June 11, 1929. H. W. SHONNARD 1,716,568

ELEVATOR CONTROL APPARATUS

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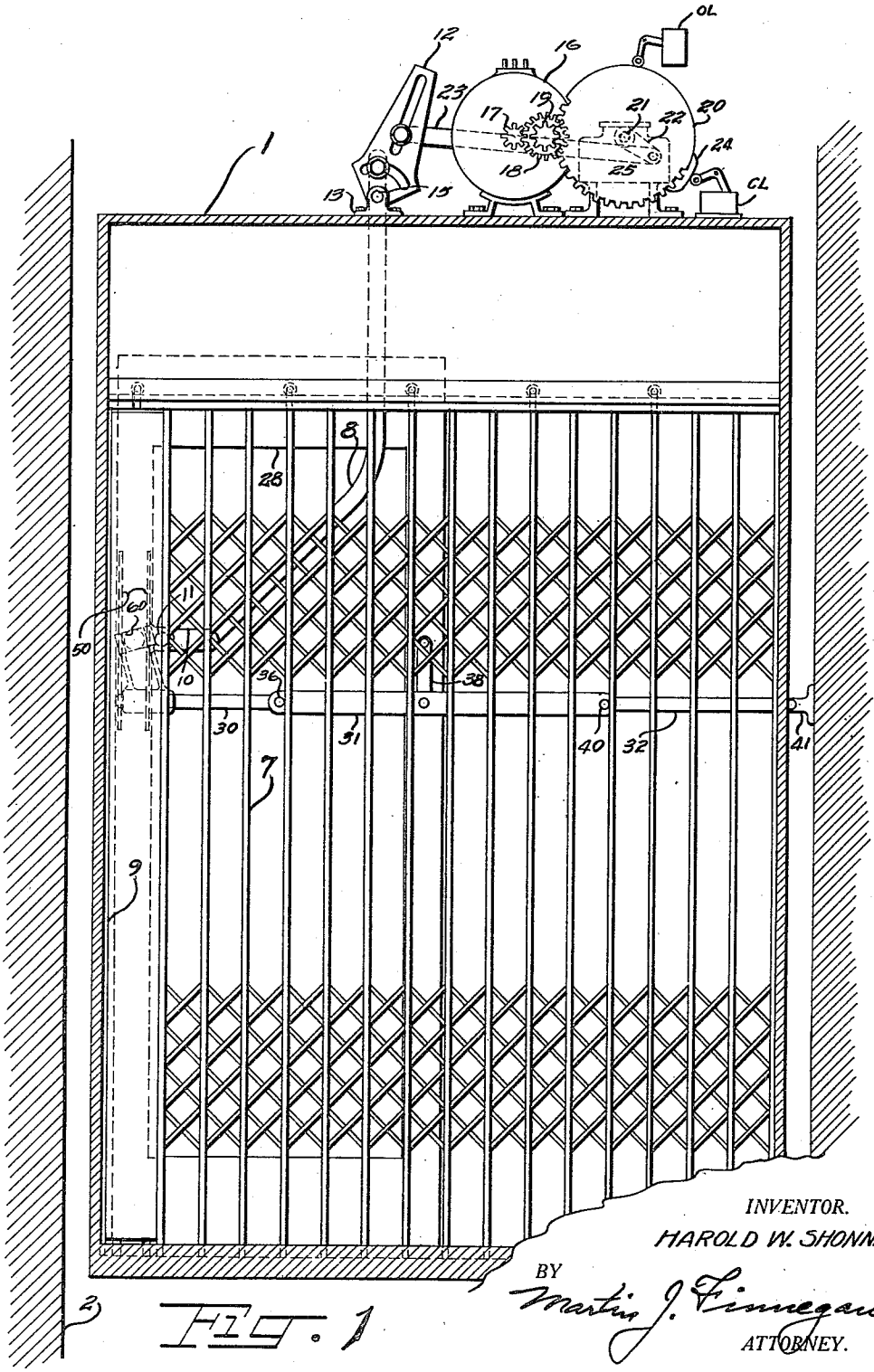


