

April 14, 1953

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2,634,828

CLOSURE OPERATOR CONTROL MECHANISM

Original Filed Jan. 27, 1951

3 Sheets-Sheet 1

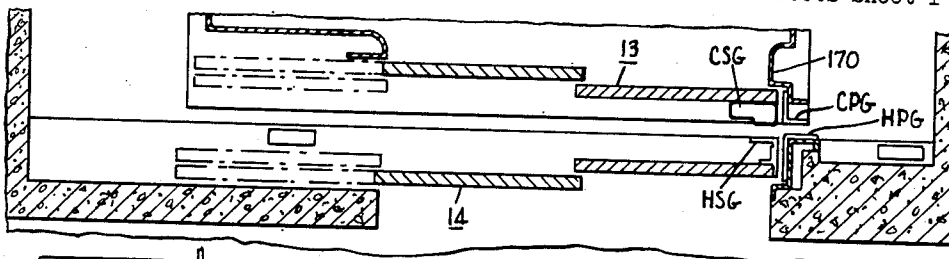


FIG. 1

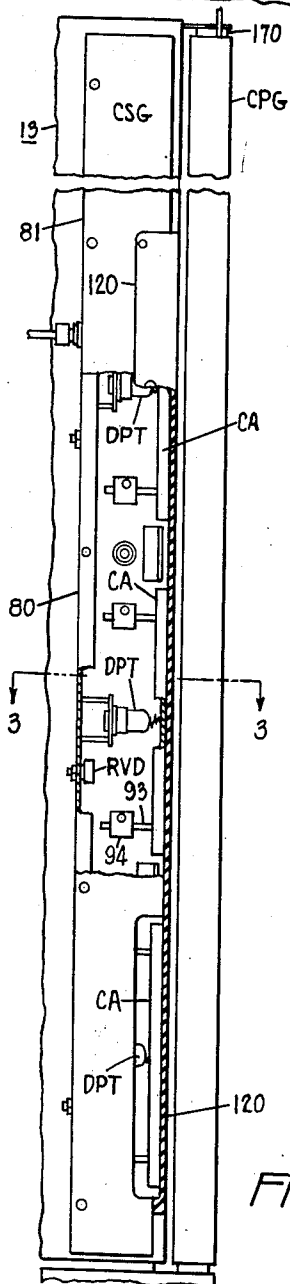


FIG. 2

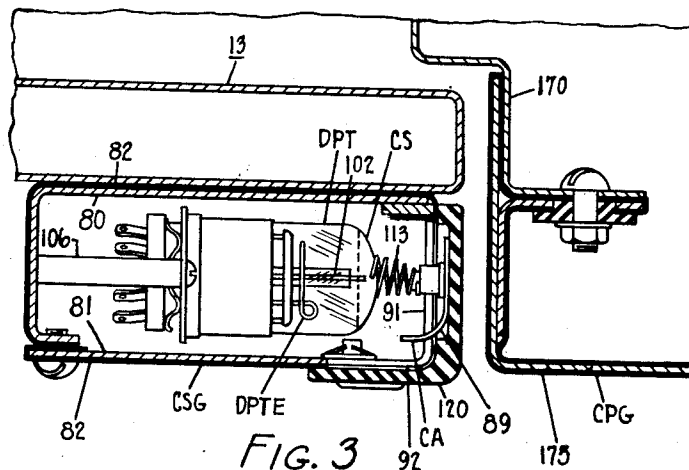


FIG. 3

