April 28, 1942. J. W. DODD 2,280,805

LOCK MECHANISM FOR ELEVATOR LANDING DOORS

Filed Dec. 12, 1939 4 Sheets-Sheet 1

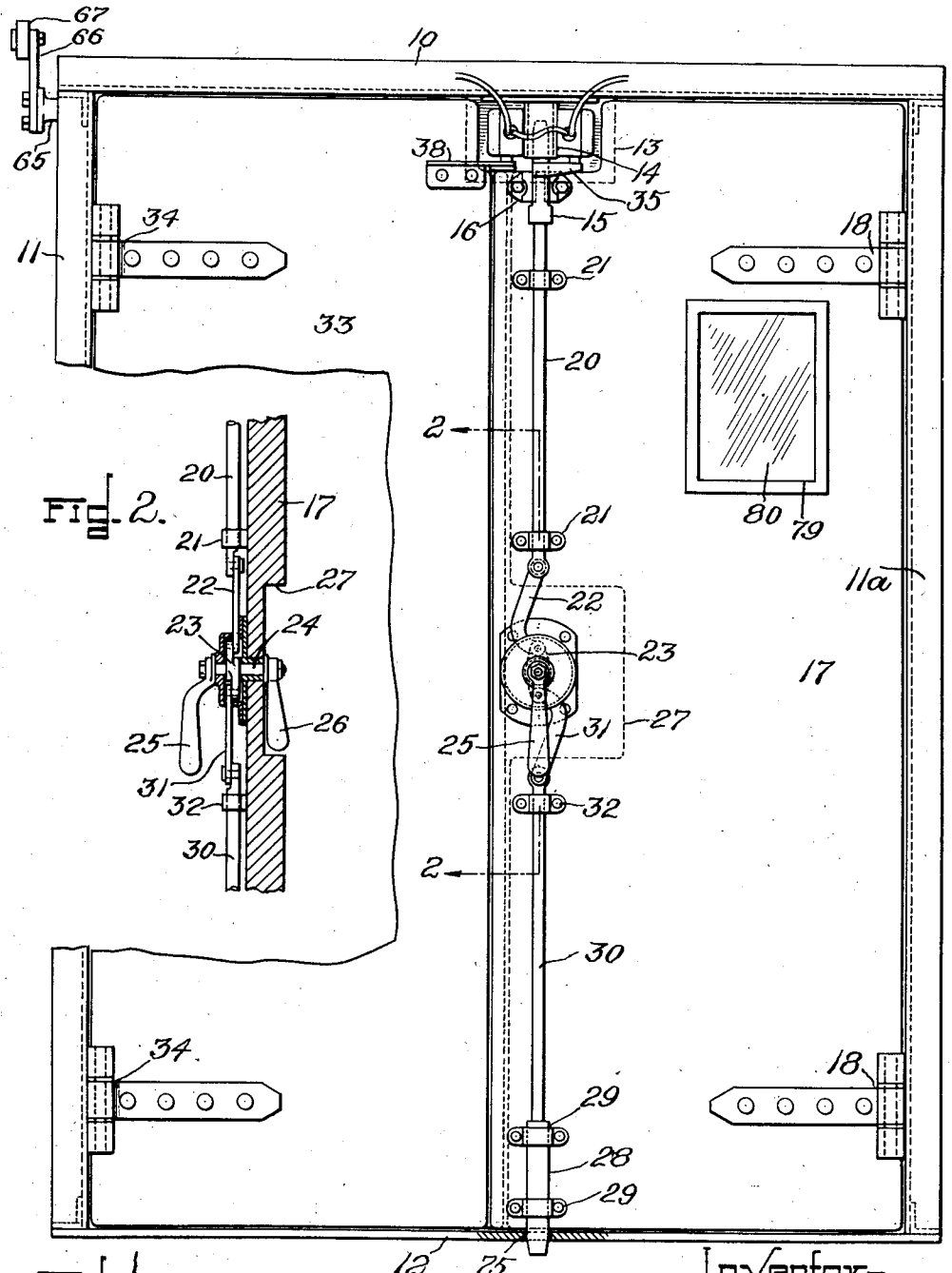


Fig. 1.

