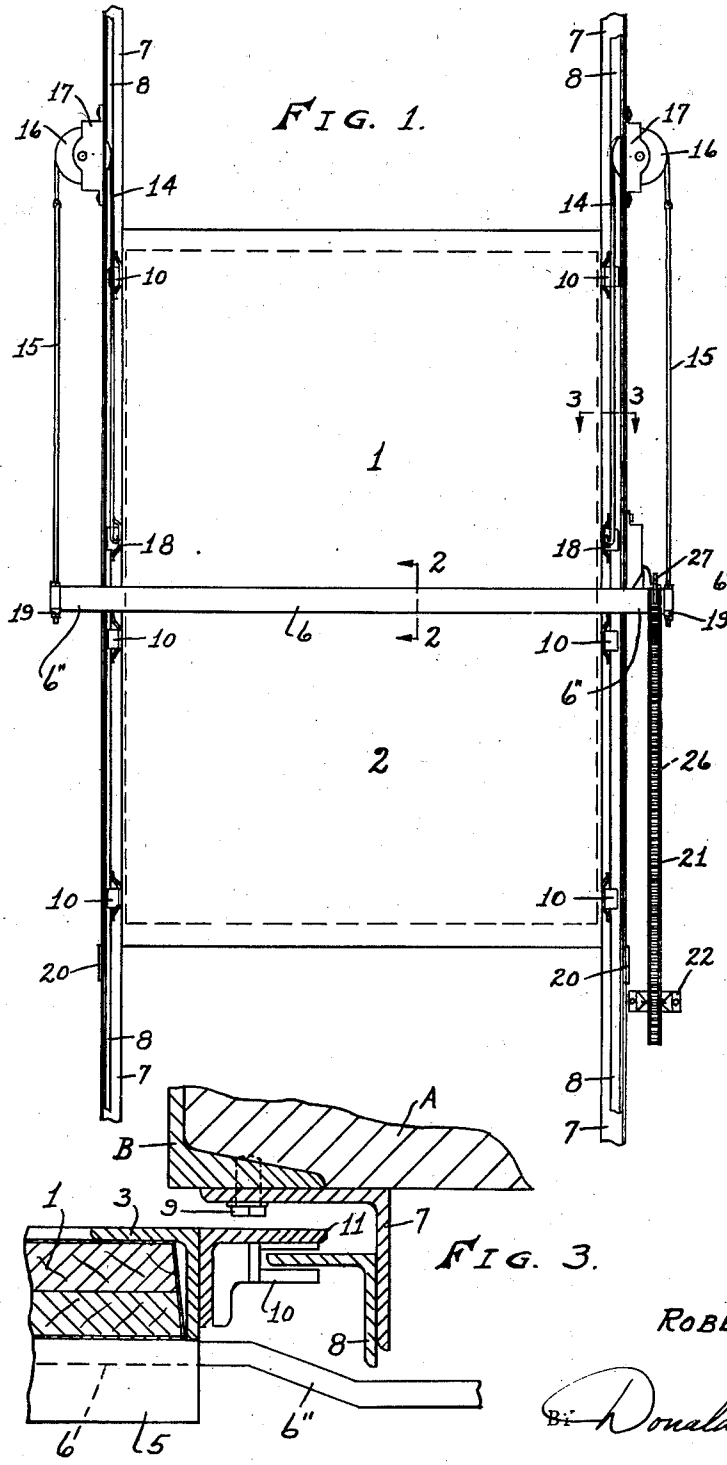
Sept. 26, 1944. R. S. PEELLE 2,358,994

ELEVATOR DOOR OPERATOR

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FIG. 1.



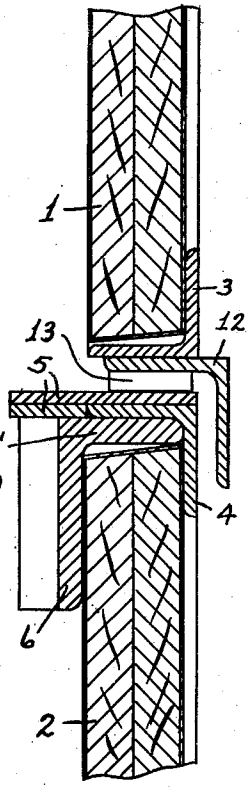


FIG. 2.