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3 Sheets-Sheet 2

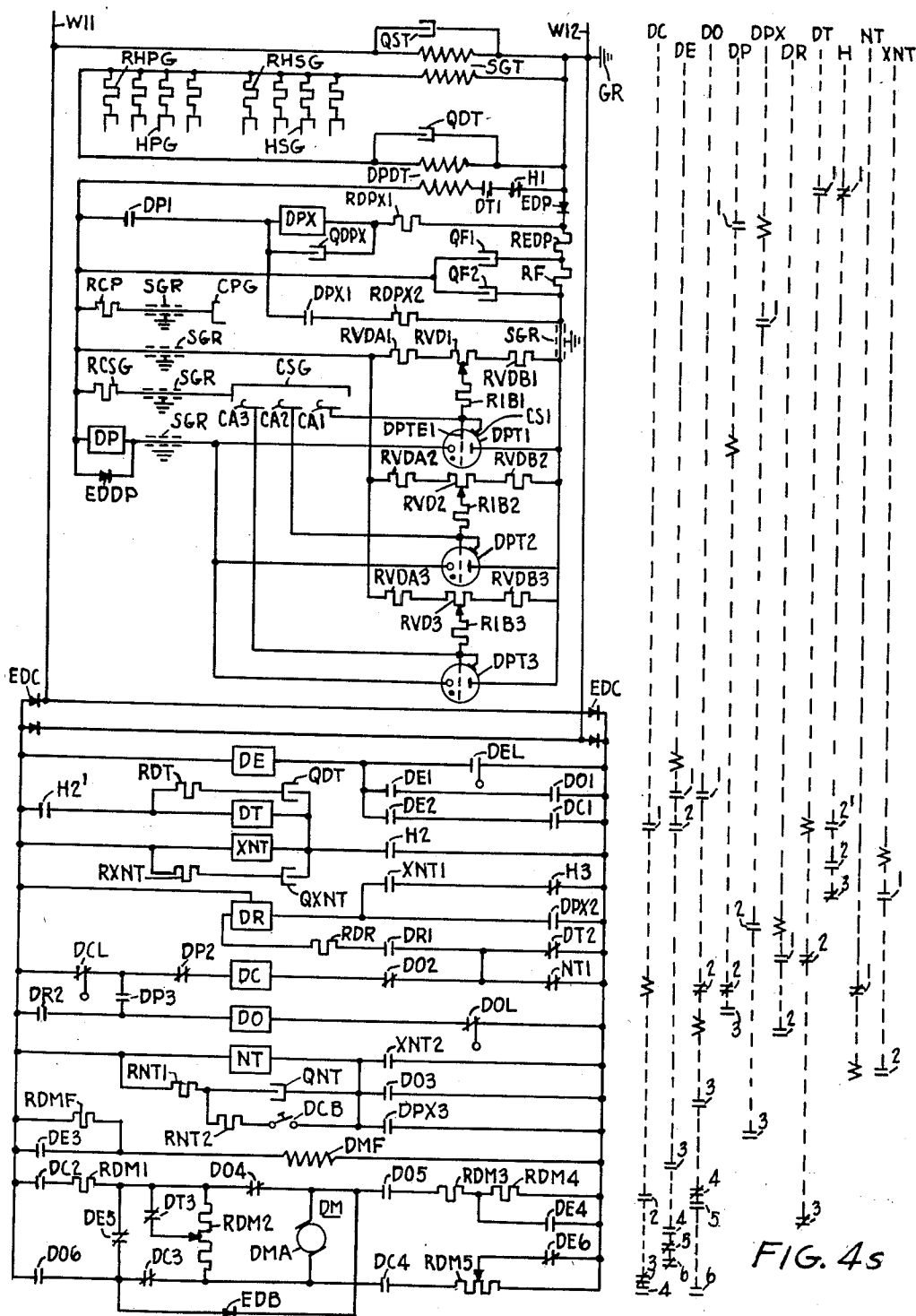


FIG. 4

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3 Sheets-Sheet 3

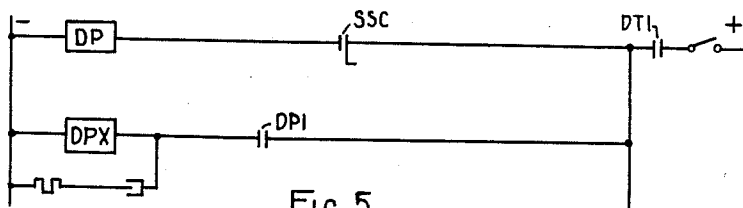
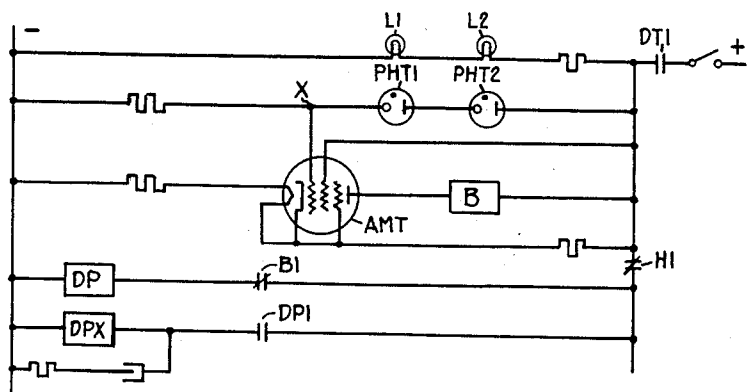
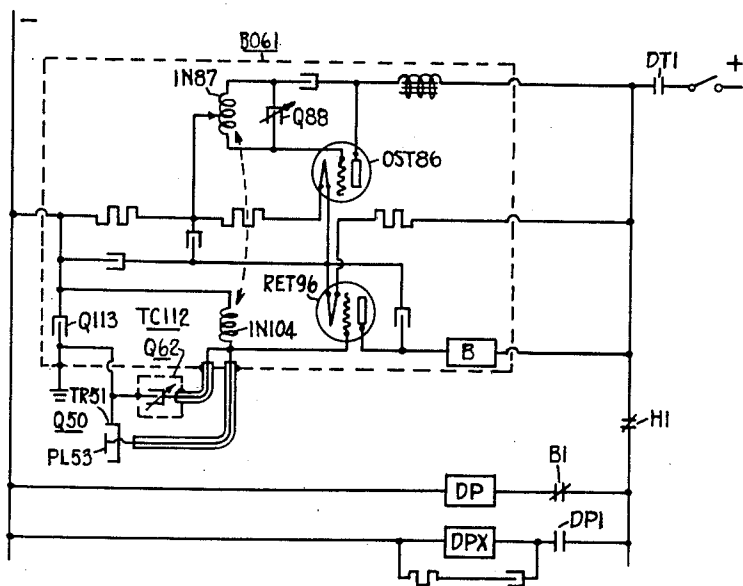


