F. A. BOEDTCHER.

COMBINED LOCKING AND CIRCUIT CONTROLLING DEVICE FOR DOUBLE DOORS.

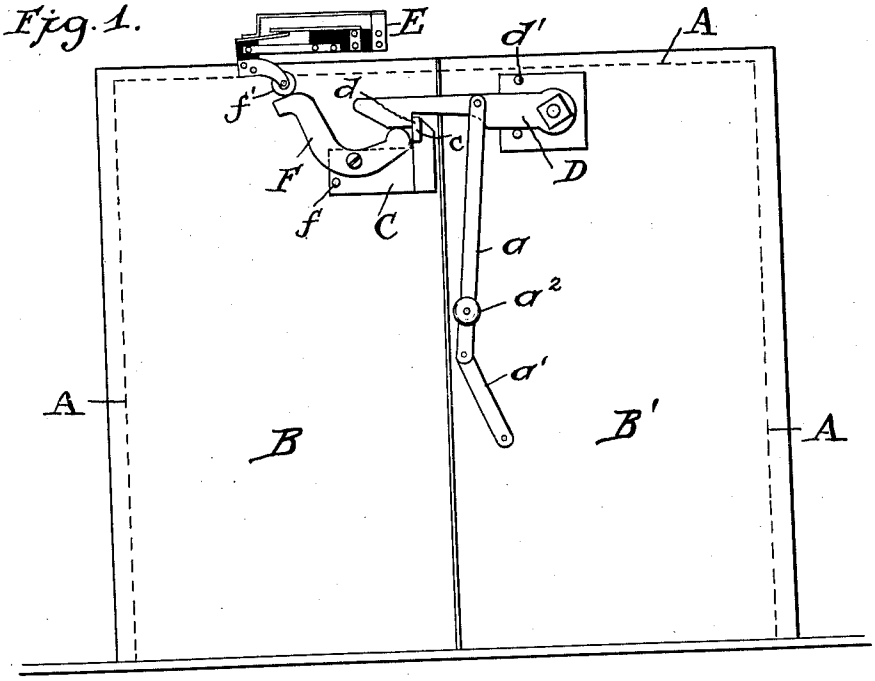
APPLICATION FILED OCT. 14, 1916.

1,346,111.

Patented July 13, 1920.

2 SHEETS—SHEET 1.

Fig. 1.



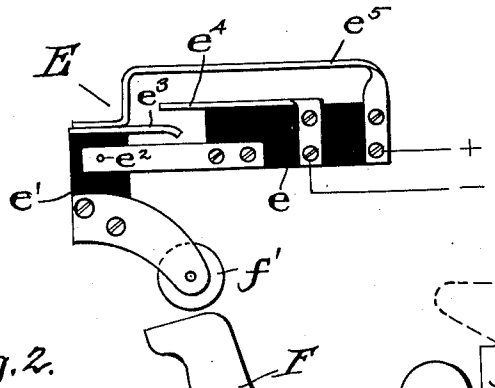
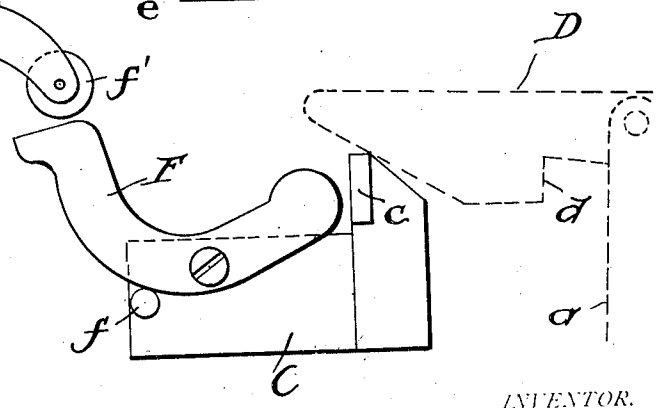


