

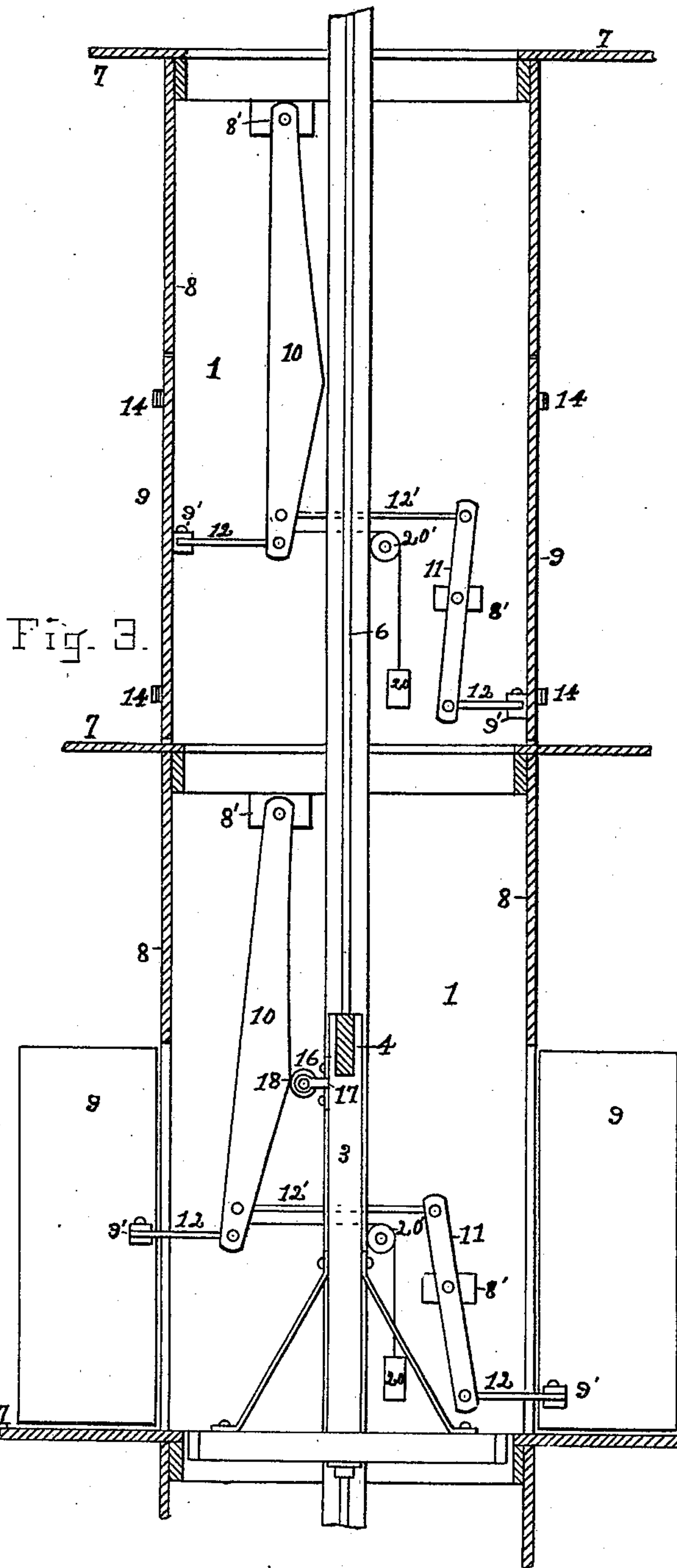
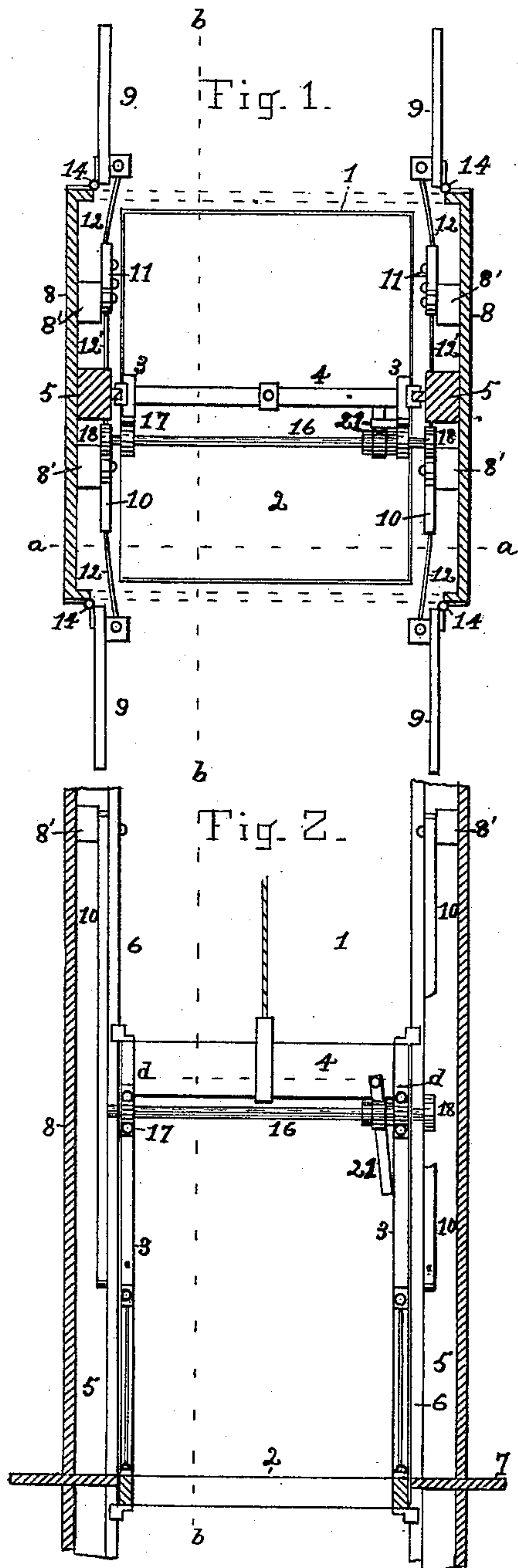
(No Model.)