FIG. 7

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2,634,828

CLOSURE OPERATOR CONTROL
MECHANISM

William Henry Bruns, Lincolndale, and Samuel Davis, Brooklyn, N. Y., assignors to Otis Elevator Company, New York, N. Y., a corporation of New Jersey

Original application January 27, 1951, Serial No. 208,164, now Patent No. 2,601,520, dated June 24, 1952. Divided and this application January 9, 1952, Serial No. 265,672

6 Claims. (Cl. 187—48)

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The invention relates to closure operator control mechanism, especially for elevator doors, and is a division of the application of William H. Bruns and Samuel Davis, Serial No. 208,164, filed January 27, 1951, now Patent No. 2,601,520, dated June 24, 1952, for Safety Mechanism for Doors.

It is common practice in present-day elevator installations to effect closing of the doors automatically. In passenger installations in which the starting of the car is under the control of an attendant, the attendant also acts as a guard to prevent passengers being struck by a closing door. However, this is not the case in installations in which the car is started automatically as, for example, where both the starting and stopping of the car are under the control of the passengers themselves. In many of such installations in which the car door or both the car door and hoistway doors are power operated, safety devices have been provided for stopping the closing of the door when a transferring passenger or an inanimate object is or is about to be struck. Depending on the arrangement, this softens the blow, or obviates the person being struck, thereby minimizing the possibility of real injury. In installations in which such protective mechanism is provided, it may happen, due for example to unwanted operation of the protective mechanism or the continued presence of an object or person in the path of closing movement of the door, that the door fails to close within a reasonable time.

It is the object of the invention to cause operation of the power operating mechanism to exert a force to close the door, notwithstanding the operation of the protective mechanism, when the door is delayed in closing for a predetermined time interval. It is also an object of the invention to cause the closing of the door to take place at a reduced speed so that if a person is in the path of the closing door he is nudged out of the way without real injury.

In elevator installations of the above character it is customary to initiate the door opening operation incident to the stopping of the elevator car at a landing. Also where the starting of the car is initiated automatically, as in response to registered calls or to dispatching mechanism at the terminal floors, the closing of the door takes place automatically incident to the starting operation. The door is caused to remain open for a predetermined door time interval when a stop is made to insure sufficient time for passenger transfer to be effected. When a stop is made at an intermediate floor, the door closing operation

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normally takes place upon the expiration of the door time interval whereas in the case of dispatching of the car from a terminal floor the door closing operation usually is initiated by the dispatching mechanism incident to the starting operation, provided the door time interval has expired. In carrying out the invention according to the preferred arrangement, should the door have not reached closed position by the expiration of a predetermined time interval say from time the stop is made, circuits are established to cause operation of the door closing mechanism to close the door at a reduced speed, notwithstanding the operation of the protective mechanism.

Features and advantages of the invention will be apparent from the above statements and from the description which follows and the appended claims.

In the drawings:

Figure 1 is a somewhat simplified plan view of an elevator car door and associated hoistway door embodying the invention;

Figure 2 is an enlarged detail in front elevation with parts broken away illustrating the protective mechanism along the front edge of the car door of Figure 1, with the door abutting the strike jamb;

Figure 3 is an enlarged detail taken along the line 3—3 of Figure 2;

Figure 4 is a simplified schematic wiring diagram of that portion of elevator power and control circuits which relate to the control of the doors of an elevator installation, including circuits for one form of door protective mechanism and embodying the invention;

Figure 4s is a key sheet for Figure 4, showing the electromagnetic switches in spindle form; and

Figures 5, 6 and 7 are simplified schematic wiring diagrams of circuits for other forms of door protective mechanism to which the invention is applicable.

In view of the simple circuits involved, no key sheets are shown for the wiring diagrams of Figures 5, 6 and 7.