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

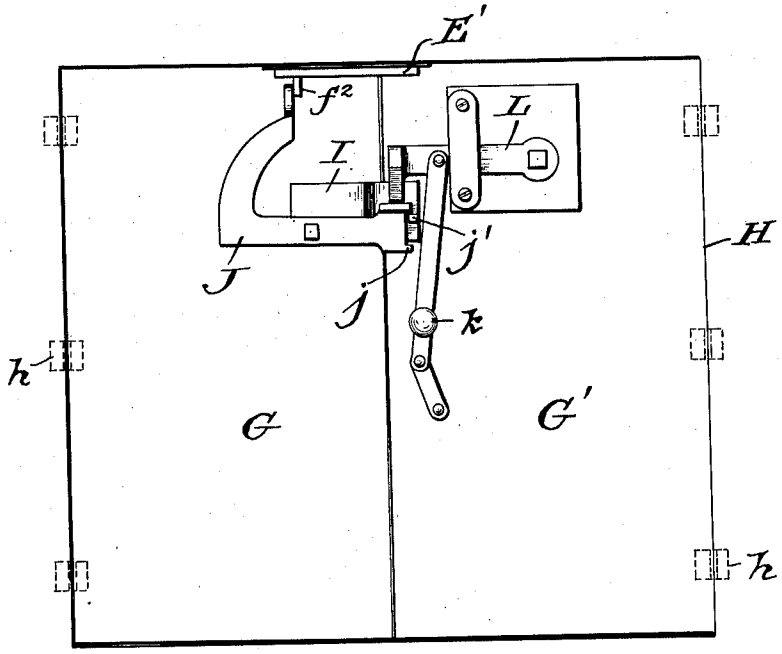
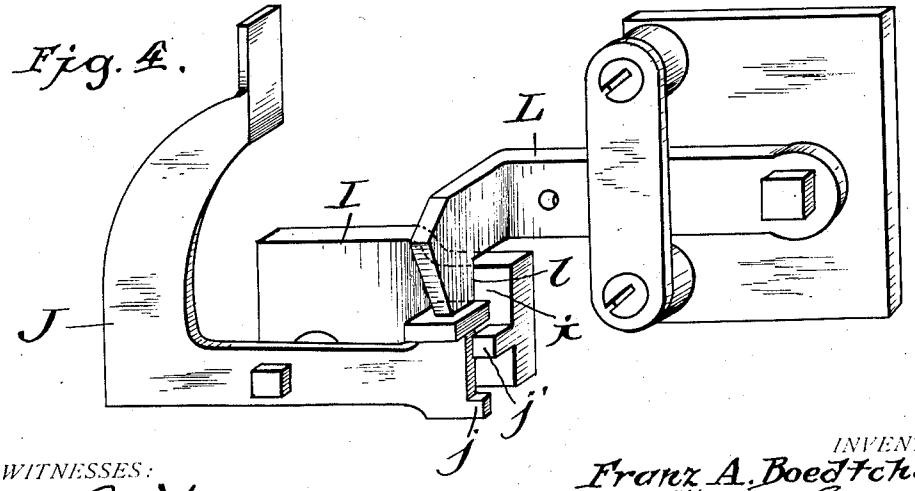


Fig. 4.



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COMBINED LOCKING AND CIRCUIT-CONTROLLING DEVICE FOR DOUBLE DOORS.

1,346,111. Specification of Letters Patent. Patented July 13, 1920.

Application filed October 14, 1916. Serial No. 125,757.

To all whom it may concern:

Be it known that I, FRANZ A. BOEDTCHER, a citizen of the United States, residing at Bergenfield, county of Bergen, and State of New Jersey, have invented certain new and useful Improvements in Combined Locking and Circuit-Controlling Devices for Double Doors, of which the following is a specification.

This invention is a combined locking and circuit controlling device for double doors and more particularly for elevator car or floor doors.