2 Sheets—Sheet 1.

G. A. WHITING.  
ELEVATOR DOOR OPERATING MECHANISM.

No. 420,525.

Patented Feb. 4, 1890.



Witnesses.

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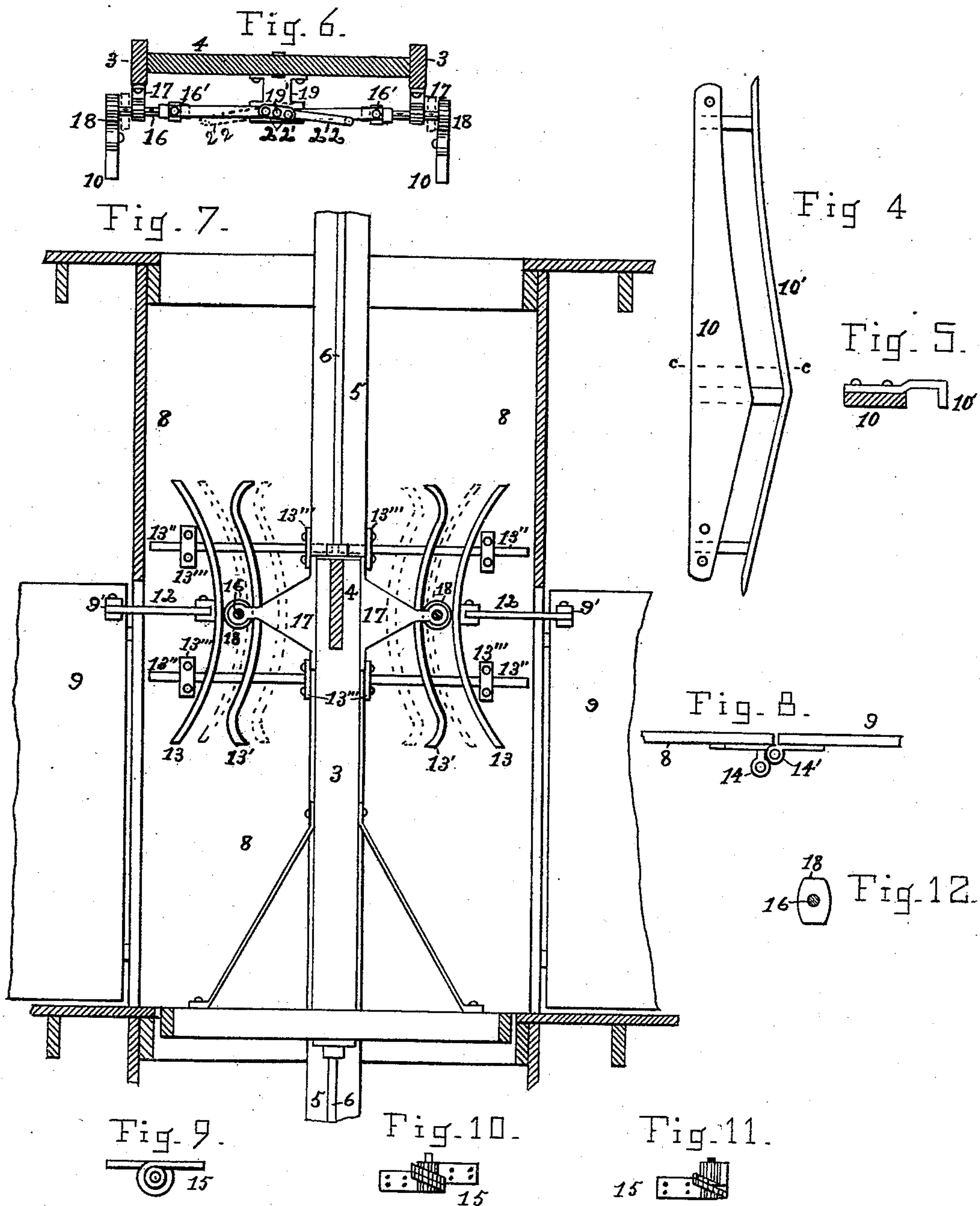


