

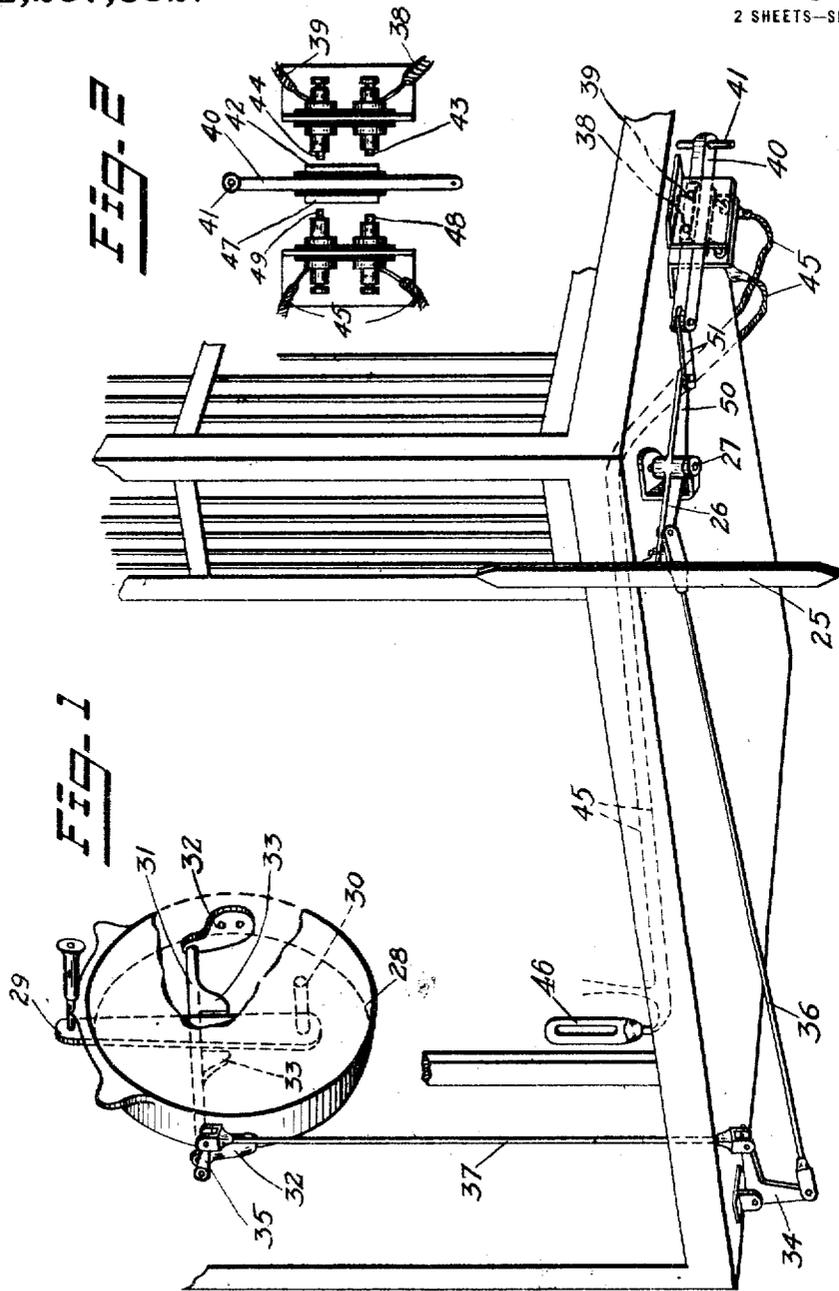
W. T. DUNFORD.
ELEVATOR SAFETY SYSTEM.

APPLICATION FILED AUG. 10, 1914. RENEWED JAN. 23, 1917.

1,237,882.

Patented Aug. 21, 1917.