In elevator installations and particularly of those in loft buildings where the elevator is called upon to carry goods or materials of such size and proportions that a comparatively large exit must be provided it is necessary, because of the particular construction of the elevator, to form the floor doors as well as the car doors in two parts so that they will constitute, in effect, double doors. These double doors may be either of the hinged or sliding type, depending upon the conditions encountered. In either case some mechanism must be provided for locking the doors in their closed positions; moreover, in many cases the electric switch which governs the operations of the elevator car should be dependent for its operation upon the proper closing and locking of said doors so that an elevator cannot leave the floor doors when the elevator gates or floor doors are in open position.

With the foregoing in mind the object of the present invention is to provide means cooperative with both of the double doors and with a switch included in the operating circuit of the elevator so that both doors may be simultaneously locked against opening and the operating circuit simultaneously controlled. The result of such construction is that if either one or both of the doors are not entirely closed they cannot be locked and if not locked the elevator controlling circuit will not be closed and the elevator cannot leave the floor of which said door or doors had been previously opened.

A further object of this invention is the provision of locking means so constituted that the act of opening one of the doors automatically unlocks said door from its companion and immediately upon such unlocking operation the controlling circuit of the elevator is rendered broken so that while the door is unlocked the elevator is inoperative to leave the floor.

Features of the invention other than those specified, as well as the particular advantages thereof, will be apparent from the following specification when read in conjunction with the accompanying drawings.

In the accompanying drawings are illustrated different practical embodiments of the invention but the constructions therein shown are to be understood as illustrative only and not as defining the limits of the invention.

Figure 1 shows a pair of double sliding floor doors as viewed from the interior of an elevator shaft and which doors are shown with a structure embodying one form of the present invention applied thereto.

Fig. 2 shows, on an enlarged scale, the relation between the various elements of the locking and circuit controlling structure shown in Fig. 1. In Fig. 2 the parts are shown as removed from the doors and door frame in the interest of clearness.

Fig. 3, a view similar to that of Fig. 1 but showing the present invention as modified to coöperate with double hinged doors.

Fig. 4 is a perspective view showing the relation between the locking and circuit controlling elements shown in Fig. 3.

Referring to the drawings, and particularly to Figs. 1 and 2, A designates a doorway or opening of any floor of the building which serves as an exit from the floor of the elevator shaft and coöperating with said door-way A is a pair of sliding doors B B′ which are mounted, in any suitable manner (not shown) for sliding movement so that when drawn together they close the doorway but when slid apart they render said door-way open to allow of free passage to or from an elevator which is in rest position at said floor. In installing doors B B′ they may be hung either to operate separately or simultaneously as is desired but this forms no part of the present invention.

Mounted upon door B is a keeper member C while pivotally mounted on door B′ is a latch D. The keeper member C and latch D are preferably mounted near to the adjacent edges of the doors and the nose of the latch D is formed with a shoulder *d* adapted to gravitate into engagement with

the stop c of the keeper member C when both doors are closed and in abutting relation for locking them in said position.

Mounted on door A is a toggle member composed of two links a a'. The links a and a' are pivoted together to form the toggle and one end of link a is pivoted to the latch D while one end of a' is pivoted to the door A. The toggle is so disposed upon the door and latch that when the latch is in its normal locking position with respect to the keeper, the legs a a' of the toggle are out of alinement. If the toggle is, however, actuated so that its legs approach alinement the latch D is lifted on its pivot so that the nose of the latch is moved free from the keeper and either one or both doors may be opened. In the form of the invention illustrated the toggle is provided with a suitable handle or knob a^2 so that when the handle a^2 is grasped to straighten out the toggle the first movement of the toggle would be to elevate the latch. A stop d' is formed on the plate which constitutes the mounting of the latch and, after the latch has been elevated sufficiently to free it from the keeper it comes into engagement with the stop d' which precludes further straightening out the toggle. Thus a continued pull upon the toggle by the operator will cause pivotal movement of the latch. It will thus appear that the unlocking and opening of the door results from one continuous operation by the operator when the toggle form of latch operating device is employed as described.

