

No. 865,335.

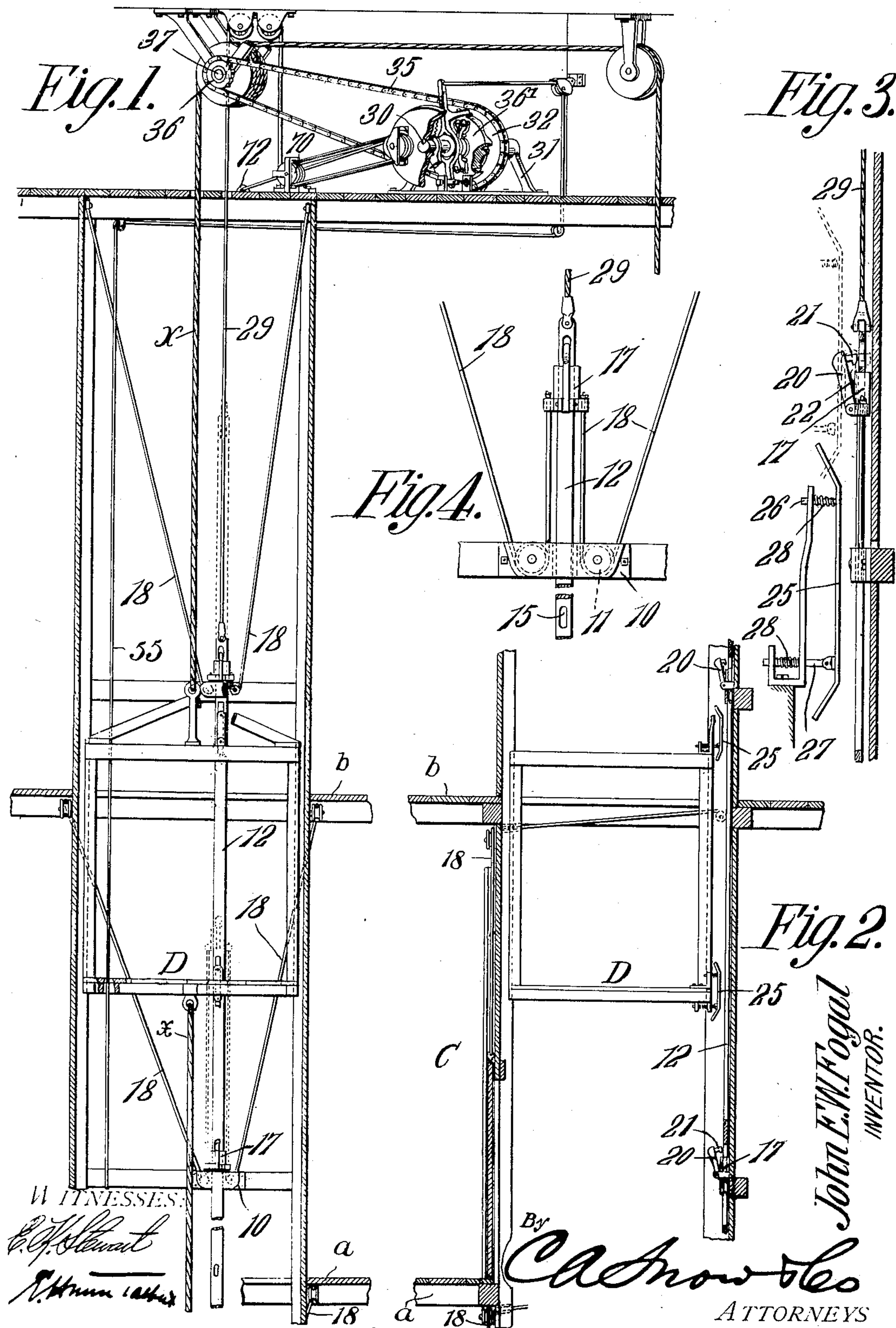
PATENTED SEPT. 3, 1907.