Referring to Figures 1 to 3, the car door 13 and hoistway door 14 are illustrated as two speed, side opening doors. Vertical channels known as sight guards are provided at the leading edges of the car door and hoistway door to close the space between them, the car door sight guard being designated CSG and the hoistway door sight guard being designated HSG. The car door sight guard is made up of a pair of vertical

angles 80 and 81 secured to the front edge of the door and each covered on its outer side with sheet insulating material 82. The strike jamb for the car door comprises the strike column 179 of the elevator cab on which is mounted a car post guard CPG covered with insulating material 175. The hoistway door sight guard HSG is of the same construction as the car post guard. The hoistway door strike jamb arrangement is similar to that of the car door strike jamb, being provided with a hoistway door post guard HPG.

A plurality of antennae CA are arranged at cut out portions along the front face of car sight guard angle 81 to cover a space sufficient to scan a person of average height. Each antenna is in the form of a conductive plate secured by mounting posts 93 and blocks 94, both of insulating material, to angle 80. Arranged behind each antenna and mounted on posts 106 is an electronic cold cathode gas tube DPT. An area CS on the outside of the tube envelope at the top adjacent anode 102 is covered with an electrically conductive material, this conductive spot CS and control electrode DPTE of the tube both acting as controls for the tube. A spiral spring 113 connects the spot CS to the antenna, the control electrode also being connected to the antenna as indicated in the wiring diagram. The tube is fired by effecting an increase in antenna to ground capacity by the body capacity to ground of a person in the zone of influence of the antenna. The arrangement for each of tubes DPT is the same. A face plate 120 of opaque insulating material commensurate with the scanning area along the front edge of the car door covers the face 91 and side 92 of angle 81.

To prevent unwanted firing of the tubes, they are shielded from ground by placing a potential on the sight guards CSG and HSG and post guards CPG and HPG. The potential on the sight guards also minimizes the capacity of antennae to ground, thus greatly enhancing the effect of body capacity to ground in firing the tubes. Voltage divider resistors RVD, one for each tube, are mounted on the back of angle 80. The above described arrangement not only protects against the closing car door but, owing to the provision of the curved edges 89 of the antennae exposed toward the hoistway door, extends the zone of influence to provide protection against the closing hoistway door as well.

Reference may now be had to Figure 4 which illustrates diagrammatically the various circuits for controlling the operation of the motor DM of mechanism for operating both the car door and the hoistway door for a floor at which the car is stopped. The circuits are shown in "across-the-line" form, the relationship of the coils and contacts being seen from Figure 4s where the coils and contacts are in horizontal alignment with the corresponding coils and contacts in the wiring diagram. Inasmuch as the invention is applicable to various forms of elevator control systems, a complete elevator control system has not been shown.

The electromagnetic switches employed in the circuits shown in Figure 4 are designated as follows:

DC—Door close switch
DE—Door speed switch
DO—Door open switch
DP—Door protective relay
DPX—Auxiliary door protective relay
DR—Door control switch
DT—Door time switch

H—Field and brake switch

NT—Hall time switch

XNT—Auxiliary hall time relay

Throughout the description which follows, these letters will be applied to the coils of the above designated switches and, with reference numerals appended thereto, to the contacts of these switches.

The door protective circuits are connected to a source of single phase alternating current represented by wires W11 and W12. SGT and DPDT are constant voltage transformers for providing the desired values of alternating current voltage. The car door sight guard CSG and the car door strike jamb post guard CPG are connected to the ungrounded side of the secondary winding of transformer DPDT, thus shielding the tubes from unwanted operation due to ground potential. The hoistway door sight guards HSG and the hoistway door strike jamb post guards HPG are connected to the ungrounded side of the secondary winding of transformer SGT, thus shielding the doors against unwanted operation as they near closed positions. The voltages applied to sight guards HSG and CSG and to post guards HPG and CPG are substantially in phase. Condensers QST and QDT are surge protecting condensers. Resistors RHPG, RHSG, RCP, RCSG are current limiting resistors.

The circuits for three door protective tubes DPT are illustrated. The door protective tubes and their respective associated apparatus are differentiated from each other by the appended numerals 1, 2 and 3. An adjustable point on voltage divider resistor RVD for each tube is connected by way of current limiting resistor RIB to the control electrode DPTE and conductive spot CS of the tube. The antenna CA for each tube also is connected to the control electrode DPTE and conductive spot CS. Direct current is provided through rectifier EDP for the anode-cathode circuits of the tubes, approximately 150 volts being obtained with 120 R. M. S. volts from the transformer secondary winding which is insufficient in itself to cause breakdown of the tubes. A filter network is provided by condensers QF1 and QF2 and resistor RF. Resistors REDP, RDPX1 and RDPX2 are current limiting resistors. To prevent any undesirable effect on the tubes by action of stray fields, shielded conductors are employed with the shields connected to ground as indicated at the points SGR. The door operating circuits are illustrated as provided with direct current derived through rectifier EDC.