Mounted upon the casing or "buck" of the door is a switch mechanism E which is included in the elevator controlling circuit. The switch E embodies a block of insulation e to which the actuating arm e' is mounted for pivotal movement on a pivot pin e^2. A shoe e^3 of conductive material is mounted on arm e' and is adapted, by pivotal movement of the arm, to be brought into engagement with a spring contact e^4 and contacts e^3 and e^4, when the elevator doors are open, are normally maintained out of engagement by gravity, the weight of arm e' causing it to swing on its pivot e^2, thereby depressing contact shoe e^3 so as to keep it disengaged from contact e^4. To make this action more positive, a leaf spring e^5 is secured to the insulating block e and reaches out into engagement with the arm e', the downward tension of such leaf spring serving to maintain arm e' in neutral position.

F designates a switch actuating member which is pivotally mounted upon the keeper member C. The switch actuating member F is preferably in the general form of a bell-crank and is so proportioned that when the door B is closed one arm of the bell-crank will extend to operative position relative to the pivoted arm e' of the switch, while the other arm of the bell-crank extends into a position adjacent the retaining stop c of said keeper member. The parts are so associated that when the bell-crank is oscillated in a clockwise direction one arm thereof will engage with the switch arm e' and oscillate said arm to close the circuit between the contacts e^3 and e^4 of the switch. Moreover, as one arm of the bell-crank extends into a position adjacent the stop c of the keeper member, it lies immediately within the downward path of the latch D when said latch is in a position to engage said stop. Thus when the doors are closed and locked, the latch gravitates into engagement with the stop c and in so doing engages with the adjacent end of the bell-crank and oscillates said bell-crank to close the circuit through the switch in the manner shown in Fig. 1. It will be noted from the drawings that the bell-crank F is pivoted nearer one end than the other, the arm extending toward the switch being of greater length than the other arm. Accordingly, when the switch of the latch and its operating toggle are removed from said bell-crank, the bell-crank gravitates back to its normal position shown in Fig. 2 whereupon its switch operating arm releases the arm e of the switch and allows the same to renew its neutral position. A stop f is formed on the keeper member C to limit the counter-clockwise movement of the bell-crank.

It will be manifest from the foregoing description of the mode of operation of the parts enumerated that a particular specified condition must exist in the relationship of the parts before the operating circuit of the elevator can be closed. That is to say, the door B must be closed and locked in order to bring the bell-crank into coöperative relation with the switch arm e' and the door B' must also be closed in order that the latch D may gravitate into engagement with the bell-crank to such degree as to complete the circuit through the contacts e^3 and e^4. Obviously, if the door B is not entirely closed the circuit cannot be completed even though the door B' is closed and, even though both doors are closed, the circuit can not be completed unless they are locked. It thus appears that before an elevator car can leave the floor at which it has previously stopped, the floor doors must be closed and locked since, in the absence of the predetermined relationship between the parts, they cannot coöperate to actuate the switch as described.

It will be noted, moreover, that all of the parts are so formed as to not, in the least, interfere with the prime function of the doors. When the door B is opened the bell-crank is moved away from the arm e' of the switch and when the door is subse-

quently closed it is automatically returned to coöperative juxtaposition therewith. To obviate friction between the bell-crank F and the spring arm e', said arm is preferably provided at its free end with an anti-friction roller f' which is free to rotate during the operation of the switch from said bell-crank.

An important desideratum inherent in the construction described is that all of the parts thereof are gravity actuated so that the necessity of employing springs which become weak through use is obviated. The construction is thus entirely positive in its operations and there are no parts which are apt to become broken or distorted.

In the modified form of the construction shown in Figs. 3 and 4 the doors G G′ are illustrated as hinged within the doorway H and are of the type adapted to be swung inwardly on hinges h. On the door G is mounted a keeper member I corresponding to the keeper member C and said keeper member I is provided with a stop i corresponding to the stop c. A bell-crank J, corresponding to the bell-crank F, is pivoted on the keeper member I and one arm of said bell-crank extends into coöperative relation with a projection f^2 forming part of a switch E′ similar in its essential particulars to the switch E. A projection j is formed on the bell-crank which projection coöperates with a lug j' formed on the keeper member to limit the pivotal movement of the bell-crank J to its inactive position.