Fig. 2.

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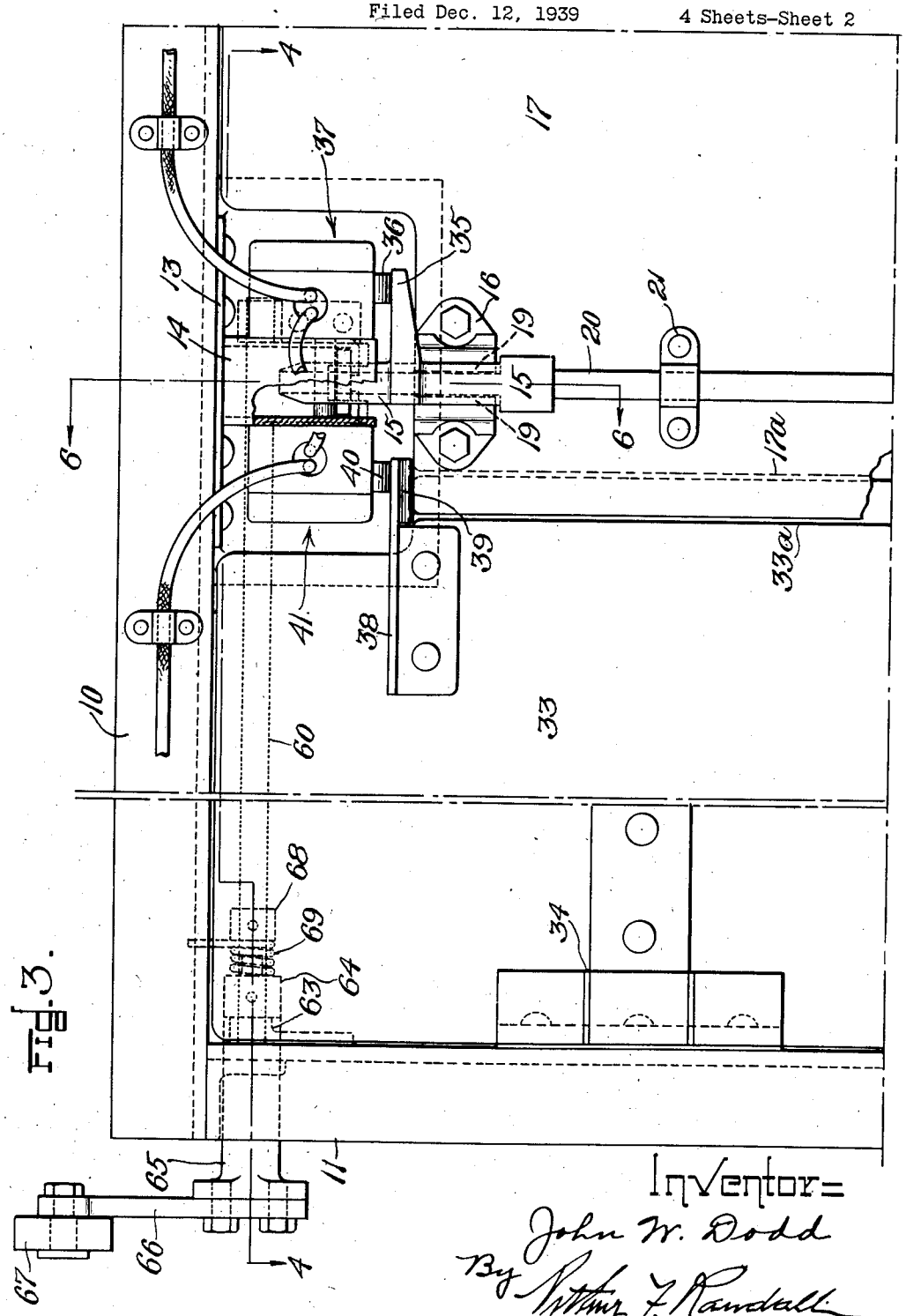


Fig. 3.

