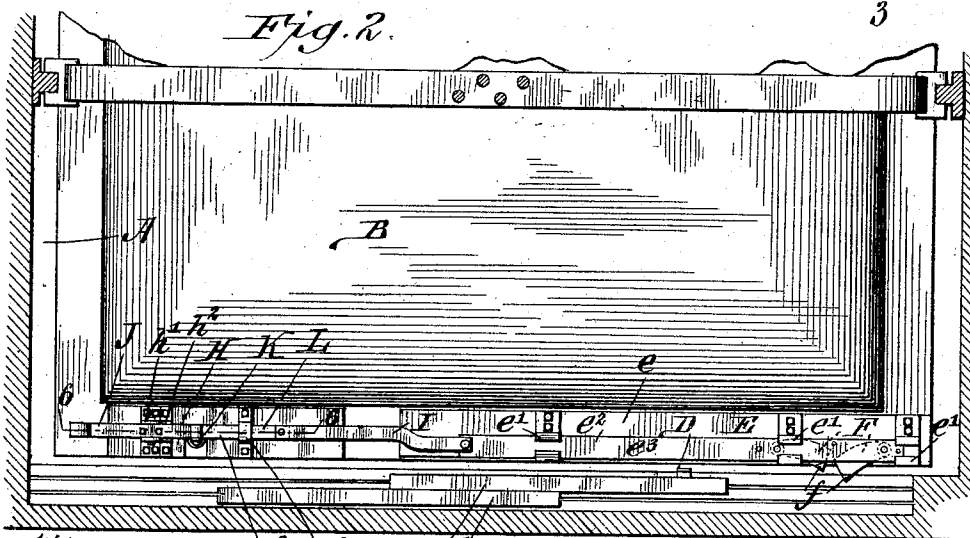
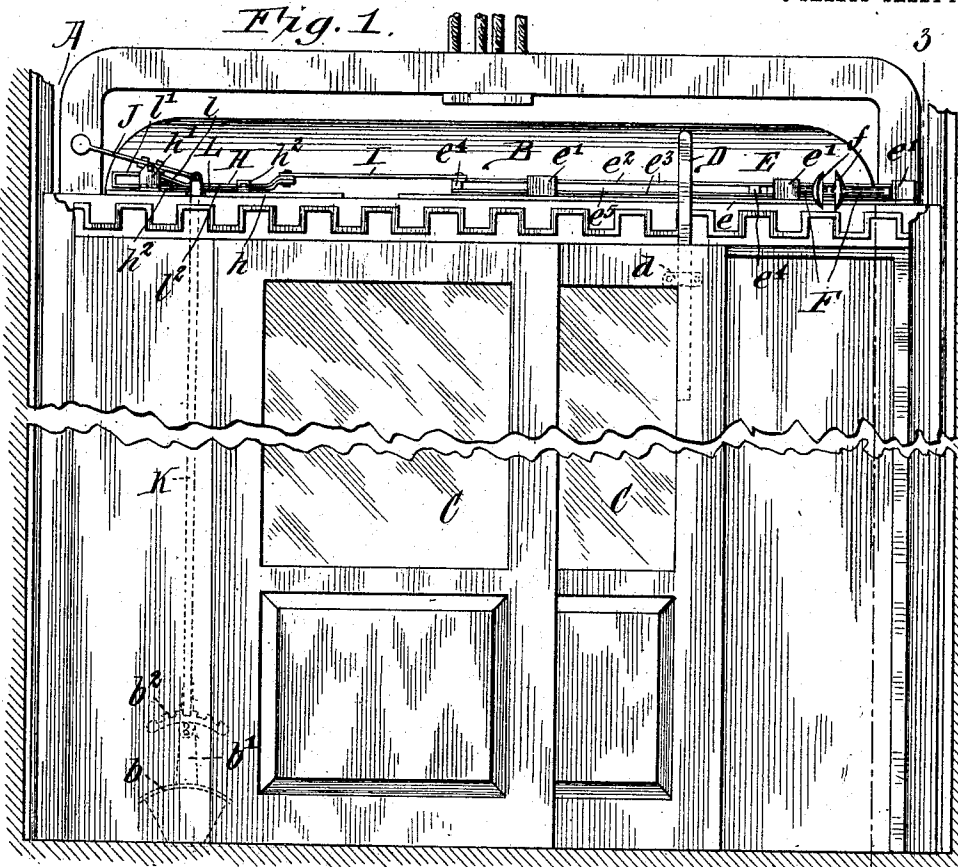


A. W. HENGERER & R. J. KIENDL.
SAFETY DEVICE FOR ELEVATORS.
APPLICATION FILED NOV. 9, 1908.

974,140.