2 SHEETS—SHEET 1.



Witnesses:
Morris Kamee
Howard Greice

William T. Dunford Inventor
By his Attorney
William J. Bisong

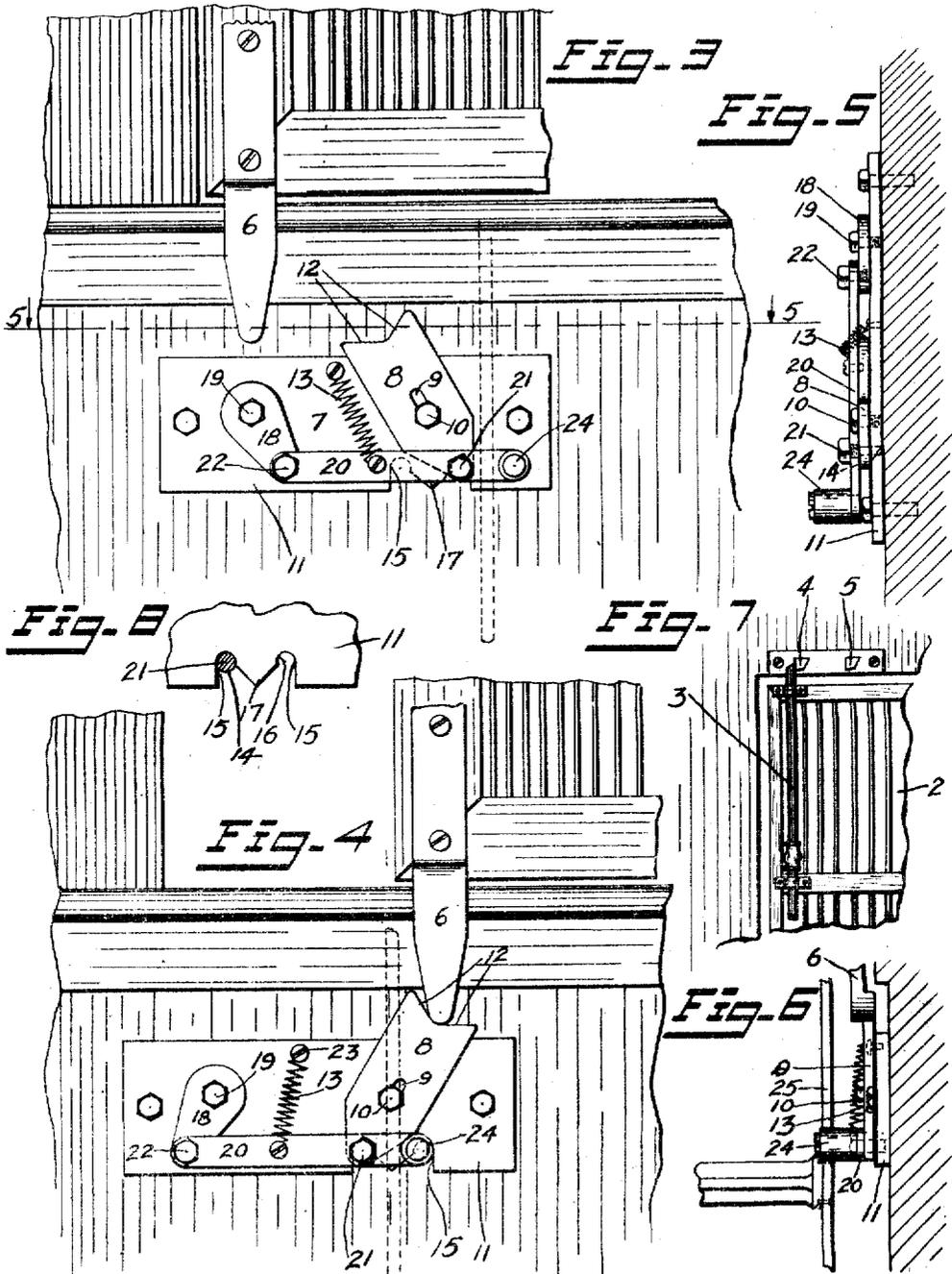
W. T. DUNFORD.
ELEVATOR SAFETY SYSTEM.

APPLICATION FILED AUG. 10, 1914. RENEWED JAN. 23, 1917.

1,237,882.

Patented Aug. 21, 1917.

2 SHEETS—SHEET 2.



Witnesses:
Moris Reamer.
Edward Cree

William T. Dunford Inventor
By his Attorney
William T. Reamer

UNITED STATES PATENT OFFICE.