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ELEVATOR GATE OPERATING MECHANISM.

APPLICATION FILED NOV. 17, 1906.

2 SHEETS—SHEET 1.



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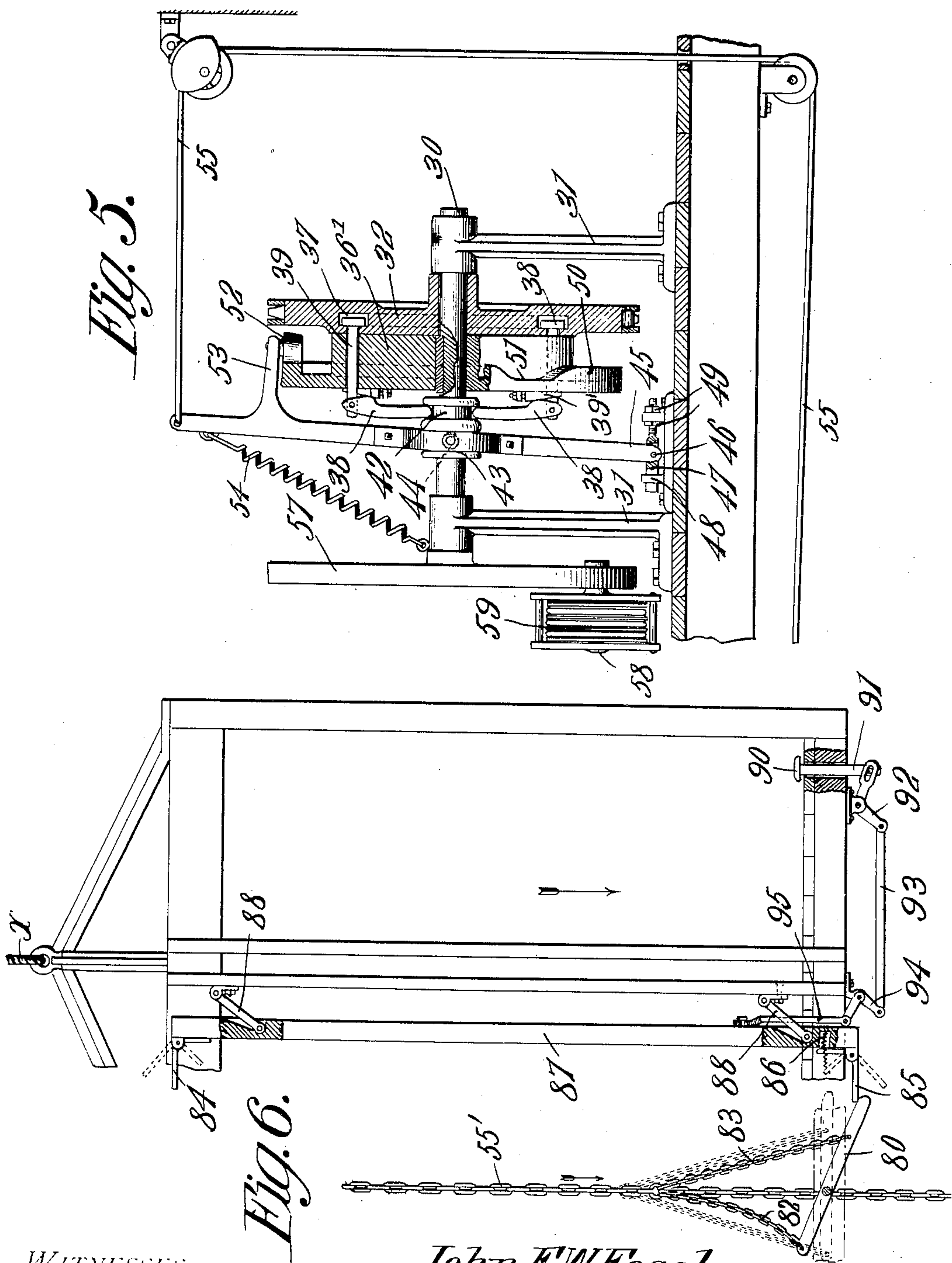
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ELEVATOR-GATE-OPERATING MECHANISM.