Patented Nov. 1, 1910.

3 SHEETS—SHEET 1.



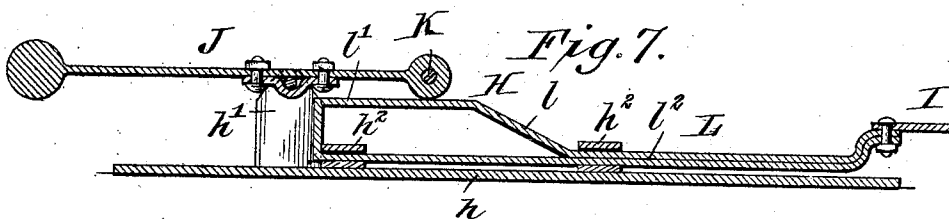
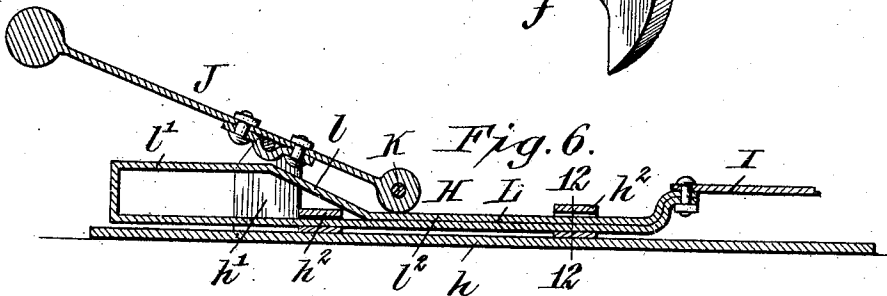
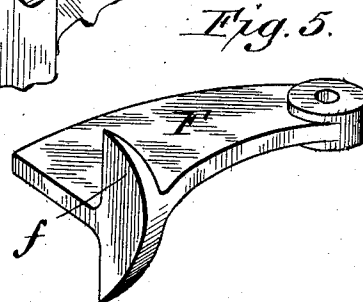
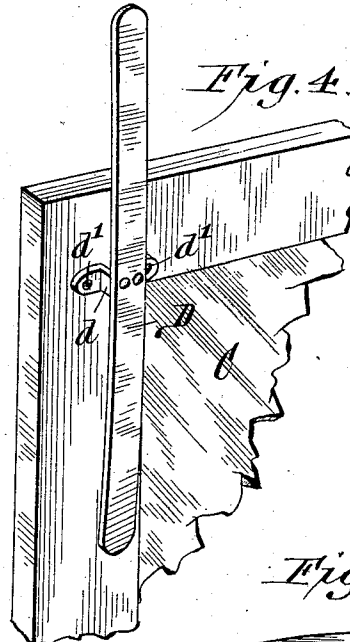
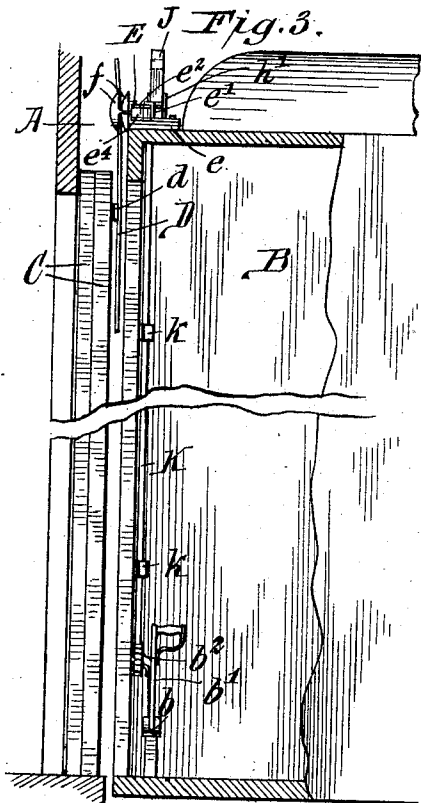
Witnesses;
Harry D. Rapp.
Christ Feinle Jr.