Fig. 9.

Fig. 10.

Fig. 11.

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# UNITED STATES PATENT OFFICE.

GEORGE A. WHITING, OF NEENAH, WISCONSIN.

## ELEVATOR-DOOR-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 420,525, dated February 4, 1890.

Application filed July 18, 1889. Serial No. 317,860. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE A. WHITING, a citizen of the United States, residing at Neenah, in the county of Winnebago and State of Wisconsin, have invented a new and useful Mechanism for Opening and Closing the Doors of Elevator-Wells, of which the following is a specification.

My invention relates to a device for opening and closing the doors of an elevator-well which may be upon the several floors of a building, said doors being the common door hung upon hinges and swinging thereon, and the object of it is to provide mechanism for opening and closing said doors at the will of the operator by the upward and downward movement of the elevator-cage or making them automatic, whereby the doors of said well will be closed at all the different floors of the building through which the elevator-cage passes, except the doors upon the particular floor upon which it may be desired to stop the elevator for receiving or landing passengers or freight. Communication between the several rooms upon the different floors of a building can thus be better controlled, there will be less danger to persons of accidentally falling into said well, the temperature of the rooms can be better governed, and there will be a diminished liability of loss from the rapid spread of accidental fires therein. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan of an elevator-well with the elevator-cage therein and representing the doors of said well swung open. Fig. 2 is a vertical section of the same, taken upon the line *a a* of Fig. 1 and representing the platform of the cage even with the floor of the room; Fig. 3, a vertical section of the elevator-well upon the line *b b* of Fig. 1 and representing rooms upon two floors of a building, the elevator-cage being in the lower room. Fig. 4 is a detail plan showing a modification of one of the levers used in the door-operating device; Fig. 5, a transverse section of the same upon the line *c c* of Fig. 4. Fig. 6 is a detail sectional view taken upon the line *d d* of Fig. 2 and showing a modification of the attachment upon the elevator-cage for operating the door opening and closing device.

Fig. 7 is a vertical section of the elevator-well, taken upon the line *b b* of Figs. 1 and 2 and representing a modification of the door opening and closing device. Figs. 8, 9, 10, and 11 are views representing two styles of hinges which when applied to doors make them self-closing, and Fig. 12 a plan of an equivalent of the roller which is arranged upon the elevator-cage for operating the door opening and closing mechanism. Figs. 1, 2, and 3 are upon the same scale. Figs. 4 to 12, inclusive, are upon the same scale with respect to each other, but upon an enlarged scale with respect to Figs. 1, 2, and 3.

Similar figures of reference indicate like parts in the several views.

