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COMBINED PUSH-BUTTON SWITCH AND TACTUAL SIGNAL

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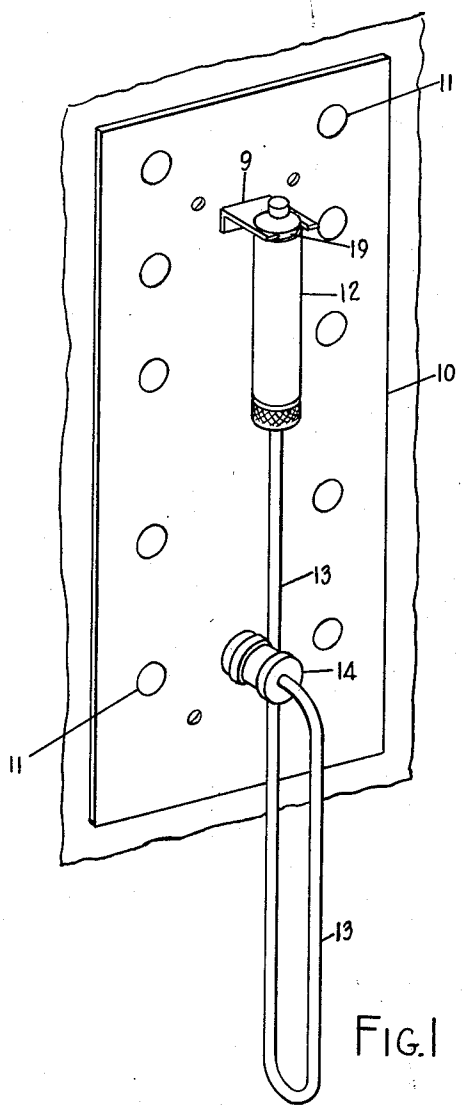


FIG. 1

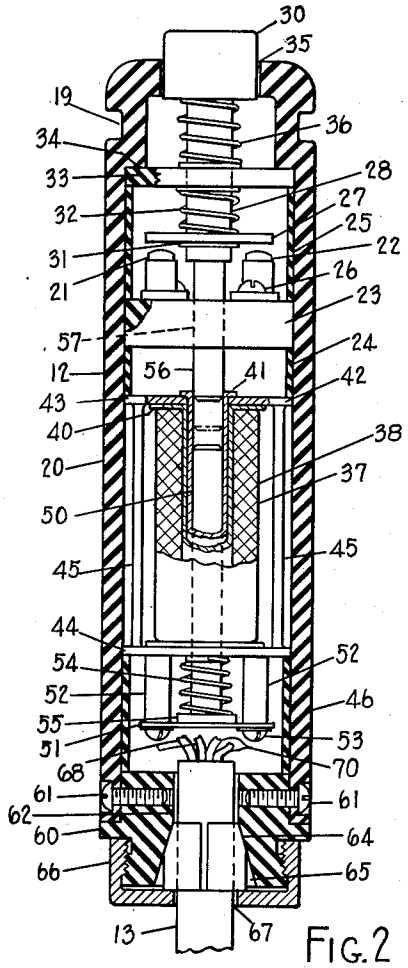


FIG. 2

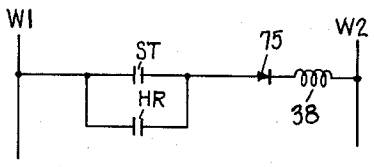


FIG. 4

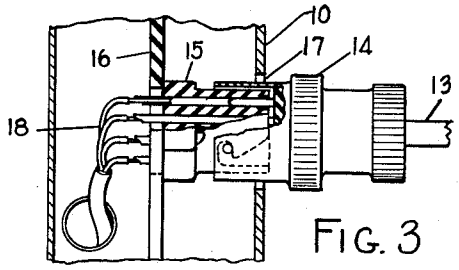


FIG. 3

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COMBINED PUSH-BUTTON SWITCH AND TACTUAL SIGNAL

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3 Claims. (Cl. 340—19)

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The invention relates to control mechanism, especially for controlling elevator cars.

In certain types of elevator systems, the starting of the elevator car is under the control of an attendant in the car, with stops being made at floors at which calls are registered. Also, the attendant has control of the closing of the doors incident to starting the car, the opening of the doors when a stop is made taking place automatically incident to the stopping operation. In such an installation, the attendant acts as a guard to obviate anyone being struck by a closing door, answers questions raised by passengers and in a great many of such installations registers calls for floors at which the passengers wish to alight. In certain instances, the control systems are arranged so that they may be thrown over to non-attendant operation, that is, operation without attendants in the cars. In many of these systems, stops are effected automatically in response to the calls that are registered. In certain of these systems, however, the attendant initiates stopping of the car at floors upon receipt of a signal given as the car arrives within a certain distance of the floor for which a call has been registered. Such signal may be in the form of an impulse or vibration imparted to the hand of the attendant through the handle of his start control switch.

One feature of the invention is to provide a car attendant's start control switch connected by a flexible electrical cable through the face of the car operating panel to the control circuits.