Augustus W. Hengerer
Robert J. Kiendl, } Inventors
By Emil Henhart, } Attorneys

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3 SHEETS—SHEET 2.



Witnesses:
Harry D. Rapp.
Christ Feinle Jr.

Augustus W. Hengerer,
Robert J. Kiendl, } Inventors.
By Emil Neubart,
Attorney.

974,140.

3 SHEETS—SHEET 3.

A technical drawing of a mechanical assembly consisting of two horizontal bars joined at a central point. The left bar is divided into four segments labeled from left to right as J , K^1 , L , and F . The right bar is divided into three segments labeled from left to right as K^2 , L , and F . At the center, where the two bars meet, there is a complex joint mechanism. Labels K^1 and K^2 point to circular components on the lower part of the left and right bars respectively. Label L^2 points to a vertical component in the center joint. Label h points to a diagonal component in the center joint.

A schematic diagram of a three-layered structure. The top layer is labeled h^2 and has a thickness H . The middle layer is labeled h and has a thickness L . The bottom layer is labeled l^2 . The layers are shown in cross-section with hatching for the top and bottom layers and a solid line for the middle layer.

A technical drawing of a mechanical assembly, likely a valve or a similar component. The drawing shows a cross-section of the assembly. Labels e^1 , e^2 , and e^3 are positioned above the assembly, while e^4 and e^5 are positioned below it. A label e is located to the right of the assembly. The drawing includes hatching to indicate different materials or sections.

Augustus W. Hengeler, } Inventors,
Robert J. Kiehl, }
By Emil Kuehner
Attorney

UNITED STATES PATENT OFFICE.

AUGUSTUS W. HENGERER AND ROBERT J. KIENDL, OF BUFFALO, NEW YORK.

SAFETY DEVICE FOR ELEVATORS.

974,140.

Specification of Letters Patent.

Patented Nov. 1, 1910.

Application filed November 9, 1908. Serial No. 461,720.

To all whom it may concern:

Be it known that we, AUGUSTUS W. HENGERER and ROBERT J. KIENDL, both citizens of the United States, and residents of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Safety Devices for Elevators, of which the following is a specification.

10 This invention relates to safety-devices for elevators, and more particularly to a device to prevent the operation of the elevator-car when a door in the inclosure of the elevator-shaft is open; also to a device of this character in which the locking-element is normally held in locked position and in which said locking-element is moved into unlocking position as the door within the inclosure of the elevator-shaft approaches the end of its closing movement, or as the door reaches the end of its closing movement, as may be desired.

15 The primary object of our invention is the production of a simple and inexpensive device of the character referred to, in which the various elements act in a positive manner to effectively lock the controlling-mechanism of the elevator-car against movement until the door of the elevator-shaft inclosure is closed.

20 It also has for its object the employment of a single trip-device on the door of the elevator which is adapted to engage coöperating trip-mechanism during both the forward and rearward movement of the door.

25 Other objects are to provide positive lock actuating-mechanism in operative connection with the trip-mechanism; and to otherwise improve on devices of this character now in use.

30 With these and other objects in view to appear hereinafter, the invention consists in the arrangement and combination of devices, and in the construction, arrangement and combination of parts to be hereinafter described and particularly pointed out in the appended claims.

35 In the drawings,—Figure 1 is a broken front elevation of an elevator-car within an elevator-shaft showing the doors of the shaft inclosure partly open. Fig. 2 is a plan view of a portion of the elevator-car and of the sliding-doors of the elevator-shaft. Fig. 3 is a vertical section taken on line 3—3, Fig.