FIG. 1

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ELEVATOR CONTROL APPARATUS

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Fig. 8

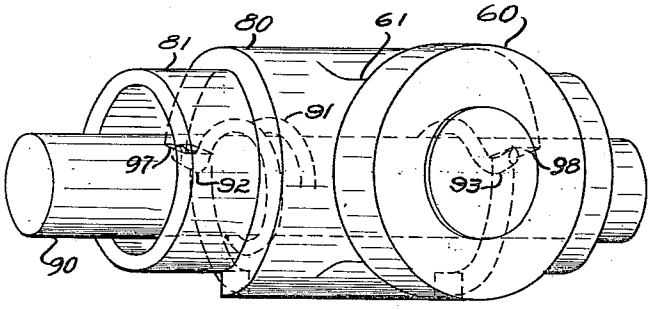


Fig. 3

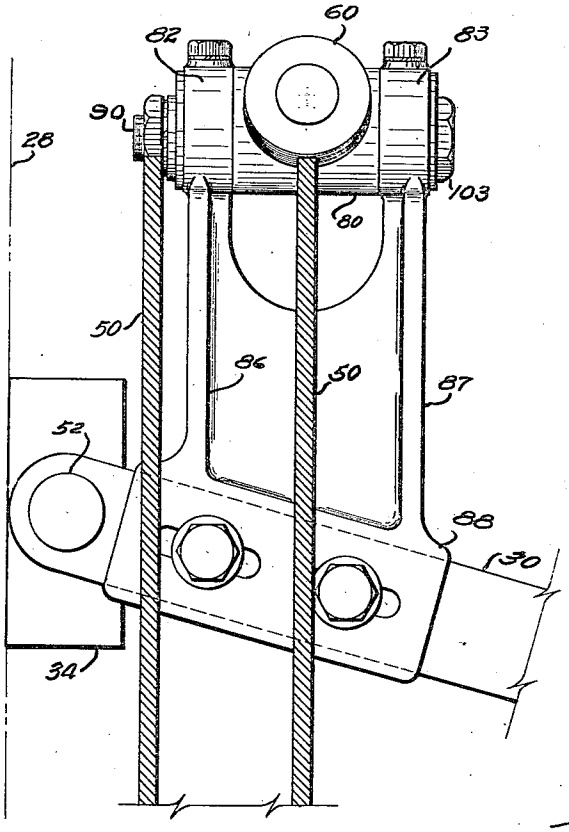
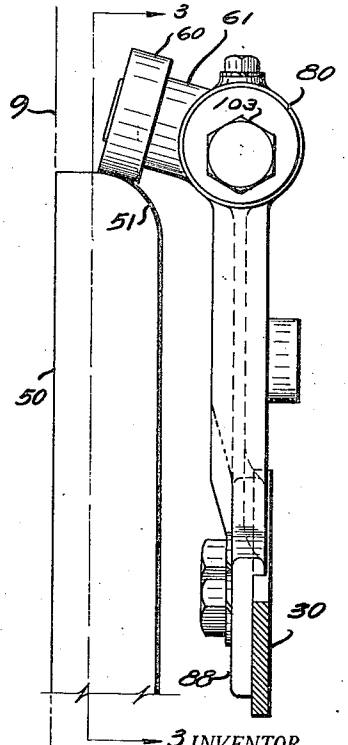


