

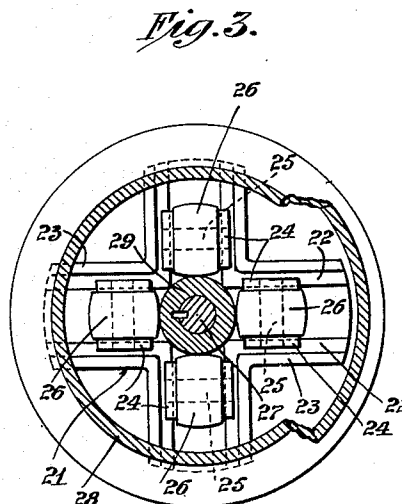
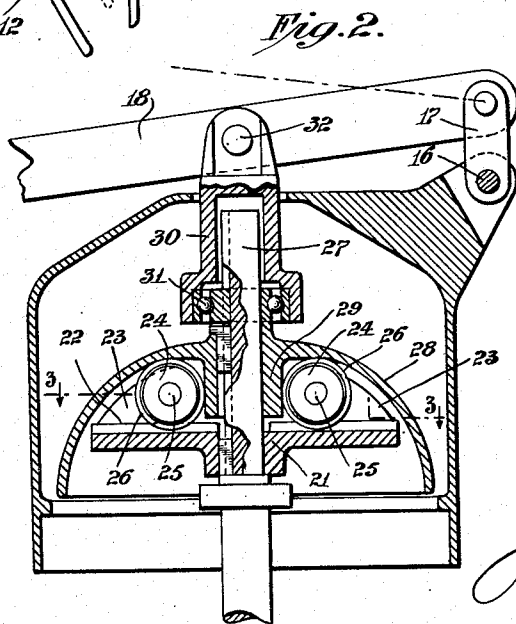
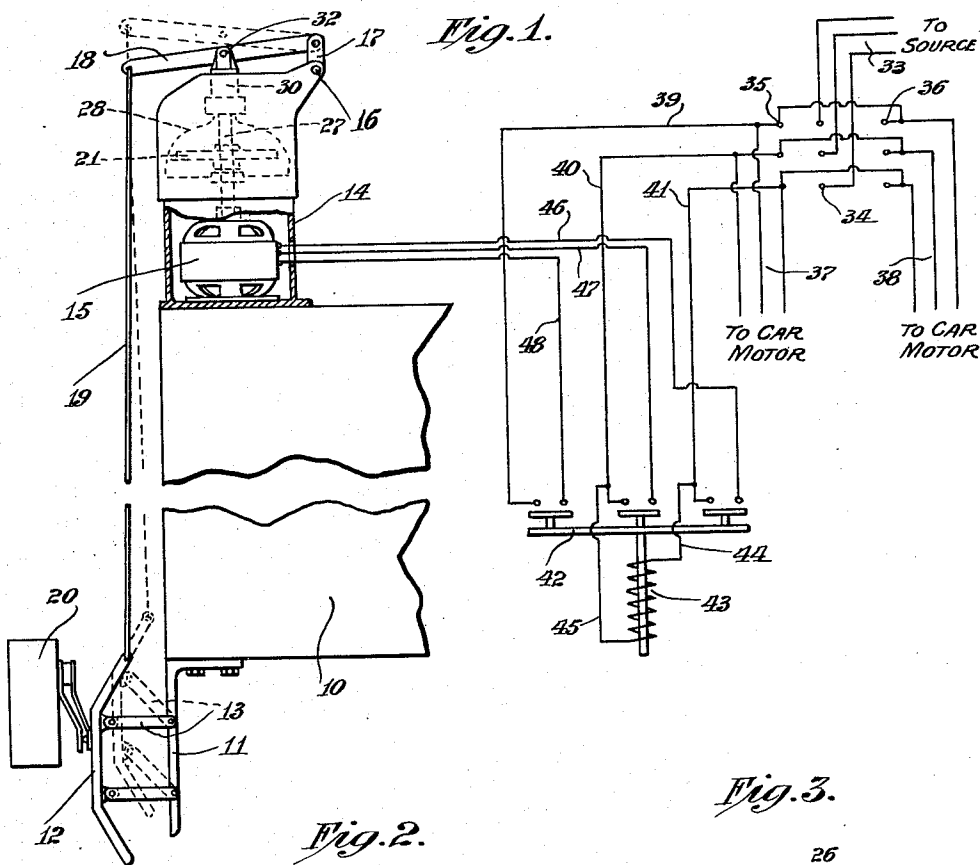
Feb. 7, 1939.