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LOCK MECHANISM FOR ELEVATOR LANDING DOORS

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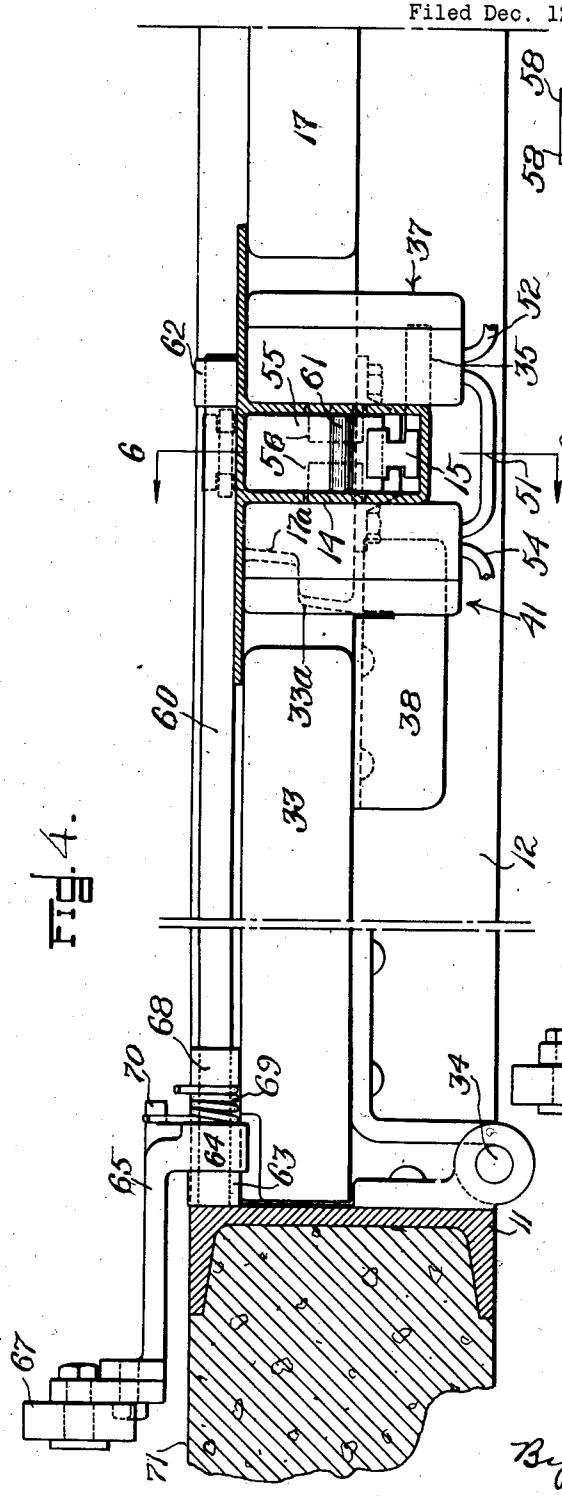


Fig. 4.