1 represents the elevator-well; 2, the elevator-cage platform; 3, the side posts of the cage; 4, the cross bar or beam connecting said posts at their upper end; 5, posts extending from the top to the bottom of the elevator-well, and 6 ways thereon for guiding the elevator-cage in its vertical movement; 7, floors of the several rooms through which said guiding-posts are extended; 8, the elevator-well casing; 9, doors to said well; 10 and 11, long and short levers, respectively, pivoted upon blocks 8', which are attached to the casing 8; 12, rods connecting the elevator-well doors and the door-opening mechanism; 12', rods connecting the levers 10 and 11; 13 and 13', bars upon a sliding skeleton-like frame which is used in the modification of the door-operating device illustrated in Fig. 7 instead of the swinging levers 10 and 11 of Figs. 1, 2 and 3; 14, hinges upon the doors of the elevator-well, which may be of the type known as "strap-hinges;" 15, modifications of said hinges; 16, a shaft journaled in the bracket 17 and carrying upon its ends rollers or small wheels 18; 19, a bracket attached to the cross-bar 4, and which is used in the modification illustrated in Fig. 6; and 21 and 22, levers for operating the shaft 16.

The mechanism illustrated in Fig. 3 is simple in construction, positive in its action in opening the doors of the elevator-well as the cage-platform reaches the floor of a room in its upward or downward movements, and in buildings in which the cage rises only from one floor to another is all that is required.

The mechanism for operating the doors



and the levers 10 and 11 in their normal position is shown in Fig. 3 in the room of the upper story, the doors 9 being closed. In the lower story the levers are shown as being  
 5 acted upon by the rollers 18, which are supported upon the side posts 3 of the cage, and the doors 9 as having been thrown open by the action of said rollers.

The aforesaid device (the levers 10 and 11 with their connections) being placed in position within the walls of an elevator-well upon each of the stories of a building through which the cage is to pass, the doors upon the well at each of said stories will be opened by  
 10 the action of the aforesaid roller upon the levers as the cage pursues its upward and downward course.

Whenever the location and requirements of the elevator-well are such as to require a  
 20 single door only upon one side thereof—that is, upon either the right or left hand side of Fig. 1—the levers 10 and 11, the connecting-rods 12 and 12', which connect said levers with the doors and with each other, (the rods 12  
 25 being connected with the doors by pivots in the sockets 9' thereon,) and a shaft, as 16, supported in brackets, as 17, affixed to the elevator-cage, and rollers or their equivalent upon said shaft are all that are required for the  
 30 opening mechanism of said doors.

An equivalent of the roller 18 is shown in Fig. 12, it consisting of a block or casting arranged in position for action upon the door-operating device, the edges thereof acting  
 35 upon said levers being slightly curved. The roller is preferable, as it is productive of less friction and noise. It is also evident that if a single door upon one side only of the elevator-well is all that is used but a single roller  
 40 or its equivalent and a single lever 10 are required for the opening thereof, or, if the modification represented in Fig. 7 is used, that a single skeleton frame, as shown, upon one side of the cage-post 3, is all that is required for  
 45 the operation of the door.

Fig. 7 shows a modification of the device and the method of applying the same, using the sliding skeleton frame instead of the levers  
 50 10 and 11. This modification consists of the bars 13 and 13', affixed to the sliding bars 13'', the latter bars being retained loosely within the keepers 13'''. The form of the bars 13 and 13' is such that the roller 18 in its upward or downward passage will enter  
 55 between said bars and both open and close the door of the well as the cage-platform reaches or passes the floor of a room.

In the use of the device illustrated in Figs. 1, 2, and 3 the closing of the doors may be effected in various ways, some of which are  
 60 represented, while others, common and well known, may be used, as the taste of the builder may elect.

The device shown in Fig. 3 is found well adapted for the purpose—viz., the weight 20,  
 65 suspended from a line and said line running over a pulley 20' and being connected with

the lower end of the lever 10, the weight being proportioned to the power required to close the door.

As an equivalent of the above, the lower end of the lever 10 may be weighted sufficiently whereby the lever will assume its normal position and close the doors; or an ordinary wire spring may be applied to each door,  
 75 as is usual upon the screen-doors of dwellings. Again, the doors may be hung upon hinges, as shown in Fig. 8, the pivotal point of the lower hinge 14 being in a different vertical plane from that of the upper one 14', it  
 80 being in the rear of it and farther from the door-jamb, whereby the tendency of the door is to swing into a closed position. Still another device for the purpose is shown in Figs. 9, 10, and 11, Fig. 9 being a top or edge view of  
 85 a hinge designed to be self-closing, Fig. 10 a front view of the same when extended, one leaf thereof being in the position as secured to the door-jamb and the other to the door,  
 90 and Fig. 11 a like view of the same, the right-hand leaf thereof being swung around at a right angle with the door-jamb. The bearing-surface of the supporting-leaf being cam-shaped, or on an angle with a horizontal line,  
 95 the door in swinging open will be raised thereon and the weight of the door will cause the upper leaf of the hinge to slide down upon said cam-shaped surface and close the door. A small roller may be interposed between the upper and lower leaf of the hinge  
 100 for lessening the friction of said surfaces. The weight 20, before described, may also be arranged in connection with the sliding skeleton frame, one only of the bars (the bar 13) being used for opening the door, and said  
 105 frame, after being thrown out and the door opened, then returned to its former position by said weight and the door closed.