FIG. 3.

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ELEVATOR DOOR OPERATOR

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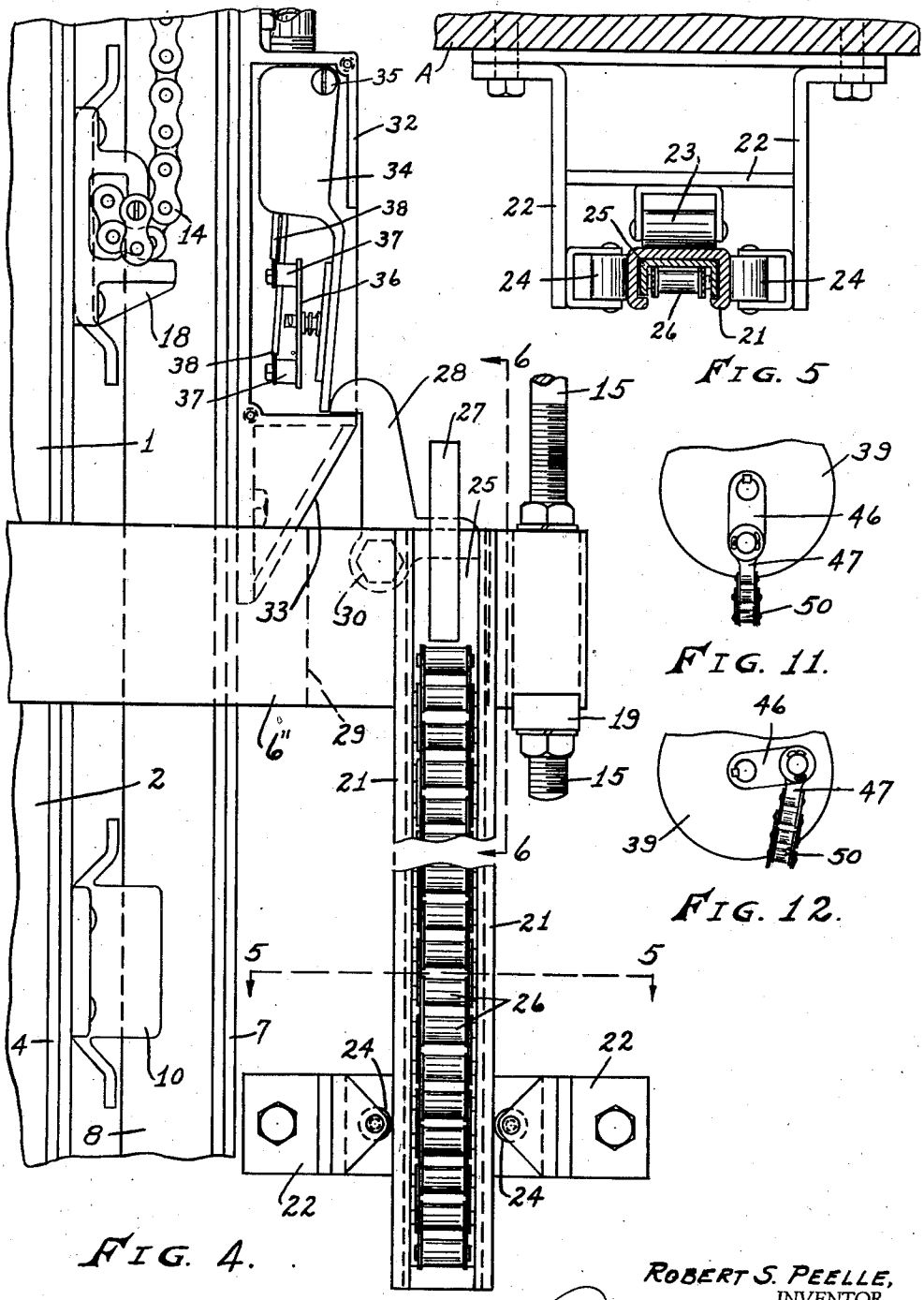


FIG. 4.

