June 24, 1930. D. L. LINDQUIST ET AL 1,767,892

SWITCHING MECHANISM

Original Filed Feb. 3, 1925 2 Sheets-Sheet 1

FIG. 1

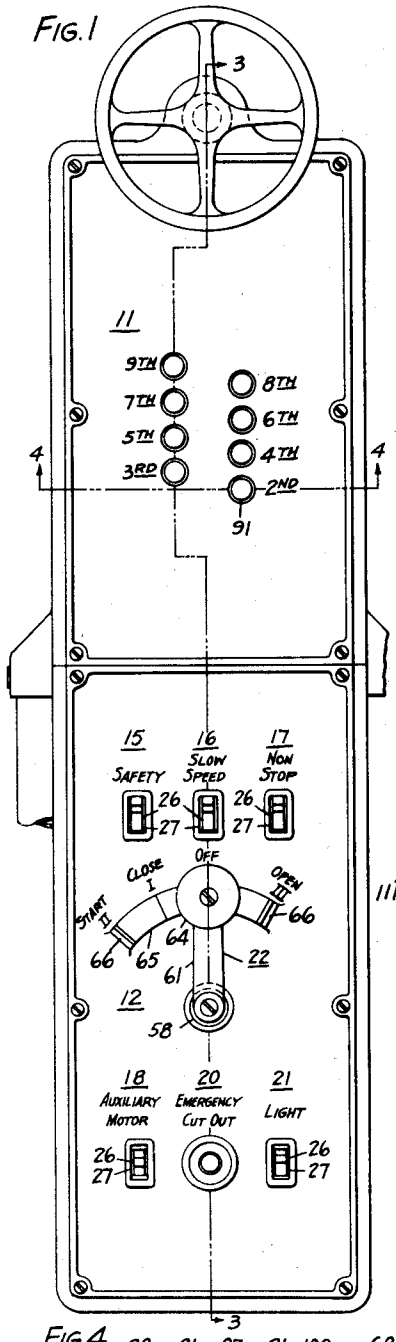


FIG. 2

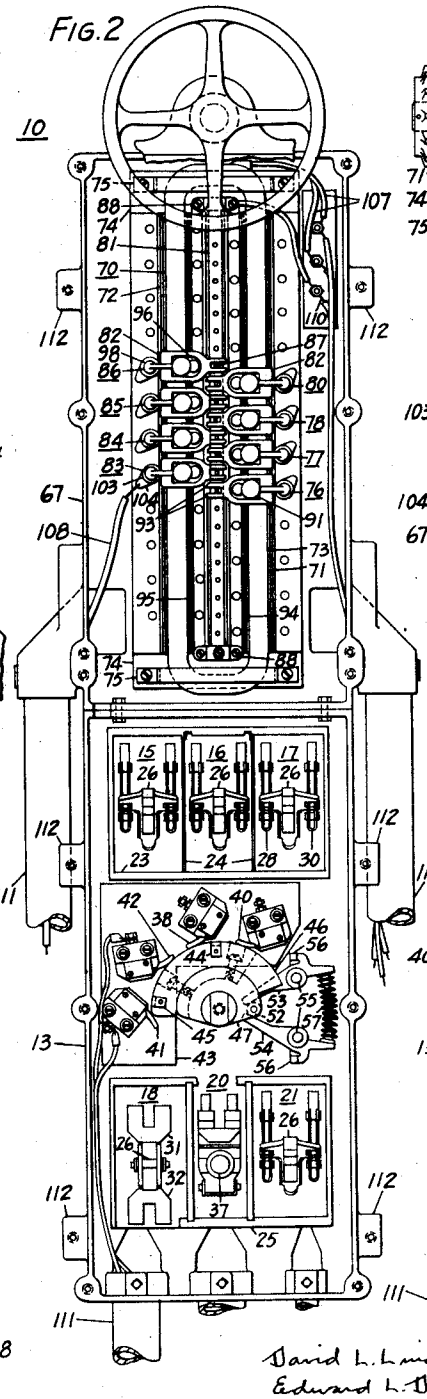


FIG. 3

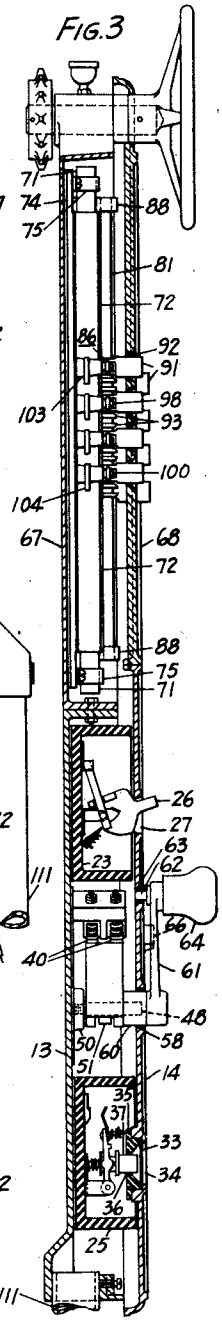
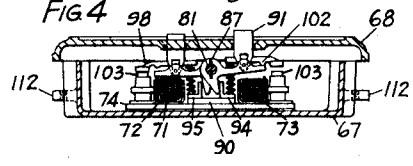


FIG 4



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FIG. 6

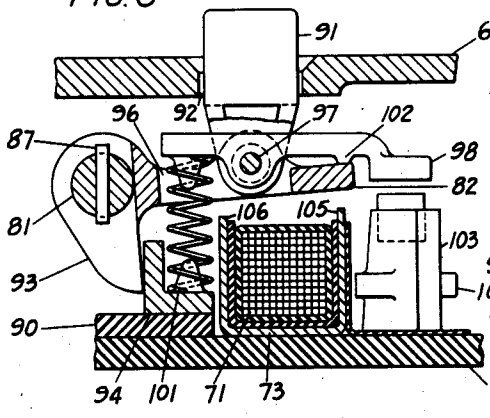
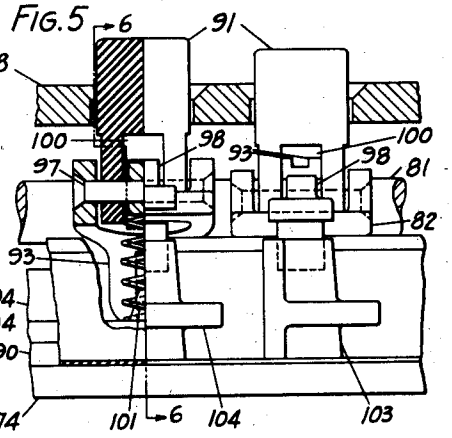


FIG. 5



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UNITED STATES PATENT OFFICE

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SWITCHING MECHANISM

Original application filed February 3, 1925, Serial No. 6,561. Divided and this application filed October 16, 1925. Serial No. 62,769.

This application is a division of application Serial No. 6,561, filed February 3, 1925.

The present invention relates to switching mechanism.

In the parent application above referred to, a system is described for controlling a single elevator car or a bank of elevator cars. In the system, the starting of the car is under the control of an operator in the car. One feature of the system is to have the car stop to discharge passengers at floors selected by the operator without further act on his part, once he has selected the floors, other than causing the starting of the car after each successive stop.

In order to obtain such operation, use is made of a plurality of push button switches arranged within the car. These switches are arranged to be operated individually into closed positions. Electromagnetic means common to all these switches is provided for retaining the switches operated in closed positions. The mechanism is arranged in an enclosure, the whole arrangement being designated in the parent application as the car operating box. As the car travels up and down the hatchway, it is brought to a stop to discharge passengers at the landings corresponding to these switches operated. The system is arranged so that the switches are maintained operated until the car reaches a terminal whereupon the electromagnetic means is deenergized and the switches are simultaneously released.

