Dec. 21, 1926. 1,611,249

M. E. SMITH ET AL

COMBINED LOCK AND SWITCH FOR ELEVATOR DOORS

Filed March 19, 1924 2 Sheets-Sheet 1

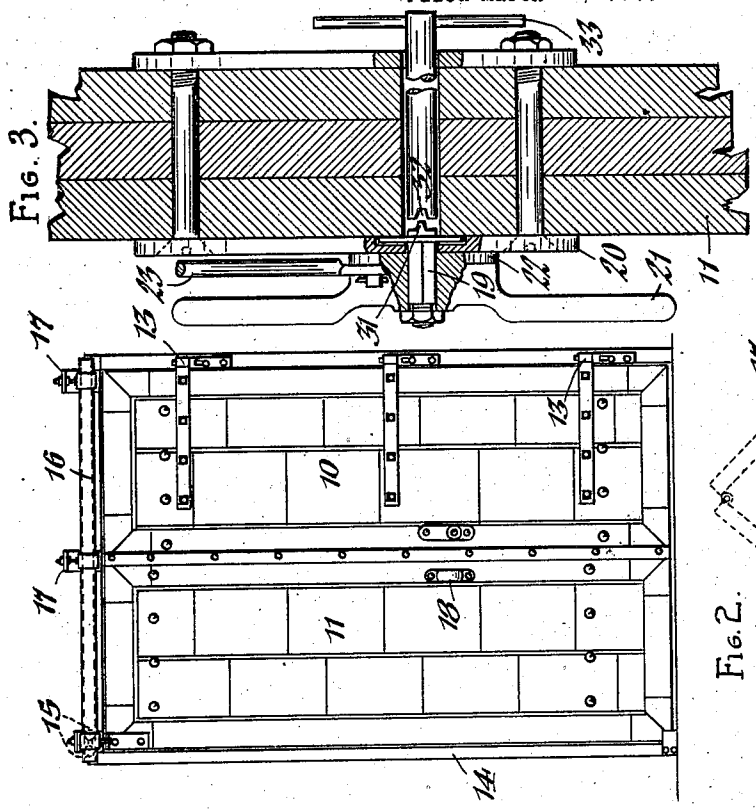


Fig. 3.

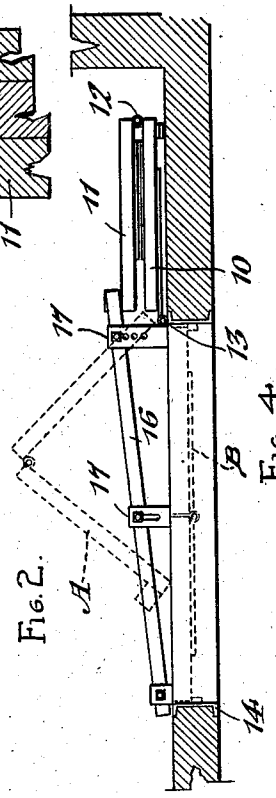


Fig. 4.

Fig. 2.

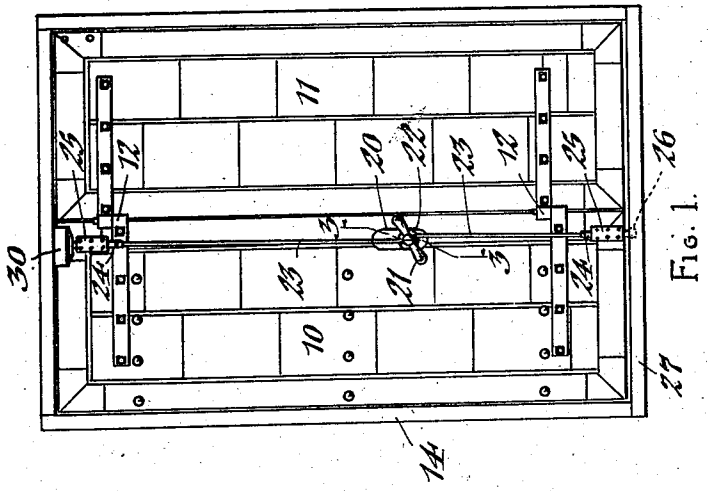


Fig. 1.