Another feature of the invention is to provide a car attendant's start control switch which may be readily disconnected from the car operating panel control circuits.

Still another feature of the invention is to provide a control of the type in which an impulse or vibrating signal is given the operator's hand, which is of simple construction and reliable and positive in operation.

Other features and advantages of the invention will be apparent from the following description and appended claims.

In carrying out the invention according to the preferred arrangement, the start control switch is provided with a casing of insulating material which serves as the grip or handle. The circuit controlling contacts are arranged within the casing and are manually actuated by a button protruding from the casing and biased to off position. These contacts are connected by a flexible electrical cable to an electrical plug. An electrical receptacle is provided in the car operating

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panel to receive the plug. This receptacle is connected to the control circuits so that when the plug is inserted, the start control switch is enabled to control the operation of the car in the manner desired. A groove is provided in the casing by means of which the control handle may be hung on a hanger when desired. With the plug-in connection, the start control switch can be removed when it is desired to shut down the car, thereby preventing unauthorized use. When employed in a system arranged for change-over to non-attendant operation, the plug-in connection enables the start control switch to be removed when on non-attendant operation.

The invention will be described as applied to a start control switch arranged to receive a vibrating signal. According to the preferred arrangement, the handle is of hollow cylindrical form and a coil is arranged longitudinally within the handle. The operating button extends longitudinally of the handle and has a longitudinal extension which is adapted to be struck by a plunger actuated by the coil. This plunger is biased to position disengaging the button. Upon the application of alternating current voltage to the coil, the plunger is caused to vibrate against the extension on the button, signalling the attendant to release the button. Also, direct current voltage may be applied to the coil instead of alternating current voltage, in which event, an impulse is given which may force the opening of the switch.

In the drawings:

Figure 1 is a perspective view of a car operating panel provided with a start control switch in accordance with the invention;

Figure 2 is a detail in cross section of the start control switch of Figure 1;

Figure 3 is a detail with parts in cross section of the plug and receptacle; and

Figure 4 is a schematic wiring diagram of a portion of elevator control circuits in which the coil of the start control switch is connected.

Referring first to Figures 1 and 3, an operating panel in the elevator car is designated 10. This panel has mounted in its face a plurality of switches such as a slow speed switch, motor generator starting switch, etc., which are indicated schematically by circles 11. The various connections of these switches to the control circuits are made in back of the panel. The start control switch is designated 12 and is connected by flexible cable 13 to the control circuits in back of the panel. The connection is effected through a multi-prong plug 14 on the end of the

cable which is inserted through the face of the panel into an electrical receptacle 15 of the bayonet type. The receptacle is mounted on a base 16 in back of the panel so as to extend through opening 17 in the panel. The socket is connected to wires 18 in back of the panel. The exterior of the start control switch is in the form of a grip or handle and is provided with a groove 19 for hanging it on a bracket 9 secured to the car operating panel.

Referring to Figure 2, the start control switch comprises a casing 20 of insulating material within which is provided a pair of stationary contacts 21 and 22. These contacts are secured to a mounting block 23 of insulating material held in place within the casing by positioning sleeves 24 and 25 of insulating material. Screws 26 are provided for making circuit connections to the contacts. The contacts are adapted to be electrically bridged by a contacting disc 27 slidably mounted on stem 28 formed on the operating button 30, the button and stem being of insulating material. The disc 27 is biased against a snap ring 31 on stem 28, this bias being effected by compression spring 32 surrounding the stem and extending between the contacting disc 27 and a guide 33 of insulating material for the stem 28. This guide is held by positioning sleeve 25 against a shoulder 34 formed inside the casing. The operating button 30 extends through an aperture 35 formed in the end of the casing and is biased to contact open position by a compression spring 36 surrounding the stem and extending between guide 33 and the button.

An electromagnet 37 is provided within the casing 20 below mounting block 23. This electromagnet comprises a coil 38 which is wound on a spool 40 in turn mounted on a sleeve 41 of non-magnetic material. The electromagnet is provided with a frame 42 made up of end pieces 43 and 44 and side pieces 45, the edges of the end pieces being rounded to fit within the casing. The frame 42 is held against positioning sleeve 24 by a third positioning sleeve 46 of insulating material.

The electromagnet 37 is provided with a movable core 50 which slidably extends upwardly into sleeve 41 to near the top thereof. At its lower end, the core rests on a stop plate 51 spaced from end piece 44 of the magnet frame by posts 52 and secured to the frame by screws 53 extending through the spacing posts. The core is biased into position against stop plate 51 by a non-magnetic compression spring 54 surrounding the core and extending between end piece 44 and a shoulder 55 formed on the lower end of the core. The core when pulled upwardly by the energization of the electromagnet is adapted to engage an extension 56 also of insulating material on the lower end of stem 28. This extension passes through an aperture 57 in mounting block 23 and is of a length to extend into the sleeve 41 as indicated by dot-dash lines, when the button is pressed downwardly.