A prominent feature of the devices above named for closing the doors after being  
 110 opened by the above-described mechanism is that any one of the elevator-well doors upon any story thereof may be opened by a person upon the floor of the room into which the door may open (for the purpose of learning  
 115 the location of the cage or for any other reason) without disarranging said mechanism, so that should the cage be going up or down at the same moment the door-opening mechanism will still remain in position for  
 120 the passage of the roller 18.

Still another appliance for closing the doors is shown in Figs. 4 and 5. Upon the lever 10 a bar 10' is secured, its working-edge corresponding in shape with the like edge of  
 125 said lever, and between which edges the roller 18 passes as the cage ascends or descends, and by the action of said roller thereon swings the lever, as before described, and opens or closes the doors, as desired.

In applying the above-described mechanism for opening the doors of elevator-wells in buildings where many of its stories are traversed by the cage it is not always desirable  
 130



to stop the cage at the doors upon each of said stories, and consequently it is unnecessary and undesirable to open said doors as the cage passes them. It is only necessary in order to prevent their opening to slide the shaft 16 horizontally, and thereby to throw the roller 18 out of the vertical plane in which the levers 10 swing, or in which the skeleton frame of Fig. 7 slides.

10 In elevator-wells having but a single door upon one or both sides at each story thereof—that is, as before described, doors the opening of which require the opening mechanism upon only one side of the well—the opening  
15 of the doors as the cage passes them is easily prevented by means of the lever 21, which is pivoted upon the cross-bar 4 and connected loosely with the shaft 16, a slight movement of it toward the left throwing the roller out  
20 of the same vertical plane of the lever or skeleton frame aforesaid and permitting the ascent or descent of the cage without any action of the roller upon said door-operating mechanism. A movement of the lever 21 toward  
25 the right as the desired landing is approached slides the shaft and the roller thereon into the vertical plane of the door-opening mechanism, permitting the action of the roller thereon and causing the desired door to open.

30 A modification of the above device adapted for elevator-wells having doors swinging upon the right and left hand sides thereof, or double doors, is shown in Fig. 6. A bracket 19 is fixed upon the cross-bar 4 of the  
35 cage, through which a hole is bored, forming thereby an intermediate journal for the shaft 16. The shaft in this modification consists of two pieces, their combined length being slightly less than the distance between the  
40 levers 10, as shown upon the right and left hand sides of the well in Figs. 1 and 2. Upon the bracket 19 is pivoted by a pivot 19' a lever 22, which, for the convenience of the operator, may have a handle upon its outer end  
45 projecting downward. Near the pivotal point of said lever, at each side thereof, are pins 22', which are connected by straps with the collar 16' upon the shaft 16, said collar being secured against longitudinal movement upon  
50 said shaft. The rollers 18 being in position for action upon the lever 10, or the sliding skeleton frame aforesaid, when the lever 22 is in the position indicated in heavy lines the movement thereof into the position shown  
55 in dotted lines retracts the two sections of the shaft 16 within the bore of the bracket 19, and the rollers thereon assume the position as shown by dotted lines, and thereby permit the cage and rollers thereon to ascend  
60 or descend without the action of the rollers upon the door-opening mechanism of the doors it may be desired to pass.

It is evident that either modification of the door-opening mechanism may be applied to  
65 the doors of elevator-wells, and also that the doors may be hung as usual upon their side or from their top end to the top of the

door-frame and the doors closed by their own weight without departing from the principle of my invention.