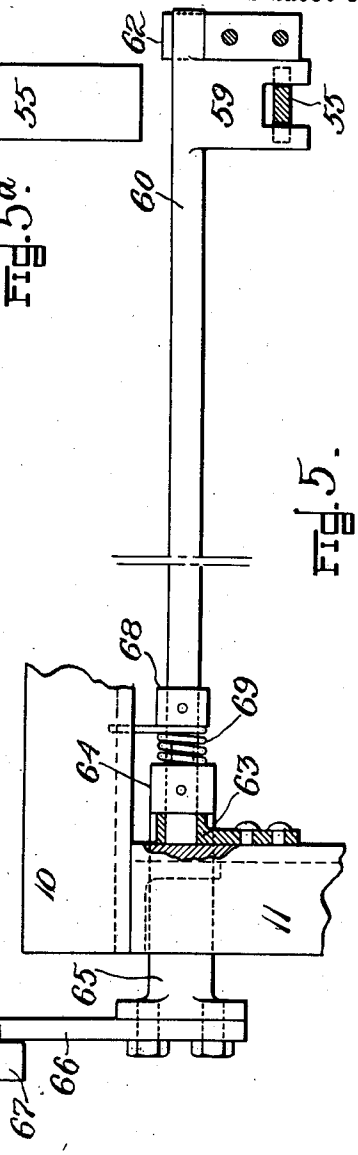


Fig. 5a.

Fig. 5.

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Fig. 6.

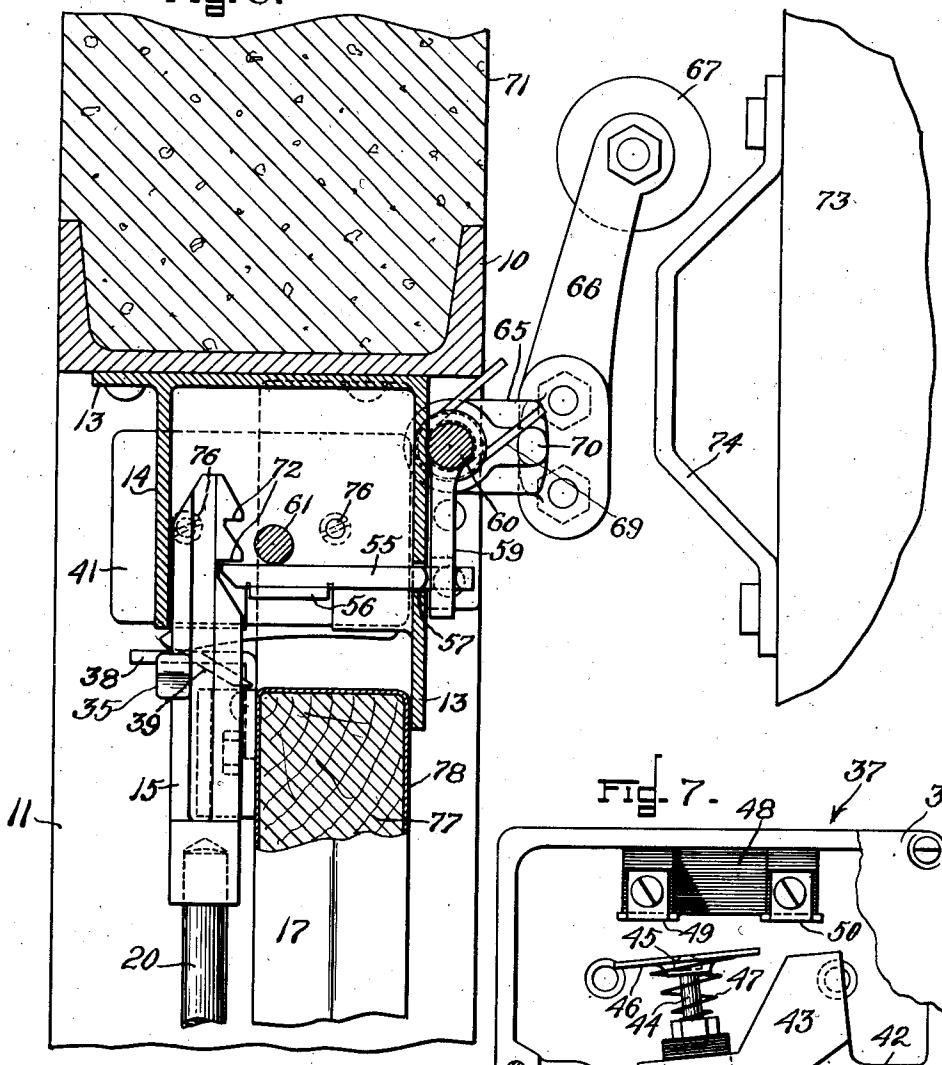


Fig. 7.

