one end to the piston-rod F, and is led around suitable guide-pulleys H, and is secured to the piston-rod F, and has its other

end also secured to the piston-rod F, thereby forming a bight having the runs thereof extending vertically through the well. The runs may be arranged in any suitable location and may or may not be made to pass through the elevator-car. In the particular 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 device G and arranged adjacent to each door are suitable stops T U.

From the foregoing description it is evident that when the motor is suitably 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 and U will be caused to travel up or down, as the case may be. Arranged in position 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 the car 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 stop or stops W. 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, carried by the door, will be engaged by stop T or U, respectively, according to the direction in which said door-moving means is caused to travel, and consequently the door will be thereby 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 held out of alinement with each other, so that the door-moving means, 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 is normally in operative relation with respect to all 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 operated, 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 mem-

bers of the particular set of stops designed to open any particular door to aline with each other be controllable 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 to carry it out of alinement with the stop carried by its companion rod. Any suitable means for rocking the rods 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 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, are 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 arrives 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 is suitably actuated by the motor. It will also be seen from the foregoing description 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-moving 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-moving means operative, may be under the control and at the will of the car-conductor. Any suitable or convenient form of motor-controlling means may be provided for accomplishing this result.

We have shown an illustrative form of means for controlling the action of the motor from the car, but we 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 is arranged and adapted to control the action of the motor.

We have shown in Fig. 4 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 con-

nection 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 other of the 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 cylinder, the supply-pipe O being suitably connected to the valve device and the pipes P and Q being arranged to open communication 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 and the particular form of motor shown in Fig. 1 is normally mounted 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 normally held in their closed position by the door-moving means, which, as above explained, is arranged to be actuated by the motor. 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, carried by the car, may be operated in any suitable or desirable manner. A suitable and convenient form of means for operating said valve device 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 convenient location and position to be operated by the car-conductor and is suitably connected to the stem of the valve device. The tread or pedal R is arranged to be held in any suitable manner, as by spring S, in a normal 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 pedal or tread R the valve device N is moved or shifted to admit the motor-operation medium to the opposite end of the cylinder, thereby bringing the motor into action, and hence causing the door-moving means to be actuated, 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, the operation of the motor and the bringing into operation of the devices for making the door-moving 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, said rod is returned to its normal position to maintain the stop carried thereby out of alinement with its corresponding stop, and hence in inoperative relation relative to each other by any suitable means, as, for instance, by a spring, as shown.

It will be evident that any desired form of motor for actuating the door-moving means may be employed in carrying out the principles of our invention, and we do not desire to be limited or restricted to any particular type, form, or style of motor for this purpose. We have shown in Fig. 2 a form of electric motor which, if desired, may be employed instead of the form of motor shown in Fig. 1. In this form of motor, 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 its ends thereof to said rack, as will be evident. In this form of motor it will be 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 controlled 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 the elevator well or shaft are moved by a single stationary motor, and that the movement of each door is under the control of the elevator-conductor. This idea may be embodied in a wide variety of forms and arrangement of apparatus, and we do not desire, therefore, to be limited or restricted to any particular form of apparatus embodying this idea. If desired, and as a matter of precaution, each door of the elevator well or shaft may be locked in its closed position. Any convenient form of locking device for the purpose may be employed, adapted to be automatically released when the car arrives adjacent to the door to be opened. A convenient and simple form of device for accomplishing this purpose is shown in Fig. 3, wherein a latch *a* is pivoted upon a stationary part of the framework of the well in position for one end thereof to normally engage the rear edge of the door C, thus locking the said door. The latch *a* may be rocked about its pivot in any suitable way to release the door when it is desired to open the same. This may be accomplished by means of a lug or cam-shaped surface *b*, carried by the car *b'*,

adapted and arranged to engage one end of the latch and so move it as to release the door when the car arrives adjacent to the door. By suitably hanging the latch it may be held by gravity normally in position to lock the door, or, if desired, the spring may be used to accomplish the same purpose.

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 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 moving of any particular door is wholly under the control and at 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 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. 519,556, filed of even date herewith.

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 do not desire, therefore, to be limited to any specific form of apparatus and arrangements thereof embodying the principles of our invention; but,

Having explained the object and nature of our invention and a form of apparatus illustrating the principles thereof and having set forth the function and mode of operation of such apparatus, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an elevator apparatus, a car, a plurality of doors, arranged in the elevator well or shaft, a stationary motor independent of the car-hoisting motor, means actuated thereby for moving said doors, and means for controlling said motor from the car; as and for the purpose set forth.

2. In an apparatus of the class described, a car, a plurality of doors to be moved, means for moving said doors independent of the movement of the car, a stationary motor adapted to actuate said door-moving means, and means for controlling said motor from the car; as and for the purpose set forth.

3. In an apparatus of the class described, a car, a plurality of doors, means for moving said doors, normally in inoperative relation with respect to all of said doors, a stationary motor for actuating said door-moving means, means for bringing said door-moving means into operative relation when the car arrives adjacent to the particular door to be moved, and means for controlling said motor from the car; as and for the purpose set forth.