It will be observed that at the widest part of the lever 10 an angle of some extent is formed, while upon the bar 13, which performs a like duty, said part is of a uniform curve. The latter form is preferable, although  
75 either one is applicable, the curve producing less noise and running smoother.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In mechanism for operating the doors of elevator-wells, the combination, with a door hinged to said well, of a rod, one end of the rod being hinged to said door, the other to a device supported upon the wall of said well  
85 and movable toward and from said door, said device having an edge which forms an angle or slight curve with a vertical plane, and a roller or its equivalent arranged upon the elevator-cage and adapted to engage said an-  
90 gular or curved edge and to move said device and open the door both during the upward and downward movement of the elevator-cage, substantially as described.

2. In mechanism for operating the doors of  
95 elevator-wells, the combination, with a door hinged to said well, of a rod, one end of the rod being hinged to said door, the other to a device supported upon the wall of said well and movable toward and from said door, said  
100 device having a channel therein whose sides form an angle or slight curve with a vertical plane, and a roller or its equivalent arranged upon the elevator-cage and adapted to enter  
105 said channel and to move said device and open the door as the cage approaches a landing therefor, and also to close said door after the cage has passed said landing both during the upward and downward movement of the ele-  
110 vator-cage, substantially as described.

3. In mechanism for operating the doors of an elevator-well, the combination, with the elevator-cage, of a roller or its equivalent arranged thereon, the lever 10, pivoted near its  
115 upper end upon the wall of the well, an intermediate portion of one edge of said lever projecting toward and arranged to be acted upon by said roller, and the connecting-rod 12, connecting the lower end of said lever and a door  
120 and arranged to open said door by the action of the roller upon the aforesaid projecting edge of the lever as the elevator-cage reaches a landing therefor in its upward or downward movement, substantially as described.

4. In mechanism for operating the doors of  
125 an elevator-well, the combination, with the elevator-cage, of a roller or its equivalent arranged thereon, the lever 10, pivoted near its upper end upon the wall of the well, an in-  
130 termediate portion of one edge of said lever projecting toward and arranged to be acted upon by said roller, the connecting-rod 12, connecting the lower end of said lever and a door and arranged to open said door by the



action of the roller upon the aforesaid projecting edge of the lever as the elevator-cage reaches a landing therefor in its upward or downward movement, and the weight 20, or its equivalent, for closing said door after the cage has passed said landing, substantially as described.

5. In mechanism for operating the doors of an elevator-well, a roller or its equivalent arranged upon the elevator-cage, the lever 10, pivoted near its upper end upon the wall of the well, the connecting-rods 12, one end of each rod connected to a door of the well, the other to a lever, the lever 11, pivoted intermediate of its ends upon the wall of the well, and the connecting-rod 12', connecting the levers 10 and 11, all arranged, combined, and operating substantially as described.

6. In mechanism for operating the doors of elevator-wells, the combination, with the elevator-cage, of a roller or its equivalent arranged thereon, the lever 10, pivoted near its upper end upon the wall of the well, an intermediate portion of one edge of said lever projecting toward and arranged to be acted upon by said roller, a bar or guide arranged for receiving the aforesaid roller between said bar or guide and the aforesaid projecting edge of the lever, and a connecting-rod 12, connecting the lower end of said lever and a door and arranged to open said door by the action of the roller aforesaid upon the lever 10 as the elevator-cage approaches a landing, and also to close the door by the action of said roller upon the aforesaid bar or guide after the cage has passed said landing, substantially as described.

7. In mechanism for operating the doors of an elevator-well, consisting of a transversely-movable device connected with a door and supported upon the wall of the elevator-well and adapted to be acted upon by a roller or its equivalent arranged upon the elevator-cage, the combination of a roller or its equivalent adapted for longitudinal movement upon the elevator-cage at right angles with the vertical plane of the movement of the aforesaid transversely-movable device, whereby said roller or its equivalent may be thrown out of or into engagement with the said door-operating mechanism, and thereby making said mechanism operative or the reverse at the will of the operator, substantially as described.

8. In mechanism for operating the doors of elevator-wells, consisting of transversely-movable devices connected with the doors and supported upon the wall of the elevator-well, the combination of two shafts arranged upon the elevator-cage, each carrying a roller or its equivalent upon its outer end and adapted for action upon the aforesaid transversely-movable device, said shafts being arranged for longitudinal movement toward and from each other, whereby the aforesaid rollers or their equivalents may be thrown out of or into engagement with the aforesaid door-operating mechanism, and thereby making it operative or the reverse at the will of the operator, substantially as described.

GEORGE A. WHITING.

Witnesses:

E. S. BARNES,

W. T. WHITING.