J. E. BANCROFT

2,146,046

OPERATOR FOR ELEVATOR DOORS

Filed Jan. 26, 1938



James E. Bancroft
INVENTOR
Francis P. Wentworth
his ATTORNEY.

UNITED STATES PATENT OFFICE

2,146,046

OPERATOR FOR ELEVATOR DOORS

James E. Bancroft, Jamaica, N. Y., assignor to
The Peelle Company, Brooklyn, N. Y., a corpo-
ration of New York

Application January 26, 1938, Serial No. 187,095

11 Claims. (Cl. 187—52)

The invention relates to operators for elevator doors, and more particularly to an electrically actuated mechanism for controlling the movements of a receding cam carried by an elevator car in a manner to control the circuits to the motors for opening and closing doors at different shaft openings upon the stoppage of an elevator car, and to prevent the energizing of the door actuating motors except as a result of the stoppage of the car.

The main object of the invention is to provide an electric motor actuated mechanism for controlling a movable or receding cam, wherein the motor actuating said mechanism receives energy from the source of supplying energy to the motor for moving the car whereby so long as a car is in motion, said mechanism will be operative to hold the cam out of the operative relation to the switch or other mechanisms in the elevator shaft. With the stoppage of the car, however, the motor actuating said mechanism will be made inoperative so that the weight of the cam, and of the mechanisms acting thereon, will become effective to cause the cam to move into its operative relation with a shaft switch or other mechanisms for controlling the opening or closing of a door.

To secure the desired reliability and rapidity in the operation of the device, I provide an actuating mechanism capable of developing sufficient lifting power to rapidly raise the cam, and to develop and maintain sufficient continuing power, while the motor is in operation, to hold the cam out of its operative position at all times while the car is in motion. In securing this result, I provide a mechanism which will convert the rotary movement of an electric motor into a right line movement of a mechanism acting upon the cam. This right line movement is developed through a mechanism acted upon by the motor and acting upon a member capable of right line, or reciprocatory movement, thus effectively utilizing the power of the motor for moving the cam and ensuring a length of such right line movement sufficient to cause the desired cam movement.

The construction of parts is such as to not only avoid any substantial resistance during the actuation of the converter mechanism, but these parts may be so formed as to ensure a rapid initial lifting movement of the cam by the motor, with a progressively decreasing lifting movement, so as to substantially equalize the lifting power developed by said converter mechanism throughout its entire range of movement.

With the use of a cam shoe actuating mecha-

nism embodying the invention, the actuation of the cam shoe is controlled by, and synchronized with, the application of power to the car motor for imparting movement to the car, and hence is controlled through the same mechanisms which control the application of power to the car. Consequently, when a cam shoe is projected into its operative position, it must, if an electric interlock be used, remain in this position until a door is closed and locked so as to permit application of power to the motor which moves the car and to the cam actuating motor.

The invention consists primarily in an operator for elevator doors embodying therein a cam shoe, supports therefor permitting simultaneous vertical and horizontal movement thereof, an oscillatory lever, connections between said lever and said cam shoe, a cam shoe actuating motor, a rotary member driven from said motor, a reciprocatory member operative upon said lever, means carried by said rotary member for imparting right line movement to said reciprocatory member, and electrical connections to said cam shoe actuating motor in shunt with a line supplying energy to the motor for operating an elevator car, whereby the energizing and de-energizing of said cam shoe actuating motor is synchronized with the energizing and de-energizing of the car motor; and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawing,

Fig. 1 is a conventional showing of an elevator car having a cam shoe controlled mechanism embodying the invention applied thereto, and showing conventionally an electrical diagram illustrating the mode of operation of said mechanism;

Fig. 2 is a vertical section through the mechanism for converting the rotary movement of the motor into a vertical movement for actuating the cam shoe; and

Fig. 3 is a plan view of the motor actuated parts of said converter mechanism, on the line 3—3 of Fig. 2.