4 Fig. 4 is a perspective view of that portion of the sliding-door having the trip-device attached thereto. Fig. 5 is an enlarged detached perspective view of one of the trip-dogs adapted to be engaged by the trip-device on the sliding-door. Fig. 6 is an enlarged section through the lock actuating-mechanism taken on line 6—6, Fig. 2; the parts being in positions which they assume when the controlling-mechanism of the elevator-car is locked. Fig. 7 is a similar view showing the parts in the positions they assume when the locking-element is disengaged from the controlling-mechanism. Fig. 8 is an enlarged plan view of the lock actuating-mechanism. Fig. 9 is an enlarged broken plan view of the trip-mechanism. Fig. 10 is a broken front elevation of the same. Fig. 11 is a horizontal section taken on line 11—11, Fig. 10. Fig. 12 is a transverse section taken on line 12—12, Fig. 6. Fig. 13 is a transverse section taken on line 13—13, Fig. 9. Fig. 14 is a transverse section taken on line 14—14, Fig. 9.

Referring now to the drawings in detail, like letters of reference refer to like parts in the several figures.

The reference letter A designates the elevator-shaft within which the elevator-car B is adapted to travel; *b* representing controlling-mechanism within the car whereby the operation of the elevator-car is controlled, said controlling-mechanism being shown as including an operating-lever *b*¹ having a toothed segment *b*².

The particular form of controlling-mechanism herein shown is not essential to the proper working of our improved safety-device, it being merely shown as a representative construction, which may have substituted therefor any other form of controlling-mechanism. In the particular form shown, the operating-lever *b*² assumes a vertical position when the car is at rest, and when in this position, the locking-element of our safety-device is adapted to lock into the toothed-segment *b*².

C designates sliding-doors which serve to open or close the various entrances located on the different floors of the elevator-shaft and also to govern the locking of the controlling-mechanism within the elevator-car. Although a double sliding-door is shown, a single door may be used if desired. For this

purpose a trip-bar D is secured to the inner side of the door and extends a considerable distance above the upper edge of the door and preferably a distance below said edge; said trip-bar being secured to a bracket d affixed to the door, as at d^1 , and the ends of said bar are preferably curved outward or toward the door so that projecting portions of the elevator-car will not strike the ends of the bar during the travels of said car within the elevator-shaft.

At the top of the elevator-car, trip-mechanism E is arranged which comprises a securing-plate e to which are secured guides e^1 serving to retain and guide a shifting-member e^2 , preferably formed of two bars e^3 connected by spacing-blocks e^4 which provide an intervening-space e^5 . Within said intervening space, oppositely-disposed trip-dogs F are pivotally held; each dog having at its outer end a vertically-disposed crescent-shaped portion f which is adapted to be engaged by the trip-bar on the door, either during its closing or opening movement. Said dogs are independently movable on their pivots and normally held in projected position by a spring G which bears against the inner edges of said dogs and is secured to a block G^1 fastened between the bars e^3 of the shifting-member. Said shifting-member is so positioned that the trip-dogs lie between two of the guides e^1 , and when shifted rearward by the trip-bar on the door coming in contact with the rearmost trip-dog, the outer edge of said dog is moved into contact with the forward edge of the adjacent guide, which causes said dog to be forced inward against the action of the spring G. During this action, the forward trip-dog moves out of engagement with its cooperating guide and swings into projected position by reason of the spring G exerting its pressure against the rear edge thereof. Therefore, when the door is moved into closed position it engages the projected front dog and causes the shifting-bar to be moved forward and said dog to be moved into engagement with the rear edge of its cooperating-guide, whereupon it is caused to swing inward against the action of the spring G while the rear dog moves free of its cooperating guide and is forced into projected position to be engaged by the trip-bar on the door when opening said door. By arranging the trip-dogs in opposition to each other and so that one is in projected position in the path of the trip-bar on the door while the other is moved inward out of the path of said bar, the shifting-member is compelled to move with the door, and by reason of such cooperating action, it is utilized to control the actuation of the locking-device. The trip-bar is of considerable length so that it will actuate the shifting-member irrespective of the exact position

of the floor of the car with respect to the floor of the building it is intended to stop at. The floor of the elevator car can therefore be some distance below or above a floor of a building, yet the trip-bar will be in position to engage the trip-dogs and cause actuation of the shifting-member.

H designates lock actuating-mechanism which is connected with the shifting-member by means of a link I. Said lock actuating-mechanism is mounted on a plate h secured to the top of the elevator-car. Rising from said plate are two standards h^1 between which a weighted lever J is pivoted. Connected to one end of said lever is a lock-rod K which passes through an opening in the top of the elevator-car and extends down to the toothed segment on the controlling-lever of the controlling-mechanism within the elevator-car, said lock-rod being slidable in guides h secured to the wall of the elevator-car, as clearly shown in Fig. 3. The weight of the lever is at the opposite end and serves to aid in overcoming the weight of the lock-rod; said lever being normally drawn into the position shown in Fig. 6 by the weight of said rod.