WILLIAM T. DUNFORD, OF NEW YORK, N. Y., ASSIGNOR TO SHURLOC ELEVATOR SAFETY CO., INC., A CORPORATION OF NEW YORK.

ELEVATOR SAFETY SYSTEM.

1,237,882.

Specification of Letters Patent.

Patented Aug. 21, 1917.

Application filed August 10, 1914, Serial No. 856,122. Renewed January 23, 1917. Serial No. 144,057.

To all whom it may concern.

Be it known that I, WILLIAM T. DUNFORD, residing at 364 West 117th street, city, county, and State of New York, have invented certain new and useful Improvements in Elevator Safety Systems, of which the following is a specification.

The invention is an improvement in elevator safety systems, more particularly of the type in which mechanism on the car is controllable by the doors at the several landings, so that when the car is at a landing it cannot be started until the door is closed, or closed sufficiently to engage it with means preventing its re-opening. A particular object is to provide an exceedingly simple, compact and reliable construction for the mechanisms at the landings by which the car mechanism is actuated from the landing door opposite which the car may be, and especially to adapt the landing mechanisms to installation in narrow spaces and to guard against accidental shifting of these mechanisms when not engaged by the door. The invention also comprises an improved construction of car mechanism for rendering the controller inoperative when such car mechanism is actuated by one of the landing mechanisms.

The accompanying drawings illustrate the preferred embodiment of the invention, but it will be apparent to those skilled in the art that numerous other equivalent constructions and modifications may be devised without departing from the essentials of the invention. In the said drawings:

Figure 1 is a fragmentary perspective view looking upward at the bottom of the car;

Fig. 2 is a detail view of a switch;

Fig. 3 is a fragmentary elevation of the face of the shaft at a landing and a landing door, together with the landing mechanism controlled by the door;

Fig. 4 is a similar view, showing the door partly open instead of closed and the mechanism in a corresponding shifted condition;

Fig. 5 is a sectional plan on the line 5-5 of Fig. 3;

Fig. 6 is a side view of parts shown in Figs. 3 and 4, the car contact being shown in full lines instead of in broken lines as in those views;

Fig. 7 is a fragmentary elevation looking at the inside of the landing door, to illus-

trate a form of door locking means; and Fig. 8 is a fragmentary detail view of the means for locking the landing device.

The invention is designed more particularly, though not necessarily exclusively, for application to elevator systems wherein the landing doors are locked against opening movement when in closing they reach a predetermined distance from the edge of the door opening. This distance is too small to permit the passage of a body, and the early locking provision enables the operator to start in safety while the door is completing its closing movement. The present mechanism is adapted to cause the car controller to be locked or otherwise rendered inoperative when the door is open beyond this predetermined distance and to restore control to the operator as soon as the door in closing passes such point. Fig. 7 shows a form of double or successive door locking device, which has been selected for illustration because of its simplicity, numerous other constructions being equally available. In this view the landing door is designated 2, and 3 is a vertical sliding rod thereon for locking and unlocking the door and serving as a handle to open the same. It will be understood that this rod is pushed upward by a usual spring (not shown), to cause its upper end to engage a couple of spaced locking lugs 4 and 5 at the top of the door opening, the lug 5 barring the door against re-opening when it has approached within a safe distance of closing, and the lug 4 serving the same function when the door is closed, the lugs and the upper end of the rod being beveled at one side to permit the rod to latch by the lugs when moving toward the closing position.

The landing mechanism is actuated by a suitable part 6 projecting downward from the door, preferably near the forward edge thereof, and suitably formed to clear the edge of the landing and operate in the gap between the same and the car. The said mechanism comprises a device designated as a whole by the numeral 7, which is adapted to be moved in opposite directions by the door part 6 in the door opening and closing movements, respectively; and an important part of the invention consists in the provision of means for locking such device in each of its shifted positions, as will hereinafter more particularly appear. The construction

of the device and its locking means may be considerably varied. In the particular construction shown, the device includes a rock member 8 in the form of a somewhat elongated plate, having a substantially central, longitudinally disposed slot 9 and a notched, forked or fish-tail formation 12 at its upper end. The said member is mounted for pivotal and also for bodily shifting movement by a screw 10, which is received loosely in said slot and threaded into a supporting plate 11 secured to the face of the shaft. The formation of the upper end of the member and its slotted mounting enables the door part 6, when moving in either direction, to both rock the member and force it downward or endwise.