Like numerals refer to like parts throughout the several views.

The invention, as illustrated in the drawing, is for use primarily for actuating the switch controlling the circuits to the motors for opening and closing a door. The mechanism actuated by the cam shoe may have other functions, but the invention does not extend beyond the mecha-

nisms for actuating the cam shoe in the manner herein described, since the cam shoe itself and the mechanisms actuated thereby are old and well known in this art.

5 Referring to the particular embodiment of the invention shown in the drawing, an elevator car is shown conventionally at 10. Below this car is a bracket 11 supporting a cam shoe 12 of the usual construction, this cam shoe being connected with
10 said bracket by means of links 13 permitting simultaneous vertical and horizontal movement of the cam shoe.

Mounted upon the top of the car is a housing 14 for an electric cam shoe actuating motor 15. Mounted upon this housing at 16, by means of a pivoted link 17, is a lever 18, one end of which is connected by a link 19, of any desired construction, with the cam shoe 12.

As heretofore stated, the cam shoe and its appurtenances usually weighs about twenty-five pounds or more, so that the shoe has a normal tendency to fall by gravity into its operative position, and possesses sufficient inherent weight to actuate a switch arm or other mechanisms co-operating therewith. Such a mechanism is shown conventionally at 20 in the drawing.

While a cam shoe 12 is shown as being positioned below the car platform, it is obvious that it may be positioned at any point of the height
30 of the car, as desired, there being ample clearance for this purpose alongside of any car.

The cam shoe 12, as shown, is of the conventional or usual form, except that no springs are necessary for its operation.

35 The electric motor 15 has low horsepower, from $\frac{1}{8}$ to $\frac{1}{4}$ H. P., and will operate at 1500 to 1800 revolutions per minute.

In order to apply the energy of this motor with a lifting action upon the cam shoe, it is essential
40 to convert the rotary movement of the motor into a right line movement of a member acting upon the lever arm 18, and at the same time develop sufficient power to lift and hold a shoe of the required weight into its inoperative position
45 so long as the motor 15 is in operation.

To secure the mode of operation above referred to, the shaft of the motor 15 has secured thereto and rotatable therewith, a head fitting 21 having a plurality of radially extending tracks 22. Each
50 track has two rails, and adjacent each rail is a curved side flange or plate 23. As shown in Fig. 3 of the drawing, this head fitting 21 is circular in form and has four tracks and associated guide flanges arranged 90° apart.

Mounted upon the tracks are wheels 24 carried by an axle 25, which is rigid with said wheels. Loosely mounted upon each axle 25, intermediate the wheels 24, is a weighted roller 26 of greater diameter than the wheels 24. The roller 26 is
60 crowned, as shown in the accompanying drawing, and is positioned between the rails of the track with which it is associated.

The shaft of the motor 15 is indicated at 27. Splined for vertical movement upon said motor shaft 27 is a dome shaped cap 28 having a hub
65 29, this cap resting upon the various weighted rollers 26 and being held by said rollers out of engaging relation with the wheels 24.

Loosely mounted adjacent the end of the motor shaft 27 is a fitting 30 having a ball bearing 31
70 interposed between same and the shaft, one ring of this ball bearing being carried by the cap 28 and the other by the fitting 30.

The fitting 30 is pivoted at 32 substantially mid-way of the length of the lever 18, thus ensuring

an effective application of power from the cap 28 to said lever, while at the same time ensuring a desired lift of the free end of said lever 18 to which the flexible connection 19 is secured.

As will more fully appear hereinafter, the cap 28, during the operation of the motor 15, has both a rotary and a right line movement, and imparts to the fitting 30 movement longitudinally of the motor shaft 27 or a right line movement only.