Slidable on the plate h is an actuating-member L which is guided between the standards h^1 and clips h^2 . Said actuating-member has an inclined portion l connecting an elevated portion l^1 with a depressed portion l^2 ; said inclined portion serving to elevate the forward end of lever J when said actuating-member is drawn forward; the front end of said member having the link I pivotally attached thereto.

When the lock-rod K is in engagement with the toothed-segment of the controlling-mechanism, the parts of the lock actuating-mechanism are in the positions shown in Fig. 6; the actuating-member L having been moved into the position shown by the shifting-member e^2 which is forced rearward upon opening the door. When the door is moved into closed position, the trip-bar thereon will come into engagement with the trip-mechanism E and move the shifting-member thereof forward, which in turn will draw the actuating-member L of the lock actuating-mechanism forward with it, causing the inclined portion l of said member to engage the front end of the lever J and elevate said end, and by reason of the lock-rod K being attached to said front end, its lower extremity is drawn out of engagement with the toothed segment of the controlling-mechanism so that the latter may be actuated to operate the car. The forward end of lever J is held in elevated position by the elevated portion l^1 of the actuating-member L.

Having thus described our invention, what we claim is,—

1. In an elevator, the combination with an elevator-shaft having a door-opening, and a

door for closing said door-opening, of an elevator car equipped with controlling-mechanism to control the operation thereof, co-operating-means on the door and the elevator-car including two independently-pivoted spring-controlled trip-dogs on one part of said coöperating means, and locking-mechanism actuated by said coöperating means and adapted to lock said controlling-mechanism when the door of the elevator-shaft is open.

2. In an elevator, the combination with an elevator-shaft having a door-opening and a door for closing said opening, of an elevator-car equipped with controlling-mechanism to control the operation thereof, means coöperating with said controlling-mechanism embodying opposed independently movable trip-dogs, and a trip-device adapted to engage said trip-dogs for causing actuation of said means.

3. In an elevator, the combination with an elevator-shaft having a door-opening, and a door for closing said door-opening, of an elevator-car equipped with controlling-mechanism to control the operation thereof, locking-mechanism adapted to lock said controlling-mechanism against actuation, a trip-device on the door of the elevator-shaft, and mechanism for actuating said locking-mechanism including two opposed independently-pivoted spring-controlled trip-dogs adapted to be engaged by said trip-device.

4. In an elevator, the combination with an elevator-shaft having a door-opening, and a door for closing said door-opening, of an elevator-car equipped with controlling-mechanism to control the operation thereof, locking-means to prevent the operation of said controlling-mechanism, a trip-device on said door, and a shifting-device including two opposed independently-movable trip-dogs adapted to be engaged by said trip-device, said shifting-device being interposed between said locking-mechanism and said trip-device.

5. In an elevator, the combination with an elevator-shaft having a door-opening, and a door for closing said door-opening, of an elevator-car equipped with controlling-mechanism to control the operation thereof, locking-mechanism adapted to coöperate with said controlling-mechanism, a shifting-bar on said car, actuating-mechanism operatively connected with said shifting-bar and having connection with said locking-mechanism, a trip-device secured on the door, and two oppositely disposed spring-controlled trip-dogs independently-movable on said shifting-bar and adapted to act as a means of co-operation between said shifting-bar and said trip-device.

6. In an elevator, the combination with an elevator-shaft having a door-opening, and a door for closing said door-opening, of an

elevator-car equipped with controlling-mechanism to control the operation thereof, locking-mechanism to prevent the operation of said controlling-mechanism, a trip-device on said door, a shifting-bar slidable on the car, two oppositely disposed spring-controlled trip-dogs on said shifting-bar adapted to be engaged by said trip-device, an actuating-device operatively connected with said locking-mechanism and adapted to cause the latter to be engaged with and disengaged from said controlling-mechanism, and a link connecting said actuating-device with said shifting-bar.