FIG. 5

FIG. 11.

FIG. 12.

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ELEVATOR DOOR OPERATOR

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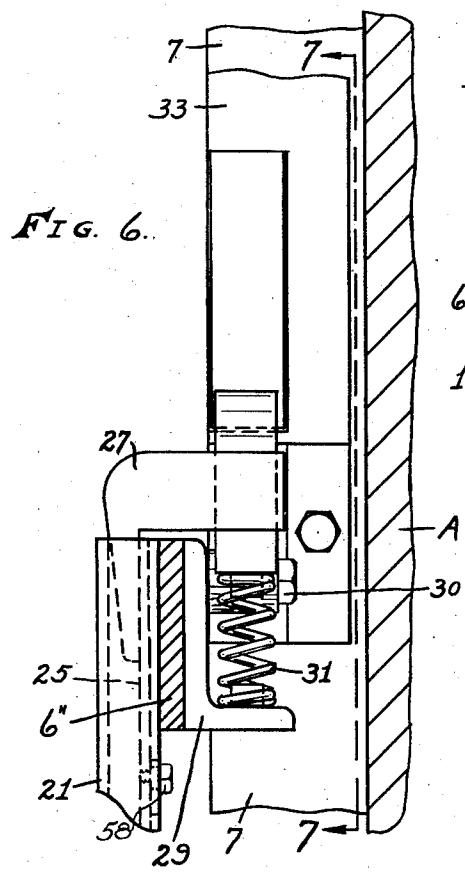


FIG. 6.

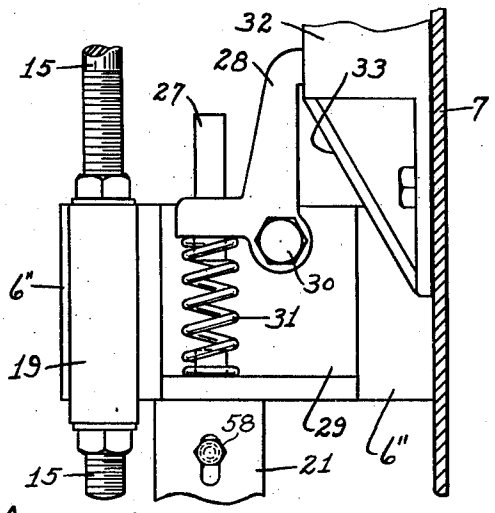


FIG. 7.

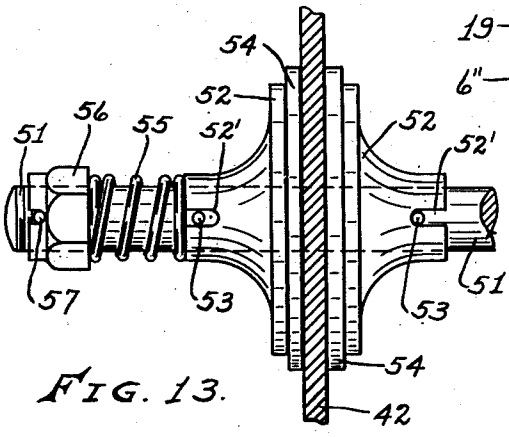


FIG. 13.

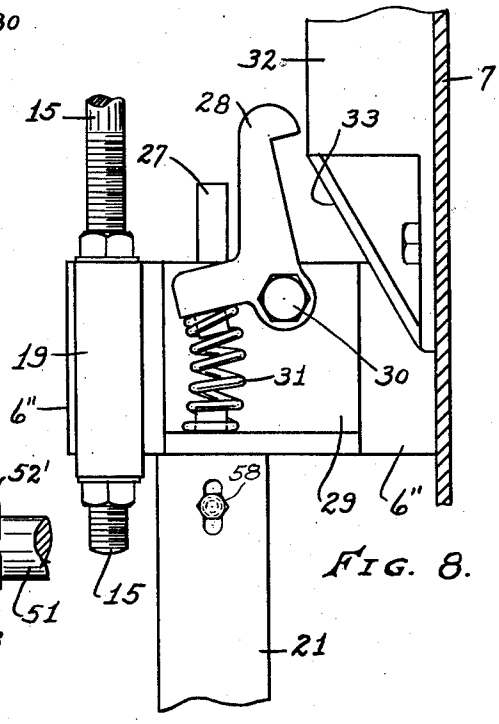


FIG. 8.