The manner in which the doors are controlled may vary considerably. In the particular circuits illustrated, the doors open automatically as a stop is made at a landing and close automatically upon the expiration of a given time interval. Relay XNT and switch NT are both operated during the running of the car. As the car arrives at the landing at which the stop is being made, switch H drops out, separating contacts H2 to disconnect the coil of relay XNT from the supply lines, the dropping out of this relay being delayed by the discharge of condenser QXNT. Switch H also engages contacts H3 to complete a circuit by way of contacts XNT1 for the set coil of switch DR. This switch operates and latches itself in operated condition, engaging contacts DR2 to complete a circuit by way of door open limit switch DOL for the coil of switch DO. This switch engages contacts DO5 and DO6 and separates contacts DO4, establishing a circuit for the armature DMA for the door operating motor

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through resistors RDM3 and RDM4 for causing the operation of the door operating mechanism to open the car door and also the hoistway door at the floor at which the stop is being made. As the doors move a certain distance, door speed limit switch DEL closes to complete a circuit for the coil of switch DE. This switch engages contacts DE3 to short circuit resistance RDMF in circuit with door motor field winding DMF and engages contacts DE4 to short circuit resistance RDM4 in circuit with armature DMA. As the doors near open position, switch DEL opens. As the doors reach open position, door open limit switch DOL opens, deenergizing switch DO which drops out to break the circuit for armature DMA. It also deenergizes switch DE which drops out, engaging contacts DE5 to establish a short circuit for armature DMA to bring the door operating motor to a stop.

Upon the expiration of a given time interval, relay XNT drops out, separating contacts XNT2 to disconnect the coil of switch NT from the supply lines. This switch does not drop out immediately, being delayed by the discharge of condenser QNT. Upon dropping out, switch NT engages contacts NT1 to establish a circuit by way of contacts DR1 for the reset coil of switch DR which is restored to unlatched condition. Contacts NT1 also complete a circuit by way of door close limit switch DCL and contacts DP2 and DO2 for the coil of door close switch DC to initiate the door closing operation. A time interval is thus provided, namely the interval of relay XNT, say three seconds, plus the interval of switch NT, say another three seconds, or a total of six seconds, from the time that the stop is made before the closing of the doors is initiated. Switch DC upon operation engages contacts DC2 and DC4 and separates contacts DC3 to complete a circuit for armature DMA for effecting operation of the door operating mechanism to close the car door and hoistway door. During the closing operation, limit switch DEL is again closed, causing operation of switch DE which short circuits motor field resistance RDMF and in addition separates contacts DE6 to remove a short circuit for a portion of resistor RDM5. As the doors reach closed position, limit switch DCL opens, breaking the circuit for the coil of switch DC which separates contacts DC2 and DC4 to break the circuit for the door motor armature DMA and separates contacts DC1 to break the circuit for the coil of switch DE. This switch drops out to reengage contacts DE5 to establish a short circuit for armature DMA to bring the door operating motor to a stop. If desired, as where a passenger is in the car and no further passenger transfer is to be made, the passenger can by pressing door close button DCB shorten the time interval that the doors remain open by establishing a short circuit for condenser QNT.

The protective circuits are effective only while the car is stopped due to the provision of contacts H1. Referring for example to the circuits for tube DPT1, there is a capacity network from antenna CA1 to shield CSG and from antenna CA1 to ground. Thus a biasing voltage is applied to both the control electrode DPTE1 and the conductive spot CS1 adjacent the anode, which bias is due to a direct current potential taken from resistors RVDA1, RVD1 and RVDB1, and an alternating current potential which is a function of the ratio of the two capacity networks. This is adjusted so that the biasing voltage is just below tube breakdown value. Resistor RIB1

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is of such value as to effectively isolate the alternating current source from the direct current source. When a person enters or leaves the car his body capacity in effect increases the antenna to ground capacity and thus brings the potential of the conductive spot and control electrode to which it is connected nearer to ground potential. When during the closing of the doors antenna CA1 comes within a certain distance of a person, the alternating current potential reaches a value which causes breakdown of tube DPT1. This completes the anode-cathode circuit of the tube which extends through the coil of door protective relay DP, causing this relay to operate. Upon operation, relay DP separates contacts DP2 to break the circuit for the coil of door close switch DC. Switch DC in dropping out breaks the circuit for door motor armature DMA and in addition engages contacts DC3 which completes a short circuit for armature DMA through braking rectifier EDB. This acts in effect as a short circuit for armature DMA and brings the doors to a quick stop.