Fig. 2



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Fig. 5

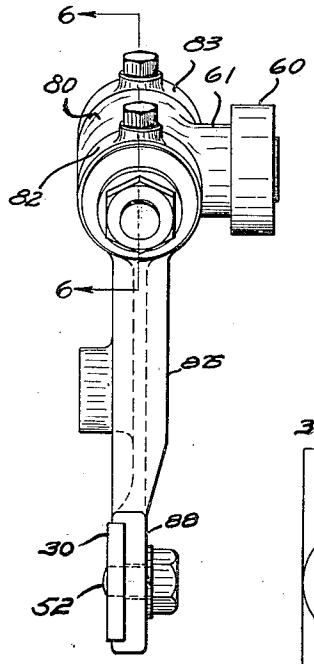


Fig. 4

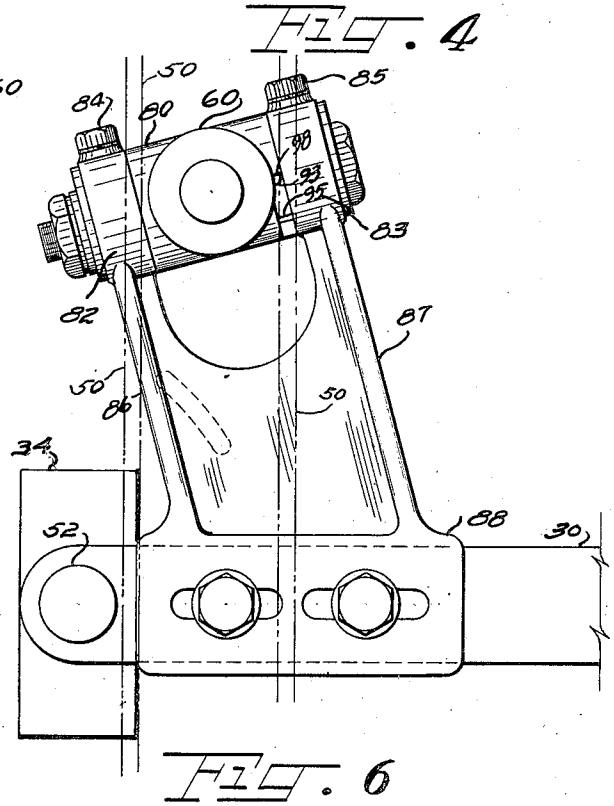


Fig. 6

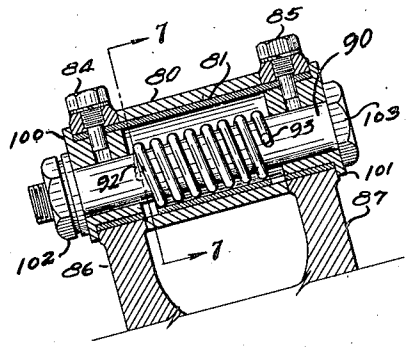
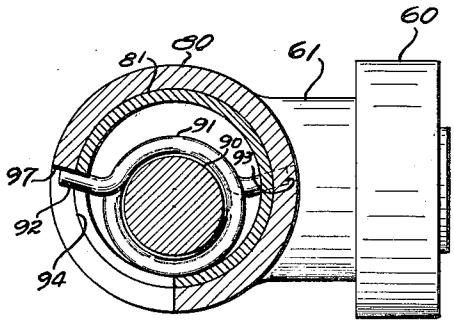


Fig. 7



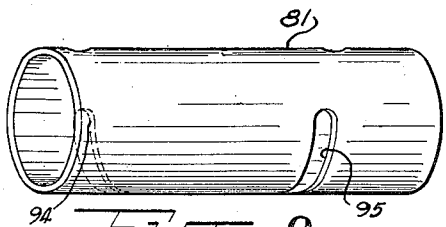


Fig. 9.

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UNITED STATES PATENT OFFICE.

HAROLD W. SHONNARD, OF UPPER MONTCLAIR, NEW JERSEY, ASSIGNOR TO ELEVATOR SUPPLIES COMPANY, INC., OF HOBOKEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ELEVATOR-CONTROL APPARATUS.

Application filed June 5, 1928. Serial No. 282,904.

This invention relates to elevators and particularly to improvements in the operation of elevator doors, including both the doors along the elevator shaftway and the doors (commonly referred to as "gates") on the elevator itself.

The invention consists principally in the provision of novel motion transmitting and self-retiring mechanism adapted to operate in conjunction with the door operating mechanism whenever the elevator stops at a landing to receive or discharge passengers. The invention is herein described and illustrated as applied to the door operating mechanism disclosed and claimed in my co-pending application for "door control means for elevators", filed December 15, 1927, and bearing Serial No. 240,305, which has matured into Patent No. 1,691,787, issued November 13th, 1928. After a perusal of the ensuing description with reference to the accompanying drawings, however, it will become apparent that the novel motion transmitting and retiring mechanism disclosed herein is capable of application to door operating mechanisms differing considerably in form and structure from that disclosed in my aforesaid co-pending application. Therefore, the invention is to be understood as being limited only by the scope of the claims appended hereto.

A principal object of the invention is to provide, in conjunction with the prime mover or motion producing means on the elevator, a driving member also on the elevator and a plurality of driven members, one associated with the doors at each shaftway landing, the driven members being engageable in succession by the driving member on the elevator to produce operation of the shaftway doors in response to the energization of the motion producing means on the elevator as the elevator stops at the respective landings.