The cap 28 is interiorly domed, the curvature of the inner wall thereof being upon an irregular curve of progressively increasing radius, thus presenting, adjacent each of the rollers 26, a cam surface of progressively higher pitch.

As will more fully appear hereinafter, the lifting of the cap results from outward movement of the rollers 26 from centrifugal force resulting from the high speed of rotation of the head fitting 21, and the speed of the rollers and the power of the outward thrust thereof increases as the distance of the rollers from the axis of the shaft 27 increases. By graduating the cam surface in the manner above described, the lifting power is substantially equalized, and the power of the motor is more effectively utilized in holding the cap in its raised position.

By using a dome shaped cap as described, it is not only possible to reduce the diameter of the entire actuating structure, but to limit the development of centrifugal force in the rollers 26 to that required for a proper actuation of the device. Furthermore, with a curved cam surface as described, the movement of the cam shoe into its operative position can be more rapidly and more effectively secured than with any other form of cam surface which could be used.

The exterior configuration of the cap 28 is a mere matter of convenience and design.

While, in the drawing, this cap is shown as being made of a finished metal casting, if desired, it may be drawn from sheet metal and welded to the hub 29.

The rollers 26, wheels 24 and appurtenant parts, as well as the cap 28, are preferably made of brass or bronze having high specific gravity and anti-friction properties. This avoids undue wear and obviates the necessity for frequent lubrication.

The crowning of the rollers 26 ensures proper contact of the roller with the curved co-operating surface of the cap. By making the rollers 26 of greater diameter than the wheels 24, the rollers are free to turn in one direction, as a result of their travel along the cam surface within the cap, while the wheels 24 are free to turn in the opposite direction upon the rails 22. In this manner, substantially no frictional resistance is offered by the dome or tracks to the movements of the rollers along the dome surface or of the rollers along said tracks. This not only effectively utilizes the power of the motor 15 but eliminates any substantial wear upon the tracks, the wheels, the rollers and the portions of the dome with which the rollers contact.

The electrical conditions in an equipment embodying the invention are shown conventionally in the diagram forming a part of Fig. 1 of the drawing. This diagram is merely illustrative, since it is capable of wide variation in adapting the invention to different electrical systems for operating elevator cars.

As shown in the drawing, a three-phase current is used, and the lines 33 connect the electrical source with movable contacts 34 of a control

switch in an elevator car. Co-operating with said movable switch member 34 are two sets of fixed contacts 35 and 36, with which the movable contacts 34 may be selectively engaged to determine the direction of travel of the car.

Leading from one set of contacts as 35, is a line 37 to the car motor for imparting movement to the car in one direction, and leading from the other set of contacts 36 is a line 38 leading to the car motor for imparting movement to the car in the opposite direction.

Connected with both sets of contacts 35 and 36 by means of lines 39, 40 and 41 is a switch mechanism 42, which may be of any desired construction. A solenoid 43 is shown for actuating said switch mechanism. One terminal of this solenoid is connected with the line 41 by a lead 44, while the other terminal of said solenoid is connected with the line 40 by a lead 45.

The switch 42, in the drawings, is shown as of the bridge type, there being one set of contacts for each of the lines 39, 40 and 41, the output terminals of which contacts are connected respectively by the leads 46, 47 and 48 with the terminals of the cam motor 15.

With the electrical system as illustrated, the closing of the circuit to either of the lines 37 or 38 by the switch mechanism 34—35—36 will close the circuit to the solenoid 43 and, through the switch mechanism 42, to the cam motor 15, and instantly, with the interruption of the circuit to either of the lines 37 or 38, the circuit to the cam motor will also be interrupted.

The construction of the cam actuating mechanism is such that it is immaterial in which direction the motor 15 turns, since the operative effect of said motor will be the same whatever its direction of movement.