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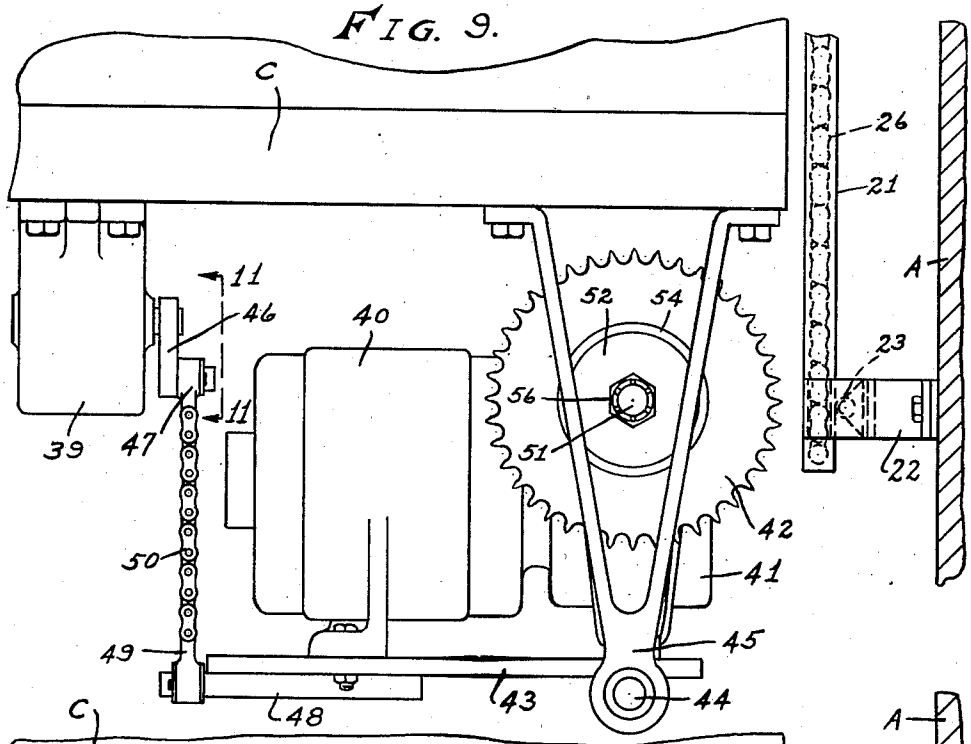
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ELEVATOR DOOR OPERATOR

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FIG. 9.