One feature of the invention is the provision of switching mechanism of the above character which is of simple and compact construction and wherein the various switches are positive in the control of their respective circuits.

Other features and advantages will become apparent from the following description, taken in connection with the accompanying drawings wherein one embodiment of the invention is illustrated and in which:

Figure 1 is a front elevation of the car operating box;

Figure 2 is a similar view with the cover plates removed;

Figure 3 is a view in vertical section taken along the line 3—3 of Figure 1;

Figure 4 is a view in horizontal section taken along the line 4—4 of Figure 1;

Figure 5 is a view of the push button switches with parts shown in section; and

Figure 6 is a view taken along line 6—6 of Figure 5.

Referring to the drawings, the car operating box, designated as a whole by numeral 10, is separated into an upper and lower compartment, the upper compartment 11 for the magnetic push button apparatus and the lower compartment 12 for various control switches employed in the system. The compartments may be joined in any suitable manner, for example by means of bolts as illustrated.

The lower compartment comprises a casing 13 and cover plate 14 within which the control switches are enclosed. These switches comprise safety switch 15, slow speed switch 16, non-stop switch 17, auxiliary motor switch 18, emergency cut-out switch 20, light switch 21 and starting switch 22. The safety, slow speed and non-stop switches are arranged in a group and mounted in an insulating box 23. The switches are separated by insulating partitions 24. The auxiliary motor, emergency cut-out and light switches are similarly arranged in insulating box 25. The boxes 23 and 25 are secured to the casing 13.

Safety switch 15, slow speed switch 16, non-stop switch 17 and light switch 21 may be of any suitable construction, being illustrated as double pole, single throw knife switches. Each switch is provided with an operating lever 26. Apertures 27, through which these levers extend, are provided in the cover plate 14. The safety switch, slow speed switch and light switch are provided with toggle arrangements (not shown), of any well known construction, for maintaining the switches in either closed or open positions. The two blades of the safety switch, slow speed switch and light switch are electrically connected. The blades of the non-stop switch, however, are unconnected, forming in effect two separate switches 28 and

30. The non-stop switch is spring-biased to closed position. The light switch is used for completing the circuit to the lamp in the electrolier in the car.

Auxiliary motor switch 18 in effect forms two switches 31 and 32. The switches are arranged in any suitable manner for connection to a common feed and are biased by means of a spring (not shown) tending to maintain them in open position.

The operating lever 26 for the switches extends through an additional aperture 27 provided in cover plate 14.

The emergency cut-out switch 20 is a double pole switch, spring-biased to open position. The switch is mounted behind a glass plate 33 arranged in an aperture 34 in cover plate 14. The glass plate 33 is held against a seat, formed around the aperture 34, by means of a retainer 35. The retainer is formed with an aperture 36 for supporting the switch operating button 37. In operation, the glass plate must be broken before the switch can be closed.

Pairs of starting switch contacts 38, 40, 41 and 42 are mounted on a panel 43 secured to the casing 13. Contact bars 44 and 45, for bridging the pairs of contacts, are mounted on a segment 46 of insulating material. The segment 46 is carried by a segmental support 47, being secured thereto as by means of screws in the manner illustrated. Support 47 is pivotally mounted on a spindle 48 secured in a boss 50 formed on the base of casing 13. A positioning collar 51 is pinned to the spindle between the sides of support 47. A centering roller 52 is pivotally mounted between the sides of support 47 and is arranged to cooperate with centering arms 53 and 54 to return the starting switch to off or "neutral" position. These arms are pivotally mounted on the base of the casing by means of pins 55 and are forced against limit stops 56 by means of a centering spring 57. The stops 56 are arranged so that the centering arms cannot return the starting switch beyond the "neutral" position. Spring 57, however, will yield and permit the starting switch to be moved into its operative or contact bridging position.