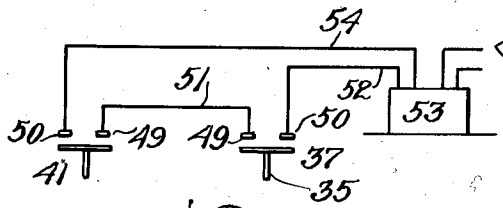


Fig. 8.

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UNITED STATES PATENT OFFICE

2,280,805

LOCK MECHANISM FOR ELEVATOR LANDING DOORS

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Application December 12, 1939, Serial No. 308,749

8 Claims. (Cl. 187—31)

This invention relates to lock mechanisms for elevator landing doors, particularly landing doors which are associated with a button-controlled elevator.

The object of this invention is to provide an improved lock mechanism of the character described which will be of simple and efficient construction and which will be comparatively inexpensive to construct and install.

A further object of this invention is to provide a simple and efficient lock mechanism of the character described which will permit operation of the elevator car only when all of the doors of the elevator shaft-way are closed and locked.

Other objects of the invention are to provide a lock mechanism of the character described which cannot be operated to free the door for opening unless the elevator car is at the landing; to provide for the disposition of the doors, and practically all of the lock mechanism therefor, in close proximity to, but outside of, the shaft-way so as to leave the latter free and clear of practically all parts of the door structure, and to provide, as a new article of manufacture, a complete door unit including a frame, a pair of swing doors therefor and lock mechanism through which both of the swing doors and the elevator car are controlled.

To these ends I have provided an improved lock mechanism for elevator landing doors constructed and operating as set forth in the following description, the several novel features of the invention being pointed out and defined in the claims at the close thereof.

In the accompanying drawings:

Figure 1. is an elevation, partly in section and partly broken away, of a self-contained door unit constructed in accordance with my invention.

Figure 2 is a section on line 2—2 of Fig. 1.

Figure 3 is an elevation, partly broken away and in section, of an upper portion of the unit shown in Figs. 1 and 2.

Figure 4 is a section on line 4—4 of Fig. 3 with the addition of a portion of the building wall adjacent to the doorway.

Figure 5 is a detail, partly in section and partly in elevation, showing the mechanism for operating the detent or latch hereinafter described.

Figure 5a is a detail of the detent or latch hereinafter described.

Figure 6 is a section on line 6—6 of Figs. 3 and 4 with the addition of a portion of the building wall surrounding the door-way.

Figure 7 is an elevation of one of the electrical switches hereinafter described, the same being shown with its cover broken away.

Figure 8 is a diagram illustrating the circuit that is controlled by the pair of switches hereinafter described, one of the latter being illustrated in Fig. 7.

When my invention is embodied in a self-contained door unit for incorporation in the wall of an elevator shaft-way at a landing thereof, as herein shown, I provide a rectangular frame comprising a channel lintel 10 fastened at its opposite ends to the tops of two channel jambs 11 and 11a to the lower ends of which latter are fastened the opposite ends of a threshold plate 12. The threshold plate 12 is seated upon the sill of the landing opening and the shaft-way wall is built up to lintel 10 and jambs 11 and 11a. In Fig. 1 of the drawings the door unit is viewed from the landing side.

Fastened to the under side of lintel 10, near the middle thereof, is a metal angular bracket 13 constructed at its middle with a rectangular box-like portion 14 which serves as a socket for a bolt 15, said socket portion 14 being open upon its bottom side to permit of movement of the bolt into and out of the same.

Bolt 15 is slidably mounted within a bracket 16 that is rigidly fastened to a door 17 disposed within the door-way frame 10—11—12 at one side thereof and connected with the jamb 11a by hinges 18 so that it can swing into and out of the door-way frame.