No. 865,335.

Specification of Letters Patent.

Patented Sept. 3, 1907.

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To all whom it may concern:

Be it known that I, JOHN E. W. FOGAL, a citizen of the United States, residing at Quincy, in the county of Adams and State of Illinois, have invented a new and useful Elevator-Gate-Operating Mechanism, of which the following is a specification.

This invention relates to apparatus employed for opening elevator doors, gates and the like, and has for its principal object to provide an operating means which may be actuated at the option of the elevator attendant, so that it will not be necessary to open all of the doors or gates which the car passes.

A further object of the invention is to provide a door opening mechanism in which there is no lateral or other strain on the car or cage, or on the guiding devices, and in which no power is used except at gates which it is desired to open.

A still further object of the invention is to provide a device of this class which will not start the door or gate opening operation until the car is very close to the floor line, and in which the closing operation will commence as soon as the car moves from the floor line in either direction, thus reducing the danger of accident where persons attempt to board or leave the moving car.

A still further object of the invention is to provide a door opening mechanism which receives its motion from a part of the hoisting mechanism, so that the movement of the door with relation to that of the car may be properly timed, and when the car stops at a floor with the door in open position, the door will be held in the open position until the car resumes its travel.

A still further object of the invention is to provide a door opening and closing member which is automatically connected to the door or gate as the car approaches the latter from either direction and which may be set into motion at the option of the elevator attendant.

A still further object of the invention is to provide a door opening mechanism which may be readily set into operation by the attendant and which will operate automatically to effect a complete opening or closing movement of the door or gate when once started into operation.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is an elevation of an elevator door or gate operating mechanism constructed in accordance with the invention, parts being broken away in order to more clearly illustrate the construction. Fig. 2 is a vertical section of a portion of the same in a plane at right angles to Fig. 1. Fig. 3 is a view of a portion of the mechanism shown in Fig. 2 drawn to an enlarged scale. Fig. 4 is a front elevation of the pawl and lifting bar mechanism illustrated in Fig. 3. Fig. 5 is an elevation, partly in section, of the clutching mechanism by which the door or gate operating bar is set into motion. Fig. 6 is an elevation partly in section, illustrating a modification of the clutch operating mechanism.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The elevator shaft is arranged in the usual manner to pass through hatchways formed in the various floors *a—b* of the building, and at each floor is arranged a door or gate *c* which may be of any ordinary construction, that shown in the present instance being in the form of a vertically movable gate, although it is to be understood that the device is equally applicable to sliding doors or other structures at the floors.

To the hatchway wall above each floor is secured a small frame 10 having bearings for the support of a pair of sheaves 11, and serving further as a guide for a vertically movable bar 12 which extends from the top of the elevator shaft to the basement, this bar being preferably in the form of a thin flat strip of metal that is provided with vertically elongated eyes 15, one of which is arranged adjacent to each floor of the building.

Surrounding the lifting bar 12 above the floor is a vertically movable block 17 to which are connected the ends of a pair of ropes or cables 18 which extend around the sheaves 11 and thence up and over such other guiding sheaves as may be necessary to the gate or door to be operated. To each block 17 is pivoted a cam lever 20 that carries a hooked pawl 21 that is arranged to engage in the opening 15, but is normally held out of engagement therewith by a small spring 22. If the pawl is moved into or through the opening and the lifting bar is elevated, the hooked pawl, by engagement with the lower wall of the opening will be maintained in engagement therewith during the entire movement of the bar.

On the elevator cage or car *D* are arranged two cam operating shoes 25, these being arranged one near the floor and the other near the roof of the car. Each shoe is mounted on two pins 26 and 27 that are operated on by springs 28 tending to force the shoes outward

from the car in position to engage the cam arms 20 as the car passes the latter, and the connection of the shoe with the lower pin is pivotal, so that the shoe will be free to yield, that is, each end may move in without
5 effecting similar movement of the opposite end.