Mounted on the door G′ is a gravity latch L which is actuated by any suitable means such as a toggle k.

In order to lock the door G′ against pivotal movement relative to the door G the latch is bent so that its nose extends at right angles to the face of the door as shown in Fig. 4 and said latch is provided with a shoulder l adapted to engage with the stop i of the keeper in substantially the same manner as in the preferred form of the invention as shown in Figs. 1 and 2. The latch L, in engaging with the keeper member I, simultaneously engages with the bell-crank J and thus controls the switch. When it is desired to open the door G′ the toggle k is actuated to elevate the latch and disengage its nose from the keeper member, and the bell-crank J is weighted so that when the latch is raised the bell-crank releases the switch and allows it to assume an open condition, as will be readily understood.

It will be noted that in Fig. 3 the switch E′ is shown as positioned on the underside of the doorway and in a substantially horizontal position whereas in Fig. 1 it is shown as mounted on the wall adjacent to the doorway and in a substantially vertical position. This change of position however is a matter of installation and it will be understood that, if desired, the switch E′ might be in a vertical position or the switch E might be in a horizontal position, the only difference in structure being a slightly different shaping of the pivotal switch arm. The salient feature is that the switch be provided with a pivotal arm adapted to be oscillated by the pivotally mounted spring actuating members F and J.

In the hereinbefore description the invention has been explained in conjunction with this application to floor doors of an elevator shaft. It will be understood, however, that the invention may be also applied to elevator gates or doors such as are mounted on an elevator car.

In the foregoing description, the invention has been explained as adapted more particularly to hinged doors which pivot on a vertical axis, and sliding doors which slide laterally. It will be understood, however, that the invention is also equally well adapted for use on hinged doors which are pivoted on horizontal axes, or vertically slidable, as all of these various types of doors are used in elevator installations, either on the elevator car or at the shaft openings at the floors. The present invention is, therefore, to be understood as not limited to use with my particular style of elevator door, since it is adapted to operate with great efficiency with any of the several well known types.

Having thus fully described the invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In a device of the class described, the combination of a door casing provided with double doors, a pivoted member mounted on one door, a switch mounted on the door casing and having an actuating member projecting into the path of oscillation of the pivoted member, said pivoted member being weighted to normally swing free from engagement with the switch actuating member, a pivoted latch mounted on the other door, means for normally depressing said latch, said latch being so disposed that, when depressed, with the doors in closed abutting relation, the weight of said latch is imposed upon the pivoted member for the purpose of oscillating the same into such position as to operate the switch actuating member to close the circuit through the switch, and a keeper positioned adjacent the pivoted member and adapted to engage with the latch for the purpose of locking the doors in closed abutting position.

2. In a device of the class described, the combination of a door casing provided with double doors, a pivoted member mounted on one door, a switch mounted on the door casing and having an actuating member projecting into the path of oscillation of the

pivoted member, said pivoted member being weighted to normally swing free from engagement with the switch actuated member, a pivoted gravity actuated locking member mounted on the other door, said locking member being so disposed that when depressed, with the doors in closed abutting relation, the weight of said locking member will be imposed upon the pivoted member for the purpose of oscillating the same into such position as to operate the switch actuating member to close the circuit through the switch, and a keeper positioned adjacent the pivoted member and adapted to engage with the locking member for the purpose of locking the doors in closed abutting position, said pivoted member gravitating into a position to allow of the breaking of the circuit through the switch when the locking member is elevated to unlock the door.

3. In a device of the class described, the combination of a door casing provided with a double door, an electric circuit controlling switch mounted on the door casing, a pivoted and gravity controlled member located on one door with an upwardly extending portion adapted to close said switch, a locking member mounted on one door, a keeper for said locking member mounted on the other door, said keeper being so arranged and disposed that when the door is locked the pressure of the locking member on the pivoted member causes the pivoted member to close the switch and the pivoted member being so arranged and disposed that it will close the switch at no other time.

In testimony whereof I have signed my name to this specification.

FRANZ A. BOEDTCHER.