4. In an apparatus of the class described,

an elevator-car, a series of elevator-well doors, means for moving said doors, a stationary motor independent of the car-hoisting mechanism, adapted to actuate said door-moving means, and means carried by the car for controlling said motor; as and for the purpose set forth.

5. In an apparatus of the class described, an elevator-car, elevator-well doors respectively arranged at different landings, means for moving said doors, normally arranged in inoperative relation with respect to said doors, a stationary motor adapted to actuate said door-moving means, and devices carried by the car for bringing said door-moving means into operative relation with respect to any one of said doors when the car arrives adjacent thereto, and devices, also carried by the car for controlling the action of said motor; as and for the purpose set forth.

6. In an apparatus of the class described, an elevator-car, a series of elevator-well doors, means for locking said doors in closed position, means for opening said doors, a stationary motor for actuating said door-opening means, normally inactive with reference to said door-moving means, means carried by the car for unlocking a door when the car arrives adjacent thereto, and devices also carried by the car for throwing said motor into action with reference to the door-moving means; as and for the purpose set forth.

7. In an apparatus of the class described, an elevator-car, a door, means for moving said door, a motor for actuating said door-moving means, normally acting upon said door-moving means to maintain said door in closed position, and means carried by the car for controlling said motor, whereby said door-moving means may be actuated to open said door; as and for the purpose set forth.

8. In an apparatus of the class described, an elevator-car, a plurality of doors respectively arranged at different landings, a cable extending from top to bottom of the elevator shaft or well, devices operated by said cable for moving all of said doors, a motor adapted to operate said cable, and means for throwing said motor into action when the car arrives adjacent to the particular door to be moved; as and for the purpose set forth.

9. In an apparatus of the class described, an elevator-car, a plurality of doors, a cable, a motor for operating said cable, means carried by the car for controlling the action of said motor, and connections between said cable and doors; as and for the purpose set forth.

10. In an apparatus of the class described, an elevator-car, a plurality of doors respectively arranged at different landings, a cable, a motor for moving the same, stops carried by said cable, means operated by said stops for positively moving said doors, and means for throwing said motor into action; as and for the purpose set forth.

11. In an apparatus of the class described, a

plurality of doors arranged in an elevator well or shaft, a cable extending throughout said well or shaft, a motor for moving said cable, stops carried by said cable arranged adjacent to each door, other stops connected to the doors and adapted to be engaged by said first-mentioned stops for positively moving said doors; as and for the purpose set forth.

12. In an apparatus of the class described, a car, a plurality of doors respectively arranged at different landings in an elevator well or shaft, means for moving all of said doors normally in inoperative relation with respect to said doors, a motor for actuating said door-moving means, devices carried by the car for bringing said door-moving means into operative relation with respect to a door when the car arrives adjacent thereto, and means for controlling said motor from the car; as and for the purpose set forth.

13. In a device for moving a plurality of doors in an elevator well or shaft, a cable having stops, a motor for actuating said cable, guides normally holding said stops out of operative position, means for moving said guides to bring the stops into operative position, and means for controlling the action of the motor; as and for the purpose set forth.

14. In a device for moving a plurality of doors in an elevator-shaft, a cable, devices operated thereby for positively moving each door, said devices normally held out of operative position, a motor for actuating said cable, and means for throwing said door-moving devices into operative position; as and for the purpose set forth.

15. In a device of the class described, a series of doors, normally held in closed position, a cable arranged adjacent to all of said doors, and carrying a stop adjacent to each door, a stop connected to each door and adapted to be engaged by the cable-stops, said stops normally held out of operative relation with respect to each other, and means for actuating said cable; as and for the purpose set forth.

16. In a device for moving a series of doors in an elevator-shaft, a cable arranged adjacent to all the doors, and carrying stops ad-

jacent to each door, a connection carried by each door having stops, said stops arranged in position to be engaged by the stops on the cable for moving the door into open and closed position, means for normally holding the members of one pair of stops out of alinement with each other, mechanism for bringing said stops into alinement and means for actuating said cable; as and for the purpose set forth.

17. In an apparatus of the class described, a plurality of doors, flexible connections secured to each door and carrying stops, a cable arranged adjacent to all the doors, and carrying stops arranged adjacent to each door, adapted to engage said first-mentioned stops, the members of one pair of said stops normally arranged out of operative position with respect to each other, an elevator-car, means operated therefrom for bringing said stops into operative position when the car arrives adjacent to the particular door to be moved, and means for actuating said cable; as and for the purpose set forth.

18. In a device for moving the doors in an elevator-shaft, a cable having a pair of stops arranged adjacent to each door, a pair of stops connected to each door, a cable-stop and a stop on the door constituting a pair and relatively arranged to coöperate with each other, a pivoted guide for one stop of a pair or set of stops and a stationary guide for the other stop of the same pair or set, said guides normally arranged so that the said stops will be out of alinement with each other, means operated from the car for rocking said pivoted guide into position for said stops to engage each other when the car arrives adjacent to the particular door to be moved, and means for actuating said cable; as and for the purpose set forth.

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

JOHN B. BURDETT.
HAROLD ROWNTREE.

Witnesses:

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