This sliding movement of the rock member enables it to be unlocked by the action of the door and re-locked through the agency of a spring 13 after completing its rocking movement. In the particular construction illustrated the lower end of the said member is provided with a rearward projection 14, which cooperates with stationary locking means afforded by spaced notches 15 in the lower edge of the supporting plate 7. The inner sides of these notches constitute abutments or shoulders which bar the rock member against return movement after having been rocked in either direction; their outer sides similarly prevent movement of the member beyond predetermined limits. The upper holding portion 16 of the inner sides of the notches are preferably comparatively short and slightly incurved in order better to hold the round projection 14; and the portion of the fixed plate below and between them is beveled or tapered, as shown at 17 to facilitate the engagement and disengagement of the locking provisions. The spring 13 is so arranged as to urge the member 8 at all times upward, in order to seat the projection 14 in one or the other of the notches 15, as the case may be, as soon as permitted by the door part 6. While it is manifest that the spring might be connected directly with the member 8, such an arrangement would introduce certain mechanical difficulties; and to avoid these and in order to secure certain other advantages, a second rock member or guide 18, pivoted at 19 to the supporting plate, and a link 20 connecting the rock members are provided. The link is pivoted to the lower ends of the rock members at 21 and 22, and in the two rock members the lines of centers are approximately parallel. The spring, which is preferably a helical tension spring is secured at one end to the link intermediate the rock members and at the other end to a screw 23 on the supporting plate, and its pull after the members pass dead centers in either direction opposes the return to dead-center or mid-position. Consequently the

spring itself tends to hold the device against displacement, but its main function is to engage the device with its cooperative stationary positive locking means by virtue of the sliding movement of which part of the device is capable through the provision, for example, of the slot 9. The projection 14 constituting one of the locking elements, may be formed by the rearwardly projecting portion of the pivot 21, connecting the member 8 and the link 20.

The landing device which has just been described actuates a landing contact, the latter actuates a contact on the car when the car is opposite the landing, and the car contact in turn actuates mechanism on the car to prevent starting of the same. The landing contact is preferably a roller 24 mounted on the end of the link 20, which extends beyond the rock member 8, though manifestly this contact could be mounted on another part if desired. The car contact is mounted for movement sidewise of the car, and is preferably in the form of a vertically elongated shoe 25. This shoe is fixed to the end of a forwardly projecting member or arm 26, which is pivoted at 27 on a vertical axis beneath the floor of the car and is connected with means for locking the controller 28. The latter is located at one side of the car and has a hand lever 29, fulcrumed at 30 to swing in a vertical plane. The construction of such controllers is well understood, and accordingly the internal mechanism and the provisions whereby the lever controls the circuits for operating the car are not illustrated. When the lever is in mid-position the car is at rest, and cannot be started until the lever is moved in one direction or the other, according as the car is to move upward or downward. The locking means comprises a member 31 disposed transversely of the controller lever at the back of the controller casing, where it is rotatably supported at the ends by brackets 32 secured to the sides of such casing. Spaced locking lugs 33 project from the member, and in the normal or running condition are turned downward out of the plane of action of the lever, but when the member is rocked through approximately a quarter turn are brought upward at opposite sides of the lever, so as to hold the same in mid-position. Naturally, it is not necessary to lock the lever absolutely immovable, it being sufficient merely that it be so confined that it cannot be moved far enough to start the car. The connections between the rocking lock member 31 and the pivoted member 26 beneath the floor of the car comprise a bell-crank 34 fulcrumed beneath the car at the same side as the controller, a push rod 37 extending upward from the horizontal arm thereof and connected to a crank arm 35 on one end of the member 31, and a pull rod 36

connecting the downwardly projecting arm of the bell-crank with the member 26. By these connections, movement of the shoe 25 to the right in Fig. 1 elevates the push rod 37 and thereby swings the lugs 33 into locking relation to the controller lever.