Relay DP, upon operation, also engages contacts DP3 to complete a circuit for the coil of door open switch DO, causing the immediate re-opening of the doors. It also engages contacts DP1 to complete the circuit for the coil of auxiliary door protective relay DPX. This relay, upon operation, engages contacts DPX2 which complete a circuit for the set coil of switch DR. It also engages contacts DPX1 to by-pass the circuits for tubes DPT, causing the dropping out of relay DP. This relay is delayed slightly in dropping out by the discharge of its coil through rectifier EDDP to insure operation of switch DO. Switch DO is maintained energized through contacts DR2 after contacts DP3 separate. When relay DP drops out it separates contacts DP1 to break the circuit for the coil of relay DPX. This relay is delayed in dropping out by the discharge of condenser QDPX to insure deionization of tubes DPT.

Upon the operation of switch DO to initiate the door opening operation, contacts DO3 engage to complete a circuit for the coil of switch NT, causing this switch to operate. This circuit is maintained through contacts DO3 until the doors reach open position. Thus the time delay before the reclosing of the doors starts from the time they reach open position. This time interval is that due to switch NT alone and is thus shorter than the time interval provided when the doors are opened incident to stopping the car at a landing.

In this connection, it is to be noted that in case of congestion when the passenger transfer cannot be effected quickly, so long as any person is in the zone of influence of the antennae there will be repeated operations of relays DP and DPX until this condition ceases to exist. Thus the coil of switch NT is repeatedly energized by way of contacts DPX3 to maintain the doors in open position. Also the time delay in the dropping out of switch NT does not start until the congestion is cleared. The delayed dropping out of relay DPX insures the full charging of condenser QNT and thus the reestablishment of the full time interval of switch NT in the event that relay DPX is operated during the time interval of switch NT.

The system is arranged so that if due to the protective mechanism the doors fail to close after a certain period, say fifteen seconds, the door protective mechanism is rendered ineffective and the door operating motor is energized for closing

the doors at a reduced speed. Switch DT is utilized for this purpose. This switch is energized during running of the car, the circuit through its coil being completed by way of contacts H2 and H2'. When a stop is made at a landing, these contacts separate to disconnect the coil of switch DT from the supply lines. This switch is delayed in dropping out for the prescribed period, say fifteen seconds, by the discharge of condenser QDT. Upon dropping out, switch DT separates contacts DT1 to render the protective circuits ineffective and also engages contacts DT2 to reset switch DR and to complete a circuit by way of contacts DP2 for the coil of door close switch DC. Switch DC operates as above described to complete a circuit for the door operating motor for effecting the closing of the doors. Switch DT also engages contacts DT3 to short circuit a portion of resistance RDM2 across motor armature DMA, causing the door closing operation to take place at a reduced speed so that if any one is hit he will not be injured. This arrangement obviates shutting down the car at a floor in the event of unwanted operation of the protective mechanism due, for example, to oversensitivity of one or more of tubes DPT.

In applying the protective mechanism to center opening doors, the two leading door sections of the car door are each arranged as above described for the leading section of a side opening car door, each leading section having its own set of tubes and associated apparatus. Where center opening doors are provided, inasmuch as the door sections close upon each other, there are no strike jambs so that the post guards are not provided. While the circuits are arranged to effect the reopening of the doors by the protective mechanism, they may be arranged simply to bring the doors to a stop, as by eliminating the control of switch DO by the protective mechanism. In any case should the doors fail to close within the selected time interval, switch DT times out to establish the door closing circuits. In some installations it may be considered satisfactory to cause the door closing operation initiated by the timing out of switch DT to take place at full speed, especially in cases where high speed door operating mechanism is not employed. This will obviate shutting down the car in case a defect has developed in the protective mechanism. However, closing at a reduced speed is the preferred arrangement, especially for high speed operating mechanism as, if any one is struck, he will simply be nudged out of the way without real injury.

Arrangements for closing the doors at the expiration of a given time interval notwithstanding the protective mechanism may be employed with door protective mechanism of other forms. To illustrate this, examples of other forms of door protective mechanism are illustrated in Figures 5, 6 and 7. These circuits are arranged to go with the door operating circuits shown in Figure 4 below rectifier EDC, illustration of the door operating circuits not being repeated. It is to be understood that the arrangement of these door protective circuits may vary, depending on the particular door operating circuits to which they are adapted, and that relays DP and DPX may be combined into a single relay.