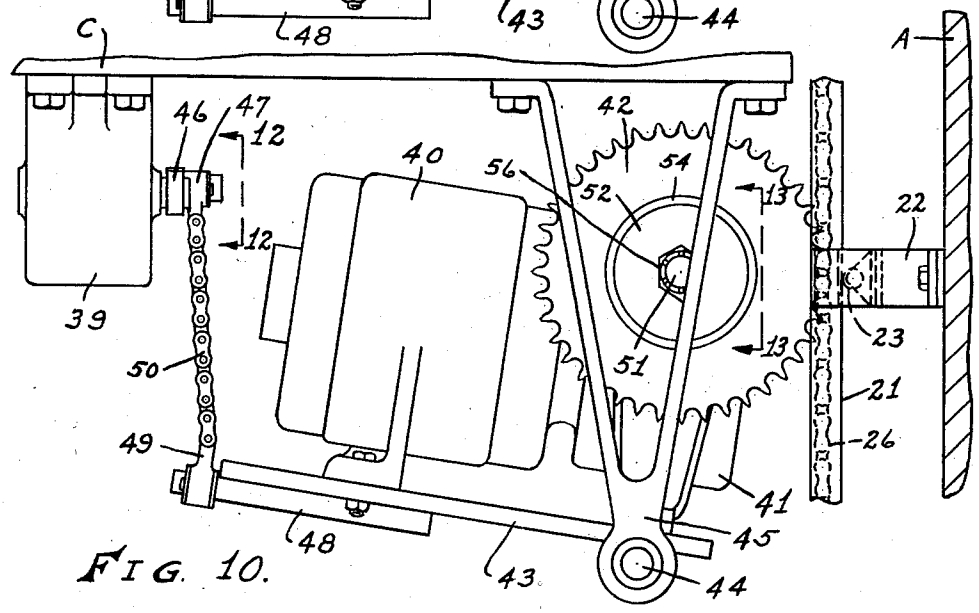


FIG. 10.

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Patented Sept. 26, 1944

2,358,994

UNITED STATES PATENT OFFICE

2,358,994

ELEVATOR DOOR OPERATOR

Robert S. Peelle, Hollis, N. Y., assignor to The Peelle Company, Brooklyn, N. Y., a corporation of New York

Application July 24, 1943, Serial No. 496,257

7 Claims. (Cl. 187—52)

My present invention relates to operators for elevator doors, the same being more particularly adapted to operate doors known to the trade as counterbalanced doors with the doors being comprised of two sections movable in opposite directions vertically and in substantially the same plane. The door sections are mounted within the elevator shaft and are guided in their vertical movements by means of guide rails secured to the walls of the elevator shaft with the guide rails being located adjacent the jambs of the respective openings. Each lower section of each door is connected, at its sides, to its respective upper section by means of chains passing over sheaves which are mounted in housings fastened to the guide rails.

Operating devices have heretofore been used which are either located above the travel of the elevator car, or located at each of the doors. Operators geared directly to the sheaves have also been used. All of these operators require extensive electrical wiring together with elaborate panel boards with their switching and reversing equipment, and also extensive mechanical hookups are required from the operators to the doors.

The primary object of the invention is the provision of an operator mechanism which is carried on the under side of the elevator car platform, and which is adapted to engage and open or close any one of a series of doors without the necessity of using extensive mechanical hookups or wiring.

A second object of the invention is the provision of an operating device which moves into and out of engagement with a part of the door, the operator being actuated through electrically connected push buttons located within the elevator car.

A third object is the provision of a geared rack bar or the equivalent thereof having one part secured to one section of the door and with a second part thereof being slidable within the first part, and with the slidable part having means carried thereby for latching the door in closed position.

Another object of the invention is the provision of an operating mechanism which eliminates the necessity of using a retiring cam in connection therewith.

Further objects of the invention are the provision of an operating mechanism which is economical to manufacture, which is simple of construction, which is positive in its operation, and which is provided with members located therein providing slippage of the driving member with relation to the driven members and thereby preventing injury to any of the parts thereof through quick starting and stopping operations.

Other objects and advantages of the invention will suggest themselves in the course of the following description, and that which is new will be pointed out in the appended claims.

In order that the invention may be more fully understood, reference is made to the accompanying four sheets of drawings, in which:

Figure 1 is a shaft side elevation of a door having a portion of the device in connection therewith.

Figure 2 is a vertical section through the meeting rails of the door, taken on line 2—2 of Figure 1.

Figure 3 is a detail section through the right jamb of an opening and showing the guide rail members and a portion of the door, as taken on line 3—3 of Figure 1.

Figure 4 is an enlarged detail of the portion of the device which is secured to the door and showing the same in connection with an electrical interlocking device.

Figure 5 is a detail plan section, taken on line 5—5 of Figure 4, showing the guide for the lower extending portion of the device which is secured to the door.

Figure 6 is a detail section taken on line 6—6 of Figure 4.

Figure 7 is a detail section, taken on line 7—7 of Figure 6, showing the rear side of the latch member with the same being shown in latching position.

Figure 8 is a detail similar to Figure 7 except the latching member is shown in disengaged position.