A further object of the invention is to so position the driving member on the elevator on the one hand and the driven members along the shaftway on the other that the transmission of motion from one to the other will be effected by means of producing contact between lateral surfaces on each of the members whereby sidewise movement of the driving member will produce corresponding lateral movement of the driven member.

In this connection a further object of the invention is to provide means associated with one of said members to cause it to recede from its normal position upon being struck from above or below by the other member. In the preferred embodiment as illustrated herein, the member constructed so as to be capable of receding under such conditions is the so-called driven member, which is mounted in the shaftway, and so constructed and disposed that in the event that, through some chance misalignment of parts, the approach of the elevator to the landing at which such driven member is located should cause the upper or lower edge, as the case may be, of the driving member (or any other projecting part on the elevator for that matter) to collide with the said driven member, the latter will automatically recede from its normal position and thereby withdraw itself from an obstructing position.

The advantage to be derived from the provision of means capable of operating as just described resides in the consequent elimination of possibility of serious accidents such as have heretofore occurred due to collisions between protruding members on the elevator and along the shaftway. Such collisions during the continued progress of the elevator along the shaftway almost necessarily result in dislocation or snapping off of some portion of the mechanism. Accidents of this nature have occurred and persons riding on the elevator or at some lower point along the shaftway have been struck by portions of the mechanism which were thus dislodged or broken off and serious injuries and even fatalities have resulted.

By the use of the construction disclosed herein such possibilities of accident are eliminated, and without sacrificing any necessary feature of operation heretofore obtained in connection with the operation of the gates on the elevator or the doors along the shaftway. For example, the self-withdrawing means just referred to is provided without in any way interfering with the normal disposition of the driven member in such manner as to constitute the means for transmitting lateral movement of the driving member on the elevator to effect lateral movement of the operating members for the landing doors.

Other objects and advantages to be derived from the use of the novel mechanism disclosed herein reside in the specific construction and inter-relation of the parts as will become apparent from the following description, the understanding of which may be facilitated by reference to the accompanying drawings, wherein—

Fig. 1 presents a view in elevation taken from within the elevator and showing the elevator gate and the landing door at one landing, together with the door operating motor on the elevator, and the novel motion transmitting and collision neutralizing means.

Fig. 2 is a view in elevation showing the motion transmitting member (or driving member as it is called in this description) on the elevator in engagement with the driven member in the shaftway, as such parts would appear in the event of a collision between them.

Fig. 3 is an elevation view in section along the line 3—3 of Fig. 2.

Fig. 4 is an elevation view of the driven member in the hatchway and a portion of its associated door operating member, the view representing on a larger scale these parts as they appear when the landing doors are completely closed and with driving and driven members in proper alignment.

Fig. 5 is a side view in elevation of parts shown in Figure 4.

Fig. 6 is a sectional view in elevation along line 6—6 in Fig. 5.

Fig. 7 is a sectional view in elevation along line 7—7 in Fig. 6.

Fig. 8 is a view in perspective of some of the parts shown in Figures 2 to 7 inclusive.

Fig. 9 is a perspective view of the cylindrical shell shown in Fig. 8.

Referring to the drawings wherein the preferred embodiment of the invention is illustrated, and wherein like reference characters refer to like parts throughout the several views, the character 1 designates an elevator adapted to travel in either direction along the hatchway 2, the elevator being provided with suitable suspension means (not shown) adapted to be controlled from the elevator hoisting motor by means of manipulation of the customary motor control member.

The elevator 1 as shown in Fig. 1 for purposes of illustration of one application of the invention, is provided with a gate 7, and as illustrated in Fig. 1 the gate is shown as of the collapsible type; but obviously other constructions may be employed. A gate operating arm 8 is shown connecting with the vertically disposed outer plate 9 of the gate 7 by means of a link 10 and pin 11. This operating arm 8 is adapted to be oscillated back and forth to effect opening and closing movements of the elevator gate 7, the means preferably employed for effecting this oscillation consisting of an adjustable rocker plate 12 anchored preferably to the roof of the elevator as indicated at 13, at which location the arm 8 is affixed thereto, preferably by the provision of a pivot pin 15. This rocker plate 12 is in turn adapted to be oscillated or rocked in response to the alternate rotations of the prime mover; the power transmitting means in the preferred embodiment, as shown in Fig. 1, consisting of a train of gears 17, 18, 19 and 20, a shaft 21 on which the gear 20 is mounted, a crank 22, and a connecting link 23. The gear 20 is preferably provided with a cam-shaped portion 24 adapted to actuate alternately the switches OL and CL, as the gear rotates first in one direction and then the other. The function of these switches is more fully explained in my aforesaid co-pending application.