The controller may also be rendered inoperative by breaking a circuit controlling the movement of the car at a point outside the controller. Such a circuit is indicated by the conductors 38, 39, and may be assumed to be the main car circuit, breaking of which renders it impossible to move the car even though the controller lever could be moved. The preferred form of switch comprises an arm 40 pivoted at 41 beneath the car and bearing an insulated contact piece or plate 42, which may be brought against contacts 43 and 44 constituting the terminals of conductors 38 and 39 of the car circuit. These terminals are of a well-known spring-pressed type, not requiring special illustration, so that engagement of the plate 42 with both of them is insured. The same device preferably controls the circuit 45 of the floor light 46. To this end the arm 40 is provided at the opposite side with another insulated contact plate 47, which is adapted to bridge the gap between contacts 48 and 49. The switch is actuated by movement of the car contact, simultaneously with the actuation of the controller lock, this being accomplished in a simple and advantageous manner by the provision of a rearwardly projecting arm 50 on the member 26 and a link 51 connecting this arm with the forward or free end of the switch arm. The arrangement is such that normally, that is to say when the car is running, the switch is in its right-hand position (referring to Fig. 1), so that the contact piece 42 presses against the contacts 43 and 44 of the car circuit, thereby closing the same at this point, while the contact piece 47 is away from the contacts of the lamp circuit, which is consequently open with its lamp extinguished. When the car is brought to rest opposite a landing, and the landing door is opened, thereby causing the landing contact 24 to force the car contact 25 to the right, the car circuit is broken at the switch 40, by the movement of the contact piece 42 away from the contacts 43 and 44, while the lamp circuit is closed by the engagement of the plate 47 with the contacts 48 and 49. Simultaneously, the controller lock is applied. The various connected parts of the car mechanism are preferably restored to normal condition, when the landing contact is retracted, by gravity, though manifestly a spring could be provided for the purpose if desired. Generally, the weight of the push rod 37 will be found sufficient.

The operation will be briefly summarized.

The normal condition of the landing parts is illustrated in Fig. 3. The door is closed and the member 8 is in diagonal position inclined toward the door part 6. The car contact 24 is disposed to one side of the vertical path of travel of the car contact 25, as indicated by dotted lines. The locking means positively holds the landing contact in this position and the member 8 in proper position to be engaged by the door part 6 when the door is opened. The car being brought to rest opposite or approximately opposite the landing, the operator unlocks and slides the door in the opening direction. The rock member 8 being located at a distance from the door part 6 in its normal position, the landing device is not actuated immediately, though manifestly it could be positioned so as to be engaged at once by the door part, if desired. When the door part strikes the fork or notch it forces the rock member bodily in an endwise and downward direction and also rocks it. The bodily movement disengages the device from the locking means, and the rocking movement swings it past mid-position to or toward the position shown in Fig. 4. After passing the center the relation of the door part 6 and the rock member 8 are such that the latter is permitted to rise under the action of the spring 13, so that the device is re-engaged with the locking means but in a different position than before. Meanwhile the rocking movement has caused the landing contact 24 to advance to the left (Fig. 4) against the car contact 25, which it pushes sidewise (to the right in Fig. 1), thus causing the car mechanism to lock the controller and break the car circuit, in the manner before described. As the landing door continues its opening movement, the landing device 7 is held positively locked in the position shown in Fig. 4, so that the car mechanism cannot be released until the door is again moved in the closing direction and so that the proper engagement of the door part 6 with the member 8 is insured. In this movement the said part 6 upon engaging the rocking and sliding member repeats the previous operation, though swinging the member in the reverse direction, thereby returning it to normal position (Fig. 3) where it is re-locked in this position. This rocking movement retracts the landing contact from the operative position of Fig. 4, and permits the car mechanism to return to its normal condition, thus unlocking the controller and closing the break in the car circuit. The landing mechanism is so disposed that when the car mechanism is released in the closing of the door, the latter has reached or approximately reached its first locking position, determined in this instance by the location of the lug 5, so that even though the operator starts his car while

the door is still ajar the door is not left unlocked. When in the appended claims parts are described as being at a landing, it will be understood that a location immediately at or below the landing floor is not necessarily implied, but such location as will bring the parts into operative relation to the car when the latter is at the landing.

The preferred embodiment of the invention has been illustrated and described in detail, but is recognized that numerous changes and modifications may be devised without departing from essentials, and accordingly the invention is not to be limited to the precise construction shown.