The bracket 16 embraces the bolt 15 and is made with oppositely disposed splines or tongues 19 loosely occupying longitudinal grooves provided upon the opposite sides of the bolt 15 so that while said bolt is movable vertically endwise relatively to bracket 16, it is held by the latter against movement in any direction laterally relatively to the door 17.

The bolt 15 is made with a downwardly extending stem 20 slidably mounted in brackets 21 fixed to door 17 and at its lower end said stem is pivotally connected to one end of a link 22 whose opposite end is pivotally connected with a rocker 23.

Rocker 23 is provided with a shaft 24 which extends through the door 17 and is journaled within a bearing provided on the latter. A handle 25 is provided upon the outer or landing end of shaft 24 by means of which a person standing at the landing can manually actuate the rocker 23. A handle 26, provided upon the inner or shaft-way end of shaft 24, provides for manual

actuation of the rocker 23 by a person on the elevator car. This inner handle 26 is preferably disposed within a recess or pocket 27 provided upon the inner side of door 17.

Upon the outer side of door 17, and at the lower end thereof, I provide a second bolt 28 that is slidably mounted in brackets 29 fastened to door 17 so that it is movable vertically endwise toward and from threshold 12. This bolt is provided with an upwardly extending stem 30 whose upper end is pivotally connected to one end of a link 31 whose opposite end is pivotally connected with the rocker 23 diametrically opposite the point of connection of link 22 with said rocker. Near its upper end the stem 30 is supported and guided by a bracket 32 fastened to door 17.

A second door 33, disposed within the door frame, is connected by hinges 34 with the opposite jamb 11 and when both doors 17 and 33 occupy their fully closed positions against the depending flange of bracket 13, as shown in Fig. 4, they are in alignment across the opening within said frame and disposed about three quarters of an inch away from the elevator shaft-way.

The proximate vertical edge portions of the doors 17 and 33 are stepped as indicated at 17*a* and 33*a*, Figs. 3 and 4, so that in order to fully close both doors it is necessary to first close door 33 and thereafter to close door 17. As shown in Fig. 3, and as indicated by dotted lines in Fig. 4, the bolt member 15 is made with a laterally extending arm 35 to cooperate with an adjustable switch member 36 forming part of a make-and-break switch that is indicated generally at 37 and shown diagrammatically at 37 in Fig. 8.

Fastened in position upon the outer side of door 33, near the top thereof, is an angular cam bracket 38, Figs. 3, 4 and 6, having a cam portion 39 to cooperate with the adjustable member 40 of a second make-and-break switch that is indicated generally at 41.

As shown in Figs. 3 and 7 the switch 37 comprises a box-like frame provided with a removable lid portion 37*a* and within this frame the adjustable member 36 is pivotally mounted as at 42, said member being provided with a weighted arm 43 which yieldingly urges said member downwardly and movement of said member in that direction being limited by the engagement of arm 43 with the inner side of the bottom wall of the box-like frame.

Mounted upon, but insulated from, the arm 43 is an upstanding post 44 provided at its upper end with a head 45 against which a movable contact washer 46 is yieldingly supported by a spring 47, said spring surrounding the post 44.

Fixedly mounted within the box-like frame of switch 37 is a block of insulating material 48 on which are mounted two fixed contacts 49 and 50.

When the rocker 23, Figs. 1 and 2, is operated to thrust the bolt 15 upwardly into the socket 14 of bracket 13 the laterally extending arm 35 of the bolt swings the arm 36, Figs. 3 and 7, upwardly thereby seating the contact 46 against the contacts 49 and 50, and it will be clear that when bolt 15 is moved downwardly arm 36 is lowered by gravity thereby removing contact 46 from engagement with contacts 49 and 50. The frame of each switch 37 and 41 is fixed to the adjacent side of box-like socket 14 of bracket 13 by means of screws 76, Fig. 6.

The switch 41 is a counterpart of the switch 37 and it will be clear that when door 33 is swung from an open position into its fully closed position against bracket 13 the cam 39 of bracket 38 raises the member 40 of switch 41 thereby closing the latter, and when said door is opened the member 40 of switch 41 falls by gravity and opens said switch.