The operation of the herein described mechanism is substantially as follows:

The position of parts shown in full lines in the drawing, is such as occurs when an elevator car is at rest and the cam shoe is projected by gravity into its operative relation to the shaft switch mechanism. With the parts in this position, the circuit to the motor 15 is interrupted and the motor and the various parts actuated thereby are at rest. When the parts are in this position, the shaft doors may be either opened or closed.

When power is applied to the elevator car motor to either raise or lower the car through the closing of switches 34—35—36, the circuit to the coil of the solenoid 43 is closed, thus actuating a switch mechanism 42 in a manner to close the circuit to the motor 15. As heretofore stated, if an electrical interlock be used, this cannot be done until the door is fully closed and locked. Substantially simultaneously with the energizing of the elevator car motor, the motor 15 is energized.

With rotation of the motor shaft 27 and its head fitting 21 in either direction, the various wheels 24 move by centrifugal force outwardly of the axis of said shaft along the rails 22, the axle 25 of these wheels moving the roller 26 associated with each pair of wheels outwardly of the shaft. The weight of the rollers 26 ensures the development of sufficient power in the thrust of the wheels 24 and rollers 26 by centrifugal force, to impart rapid movement to the cap 28 longitudinally of said motor shaft 27.

Since the rollers 26 are of greater diameter than the wheels 24, it is obvious that said wheels have a free rolling movement along the rails of the tracks 22 and do not contact with the inner

surface of the cap 28, and that the rollers 26 have free rolling contact along the inner wall of the dome in the opposite direction to that of the wheels 24 and do not contact with the rails 22. The wheels 24 maintain the rollers in contact with the cap 28, and the rollers 26 maintain the wheels 24 in contact with the tracks 22. The side flanges or webs 23 prevent any axial movement of said rollers and wheels.

As the wheels 24 move toward the outer end of the tracks 22, their effective action from centrifugal force increases, but this increased action of the rollers 26 is counteracted by the downward trend and higher pitch of the walls of the cap.

With the initial upward movement of the rollers 26 by reason of the extremely low pitch of the curvature of the inside of the cap, said cap, which rotates about the axis of the shaft 27 with said rollers, is raised, and, as the said rollers continue to move outwardly, the cap is still further raised. While the later movements of the cap will tend to be at a higher speed than the initial movement, the rapid increase in pitch of the inside of the cap will require increased force to impart any movement to the cap, thus utilizing the increased thrust of the rollers by centrifugal force in a manner to substantially equalize the rate of upward movement of the cap until the lower part of the wall of the dome prevents further movement of said rollers. The dome being splined to the shaft 27, may have movement along this shaft while the shaft is rotating, so that there is no movement of the cap in relation to the rollers other than that imparted thereto by the rollers.

The ball bearing 31 permits free turning movement of the cap 28 in relation to the fitting 30, this being necessary since said fitting is capable only of a reciprocatory movement along the upper end of the shaft 27. The amount of the upward reciprocation of this fitting is limited by the amount of upward movement of the cap.

The rollers 26 impart a rapid upward movement to the cap 28 and hold it in its elevated position so long as the motor 15 is energized, or so long as power is being applied to impart movement to the elevator car.

With upward movement of the fitting 30, the lever 18 is rocked upwardly, and the upward movement of said lever, through the connection 19 with the cam shoe, raises said cam shoe so as to bring it out of the operative relation to the co-operating switch mechanisms in the elevator shaft.

It has been found in actual practice that while only approximately a twenty-five pound lift is required to bring the cam shoe into its inoperative position, with four weighted rollers 26 and their associated parts, sufficient force can be developed with a small horsepower motor to quickly lift the cam and hold it in its operative position in the manner described.

The point of connection of the fitting 30 with the lever 18 ensures the application of the lifting force of the wheels 24 and rollers 26 upon the cam shoe at an effective leverage, and also a sufficient range of movement of said lever to secure a proper cam shoe movement. The link 17 moves with oscillation of the lever 18 in a manner to compensate for the arc described by said lever, and permits a straight line movement of the fitting 30.