Referring to Figure 5, the protective circuits there illustrated are for a mechanical safety shoe for a side opening door. The circuits are illustrated as supplied from a source of direct current indicated by the supply lines + and -. These

supply lines may also be used for the door operating circuits. SSC represents contacts of the safety shoe provided on the car door. When the shoe strikes a person or object during door closing, it closes contacts SSC which completes the circuit for the coil of relay DP. Relay DP in turn completes the circuit for the coil of relay DPX. As previously described, this controls the operation of switches DR, DO, DC and NT (Figure 4) to prevent the then closing of the doors or if closing to return them to open position. As in the usual construction for side opening doors, the safety shoe does not engage the strike jamb in closed position, contacts SSC will not be closed. As none of the protective circuits are energized under such conditions, contacts H1 have been omitted. In case of center opening doors, contacts SSC are provided on each of the leading door sections and are connected in parallel in the circuit for the coil of relay DP in series with a door close limit switch to open the circuit as the door reaches closed position.

Referring to Figure 6, the circuits there illustrated are for the light ray type of protective mechanism suitable for both side opening and center opening doors. PHT1 and PHT2 are indicative of a plurality of photo tubes, such as the 918 type, positioned on one side of the car door entrance to scan an area of average person height. L1 and L2 are pin point sources of light for the photo tubes arranged on the opposite side of the entrance in line respectively with the photo tubes for which they are provided. The photo tubes are arranged to act through an amplifying tube AMT having its control grid connected to the point X. This tube may be a pentode such as a 6SJ7 to provide a high gain. The coil of a switch B is in the anode-cathode circuit of tube AMT. So long as the light ray for each tube PHT is not obstructed a positive potential exists at point X to cause sufficient current flow through tube AMT to operate switch B. Thus contacts B1 are separated. Upon obstruction of one or more of the light rays as by passenger transfer, the potential at point X is reduced sufficiently to cause the dropping out of switch B. Thus contacts B1 engage to cause operation of relay DP which in turn engages contacts DP1 to cause operation of relay DPX. Relays DP and DPX control the door operating circuits to prevent the then closing of the doors or if closing to return them to open position as previously described.

Referring to Figure 7, the door protective circuits therein illustrated are based on the circuits of Figure 5 of the patent to Lubkin No. 1,982,442, granted November 27, 1934. A capacitor Q50 made up of trough TR51 and plate PL53 extends vertically over a scanning area along the front edge of the car door. Q52 is a shielded compensating condenser variable in accordance with the position of the doors for preventing unwanted operations. Connections to one side of capacitor Q50 and condenser Q52 are led through shielded cables to a box BO31. This box, the shield for condenser Q52, the cable sheaths, the other side of condenser Q52 and capacitor Q50 are connected to ground. Within box BO31 is a triode vacuum tube OST36 with its grid and anode connected to a tuned circuit made up of condenser Q53 and inductance IN37, this being utilized to generate high frequency oscillations. RET36 is a triode vacuum tube with its input circuit connected across inductance IN104. The coil of switch B is connected in the anode-

cathode circuit of tube RET96. Inductances IN87 and IN104 are inductively coupled so that the generated high frequency oscillations are induced in inductance IN104. In parallel with inductance IN104 are capacitors Q50 and Q62 to form in conjunction with condenser Q113 a tuned circuit TC112. With no person in the entrance-way the tuned circuit is in resonance with the generated high frequency oscillations causing sufficient current flow in the coil of switch B to maintain this switch in operated condition. When a person or object in the entranceway alters the electrostatic field due to capacitor Q50 and thus detunes the tuned circuit TC112 from resonance with the generated oscillations, the current flow is reduced sufficiently to cause switch B to drop out and complete the circuit for the coil of relay DP. As above explained, this controls the door operating circuits to prevent the then closing of the doors or if closing to return them to open position.

It is to be understood that in each of these arrangements, should the doors fail to close, say within 15 seconds, switch DT times out to cause operation of the door close switch DC, notwithstanding the operation of the protective mechanism. In so doing it separates contacts DT1 to render the door protective circuits ineffective and engages contacts DT3 to cause the door closing operation to take place at a reduced speed. If desired, instead of rendering the door protective circuits ineffective by the separation of contacts DT1, contacts of switch DT may be utilized to render ineffective the operation of the contacts of relays DP and DPX in the door operating circuits. Also a holding winding subject to a door open limit switch may be provided on switch DT to prevent dropping out of this switch unless the doors are in full open position.

It is to be understood that, where reference is made to protective mechanism which is actuated when a person or object is in the path of movement of the closure, this refers to protective mechanism which may or may not require actual contact. Not only may the invention be employed with other forms of door protective mechanism but also in conjunction with other forms of door operating circuits. Also other arrangements for obtaining the time interval provided by switch DT may be employed; and since there is a correlation between time delay and repeated futile attempts at closure, this latter characteristic may, if desired, be adapted with equal facility to effect closing of the closure notwithstanding the presence of an object in the path of movement of the closure. 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. An elevator installation in which an entranceway provides access to the elevator car at a floor and a closure is provided for said entranceway, in which power operating mechanism is provided for said closure and is controlled to cause opening of said closure when a stop is made at said floor and closing of the closure upon expiration of a given time interval after the stop is made, and in which mechanism is provided for protecting persons against closing of the closure; characterized in that circuit con-

trolling mechanism is provided which is responsive to repetitive operations of said protective mechanism to render said protective mechanism ineffective.