7. In an elevator, the combination with an elevator-shaft having a door-opening, and a door for closing said door-opening, of an elevator-car equipped with controlling-mechanism to control the operation thereof, a lock-rod for locking said controlling-mechanism, actuating-mechanism operatively connected with said lock-rod, tripping-mechanism carried partly on the door and partly on the car and including two oppositely disposed independently-pivoted trip-dogs, and means of connection between said tripping-mechanism and said actuating-mechanism.

8. In an elevator, the combination with an elevator-shaft having a door-opening, and a door for closing said door-opening, of an elevator-car equipped with controlling-mechanism to control the operation thereof, a vertically disposed trip-bar secured to said door, a horizontally disposed shifting-bar on said elevator-car, two oppositely disposed spring-controlled trip-dogs pivoted to said shifting-bar, one of said dogs being in projected position and adapted to be engaged by said trip-bar while the other is drawn inward, and mechanism interposed between said shifting-bar and said lock-rod and adapted to cause actuation of the latter.

9. In an elevator, the combination with an elevator-shaft, a door in said shaft, and an elevator-car equipped with controlling-mechanism to control the operation thereof, of a lock-rod vertically movable and adapted to lock said controlling-mechanism against movement, an actuating-device comprising a swinging-lever to one end of which said lock-rod is secured, a sliding actuating-member having an inclined portion adapted to actuate said lever, a link secured to said actuating-member, a shifting-bar secured to said link, and a trip-device on the door adapted to actuate said shifting-bar.

10. In an elevator, the combination with an elevator-shaft, a door in said shaft, and an elevator-car equipped with controlling-mechanism to control the operation thereof, of a lock-rod adapted to engage said controlling-mechanism and lock the same against actuation, a swinging-lever to one end of which said lock-rod is secured, a sliding element having an inclined surface

adapted to cooperate with said lever to cause said lock-rod to be unlocked from the controlling-mechanism, and a trip-device on the door adapted to cause actuation of said sliding element.

11. In an elevator, the combination with an elevator-shaft, a door in said shaft, and an elevator-car equipped with controlling-mechanism to control the operation thereof, of a lock-rod adapted to lock said controlling-mechanism against operation, a sliding element guided on the elevator-car and having an inclined portion, a lever pivoted between its ends and having said lock-rod attached to one of its ends and its other end provided with a weight, said lever being adapted to be actuated by said sliding element, and a trip-device on the door adapted to cause actuation of said sliding element.

12. In an elevator, the combination with an elevator-shaft, a door in said shaft, and an elevator-car equipped with controlling-mechanism to control the operation thereof, of a shifting-bar on said elevator-car, guides secured to said car in which said shifting-bar is guided, oppositely disposed spring-controlled dogs carried on said shifting-bar, and adapted to be successively moved into depressed position by said guides, means on the door of the elevator-shaft for engaging one of said dogs when closing said door and for engaging the other of said dogs when opening said door, and mechanism interposed between said shifting-bar and the controlling-mechanism of the elevator-car for locking the latter against operation.

13. In an elevator, the combination with an elevator-shaft, a door in said shaft, and an elevator-car equipped with controlling-mechanism to control the operation thereof, of a shifting-bar slidable on said elevator-car, oppositely disposed spring-controlled trip-dogs pivotally secured to said shifting-bar, means for holding one of said trip-dogs in depressed position while the other is in projected position, locking-mechanism operatively connected with said shifting-bar and adapted to lock said controlling-mechanism against actuation, and a trip-device on said door to successively engage said trip-dogs.

14. In an elevator, the combination with an elevator-shaft, a door in said shaft, and an elevator-car equipped with controlling-mechanism to control the operation thereof, of a shifting-bar slidable on said elevator-car, opposed spring-controlled trip-dogs pivotally secured to said shifting-bar, a trip-device on the door adapted to successively engage said trip-dogs to reciprocate said shifting-bar, means for causing one of said dogs to be depressed when said shifting-bar is moved in one direction and for causing the other trip-dog to be depressed when moving said shifting-bar in the opposite direction,

and locking-mechanism adapted to lock said controlling-mechanism against actuation and being operatively connected with said shifting-bar.