During the ascent and descent of the elevator, the cam shoes will engage with the cam levers 20 and will force the latter inward until the hooked pawls 21 are forced through the openings into the lifting bar, and
10 then if the elevator attendant wishes to open the door or gate he sets into motion certain mechanism which raises the suspension cable 29 of the lifting bar, and said bar moves upward carrying with it the pawl and carrying block 17, and thus transmitting movement
15 through the cables 18 to the door or gate, the latter being raised and remaining in the open position while the car stops at the floor and then closing as the car leaves the floor in either direction.

The lifting bar operating mechanism may be arranged either in the basement or at the top of the building, and may be secured in any suitable position, as to the floor, ceiling, wall or other support. The lifting bar operating mechanism includes a shaft 30 that is mounted in suitable supporting bearings or
20 standards 31, and on this shaft is loosely mounted a sprocket wheel 32 which receives motion from any suitable source of power. In the present instance the shaft is shown as connected by a link belt 35 to a sprocket wheel 36, and the upper drum shaft 37, that
25 is to say, the drum over which the hoisting cable x passes, although, of course, the power may be received from one of the main winding drums in the basement or from any suitably driven shaft.

Feathered on the shaft 30 is a clutch disk 36', the
35 clutching face of which is arranged to frictionally engage a mating clutching face formed on the sprocket wheel 32. The clutch face of the sprocket wheel is provided with a continuous annular groove 37 having under-cut walls for the reception of the heads 38 of
40 a pair of bolts or pins 39 that extend through suitable guiding openings formed in the coupling member 36'. The ends of the bolts or pins are preferably milled down flat, and to each is pivoted a cam lever 38 that is arranged to bear against a preferably U-shaped wedge
45 block 39' that is disposed between the cam lever and the adjacent face of the clutch disk 36', the function of the wedge being to secure the necessary fine adjustment, so that the two clutching members may be properly engaged.

The inner ends of the cam levers fit within a groove 42 formed in the longitudinally movable sleeve 43 that is mounted on the shaft 30, and a second groove in this sleeve is engaged by rollers or pins 44 carried by a clutch operating lever 45. The lower end of the lever
50 45 is fulcrumed on a pin 46 carried by a bar 47, slidably mounted in openings formed in brackets 48. One end of the bar is threaded, and is engaged by nuts 49, so that the fulcrum point of the lever may be accurately adjusted. The clutching member 36' is provided with
60 a peripheral flange 50 in which is formed a notch 51 that is adapted to receive a roller 52 carried by an arm 53 projecting from the clutch operating lever, and when in inoperative position, the anti-friction roller 52 rests within the recess 51, the lever being pulled over to this
65 position by a suitable spring 54. From the clutch

operating lever extends a rope or cable 55 that is guided over suitable sheaves and passes down through the car within convenient reach of the operator.

When a car approaches a floor from either direction, one of the cam shoes 25 will engage the cam lever 20
70 and force the hooked pawl 21 through the opening 15 of the lifting bar. Then if the attendant wishes to open the gate or door, he pulls on the clutch operating rope 55 and the lever is moved over against the stress of the spring 54, so that the cam levers 38 will force
75 the clutching member 36' against the revoluble sprocket wheel 32, and movement will thereupon be transmitted from the sprocket wheel to the shaft.

At the end of the shaft 30 is a disk 57, carrying a wrist pin 58 on which is mounted a series of multiplying
80 sheaves 59, and on a bracket secured to the floor or other fixed point is mounted a series of sheaves 70. Over these sheaves passes a lifting rope 29 of the bar 12, one end of said rope being secured to the bar and the other end to a fixed eye 72. As soon as the shaft starts to
85 revolve, the wrist pin will be carried around and through the multiplying sheaves the rope 29 will be raised, pulling the bar 12 upward, and thus raising the door through the connections previously described.