As shown in Fig. 8 the contacts 49 of switches 37 and 41 are connected by a conductor 51; the contact 50 of switch 37 is connected by a conductor 52 with one terminal of a control instrument 53 whose other terminal is connected by a conductor 54 with the fixed contact 50 of switch 41. The control instrument 53 is the usual means through which the push-buttons of the elevator apparatus control the up and down movements of the elevator car. It will thus be clear that the elevator car cannot be moved through operation of the push-buttons unless the circuit of the control instrument 53 is closed through both switches 35 and 41.

Within the socket 14 of bracket 13 is arranged a detent or latch 55 which is slidably supported by lugs 56, Figs. 4 and 6, which are bent inwardly from the opposite side walls of socket 14. A pin or bar 61, mounted at its ends in the opposite side walls of socket 14, is disposed immediately above the detent or latch 55 and holds the latter against upward displacement relatively to the lugs 56.

The detent 55 extends inwardly from the lugs 56 through an aperture 57 provided in the rear depending flange or wall of bracket 13 and beyond the latter is formed at its opposite sides with notches 58 as shown in Fig. 5*a*, said notches being occupied by the tines of the lower bifurcated end of an arm 59 depending from a horizontal rock-shaft 60. At its one end the rock-shaft 60 is rotatably supported in position against the inner side or face of bracket 13 by a bearing bracket 62 fastened to the bracket 13 while at its opposite end said shaft 60 is rotatably supported by a bearing bracket 63 fastened to the inner side of the jamb 11.

Alongside of the bearing bracket 63 the shaft 60 has rigidly fastened to it the hub 64 of an arm 65. The arm 65 is parallel with the shaft 60 and at its outer end has fastened to it an upwardly projecting extension 66 which carries a roller or truck 67 at its upper end. Between the hub 64 and a collar 68 that is fastened in position upon shaft 60 is a coiled spring 69, one end of which bears against the corner of lintel 10 as shown in Fig. 6, while the other end bears against a lug 70 provided on arm 65. This spring acts against the lug 70 to yieldingly urge the extension 66 away from the wall 71 of the shaft-way with arm 59 held against bracket 13 and detent 55 at the limit of its movement toward bolt 15.

The bolt 15 is formed upon one side thereof with shoulders 72 to cooperate with detent 55, and it will be clear that when said detent occupies a position beneath either shoulder 72 the bolt 15 cannot be lowered to unlock the doors.

In Fig. 6, 73 represents a part of the elevator car and mounted thereon is a cam bracket 74. When bolt 15 is locked in its uppermost position by detent 55 the roll 67 occupies a position in the path of cam bracket 74, and it will be clear that when, during either upward or downward movement of the car 73, the cam bracket moves into position against the roll 67 it acts through the latter, extension 66, arm 65, rock-

shaft 60 and arm 59 to retract detent 55 thereby freeing bolt 15 but without unlocking the door. The cam bracket 74 is positioned on the car 73 so that when the floor of the latter is at a landing the elevated intermediate portion of cam bracket 74 is in engagement with roller 67 so that with the elevator stopped in that position the bolt 15 remains in door-locking position until manually retracted.

When the bolt-operating mechanism, including the rocker 23, Figs. 1 and 2, is set in position to hold the bolts 15 and 28 at the limit of their movements away from each other, the bolt 28 occupies a socket 75 formed in the threshold plate 12 while the bolt 15 occupies the socket 14 of bracket 13 and in this way the door 17 is locked closed at both its top and bottom.

The switches 37 and 41, whose interior construction is illustrated in Fig. 7, are of ordinary construction and so also is the bolt-operating mechanism including the rocker 23.

Doors of the class described are commonly made from wood as shown at 77, Fig. 6, and are metal clad; that is, covered with a sheet metal sheath 78 as a precaution against fire. Also, as shown at 79 in Fig. 1, one of the doors may be made with a window that is closed by a transparent pane of glass 80.