While an elevator car is in motion, the position of the cam shoe and lever 18 is indicated in dotted lines in Fig. 1, and the position of the cap

28 and the parts acting thereon and acted upon thereby is shown in dotted lines in Fig. 2 of the drawings. This relation of parts is maintained at all times while a car is in motion, during which time power is being applied to the motor 15.

When a car is brought to a stop, however, the circuit to the motor 15 is interrupted, thus preventing a further development of centrifugal force acting upon the wheels 24, axle 25 and rollers 26, whereupon the weight of the cam shoe, the lever 18, the fitting 30 and the cap 28 causes a return movement of said wheels and said rollers by the camming action of the inner wall of the cap 28.

Aside from the hum of the motor, the operating mechanisms herein described are substantially noiseless.

As heretofore stated, the head fitting 21, the wheels and rollers 24 and 26, and the cap 28, while the motor 15 is in operation, turn with the motor shaft 27. It is obvious that the fitting 30 merely has a free sliding movement upon said shaft.

It is not my intention to limit the invention to the precise details of construction shown in the accompanying drawings, it being obvious that such may be varied without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desire to have protected by Letters Patent, is:

1. An operator for elevator doors embodying therein a cam shoe, supports therefor permitting simultaneous vertical and horizontal movement thereof, an oscillatory lever, connections between said lever and said cam shoe, a cam shoe actuating motor, a rotary member driven from said motor, a reciprocatory member operative upon said lever, means carried by said rotary member for imparting right line movement to said reciprocatory member, and electrical connections to said cam shoe actuating motor in shunt with a line supplying energy to the motor for operating an elevator car, whereby the energizing and de-energizing of said cam shoe actuating motor is synchronized with the energizing and de-energizing of the car motor.
2. An operator for elevator doors embodying therein a cam shoe, supports therefor permitting simultaneous vertical and horizontal movement thereof, a pivotal link, an oscillatory lever pivoted at one end to said link, connections between said lever and said cam shoe, a cam shoe actuating motor, a rotary member driven from said motor, a reciprocatory member pivotally connected with said lever intermediate said link and said connections, means carried by said rotary member for imparting right line movement to said reciprocatory member, and electrical connections to said cam shoe actuating motor in shunt with a line supplying energy to the motor for operating an elevator car, whereby the energizing and de-energizing of said cam shoe actuating motor is synchronized with the energizing and de-energizing of the car motor.
3. An operator for elevator doors embodying therein a cam shoe, supports therefor permitting simultaneous vertical and horizontal movement thereof, an oscillatory lever, connections between said lever and said cam shoe, a cam shoe actuating motor, a head fitting having a plurality of radially extending tracks carried by the shaft of said motor, a reciprocatory member operative upon said lever, a member radially movable upon each of said tracks, a cap having a cam surface presented toward said tracks, a weighted roller

carried by each of said members and engageable with said cam surface, whereby with rotation of said motor shaft, said cap will be elevated as a result of centrifugal force exerted by said members and said rollers, connections between said cap and said reciprocatory member for imparting right line movement to said reciprocatory member, and electrical connections to said cam shoe actuating motor in shunt with a line supplying energy to the motor for operating an elevator car, whereby the energizing and de-energizing of said cam shoe actuating motor is synchronized with the energizing and de-energizing of the car motor.

4. An operator for elevator doors embodying therein a cam shoe, supports therefor permitting simultaneous vertical and horizontal movement thereof, an oscillatory lever, connections between said lever and said cam shoe, a cam shoe actuating motor, a head fitting having a plurality of radially extending tracks carried by the shaft of said motor, a reciprocatory member operative upon said lever, wheels radially movable upon each of said tracks, an axle connecting said wheels, a cap having a cam surface presented toward said tracks, a weighted roller mounted on each of said axles between said wheels, said roller being of greater diameter than said wheels so as to be engageable only with said cam surface, whereby with rotation of said motor shaft, said cap will be elevated as a result of centrifugal force exerted by said wheels and said rollers, connections between said cap and said reciprocatory member for imparting right line movement to said reciprocatory member, and electrical connections to said cam shoe actuating motor in shunt with a line supplying energy to the motor for operating an elevator car, whereby the energizing and de-energizing of said cam shoe actuating motor is synchronized with the energizing and de-energizing of the car motor.