15. In an elevator, the combination with an elevator-shaft, a door in said shaft, and an elevator-car equipped with controlling-mechanism to control the operation thereof, of a shifting-bar reciprocal on said elevator-car, opposed spring-controlled trip-dogs pivotally secured to said shifting-bar and having vertically disposed crescent-shaped extensions at their outer ends and being successively moved into projected position upon actuation of said bar, a trip-device on said door adapted to successively engage said trip-dogs, and locking-mechanism to lock said controlling-mechanism against actuation and being operatively connected with said shifting-bar.

16. In an elevator, the combination with an elevator-shaft, a door in said shaft, and an elevator-car equipped with controlling-mechanism to control the operation thereof, of a vertically disposed trip-bar secured to said door, a horizontally movable shifting-bar secured to said car, independently-pivoted trip-elements projecting from said shifting-bar and adapted for cooperation successively with said trip-bar, and locking-mechanism for locking said controlling-mechanism against actuation and being operatively connected with said shifting-bar.

17. In an elevator, the combination with an elevator-shaft, a door in said shaft, and an elevator-car equipped with controlling-mechanism to control the operation thereof, of a shifting-device slidable on said elevator-car and comprising two bars separated by an intervening space and connected by spacing-blocks, oppositely disposed trip-dogs held pivotally between said bars and spring-controlled to normally hold the same in projected position, guides in which said shifting-device is normally held and which cooperate with said dogs to successively depress the same when said shifting-device is actuated, a trip-device on said door adapted to successively engage said dogs upon opening and closing said door and thereby causing actuation of said shifting-device, and locking-mechanism adapted to lock said controlling-mechanism against actuation and being operatively connected with said shifting-device.

18. In an elevator, the combination with an elevator-shaft, a door in said shaft, and an elevator-car equipped with controlling-mechanism to control the operation thereof, of a shifting-device on the car, oppositely disposed spring-controlled trip-dogs normally arranged so that one of said dogs is held in projected position while the other is depressed, a trip-device on said door adapt-

ed to successively engage said dogs, means for depressing the trip-dog engaged by said shifting-device to release the latter when said shifting-device is moved a certain distance, and locking-mechanism operatively connected with said shifting-device and adapted to lock said controlling-mechanism against actuation.

19. In an elevator, the combination with an elevator-shaft, a door in said shaft, and an elevator-car equipped with controlling-mechanism to control the operation thereof, of a horizontally disposed shifting-bar on said elevator-car, opposed spring-controlled trip-dogs pivotally secured to said shifting-bar, a pair of guides between which said trip-dogs are located, said guides acting to successively depress said dogs when said shifting-bar is actuated, a vertically disposed trip-bar on said door adapted to successively engage said trip-dogs, and a locking-device operatively connected with said shifting-bar and adapted to lock said controlling-mechanism against actuation.

20. An elevator-car movable in an elevator-shaft, doors at various floors in said elevator-shaft, controlling-mechanism to control the operation of said elevator-car, a lock-rod vertically-disposed engaging said controlling-mechanism, a swinging-lever pivotally secured to one end of said lock-rod, a sliding-member having an inclined portion thereon adapted to operate said lever for engaging or disengaging said lock-rod, and

means on said doors to actuate said sliding-member.

21. An elevator-car movable in an elevator-shaft, doors at various floors in said elevator-shaft, controlling-mechanism to control the operation of said elevator-car, a lock-rod vertically disposed engaging said controlling-mechanism, a weighted swinging-lever pivotally secured to one end of said lock-rod, a sliding-member having an inclined portion thereon, a link secured to said sliding-member, and a shifting-device connected to said link and adapted to be actuated by said doors.

22. An elevator-car movable in an elevator-shaft, doors at various floors in said elevator-shaft, controlling-mechanism to control the operation of said elevator-car, a lock-rod vertically disposed engaging said controlling-mechanism, a swinging lever having a weight at its free end and being pivotally secured to one end of said lock-rod, a sliding-member, a link secured to said sliding-member, a shifting-bar secured to said link, and a trip-device on each of said doors adapted to actuate said shifting-bar.

In testimony whereof, we have affixed our signatures in the presence of two subscribing witnesses.

AUGUSTUS W. HENGERER.

ROBERT J. KIENDL.

Witnesses:

ELLA C. PLUECKHAHN,

EMIL NEUHART.