Figure 9 is an elevational detail showing the operator and associated parts as being secured to the under side of an elevator car platform and with the same being shown in neutral or disengaged position.

Figure 10 is a detail elevation similar to Figure 9 except the operating mechanism is shown in driving position.

Figures 11 and 12 are detail elevations taken from lines 11—11 and 12—12 of Figures 9 and 10 respectively.

Figure 13 is a detail elevation showing means of frictionally applying power to the driving sprocket, taken on line 13—13 of Figure 10.

Like characters designate like parts throughout the several views.

In order that the construction, the operation, and the advantages of the invention may be more fully understood, I will now take up a detailed

description thereof in which the same will be more fully described.

Referring now to the drawings in detail, 1 and 2 designate the upper and lower panels respectively of the door. The upper panel is secured in the frame 3, and the lower panel is secured in the frame 4. Members 5 are secured to the upper surface of the lower section of the door to provide support for trucks between the building floor and the elevator car platform. A trucking or reinforcing angle 6 is built into the lower section with the horizontal portion 6' thereof being of substantially the same length as the width of the door section and with the vertical leg thereof extending therebeyond and forming the portions 6''.

The sections of the door are guided in their vertical movements by means of the guide rails 7 and 8 with each of the rails 7 being rigidly secured to the wall A or to a frame jamb member B by means of screws or bolts 9. Guide shoes 10, having guide rail engaging slots formed therein, are secured to flange angles 11 which extend vertically of the door sections and are secured to the upper and lower frames 3 and 4. An astragal angle 12 is secured to the lower edge of the upper section and covers the joint between the sections when the door is in closed condition. 13 designates bumper members which absorb the shock of the doors when the same come to a closed position.

The upper and lower sections of the door are secured in connected relation by means of chains or other suitable flexible means 14 and rods 15, with the flexible members extending over sheaves 16 which are secured to their respective guide rails by means of the housings 17. One end of each of the flexible members is secured in a chain fastener 18 which is secured to the frame member of the upper section. Each of the rods 15 is adjustably secured, at its lower end, to the extended portion of the reinforcing angle 6 through a lug 19. It is obvious from the above that the opening movement of the lower section downwardly causes the upper section to move upwardly, and in closing, the movements of the sections are reversed. A member 20 is located on each of the guide rails 7 to provide stops on which the extended portions 6'' of the reinforcing member 6 rest when the door is in full open position.

In order to adapt the door to operate by means of the operating mechanism, I have provided the channelled guide 21, the upper end of which is rigidly secured to one of the reinforcing angle extensions 6'', and extends downwardly therefrom. The lower end of the guide 21 is braced from the wall A by means of bracket 22, with roller 23 providing means reducing friction between the guide and the bracket. Rollers 24 bear against the sides of the guide 21 and prevent lateral movements of the guide.

A shoulder screw 58, extending through a slotted hole in channel guide 21, and being threaded into channel 25, as shown in Figures 6, 7, and 8, provides means limiting the vertical movement of channel 25 with relation to channel guide 21.

Channel 25, carrying the rack-forming linkage 26, is slidable vertically within guide 21. A hook 27 is welded or otherwise suitably secured to the upper end of channel 25 and extends over the reinforcing bar 6''. A latch 28 is pivotally mounted on an angle 29 which is rigidly secured to the bar 6'', as shown in Figures 6, 7, and 8. A compression spring 31 is provided to force the latch into engagement with the interlocking device.

The interlocking device is comprised of the case 32 having an incline 33 formed at the lower end thereof. A swingable arm 34, pivoted on screw 35, is located within the case and carries contact bar 36 into and out of electrical contact with the contact posts 37. The contact posts are connected electrically into the elevator control circuit by means of wires 38.

The operating mechanism comprises the motor 39 which is rigidly secured to the under side of the elevator car platform C, the motor 40, the reducer 41, and the sprocket 42, which are mounted on the swingable plate 43 having the shaft 44 secured thereunder and with the ends of the shaft 44 being journalled in supporting brackets 45 which are rigidly secured to the under side of the elevator car platform C. A crank arm 46 is secured to the shaft of motor 39 and is revolvable with the shaft. Link 47 is revolvably secured on the crank arm pin. Shaft 48 is rigidly secured to the under side of plate 43 and projects therebeyond and forms a trunnion for the link 49. A flexible linkage 50 is connected, at its upper and lower ends, to link 47 and link 49 respectively.