5. An operator for elevator doors embodying therein a cam shoe, supports therefor permitting simultaneous vertical and horizontal movement thereof, an oscillatory lever, connections between said lever and said cam shoe, a cam shoe actuating motor, a head fitting having a plurality of radially extending tracks carried by the shaft of said motor, a reciprocatory member operative upon said lever, wheels radially movable upon each of said tracks, an axle connecting said wheels, an interiorly dome shaped cap, the curvature of the inner wall of which is of progressively increasing radius toward said head fitting so as to form a cam surface presented toward said tracks, a weighted crowned roller mounted on each of said axles between said wheels, said roller being of greater diameter than said wheels so as to be engageable only with said cam surface, whereby with rotation of said motor shaft, said cap will be elevated as a result of centrifugal force exerted by said wheels and said rollers, connections between said cap and said reciprocatory member for imparting right line movement to said reciprocatory member, and electrical connections to said cam shoe actuating motor in shunt with a line supplying energy to the motor for operating an elevator car, whereby the energizing and de-energizing of said cam shoe actuating motor is synchronized with the energizing and de-energizing of the car motor.

6. An operator for elevator doors embodying therein a cam shoe, supports therefor permitting simultaneous vertical and horizontal movement thereof, an oscillatory lever, connections between

said lever and said cam shoe, a cam shoe actuating motor, a head fitting having a plurality of radially extending tracks carried by the shaft of said motor, a reciprocatory member operative upon said lever, wheels radially movable upon each of said tracks, an axle connecting said wheels, a cap splined to the motor shaft and having a cam surface presented toward said tracks, a weighted roller mounted on each of said axles between said wheels, said roller being of greater diameter than said wheels so as to be engageable only with said cam surface, whereby with rotation of said motor shaft, said cap will be elevated as a result of centrifugal force exerted by said wheels and said rollers, a ball bearing connection between said cap and said reciprocatory member for imparting right line movement to said reciprocatory member, and electrical connections to said cam shoe actuating motor in shunt with a line supplying energy to the motor for operating an elevator car, whereby the energizing and de-energizing of said cam shoe actuating motor is synchronized with the energizing and de-energizing of the car motor.

7. An operator for elevator doors embodying therein a cam shoe, supports therefor permitting simultaneous vertical and horizontal movement thereof, an oscillatory lever, connections between said lever and said cam shoe, a cam shoe actuating motor, a head fitting having a plurality of radially extending tracks carried by the shaft of said motor, wheels radially movable upon each of said tracks, an axle connecting said wheels, an interiorly dome shaped cap splined to the motor shaft, the curvature of the inner wall of which is of progressively increasing radius toward said head fitting so as to form a cam surface presented toward said tracks, a weighted crowned roller mounted on each of said axles between said wheels, said roller being of greater diameter than said wheels so as to be engageable only with said cam surface, whereby with rotation of said motor shaft, said cap will be elevated as a result of centrifugal force exerted by said wheels and said rollers, a ball bearing connection between said cap and said reciprocatory member for imparting right line movement to said reciprocatory member, and electrical connections to said cam shoe actuating motor in shunt with a line supplying energy to the motor for operating an elevator car, whereby the energizing and de-energizing of said cam shoe actuating motor is synchronized with the energizing and de-energizing of the car motor.

8. An operator for elevator doors embodying therein a cam shoe, supports therefor permitting simultaneous vertical and horizontal movement thereof, an oscillatory lever, connections between said lever and said cam shoe, a cam shoe actuating motor, a head fitting having a plurality of radially extending tracks carried by the shaft of said motor, a web upon each side of each track, a reciprocatory member operative upon said lever, wheels radially movable upon each of said tracks between said webs, an axle connecting said wheels, a cap having a cam surface presented toward said tracks, a weighted roller mounted on each of said axles between said wheels, said roller being of greater diameter than said wheels so as to be engageable only with said cam surface, whereby with rotation of said motor shaft, said cap will be elevated as a result of centrifugal force exerted by said wheels and said rollers, connections between said cap and said reciprocatory member

for imparting right line movement to said reciprocatory member, and electrical connections to said cam shoe actuating motor in shunt with a line supplying energy to the motor for operating an elevator car, whereby the energizing and de-energizing of said cam shoe actuating motor is synchronized with the energizing and de-energizing of the car motor.