It is only necessary for the attendant to pull lightly
90 on the rope 55 for the reason that as soon as the clutching members are brought together, and clutching member 36' starts to rotate, the cam shaped end of the recess 51 will engage the roller 52 and will force said roller a slight further distance in the clutching direction, and
95 the roller will remain in this position, and the parts will be clutched until a single complete rotation has been made, whereupon the roller 52 is pulled into the recess by the spring 54 and the parts are unclutched, the motion of the shaft then ceasing.
100

During the upward movement of the lifting bar 12, the hooked pawl is held in position by its engagement with the lower wall of the opening 15, and by the time the car platform has reached the level of the floor, the disk 57 will have made a half revolution, and will then
105 stop as the movement of the car stops, for the reason that the shaft receives its motion from the drum shaft 37. The door or gate is then in its highest position and will remain open until the car starts to move away from the floor. If it moves in the same direction, that is to
110 say, continues either to ascend or descend, the disk 57 will be revolved in the same direction through another half revolution, and during this time the bar will be lowered and the gate moved to closed position, and after the recess has arrived opposite the roller 52, the
115 parts will be automatically disengaged. By the time the gate is closed, the pawl carrying block 17 is resting on the sheave carrying frame 10, and the bar 12 then moves down a limited distance, say an inch or so, so that the spring 22 is free to move the pawl carrying bar
120 outward to release position. Should the movement of the car be reversed, the disk 57 will be traveled backward until having made a half revolution the recess arrives opposite the roller 52 and the parts are automatically disengaged.
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Where it is desired to operate the clutch lever by a foot button or pedal member, the construction shown in Fig. 6 is employed. In this case a cord or chain 55' runs from the clutch operating lever down the elevator shaft and at each floor is pivoted a lever 80 that is con-
130

5 nected to the chain by two smaller chains 82 and 83. One end of the lever projects into position to be engaged by two bell crank levers 84 and 85, the lever 84 being operative during the ascent of the car and the lever 85 being operative as the car descends. The lever 84 is free to fall to operative position by gravity, while a small spring 86 is moved to restore the lever 85 to its position. The two bell crank levers are carried by a bar 87 that is connected by parallel links 88 to the frame of the car.

15 In the car is a foot button 90 mounted at the upper end of a spindle 91 that is connected by a bell crank lever 92 to a link 93. The outer end of the link is connected by a bell crank lever 94 and link 95 to the bar 87, so that when the attendant depresses the foot button, the bar 87 will be thrust outward and upward, and the levers 84 and 85 will be adjusted to position to engage the bar 80. When pressure on the button is relieved, the bar 87 is free to drop to inoperative position by gravity. When either of the levers 84—85 engages the lever 80, the swinging movement of the lever 80 will be imparted to the chain 55' through either the chain 82 or the chain 83, and a downward pull will be exerted on the clutch operating chain no matter what the direction of travel of the car may be.

I claim:—

30 1. The combination with an elevator gate, of an operating bar suspended within the shaft and provided with a perforation, a block mounted on the bar, a pivoted cam arm, a spring normally holding the same outward from the bar, a hooked pawl arranged on the cam arm and adapted to enter the perforation, a car carried means for engaging said cam arm, and means for raising and lowering the bar.

35 2. In combination, an elevator gate, an operating bar suspended within the shaft and provided with a perforation, a frame or bracket forming a guide for the bar, a pair of sheaves mounted in the frame or bracket, cables passing around the sheaves and connected at one end to the block, and at the other end to the gate, a cam arm pivoted to said block, a hooked pawl carried by the cam arm and arranged to enter the perforation of the bar, a spring tending to force the cam arm outward from the bar, means on the car for engaging the cam arm and forcing the pawl into the perforation, and means for raising and lowering said bar.

40 3. The combination with an elevator gate, of an actuating member suspended within the shaft and adapted for connection to the gate, a cable carrying said actuating member, a shaft, a crank member carried thereby, multiplying sheaves over which the cable passes, one set of sheaves being supported by the crank member, and the other being connected to a fixed point, and means under the control of the operator for imparting movement to the shaft.