Casing cover 14 is provided with another aperture 58 for receiving the segmental support hub 60. Starting switch lever 61 is secured to the exterior end of the hub. With the starting lever in "neutral" position, a locking pin 62, provided on the lever, extends into an aperture 63 in cover plate 14. Pin 62 may be withdrawn from the aperture by outward movement of the starting switch handle 64, as is well understood in the art.

An arcuate boss 65 is formed on cover plate 14 under the end of the starting lever. Stops 66 for the starting lever are arranged at each end of the boss, an intermediate oblique surface being provided at "close" position. Three operative positions are indicated on the cover plate, namely "Close," "Start" and "Open." For convenience of description, these positions will be hereinafter referred to as position I, position II and position III respectively.

In operation, as the starting switch is moved to the left, pin 62 will strike against the oblique surface of the boss 65, indicating that position I has been reached. In this position, contact bar 44 will bridge contacts 38 and contact bar 45 will bridge contacts 41. As the starting switch is moved farther to the left, the starting lever 61 will strike stop 66, indicating that position II has been reached. In this position, contact bar 44 will bridge contacts 42. Upon reverse movement of the starting switch to position III, contact bar 44 will bridge contacts 40. Whenever released, the starting switch will be returned to "neutral" position, by the centering mechanism described above, where pin 62 will engage aperture 63 to lock the switch in position.

The upper or magnetic push button compartment 11 similarly comprises a casing 67 and cover plate 68 within which the magnetic push button apparatus is enclosed. The push button magnet 70 comprises a rectangular coil 71 arranged in elongated iron channels 72 and 73. The magnet is secured at each end to an insulating base 74 as by means of straps 75. The push button switches, 76, 77, 78 and 80 for the second, fourth, sixth and eighth floors respectively, are pivotally mounted on a shaft 81 in such manner that their armatures 82 extend over iron channel 73. Similarly, the push button switches, 83, 84, 85 and 86 for the third, fifth, seventh and ninth floors respectively, are pivotally mounted on shaft 81 but are staggered in relation to the switches 76, 77, 78 and 80. The armatures 82 of switches 83, 84, 85 and 86 extend over iron channel 72. The switches are positioned by means of pins 87 extending through shaft 81. The shaft is secured, as by screws, in supports 88 mounted on an insulating plate 90. Operating buttons 91 for the switches extend through apertures 92 in cover plate 68.

Referring more particularly to Figures 5 and 6, the push button switch details will be described. In Figure 5 two switches are shown, one in open and the other in closed position. The pivoted end of armature 82 is formed with prongs 93 between which pin 87 extends. Stop 94, and a similar stop 95 shown in Figure 4, coextensive with shaft 81, are mounted on insulating plate 90 and are arranged to cooperate with the prongs 93 to limit the upward movement of the armature. The central portion of the armature is formed with an opening 96

across which a pin 97 extends. The pin is secured in the armature at each side of the opening to form a pivot for operating button 91 and contact lever 98. The contact lever 98 extends through a slot 100 formed in operating button 91. A spring 101 extends between the base portion of stop 94 and the inner end of contact lever 98. With the switch in open position, spring 101 acts through contact lever 98 to maintain armature 82 in position with prongs 93 abutting against stop 94. A fixed relation is maintained between lever 98 and armature 82, so long as the switch is in open position, by the engagement of projection 102 on the lever and the outer end of the armature. A stationary contact 103 is mounted on insulating base 74 in the path of the outer end of the contact lever 98. The stationary contact is provided with a lug 104 adapted for connecting the switch in the system.