An end piece 60 of insulating material is inserted in the lower end of the casing. This end piece fits against the positioning sleeve 46 to hold the parts in place and is secured to the casing by screws 61. An aperture 62 is provided in this end piece to receive the flexible cable 13. A divided tapered clamp 64 is provided on the cable near its end and fits into the tapered extension 65 of aperture 62. This clamp is wedged into the aperture by a cap 66 threaded onto the lower end of end piece 60. An aperture 67 is provided in the cap through which the cable extends. The cable has four wires as indicated, two of these wires 68 being connected to the stationary contacts 21 and 22 by means of screws 26 and the other two wires 70 being connected to the coil 38 of the electromagnet. These connections are not illustrated in order that the construction of the mechanism within the casing may be more readily seen.

It is preferred to connect the coil 38 of the electromagnet to alternating current supply mains, such arrangement being illustrated schematically in Figure 4 where the supply mains are designated W1 and W2. The contacts ST in circuit with the coil are closed automatically when the car reaches a certain distance from the landing at which a call has been registered. Such call may be either a call registered from within the car or a call registered from a landing or it may be only a call registered from a landing, depending upon the type of installation. In certain types of installations where both an up call and a down call may be registered from each of a plurality of landings, it is desirable to stop the car on its upward trip at a landing at which a down call is registered under conditions where no call is registered for a landing above. In such systems, this is effected by the engagement of contacts HR when the car reaches a certain distance from such landing. When the coil of the electromagnet is energized, the core is caused to vibrate within the coil, this vibration being transmitted to the button 30 through the extension 56 of operating rod 28. It is preferred to connect a rectifier 75 in series with the coil. This halves the periodicity of the vibrations and increases their intensity, thus insuring a positive forceful signal to the car attendant to release the button.

In operation, to start the car the attendant presses button 30, bridging contacts 21 and 22, the handle being gripped with the fingers and the button being pressed with the thumb. In systems where the start control switch controls the doors, the bridging of these contacts also effects the closing of the doors and the car starts as the doors reach closed position. The attendant maintains the button pressed until a signal is received. Upon the car reaching a certain distance from a floor at which a call is registered, contacts ST engage completing a circuit for coil 38. As a result the core 50 is actuated to give a vibrating signal to the button 30 through its stem 28 and extension 56. Upon receiving the signal, the attendant releases the button and the car is caused to slow down and stop at the floor.

The coil of the electromagnet may be connected across direct current supply lines in which event a single impulse is given to the button upon completion of the coil circuit. In such arrangement, the contacting disc 27 may be fastened directly to the operating rod and thus be forced off the stationary contacts by the upward stroke of the electromagnet core.

The provision of an extension cable for the start control switch enables the car attendant more effectively to guard the passengers against closing doors as he can stand over at the door opening and more readily follow the doors in closing. This is true whether or not the control switch is provided with vibrating mechanism. The groove in the handle enables the control switch to be hung up when not in use. When it is desired to shut down the car or, in systems arranged for change-over to automatic operation, when the change-over is effected, the plug is withdrawn from the receptacle and the

switch removed from the car, thus obviating unauthorized use.

The construction described is subject to considerable variation. This is especially true of the details of construction of the control switch where the vibrating mechanism is not provided. The control switch may be used for straight car switch operation in which case the release of the button initiates the slow down operation instead of rendering mechanism actuated in accordance with car movement effective to do so. The vibrating mechanism may be arranged in handles in which the control mechanism is outside the handle. Also the rectifier in circuit with the vibrating mechanism actuating coil may be employed with other forms of vibrating mechanism.

Therefore, 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; an operating panel mounted within an elevator car; circuits in the rear of said panel; a start control switch external to said panel, said start control switch having a cylindrical casing, circuit controlling contacts arranged within said casing and a push button member extending into one end of said casing for actuating said contacts; electrical vibrating mechanism within said casing having an electromagnet and a core for actuation by said electromagnet to impart vibrations to said push button member, said member having an extension to be engaged by said core; and a flexible electrical extension cable connecting said circuit controlling contacts and vibrating mechanism to said circuits.

2. In combination; a cylindrical casing; a pair of spaced contacts mounted in said casing; a push button extending into the upper end of said casing and having a depending stem carrying a bridging contact for enaging said contacts, said push button being biased to position in which said bridging contact is disengaged from said contacts; an electromagnet within said casing below said push button and having a coil wound on a sleeve aligned with said stem; and a movable core for said electromagnet extending upwardly into said sleeve and biased to unattracted position, said stem having an extension adapted to be engaged by said core upon being pulled upwardly by energization of said electromagnet.

3. In combination; a cylindrical casing; a pair of contacts mounted in said casing; a push button member extending into said casing and carrying a bridging contact for yieldably engaging said contacts, said push button member being biased to position in which said bridging contact is disengaged from said contacts; an electromagnet within said casing and having a coil wound on a sleeve aligned with said push button member; a core for said electromagnet movable in said sleeve to engage said push button member upon energization of said electromagnet, said core being biased to position disengaged from said push button member; a source of alternating current; a rectifier; and means for connecting said coil to said source in series with said rectifier to cause vibrative movement of said core by said electromagnet and thus the imparting of vibrative impulses to said push button by said core.

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