9. An operator for elevator doors embodying therein a cam shoe, supports therefor permitting simultaneous vertical and horizontal movement thereof, a pivotal link, an oscillatory lever pivoted at one end to said link, connections between said lever and said cam shoe, a cam shoe actuating motor, a head fitting having a plurality of radially extending tracks carried by the shaft of said motor, a reciprocatory member operative upon said lever, wheels radially movable upon each of said tracks, an axle connecting said wheels, an interiorly dome shaped cap, the curvature of the inner wall of which is of progressively increasing radius toward said head fitting so as to form a cam surface presented toward said tracks, a weighted crowned roller mounted on each of said axles between said wheels, said roller being of greater diameter than said wheels so as to be engageable only with said cam surface, whereby with rotation of said motor shaft, said cap will be elevated as a result of centrifugal force exerted by said wheels and said rollers, connections between said cap and said reciprocatory member for imparting right line movement to said reciprocatory member, and electrical connections to said cam shoe actuating motor in shunt with a line supplying energy to the motor for operating an elevator car, whereby the energizing and de-energizing of said cam shoe actuating motor is synchronized with the energizing and de-energizing of the car motor.

10. An operator for elevator doors embodying therein a cam shoe, supports therefor permitting simultaneous vertical and horizontal movement thereof, a pivotal link, an oscillatory lever pivoted at one end to said link, connections between said lever and said cam shoe, a cam shoe actuating motor, a head fitting having a plurality of radially extending tracks carried by the shaft of said motor, a reciprocatory member operative upon said lever, wheels radially movable upon each of said tracks, an axle connecting said wheels, an interiorly dome shaped cap splined to the motor shaft, the curvature of the inner wall of which is of progressively increasing radius toward said head fitting so as to form a cam surface presented toward said tracks, a weighted crowned roller mounted on each of said axles between said wheels, said roller being of greater diameter than said wheels so as to be engageable only with said cam surface, whereby with rotation of said motor shaft, said cap will be elevated as a result of centrifugal force exerted by said wheels and said rollers, a ball bearing connection between said cap and said reciprocatory member for imparting right line movement to said reciprocatory member, and electrical connections to said cam shoe actuating motor in shunt with a line supplying energy to the motor for operating an elevator car, whereby the energizing and de-energizing of said cam shoe actuating motor is synchronized with the energizing and de-energizing of the car motor.

11. An operator for elevator doors embodying therein a cam shoe, supports therefor permitting simultaneous vertical and horizontal movement thereof, a pivotal link, an oscillatory lever pivoted

at one end to said link, connections between said lever and said cam shoe, a cam shoe actuating motor, a head fitting having a plurality of radially extending tracks carried by the shaft of said motor, a web upon each side of each track, a
5 reciprocatory member operative upon said lever, wheels radially movable upon each of said tracks between said webs, an axle connecting said wheels, a cap having a cam surface presented
10 toward said tracks, a weighted roller mounted on each of said axles between said wheels, said roller being of greater diameter than said wheels so as to be engageable only with said cam sur-

face, whereby with rotation of said motor shaft, said cap will be elevated as a result of centrifugal force exerted by said wheels and said rollers, connections between said cap and said reciprocatory member for imparting right line movement
5 to said reciprocatory member, and electrical connections to said cam shoe actuating motor in shunt with a line supplying energy to the motor for operating an elevator car, whereby the energizing and de-energizing of said cam shoe actu-
10 ating motor is synchronized with the energizing and de-energizing of the car motor. /

JAMES E. BANCROFT.