Also, in the preferred embodiment of the invention, means are provided for cushioning the final movement of the elevator gate and the associated landing doors as they approach the final stage of movement in either the opening or closing direction. As shown in Fig. 1 such means consists of a double-acting liquid check 25 in which a member is connected so as to have a movement corresponding to that of the gear 20 and prime mover 16. This member has associated therewith means for retarding its progress during its final stage of movement in each direction. The structure of this cushioning mechanism 25 may, of course, vary to suit the circumstances attending any particular installation, the liquid check just described being that type disclosed and claimed in my co-pending application for an adjustable door operator, Serial No. 93,086, filed March 8th, 1926.

Each landing at which the elevator 1 may stop is provided with a door or doors preferably of the type shown at the landing indicated in Fig. 1, where a door is shown at 28 adapted to slide along in its own plane to effect an opening and closing of the hatchway 2 at that landing. This door 28 is shown in the preferred embodiment as provided with operating arms 30, 31 and 32, or toggle levers as they are commonly termed in the art. As shown, the toggle lever 30 is pivotally mounted on a plate 34 (see Fig. 3) attached to the door 28 at one end, and at the other end is connected by means of a pivot pin 36 to the outer end of the lever 31. Lever 31 is in turn pivotally mounted at a point intermediate its end to a link 38 pivotally attached to the edge of door 28. The other end of the lever 31 is pivotally connected by means of a pin 40 to the outer end of the lever 32, which is in turn connected at its inner end to a bearing lug 41 mounted on the wall of the shaftway 2 in such a manner as to permit the lever 32 to be swung about the said lug 41 in an upward direction.

With this arrangement it is evident that

any motion tending to bend the toggle levers 30 and 31 downward at their point of connection 36 will cause a corresponding upward motion of the right-hand end of the lever 31 and of the lever 32. Furthermore, this movement of the toggle levers will draw door 28 to the right to permit access to the elevator 1 when stopped at the landing referred to, such motion being imparted to the door 28 through the connecting plate 34, and through the connecting link 38.

The preferred means for imparting such opening motion to the toggle levers 30 and 31 and consequently to the door 28 comprises, as shown in Figures 1, 2 and 3, a clutching mechanism, which will hereinafter be referred to as the "driving member", consisting of a channel-shaped member 50 extending vertically along the plate member 9 of the elevator gate 7 and having the upper and lower edges of each of the two faces rounded preferably as indicated at 51 in Fig. 2. This driving member 50 is shown as attached to the said plate 9 preferably by the provision of the pin 11. This pin 11 is also utilized as heretofore indicated, as a bearing pin about which the link 10 connecting with the gate operating arm 8 may turn in response to operation of the prime mover 16, and serves to facilitate ready translation of this oscillating movement of the arm 8 and link 10 into a backward and forward horizontal movement of the driving member 50.

Adapted to be engaged in the pocket of the channel-shaped driving member 50 when the car 1 arrives opposite thereto from either direction, is a roller 60, which will hereinafter be referred to along with its associated parts as the "driven member". This roller 60 is mounted on a protruding lug or boss 61 preferably integral with a cylindrical sleeve 80, the latter being mounted on a cylindrical shell 81 which is in turn supported and held rigid in a pair of standards 82—83 preferably by means of the set screws 84—85 respectively.

These standards 82—83 have depending legs 86—87 merging into a lower flat surfaced plate 88 adapted to receive one end of the toggle lever 30 constituting part of the operating linkage for the door 28. With this construction it is apparent that lateral movement imparted to the roller 60 by engagement therewith of one of the faces of the channel-shaped driving member 50 will be transmitted to the toggle lever 30 to cause it to swing in a clockwise direction about its end pivot 52, the latter being mounted suitably on the edge of the door 28 to cause an opening movement thereof in response to the swinging of the toggle levers 30 and 31, as above described.