In operation, pushing button 91 moves armature 82 and contact lever 98 down against the force of spring 101 until the lever engages stationary contact 103. Then armature 82 moves alone until its outer end engages flange 105 of the iron channel 73, spring 101 acting to maintain the contact lever and contact in engagement. With magnet coil 71 energized, this flange forms one pole of a U shaped magnet, retaining the switch in closed position. By this arrangement, the positive engagement of the switch contacts is insured once the button has been pressed sufficiently to cause the switch to be maintained in operated position. It is preferred to provide an air gap between the armature and the pole formed by flange 106 of iron channel 73, as by shortening the flange, so as to prevent the armature from being held in by residual magnetism. Upon deenergization of magnet coil 71, spring 101 forces the armature into released position with prongs 93 abutting against stop 94. The armature in its movement strikes projection 102 a blow, thus insuring the separation of contact lever 98 and stationary contact 103 to open the switch. It will be seen that as many buttons may be pushed as may be desired, all of which will be retained in closed position in the above described manner so long as the magnet remains energized. Conductors 107 are in the circuit for magnet coil 71 (see Figure 2). A circuit for a push button switch may be traced from conductor 108 to a stationary contact 103, through the switch to shaft 81, support 88, to conductor 110.

Suitable conduits 111 are provided for the various conductors leading to and from the car operating box. Casings 13 and 67 are preferably formed with lugs 112 for mounting the box in the car.

The magnetic push button apparatus is illustrated as arranged for a ten floor elevator installation, but it is to be understood that it may be arranged for an installation of any number of floors. Push buttons for the first and tenth floors have not been included as the system is arranged to stop automatically at these floors. The system is also arranged to effect the deenergization of the magnet coil 71 to release all the switches which have been operated as the car is brought to a stop at the terminals.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In combination; a plurality of individually operable push button switches; a plurality of armatures, one for each of said switches; an electromagnet common to all of said armatures, said electromagnet being arranged to be energized regardless of whether any of said push button switches are operated or not and being adapted, when energized, to cooperate with the armatures of all the switches that are operated to maintain said operated switches in their operated positions after their manual operation, regardless of when during the time that the electromagnet is energized the switches are operated; and means for causing the operated switches to be restored to their inoperative positions upon the deenergization of said electromagnet.

2. In combination; a plurality of push buttons; a plurality of armatures, one for each of said push buttons, said armatures being adapted to be independently depressed by their respective push buttons; an electromagnet common to all of said armatures, said electromagnet being arranged to be energized regardless of whether any of said armatures are depressed or not and being adapted, when energized, to maintain all of said armatures that are depressed in depressed positions after their depression by their respective push buttons, regardless of the order that said armatures are depressed and regardless of when during the time that said electromagnet is energized said armatures are depressed; a plurality of pairs of contacts, one pair for each of said armatures, each pair of contacts being adapted to be closed when its armature is depressed and separated when its armature is released; and means for causing the simultaneous release of all the depressed armatures upon the deenergization of said electromagnet.

3. In combination; a plurality of movable

contacts; a plurality of stationary contacts, one for each of said movable contacts, said stationary contacts being disposed in the path of movement of their respective movable contacts; a plurality of armatures, one for each of said movable contacts; a plurality of push buttons, one for each of said armatures, said push buttons being manually operable individually to cause the depression of their respective armatures and the engagement of the movable contacts corresponding to the armatures depressed with their respective stationary contacts; an electromagnet common to all of said armatures, said electromagnet being arranged to be energized regardless of whether any of said movable contacts are in engagement with their respective stationary contacts or not and being adapted, when energized, to maintain all of said armatures that are depressed in depressed positions after their depression by their respective push buttons, regardless of the number of said armatures that are depressed, their order of depression, or when during the time that said electromagnet is energized said armatures are depressed; and a plurality of resilient means, one for each of said armatures, each resilient means cooperating with said electromagnet and its armature when depressed to maintain the movable contact and stationary contact corresponding to its armature in engagement, the resilient means for the depressed armatures causing the simultaneous release of their respective armatures and the separation of the contacts corresponding thereto upon the deenergization of said electromagnet.

In testimony whereof, we have signed our names to this specification.

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EDWARD L. DUNN.
DAVID C. LARSON.