2. An elevator installation in which an entranceway provides access to the elevator car at a floor and a closure is provided for said entranceway, in which power operating mechanism is provided for said closure, in which means is provided for automatically initiating operation of said power operating mechanism to close said closure, and in which protective mechanism is provided which, when an object is in the path of movement of said closure, is actuated to delay the closing of said closure by said power operating mechanism; characterized in that means is provided which is responsive to said closure being delayed in closing by said protective mechanism for a predetermined time interval for causing operation of said power operating mechanism to exert a closing force on said closure, regardless of whether or not an object is in the path of movement of said closure.

3. An elevator installation in which an entranceway provides access to the elevator car at a floor and a door is provided for said entranceway, in which power operating mechanism is provided for said door and is controlled to cause the opening of said door when the car makes a stop at said floor and closing of said door upon expiration of a given time interval after the initiation of said door opening operation, and in which protective mechanism is provided which is responsive to a person moving into the path of said door for preventing the closing of said door by said power operating mechanism; characterized in that means is provided which is rendered effective upon failure due to said protective mechanism of said power operating mechanism to close said door within a further given time interval after said initiation of said door opening operation to cut-out said protective mechanism and to cause operation of said power operating mechanism to exert force to close said door at a speed slower than normal closing speed.

4. An elevator installation in which an entranceway provides access to the elevator car at a floor and a door is provided for said entranceway, in which power operating mechanism is provided for said door and is controlled to cause opening of said door when the car makes a stop at said floor and closing of said door upon expiration of a given time interval after the stop is made, and in which protective mechanism is provided which is actuated in response to a person moving into the path of said door to prevent the closing of said door by said power operating mechanism; characterized in that timing means is provided for providing an additional time interval after said initiation of said door closing operation under conditions where due to said protective mechanism the closing of said door and restarting of the car is not effected within such additional interval, that switching means is provided which is actuated by said timing means at the expiration of said additional interval to render said protective mechanism ineffective and that additional switching means is provided which is actuated by said timing means at the expiration of said additional interval for causing operation of said power operating mechanism to close said door at a speed slower than normal closing speed.

5. An elevator installation in which an entranceway provides access to the elevator car at a floor and a door is provided for said entranceway, in

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which power operating mechanism is provided for said door, switching mechanism being provided for controlling the operation of said power operating mechanism to open and close said door, in which means is provided for causing operation of said switching mechanism to effect closing of said door upon expiration of a given time interval after initiation of door opening operation, and in which protective mechanism is provided which is responsive to a person in the path of said door to prevent operation of said switching mechanism to effect closing of said door and if the door is closing to cause operation of said switching mechanism to effect return of said door to open position; characterized in that timing means is provided which is effective when said door fails to reach fully closed position within a predetermined time interval greater than said given time interval after said initiation of the opening thereof for causing operation of said switching mechanism to effect closing of said door notwithstanding the operation of said protective mechanism, and that means is provided to cause such door closing operation to take place at a speed slower than normal door closing speed.

6. An elevator installation in which an entrance-way provides access to the elevator car at a floor and a door is provided for said entrance-way, in which power operating mechanism is provided for said door, an electromagnetically operated door close switch and an electromagnetically operated door open switch being provided for controlling the operation of said power operating mechanism, in which means is provided for caus-

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ing energization of said door open switch to effect operation of said power operating mechanism to open said door when a stop is made at a floor and for causing upon expiration of a given time interval after initiation of door opening operation energization of said door close switch to effect operation of said power operating mechanism to close said door, and in which protective mechanism is provided which is responsive to a person in the path of said door in closing to prevent energization of said door close switch if the door is fully open and if the door is closing to effect de-energization of said door close switch and energization of said door open switch to effect return of said door to open position, means being provided which is actuated upon expiration of a certain time interval after the door reaches open position and its path is cleared to effect reenergization of said door close switch to cause closing of said door; characterized in that means is provided, which is responsive to the failure of said door to reach fully closed position within a predetermined time interval greater than said given time interval after the initial opening thereof, for causing the energization of said door close switch to effect operation of said power operating mechanism to close said door notwithstanding the operation of said protective mechanism, and that means is provided to cause such door closing operation to take place at a reduced speed.

WILLIAM HENRY BRUNS.
SAMUEL DAVIS.

No references cited.