It is, therefore, apparent that with the members 50 and 60 properly aligned and positioned with relation to each other (as in Figures 1 and 4) the approach of the elevator 1 to the landing at which the door 28 is located will cause the roller 60 to be embraced in the pocket formed by the faces of the member 50 as indicated in phantom lines in Fig. 4. However, in the event that through some accidental occurrence the roller 60 is not at such time in proper alignment, but is instead in some such position as is indicated in Fig. 3 (possibly through failure of the door 28 to completely close) the approach of the elevator to the landing may cause one of the faces of the member 50 to collide with the roller 60 as indicated in Figures 2 and 3. In such a contingency the novel construction illustrated in Figures 4 to 9 inclusive, operates to automatically withdraw the member 60 from the path of the driving member 50, so that the elevator may proceed past the landing without disturbance of any part of the mechanism, or without injury thereto.

Referring to Figures 4 to 9 inclusive such novel structure comprises a coiled spring 91 formed of a single piece of metal and carried loosely on a shaft or pin 90 rigidly secured to the standards 82 and 83 by means of the flanged bushings 100 and 101 which are in turn held in place by the nuts 102 and 103 respectively threaded on the ends of the pin 90. One end of the coiled spring 90 is turned outwardly as indicated at 92 so as to normally bear against the upper end of slot 94 in shell 81 (shown best in Figures 7 and 9) and also bearing against the edge 97 formed on one end of the sleeve 80. The other end of spring 91 is similarly turned outwardly as indicated at 93 so as to normally bear against the upper end of slot 95 in shell 81 and also bear against the edge 98 (see Figures 4 and 8) formed at the other end of sleeve 80. The pin 90 is preferably mounted off the center of the shell and sleeve members to facilitate insertion and removal of the spring member 91.

With the construction just described it will be seen that the force exerted by each end of the spring 91 against the edges 97 and 98 respectively of the sleeve member 80 will under ordinary circumstances be nullified because of the fact that the shell 81 is rigidly held from turning by the set screws 84 and 85 previously referred to. Consequently, in the absence of any extraneous force being brought to bear from either a downward or upward direction against the roller 60, the spring 90 merely serves to maintain the sleeve 80 and hence the roller 62 in a centrally disposed position as indicated in Figures 4, 5 and 7. But in the event that the roller 60 is struck by an upwardly or downwardly moving member, as for example, one of the faces of shoe 50 on the elevator, (as may occur by reason of a misalignment of the members 50 and 60 with respect to each other) such impact will tend to rotate the roller 60 and sleeve 80 about the pin 90 as indicated in Figures 2 and

3. An upward tilting of the sleeve member 80 will cause the edge 97 to rotate the end 92 of spring 91 in a counter clockwise direction from the position indicated in Fig. 7, the other end 93 of the spring 91 being held stationary in the end of slot 95 formed in the shell 81. Such counter clockwise rotation of the sleeve 80 and the spring end 92, as viewed in Fig. 7, may continue until an arc has been traversed which is equal to the length of the slot 94 in shell 81; further rotation is then prevented since as above explained the shell 81 constitutes a rigid resistance.

Now, as soon as the continued movement of the elevator has carried the shoe 50 out of contact with the roller member 60 the torsion effort stored in the spring 90 during the counter clockwise rotation of its end 92 while the other end 93 remained stationary, is free to spend itself in returning the spring (and hence the sleeve 80) to its normal position as indicated in Fig. 7. It is, therefore, apparent that the spring operates to return the roller 60 to its centrally disposed position as indicated in Figures 4, 5 and 7 as soon as further movement of the elevator carries the driving member 50 away from the driven member 60.

In the event that the roller 60 is struck from above during the descent of the elevator in the shaftway, the operation just described will be reversed. That is to say, the roller 60 will be tilted downwardly and the end 93 of spring 91 will be rotated in a clockwise direction while the end 92 is held stationary against the end of slot 94. In either case a torque is set up in spring 91 which operates to return the spring and hence the driven member 60 to its normal position as soon as the colliding member is withdrawn.

If preferred, the driving member may be made the receding member, so as to withdraw itself on striking a disaligned driven member 60 in the shaftway. Furthermore, the receding member in withdrawing may move in a straight line rather than in an arc. Similarly other changes may be made in the construction and method of operation of the parts without departing from the scope of this invention as disclosed in the specification and as defined in the appended claims.