What is claimed as new is:

1. An elevator safety system, comprising a downwardly projecting part carried by a landing door, a device on the face of the elevator shaft below the landing floor adapted to be engaged and shifted in opposite directions by said part in the door opening and closing movements, respectively, a spring-actuated means arranged to hold said device in each of its shifted positions, a projection on said device extending inward of the shaft and mechanism on the elevator car having a sidewise movable contact portion adapted for direct mechanical actuation by said projection.

2. In an elevator safety system, the combination with a landing door having a downward projection, and a part mounted to rock about a horizontal axis on the face of the elevator shaft below the landing floor and having a projection into the shaft, of a car having a controller, a member pivoted below the floor of the car and having a portion projecting forward therefrom and carrying a sidewise movable shoe at its forward end arranged to be directly actuated by said projection, and a train of connections extending from said member beneath the floor of the car and thence upward to the controller for locking the same.

3. In an elevator safety system, the combination with a car and suitable mechanism thereon for preventing starting of the same, of a landing door, a part thereon, a device for actuating the car mechanism, said device having a portion in the path of said door part and adapted to be shifted thereby in opposite directions in the door opening and closing movements, respectively, means cooperative with said device positively to bar the same against movement from each of its shifted positions except by the action of the door part, and a spring for effecting engagement of the device with said means.

4. In an elevator safety system, the combination with suitable mechanism on an elevator car for preventing starting of the same, of a suitable part on a landing door, a device for actuating the car mechanism comprising a rock member in the path of

the door part whereby the device is shifted in opposite directions in the door opening and closing movements, respectively, and means whereby the device is automatically and positively locked in each of its shifted positions and unlocked by the action of the door.

5. In an elevator safety system, the combination with suitable mechanism on a car for preventing starting thereof, of a part on a landing door, a landing member for effecting actuation of the car mechanism, said member being rockable in opposite directions by the door part in the door opening and closing movements, respectively, means cooperative with said member to bar the same against rocking movement, and a spring, said member being engageable with and disengageable from said cooperative means by sliding movement under the action of said spring and the door part, respectively.

6. In an elevator safety system, the combination with a car having a controller, mechanism for locking the controller, and a contact on the car for actuating said mechanism, of a landing door, a part thereon, a pivot, a member having a slot engaging said pivot and a forked portion in the path of said door part whereby said member is rockable in opposite directions by the door opening and closing movements, respectively, and also bodily depressible thereby, stationary means cooperative with said member to lock the same in each of its rocked positions, a spring urging said member upward to engage with said stationary means, and a contact connected with said means for actuating the car contact.

7. In an elevator safety system, the combination with suitable mechanism on a car for preventing starting of the same, of a part on a landing door, a rock member having a slotted pivotal mounting and adapted to be shifted bodily by said part and also rocked in opposite directions thereby in the door opening and closing movements, respectively, cooperative locking means from which said member is disengageable by such bodily shifting, a link pivoted to said member, a pivoted guide for said link, a spring connected with said link and arranged to urge said member into engagement with the cooperative locking means in each of its rocked positions, and a landing contact operable by the rock member to actuate the car mechanism.

8. In an elevator safety system, the combination with suitable mechanism on a car for preventing starting of the same, and a car contact for actuating said mechanism; of a part on a landing door; a landing device comprising a rock member having a slotted pivotal mounting and adapted to be shifted bodily by said part and also rocked

in opposite directions thereby in the door opening and closing movements, respectively, a second rock member, and a link connecting said rock members; stationary means from which a part of said device is disengageable by such bodily shifting movement; a spring operative to effect locking engagement of the device with said means; and a contact adapted to be moved by said device relatively to the car contact.

9. In an elevator safety system, the combination with suitable mechanism on a car for preventing starting of the same, and a car contact for actuating said mechanism; of a part on a landing door; a landing device comprising a rock member having a slotted pivotal mounting and provided at its upper end with a notched formation whereby said member is bodily shiftable by said member and also rockable thereby in opposite directions in the door opening and closing movement, respectively, a bar pivoted to said rock member and a guide for the bar; stationary means from which a part of said device is disengageable by said bodily shifting movement; a spring operative to effect locking engagement of the device with said means when rocked to each side, and a projection on a part of said device for actuating the car contact.