The reducer 41 has shaft 51 projecting from one side thereof which carries sprocket 42. Sprocket 42 is not rigidly secured to shaft 51 but is frictionally engaged by washers 52 through the friction plates 54. Each of the washers 52 has a slot 52' formed therein and is revolvable with the shaft by reason of pins 53 extending through the shaft and into the slots 52', as shown in Figure 13. A compression spring 55 bears against the outer washer 52 with the compression of the spring 55 being adjustable by means of the nut 56. A pin 57 maintains nut 56 in its adjusted position.

In the operation of the device, the elevator car is stopped at a floor landing adjacent a door. Constant pressure "open" and "close" pushbuttons (not shown) are located in the elevator car for controlling motors 39 and 40 which operate simultaneously with each other. When the motors are energized, crank arm 46, being secured to the shaft of motor 39, carries linkage 50 therewith and tilts the platform plate 43 which is pivoted in brackets 45 from the position shown in Figure 9 to the position shown in Figure 10. The sprocket 42, being revolved by shaft 51 in a clockwise direction, engages the rack 26 causing the same to move downwardly and carrying channel 25 therewith. With the initial downward movement of channel 25, hook 27 engages latch 28 and pivots the same to the position shown in Figure 8. When the latch is disengaged, as shown in Figure 8, the swingable arm 34 of the interlocking device swings away from the contact posts 37 and breaks the elevator control circuit, thereby preventing movement of the elevator car until the door is again closed and the latch 28 engages the lower portion of arm 34 forcing the contact bar 36 into engagement with contact posts 37. The hook 27, in its downward movement in opening the door, engages the upper surface of bar 6'' and starts a downward motion thereof and causing the lower section of the door to move downwardly. As the lower section of the door moves downwardly, the upper section moves upwardly by reason of the two sections being connected by the flexible members 14 and the rods 15.

As the door comes to full open position the motors are deenergized by releasing pressure on the "open" pushbutton and the lower section rests on stop members 20. When the motors are deenergized, the plate 43, carrying motor 40 and

reducer 41, moves by gravity from the position shown in Figure 10 to the position shown in Figure 9 thereby disengaging sprocket 42 from the rack 26.

When it is desired to close the door, pressure is exerted on the "close" pushbutton and the motors rotate in the reverse direction from that in opening the door. As the motors rotate, the platform 43 is again tilted to the position shown in Figure 10 and engaging sprocket 42 with rack 26 causing the same to move upwardly and thereby closing the door. As the door approaches its closed position, the upper portion of latch 28 strikes incline 33 forcing the latch outwardly against the compression of spring 31. After latch 28 passes the lower portion of the interlock case the latch is forced toward the interlock case by means of spring 31 with the latch engaging arm 34 and forcing the same toward the contact posts 37, and with the contact bar 36 bridging thereacross and completing the elevator control circuit, after which the elevator car may be moved to another landing.

When the doors are to be opened or closed there is considerable inertia to be overcome upon starting the door in either direction of travel. When sprocket 42 engages rack 26, the sprocket, being frictionally held between washers 52, is being revolved by means of shaft 51. Until the inertia of the doors has been overcome, the sprocket, being frictionally engaged by plates 54, revolves at a lower rate of speed than the shaft 51. After the inertia of the door has been overcome, the speed of the sprocket then approximates the speed of the shaft. The friction plates provide means permitting the sprocket to absorb sudden shocks as the same is moved into engagement with the rack 26.

The bracket 22, together with the roller 23, prevents the guide 21 from being forced away from the sprocket and rollers 24 prevent canting of the door by preventing lateral movements of the guide 21.

While I have shown the rack as being comprised of chain 26 secured in the channel 25, a conventional geared rack may be substituted therefor, and a conventional spur gear substituted for the sprocket.