45 4. In combination with an elevator gate, of an actuating member adapted for connection to said gate, a cable carrying said member, a shaft, a crank member carried thereby, multiplying sheaves, one set of which is carried by the crank member, and the other being connected to a fixed point, the cable being arranged to pass around said sheaves, a shaft driving member mounted loosely on the shaft, and receiving motion from a part of the hoisting mechanism, and means under the control of the attendant for clutching said member to the shaft.

50 5. In combination, an elevator gate, an actuating bar therefor, means for connecting the gate to the bar, a shaft, a crank member carried thereby, multiplying sheaves, one set of which is carried by the crank member, and the other set being connected to a fixed point, a bar carrying cable passing around the sheaves, a shaft driving gear mounted loosely on the shaft, and means under the

control of the elevator attendant for clutching said gear to said shaft.

6. In combination, an elevator gate, a gate actuating member suspended therein and adapted for connection to said gate, a shaft, a crank member carried thereby, multiplying sheaves, one set of which is connected to the crank member and the other to a fixed point, a suspension cable passing around the multiplying sheaves and connected to said actuating member, a loose driving member mounted on the shaft, a clutch disk feathered to the shaft, and means under the control of the elevator attendant for forcing said disk into engagement with the driving member.

7. In combination, an elevator gate, an actuating member therefor, a shaft, a crank carried thereby, multiplying sheaves, one set of which is carried by the crank, and the other being connected to a fixed point, an operating cable passing around the sheaves and connected to said actuating member, a driving member mounted loosely on the shaft, a disk feathered to the shaft and arranged to frictionally engage said driving member, cam levers for forcing the disk into clutching position, an actuating lever for said cam levers, an anti-friction roller carried by the actuating lever, the disk being provided with a recess having cam faces in which the roller normally rests.

8. In mechanism of the class described, a gate actuating member, a normally idle operating shaft connected to said member, a shaft driving member, a clutching means under the control of the elevator attendant for connecting the shaft to the driving member, and means for automatically holding the clutch in engagement during a single complete rotative movement of the shaft and then releasing the shaft.

9. In combination, an elevator gate, an actuating bar suspended within the shaft and provided with perforations, a guiding frame or bracket for said actuating member, a block arranged to rest on said frame or bracket, a cam arm pivoted to the block, a hooked pawl arranged to enter the perforation, a spring normally tending to move the cam arm outward from the actuating means, sheaves carried by the frame or bracket, gate operating cables passing over the sheaves and connected to the block, cam shoes arranged on the car and adapted to engage the cam arm, a shaft, a crank member carried thereby, multiplying sheaves, one set of which is carried by the crank member and the other being connected to a fixed point, a suspension cable for the actuating member, said cable passing around the multiplying sheaves, a sprocket wheel loosely mounted on the shaft, means for actuating said sprocket wheel, said sprocket wheel having a friction face and being provided with an angular undercut groove, bolts having headed ends mounted within said groove, a friction disk having openings for the passage of the bolts, cam levers pivoted to the bolts and arranged to bear against the friction disk, the periphery of said disk having a recessed flange, an operating lever, a collar mounted on the shaft and with which said operating lever engages, said collar being also in engagement with the cam levers, an anti-friction roller carried by the actuating lever, and normally entered in the recess of the cam disk, and a flexible member extending from the actuating lever down through the car.

10. In mechanism of the class described, the combination with an elevator gate, of an actuating device therefor, a car-carried cam shoe for automatically connecting the gate to the actuating device, a pair of pins carrying each shoe, the connection between the shoe and one of the pins being pivotal, a support for the pins in which the latter are movable in the direction of their length, and springs one carried by each pin and tending to force the shoe outward to operative position.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN E. W. FOGAL.

Witnesses:

H. P. SIMPSON,
M. S. ORR.