It will be understood that any other suitable type of make-and-break switch may be substituted for that illustrated in Fig. 7.

What I claim is:

1. The combination of a pair of movably supported elevator landing doors; manually operated bolt mechanism mounted on one of said doors for locking both doors in their closed positions, and a car-controlling mechanism including an electric circuit which is opened to render said control mechanism inoperative to effect movement of the car that is controlled by it, and two make-and-break switches arranged in series in said circuit, one of said switches being controlled and operated by said bolt mechanism so that said switch is maintained closed by the same while the doors are locked closed by said bolt mechanism and so that said switch is opened when said bolt mechanism is adjusted to free said doors, and the other switch being independently controlled and operated by the other door so that it is maintained closed when said other door occupies its closed position and is opened when said other door is opened.

2. The combination of claim 1 wherein there is also provided car-controlled latch mechanism for normally holding said bolt mechanism in door-locking position, said latch mechanism being automatically operated by the elevator car upon arrival of the latter at the landing thereby to free said bolt mechanism.

3. The combination of a pair of elevator landing doors each of which is supported for movement independently; manually operated bolt mechanism including an adjustable bolt mounted on one of said doors for locking both doors in their closed positions; an electric car-controliing circuit, and adjustable circuit-controlling mechanism, said circuit-controlling mechanism being constructed and arranged so that movement of the other door into its closed position followed by adjustment of said bolt into door-locking position after its door has also been closed, act conjointly to adjust said circuit-controlling mechanism so as to render said circuit operable to effect movement of the elevator car but only while both doors are locked in their fully closed positions by said bolt.

4. The combination of claim 3 wherein there is also provided car-controlled latch mechanism for normally holding said bolt in door-locking position, said latch mechanism being automatically operated by the elevator car upon arrival of the latter at the landing thereby to free said bolt.

5. The combination of a pair of elevator landing doors each hingedly supported independently of the other door and one of said doors overlapping the other door when both doors are in properly closed positions; manually operated bolt mechanism including an adjustable bolt mounted on said overlapping door for locking both doors in their closed positions; an electric car-controlling circuit; adjustable circuit controlling mechanism through which movement of said overlapped door into its closed position and adjustment of said bolt into door-locking position after said overlapping door has been closed, act conjointly to adjust said circuit-controlling mechanism so as to render said circuit operable to effect movement of the elevator car but only while both doors are locked in their fully closed positions by said bolt.

6. The combination of claim 5 wherein there is also provided car-controlled latch mechanism for normally holding said bolt mechanism in door-locking position, said latch mechanism being automatically operated by the elevator car upon arrival of the latter at the landing thereby to free said bolt mechanism.

7. The combination of a pair of movably supported elevator landing doors; manually operated bolt mechanism mounted upon the outside of one of said doors for locking both doors in their closed positions; an electric car-controlling circuit; circuit controlling mechanism through which said two doors and said bolt mechanism co-act to render said circuit operable thereby to permit movement of the elevator car only when both doors are locked in their fully closed positions by said bolt mechanism, and latch mechanism movably supported at the opposite sides of said doors for holding said bolt mechanism in door-locking condition, said latch mechanism being automatically operated by the car upon arrival of the latter at the landing thereby to free said bolt mechanism.

8. The combination of a pair of elevator landing doors each of which is supported for movement independently; manually operated bolt mechanism including an adjustable bolt mounted on one of said doors for locking both doors in their closed positions; an electric car-controlling circuit, and adjustable circuit-controlling mechanism mounted upon a fixed support adjacent to said doors, said circuit-controlling mechanism including means through which the other door when moved into its closed position effects a preparatory partial adjustment of said circuit-controlling mechanism and means through which said adjustment is completed by said bolt when the latter is shifted into door-locking position after its door has also been closed thereby to render said circuit operable to effect movement of the elevator car but only while both doors are locked in their fully closed positions by said bolt.

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