It is to be understood that I am not to be limited to the exact form and arrangement of the parts herein shown and described, but that minor changes may be made, insofar as the changes may fall within the scope of the appended claims.

Having now fully shown and described the invention, what I claim, and desire to secure by Letters Patent of the United States, is:

1. In combination with a two section bi-parting elevator door operating vertically in guides secured to an elevator shaft wall, a rack secured to one of the sections and carried thereby, an operating mechanism tiltably secured to the under side of an elevator car operating in the shaft and movable into and out of engagement with the rack and transferring motion therethrough to the door, and a guide member secured to the elevator shaft wall and engaging the rack assembly and maintaining the same in alignment and preventing canting of the door when motion is transferred to the door.

2. In combination with a bi-parting door having an interlocking device mounted adjacent thereto, a rack guide rigidly secured to and carried by one section of the door, a rack slidably positioned in the rack guide, means limiting movement of the rack with relation to the rack guide, a latch member carried by the door and engaging the interlocking device, and a hook rigidly secured to the upper end of the rack and engageable with the latch member and providing means of unlatching the door and simultaneously breaking the interlocking electrical circuit through disengagement of the latch member from the interlocking device.

3. In combination with a bi-parting door mounted in vertical guides secured to an elevator shaft wall, an interlocking device secured to one of the vertical guides, a rack slidably mounted in a guide secured to and carried by one section of the door, a latch member secured to and carried by one of the door sections and adapted to engage the interlocking device, a hook rigidly secured to the upper end of the rack, with downward movement of the rack engaging the hook with the latch member and disengaging the latch member from the interlocking device and breaking the interlocking circuit and permitting the door to be opened.

4. In combination with an elevator landing door, a rack secured to the door, an elevator car, an operating mechanism secured under the elevator car platform, said operating mechanism comprising one motor rigidly secured to the under side of the elevator car platform with a second motor being mounted on a pivoted plate with said pivoted plate being supported by brackets secured to the under side of the car platform, a reducer in connected relation to the second motor and with a sprocket carried by the reducer, a linkage extending from the first motor to the pivoted plate, and with the rotating motion of the first motor tilting the pivoted plate until the sprocket engages the rack.

5. In combination with an elevator car operating in an elevator shaft, doors mounted between guides secured to the shaft walls, a rack secured to a portion of the door, an operating mechanism, said operating mechanism comprising a motor rigidly secured to the elevator car and a second motor mechanism pivotally secured in brackets secured to the elevator car, a linkage extending between the rigidly secured motor and the mounting of the second motor and with the rotation of the first motor exerting a pull on the linkage and pivoting the second motor mechanism with relation to the elevator car, a sprocket carried by the second motor mechanism, and with the pivotal action of the second motor mechanism engaging the sprocket thereof with the rack member.

6. In an elevator hatchway, an elevator car movable upwardly and downwardly in said hatchway, landing openings in the latchway walls, biparting doors closing said landing openings, a rack secured to and carried by one section of said doors, a door operating mechanism tiltably supported by means of brackets under the elevator car, a toothed member carried by the tiltable operating mechanism, means fixedly secured under the elevator car providing means tilting the operating mechanism by means of a linkage extending therebetween, and with the tilting action of the operating mechanism moving the toothed member thereof into and out of engagement with said rack and opening and closing the adjacent landing door by engagement with and moving said rack.

7. In combination with an elevator car, a landing door slidably mounted between a pair of guides secured to the elevator shaft walls, said

door being composed of upper and lower sections operating in substantially the same plane, an electric interlock secured to one of the guides and located adjacent the upper door section, a latch carried by the lowermost door section and engageable with the electric interlock, a downwardly-extending rack guide rigidly secured to the lowermost door section, a rack slidably mounted in the rack guide, means limiting the movement of the rack with relation to the rack guide, with the movement of the rack downwardly disengaging the latch from the electric interlock, door operating means pivotally mounted to the under side of the elevator car, and with the pivotal action of the operating means engaging the operating means with the rack and imparting motion to the door therethrough.

ROBERT S. PEELLE.