INVENTORS,
Merritt E. Smith,
Luther Ringer
by Geyer & Geyer
ATTYS.

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COMBINED LOCK AND SWITCH FOR ELEVATOR DOORS

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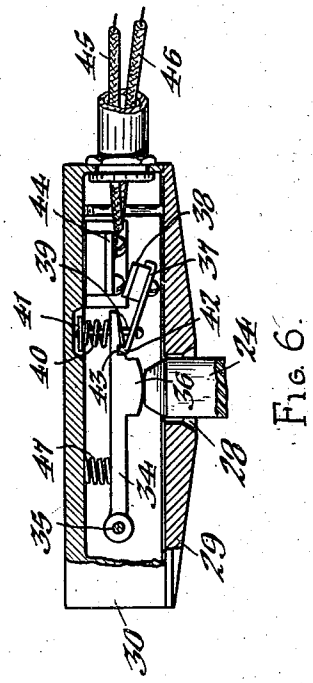


FIG. 6.

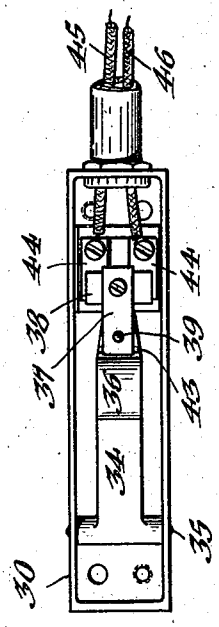


FIG. 7.

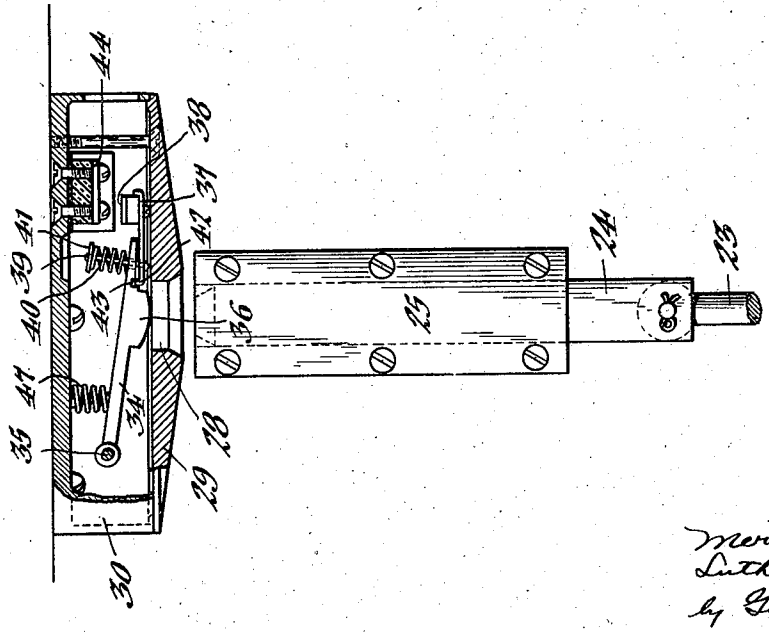


FIG. 5.

INVENTORS,
Merritt E. Smith,
Luther Ringer
by Geyer & Geyer
ATTYS.

Patented Dec. 21, 1926. 1,611,249

UNITED STATES PATENT OFFICE.

MERRITT E. SMITH AND LUTHER RINGER, OF BUFFALO, NEW YORK, ASSIGNORS TO SMITH ELEVATOR CO. INC., OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

COMBINED LOCK AND SWITCH FOR ELEVATOR DOORS.

Application filed March 19, 1924. Serial No. 700,311.

This invention relates to a combined lock and switch which is more particularly intended for use on the doors of elevators or elevator-hatchways and wherein electric power is utilized for operating the elevators.

One of its objects is the production of a simple, compact and inexpensive device of this character which will positively prevent the starting of the elevator until its door or the hatchway door has been locked in its closed position and which will likewise prevent the opening of the door until the motive power of the elevator has been cut off and the same has come to a complete stop.

Another object of the invention is the provision of a combination lock and switch which is easily controlled and which is constructed of a minimum number of parts commensurate with reliability of operation.