10. In an elevator safety system, the combination with suitable mechanism on a car for preventing starting of the same, and a car contact for actuating said mechanism, of a part on a landing door; a landing device comprising a rock member having a slotted pivotal mounting and provided at its upper end with a notched formation whereby said member is bodily shiftable by the door part and also rockable thereby in opposite directions in the door opening and closing movements, respectively, a second rock member, and a link pivotally connecting said rock members; a projection on a part of said device; a stationary member provided with notches engageable by said projection in each of the rocked positions of the device to bar the same against return movement, said projection being disengageable from said notches by the bodily shifting of the first rock member by the door part; a spring operative to effect locking engagement of said projection with said notches; and a contact adapted to be moved by said device to actuate the car contact.

11. In an elevator safety system, the combination with an elevator car, the mechanism thereon to prevent starting of the same, of a landing door, means for locking the same against opening movement in two positions, a projection on the door, a rock member positioned to be engaged by said projection when the door is approximately in its first locking position, said member being constructed so as to be rocked in opposite di-

rections by said projection in the door opening and closing movements, respectively, stationary locking means with which said member is engageable and disengageable by sliding movement in its two rocked positions under the action of a spring and of the door projection, respectively, the said spring, and a landing contact movable by said member into and out of operative relation to the car mechanism.

12. In an elevator safety system, the combination with an elevator car, mechanism thereon to prevent starting of the car, and a contact connected with said mechanism and movable sidewise of the car, of a landing door, a part thereon, a member rockable in opposite directions by the door part in the door opening and closing movements, respectively, a landing contact connected with said member for actuating the sidewise movable car contact, and means releasable by the action of the door part for automatically and positively locking said member and landing contact in normal and in operative positions.

13. In an elevator safety system, an elevator car having a controller lever, a rod extending upward at one side of the car, means at the upper end of said rod for locking the controller lever, a bell-crank connected to the lower end of said rod, a member pivoted on a vertical axis at the bottom of the car, the forward end of said member projecting beyond the front of the car and carrying a sidewise movable contact, and a link extending transversely beneath the car connecting said member and bell-crank, in combination with a cooperative contact at the landing also movable sidewise, and suitable means for actuating said cooperative contact by the landing door.

14. In an elevator safety system, the combination with suitable mechanism on a car for preventing starting of the same, of a device at a landing for actuating the said mechanism, a part on the landing door for actuating said device, the latter being adapted to be shifted in opposite directions by said part on the door-opening and closing movements respectively and also to be depressed by the part, a projection on the device, stationary means affording locking abutments cooperative with said projection in each of its shifted positions and a tapered or beveled portion between said abutments, and a spring acting to engage said projection with said stationary means.

15. In an elevator safety system, a door at a landing provided with a projection, in combination with a controller on the car, a lock for the controller, a device mounted adjacent the landing and comprising a rocking member so arranged in the path of the door projection as to be shifted thereby in opposite directions in the door opening and clos-

ing movements, respectively, a pin on said device projecting into the elevator shaft, means for compelling the said device to complete its movement, and mechanical connections on the car for operating the controller lock including a sidewise movable contact in the path of said pin.

16. In an elevator, the combination with a landing door and an operating projection thereon, a rocking device arranged so as to be shifted in opposite directions by said projection on the door opening and closing movements, respectively, said device being located so as to be spaced at a predetermined distance from the door projection in the direction of the door opening movement when the door is closed, means for preventing improper opening of the door when the latter in closing is within such distance of closed position, a controller on the car, a lock for the controller, and a train of mechanical

connections for operating said lock and being themselves constructed and arranged for direct mechanical actuation by said device.

17. An elevator safety system, comprising a lug carried by a landing door, a rocking plate mounted on the elevator shaft and adapted to be shifted by said lug in opposite directions on the door-opening and closing movements respectively, said plate also having a movement of translation, means for locking said plate in each of its shifted positions, and mechanism on the car actuated by said plate to prevent starting of the car while the landing door is open.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

WILLIAM T. DUNFORD.

Witnesses:

EDWARD P. HOPKINS,
J. F. BRANDENBURG.