In the accompanying drawings:

Figure 1 is an inside face view of a hatchway-door showing the invention applied thereto. Figure 2 is an outside face view thereof. Figure 3 is an enlarged fragmentary vertical section on line 3—3, Fig. 1. Figure 4 is a top plan view of the hatchway door showing the same in its folded or open position and in its unfolded or closed position. Figure 5 is an enlarged sectional detail view of the lock and switch, the parts being shown in their unlocked or inoperative position. Figure 6 is a similar view showing the parts in their locked or operative position. Figure 7 is a bottom plan view of the lock, its cover plate being removed.

Similar characters of reference indicate corresponding parts throughout the several views.

As illustrated in Figs. 1–4, inclusive, the invention is shown in connection with a foldable hatchway door including the inner and outer sections 10 and 11, respectively. The latter are hinged at 12 to fold outwardly, as shown by dotted lines A in Fig. 4, the inner section 10 being hinged at 13 to the door-frame 14, while the outer section 11 is provided at its free upper end with anti-friction rollers 15 guided in an overhead track 16 mounted on suitable brackets 17 secured to the head-piece of the door-frame. One of the door-sections may be provided with a handle 18 while the other section carries the lock operating mechanism.

This locking mechanism preferably comprises a horizontal operating shaft 19 rotatably mounted on a face plate 20 fastened on the inner side of the door-section 10. Mounted on the inner end of this shaft is a hand-lever 21 having an annular flange 22 to which are pivoted the opposing ends of a pair of rods 23 extending lengthwise of the door and provided at their ends with locking bolts 24 guided in suitable blocks 25 secured to the corresponding upper and lower ends of the respective door-section. The lower locking bolt is adapted to interlock with a registering socket 26 formed in the door-sill 27 while the upper bolt is adapted to interlock with a registering opening 28 formed in the bottom plate 29 of a housing or casing 30 fastened to the head piece of the door-frame, as shown in Figs. 1 and 5. The outer end of the operating shaft is provided with a tongue or projection 31 for receiving the notched end 32 of a key 33. Upon turning the latter or the hand-lever 21 in one direction or the other, the locking bolts are shifted lengthwise accordingly, projecting or withdrawing them to lock or unlock the door.

Located within the casing 30 is an electric switch mechanism, included in the control circuit of the elevator, the same being governed by the upper locking bolt 24 to close or open said switch during the act of locking or unlocking the door, thus rendering the elevator operable only at such times when the hatchway door is fully locked. In the preferred construction of this switch mechanism, shown in Figs. 5, 6 and 7, the same comprises a vertically-swinging switch-arm 34 arranged lengthwise of the casing and pivoted at 35 on one side of the bolt-receiving opening 28. This switch arm is provided with a depending arcuate contact face or projection 36 with which the end of the respective locking bolt 24 is adapted to engage for actuating said arm. Yieldingly mounted on the free end of the latter is a finger or extension 37 whose inner end engages the underside of the switch arm while its outer end projects beyond the same and has attached to its upper side and insulated therefrom, a transverse contact plate 38 of brass or other conductive material. A coupling pin 39 serves to connect the extension with its arm 34 and applied to this pin is a

coil spring 40 which bears at one end against the upper side of the switch-arm and at its other end against a washer 41, this spring tending constantly to resist movement of said extension out of its inoperative position, shown in Fig. 5. At its inner end the extension 37 is provided with an upwardly bent lip or projection 42 which engages a transverse groove or fulcrum seat 43 formed in the underside of the switch arm 34. By this construction and arrangement of the switch arm and its extension, the latter is permitted to rock yieldingly relatively to the former and at the same time is held against displacement lengthwise thereof.

The stationary element of the switch consists of a pair of contacts 44 attached to and insulated from the casing 30 and to which the wires 45, 46 of the elevator control circuit are connected. These two contacts are adapted to be engaged or bridged by the contact plate 38 of the movable switch arm to close the control circuit and permit the operation of the elevator.

A coil spring 47 may be applied to the switch-arm 34 for maintaining it in its normally inoperative position shown in Fig. 5, and for preventing its accidentally swinging out of such position. In this position of said switch-arm, its extension 37 bears against the bottom plate 29 of the casing 30 and its projection 36 is disposed above the bolt-receiving opening 28. This construction insures the complete locking of the hatch-door before the switch arm is actuated upon by the locking bolt to close the switch.

The operation of this combined lock and switch device is as follows:

Assume the operator to have stepped into the elevator and to have closed the hatchway-door to the position shown by dotted lines B in Fig. 4. He now grasps the hand lever 21 and turns it in an anti-clockwise direction, the initial movement of which projects the locking bolts 24 into the corresponding door-sill socket 26 and opening 28 of the casing 29 to lock the door, the switch at this time being unaffected and remaining in its open position shown in Fig. 5. Upon turning the handle further in the same direction, to a substantially upright position, the upper locking bolt strikes the projection 36 of the switch arm 34, swinging the latter upwardly and causing the contact plate 38 of the extension 37 to yieldingly engage the attaching screws of the pair of contacts to close the switch, the spring 40 of said extension insuring a perfect contact at all times. The switch being closed, the operator can now start the elevator through the medium of the customary control mechanism.

In unlocking the door by turning the handle in the reverse direction, the switch is first opened and then the locking bolts are withdrawn from the socket 26 and opening 28, permitting the door to be readily opened to the position shown by full lines in Fig. 4. In this position of the door it is impossible to operate the elevator, thereby reducing the liability of accidents to a minimum.

In practice, the door frame 14, including the hinge pintles for the door-section 10 and the switch casing 30, is assembled at the shop and then set in place on the job. With the frame in place, the door sections are then hung, thereby producing a material saving in time and labor in effecting this installation.

The folding door construction has the advantage that it can be swung back out of the way and leave the full width of the door-opening available. Furthermore, in its closed position the door is flush with the adjacent side walls of the door-opening and the combined lock and switch mechanism is concealed behind them where it can not be tampered with by unauthorized persons.

We claim as our invention:

1. The combination with the hatchway-door and the control circuit of an elevator, of a casing secured to the door-frame and having an opening therein, a fixed switch contact contained within said casing and included in the control circuit, a movable switch arm arranged within said casing opposite its opening, an extension member fulcrumed to rock independently of said switch arm and carrying a switch contact mounted on said arm, means for yieldingly connecting said extension member to the switch arm, and a locking bolt carried by the door, arranged to interlock with said casing-opening and controlling said switch-arm.

2. The combination with the hatchway-door and the control circuit of an elevator, of a casing secured to the door-frame and having an opening therein, a fixed switch contact contained within said casing and included in the control circuit, a movable switch arm arranged within said casing opposite its opening, an extension member carrying a switch contact mounted on said arm, a pin connecting said extension member with said switch arm, a spring applied to said pin for resisting movement of the extension member relative to the switch arm, and a locking bolt carried by the door, arranged to interlock with said casing-opening and controlling said switch arm.

3. The combination with the hatchway-door and the control circuit of an elevator, of a casing secured to the door-frame and having an opening therein, a fixed switch contact contained within said casing and included in the control circuit, a movable switch arm arranged within said casing opposite its opening, said arm having a transverse groove in its underside near one end thereof, an extension member having a lip

at its inner end engaging the groove of said arm, means for yieldingly resisting movement of said extension member relative to said arm, a switch contact carried by the outer end of the extension member for engagement with said fixed contact, and a locking bolt carried by the door, arranged to interlock with said casing-opening and controlling said switch arm.

4. The combination with the hatchway-door and the control circuit of an elevator, of a casing secured to the door-frame and having an opening therein, a pair of fixed switch contacts mounted near one end of said casing and included in the control circuit, a vertically-swinging switch arm fulcrumed at the opposite end of said casing and extending across the opening thereof, said arm having a transverse groove in its underside, an extension member for the arm having a lip at its inner end engaging said groove, a pin passing through said extension member and said switch arm, a spring applied to said pin for normally resisting movement of the extension member relative to the switch arm, a switch contact connected to the free end of said extension member for engagement with said fixed contacts, and a locking bolt carried by the door, arranged to interlock with said casing-opening and controlling said switch arm.

MERRITT E. SMITH.
LUTHER RINGER.