I claim:

1. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, means for moving said landing door in unison with said gate comprising a driving member on the elevator and a driven member connecting with the landing door and engageable by said driving member, both said members being normally positioned so that when the elevator is stopped at said landing the driving member exerts a lateral pressure against the driven member in response to the operation of said gate operating means, and means associated with one of said members to cause it to recede from its normal position upon being struck from above or below by the other member.

2. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, and means for moving said landing door in unison with said gate comprising a driving member on the elevator and a driven member connecting with the landing door and engageable by said driving member, both said members being normally positioned so as to clear each other when the elevator passes the landing without stopping, means for bringing said members into engagement when the elevator is stopped at said landing and for causing the driven member to move laterally with the driving member when a lateral surface of one of said members engages the other member, and means associated with one of said members to cause it to recede from its normal position upon being struck from above or below by the other member.

3. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, and means for moving said landing door in unison with said gate comprising a driving member on the elevator and a driven member connecting with the landing door and engageable by said driving member, both said members being normally positioned so as to clear each other when the elevator passes the landing without stopping, means for bringing said members into engagement when the elevator is stopped at said landing and for causing the driven member to move laterally with the driving member when a lateral surface of one of said members engages the other member, means associated with one of said members to cause it to recede from its normal position upon being struck from above or below by the other member, and means for automatically returning said receding member to its normal position as soon as the further movement of the elevator carries the driving member away from the driven member.

4. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, and means for coupling said landing door to said gate operating means to cause opening movement of the landing door in unison with the movement of said gate, said coupling means comprising a driving member on the elevator and a driven member connecting with the landing door, both said members being normally positioned so as to clear each other as the elevator passes the landing without stopping, means for bringing the two members into engagement in response to the operation of said gate opening means when the elevator is stopped at said

landing, said means also serving to cause lateral movement of said driven member in response to the lateral movement of said driving member, and means associated with said driven member to cause it to recede from its normal position upon being struck from above or below by the driven member as the elevator approaches said landing.

5. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, and means for coupling said landing door to said gate operating means to cause opening movement of the landing door in unison with the movement of said gate, said coupling means comprising a driving member on the elevator and a driven member connecting with the landing door, both of said members being normally positioned so as to clear each other as the elevator passes the landing without stopping, means for bringing the two members into engagement in response to the operation of said gate opening means when the elevator is stopped at said landing, said means also serving to cause lateral movement of said driven member in response to the lateral movement of said driving member, means associated with said driven member to cause it to recede from its normal position upon being struck from above or below by the driven member as the elevator approaches said landing, and means for automatically returning said driven member to its normal position as soon as the further movement of the elevator carries the driving member away from the driven member.

6. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, means for moving said landing door in unison with said gate comprising a driving member on the elevator and a driven member connecting with the landing door and engageable by said driving member, both said members being normally positioned so that when the elevator is stopped at said landing the driving member exerts a lateral pressure against the driven member in response to the operation of said gate operating means, and means associated with one of said members to cause it to recede from its normal position upon being struck from above or below by the other member, said receding means comprising a relatively stationary support and a projection extending from said support and operable to turn about said support upon the application of force against said projection from either a downward or upward direction, thereby swinging itself into a non-interfering position with respect to the other of said members.

7. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, and means for moving said landing door in unison with said gate comprising a driving member on the elevator and a driven member connecting with the landing door and engageable by said driving member, both said members being normally positioned so as to clear each other when the elevator passes the landing without stopping, means for bringing said members into engagement when the elevator is stopped at said landing and for causing the driven member to move laterally with the driving member when a lateral surface of one of said members engages the other member, and means associated with one of said members to cause it to recede from its normal position upon being struck from above or below by the other member, said receding means comprising a relatively stationary support and a projection etxending from said support and operable to turn about said support upon the application of force against said projection from either a downward or upward direction, thereby swinging itself into a non-interfering position with respect to the other of said members.

8. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, means for moving said landing door in unison with said gate comprising a driving member on the elevator and a driven member connecting with the landing door and engageable by said driving member, both said members being normally positioned so that when the elevator is stopped at said landing the driving member exerts a lateral pressure against the driven member in response to the operation of said gate operating means, means associated with one of said members to cause it to recede from its normal position upon being struck from above or below by the other member, said receding means comprising a relatively stationary support, a projection extending from said support and operable to turn about said support upon the application of force against said projection from either a downward or upward direction, thereby swinging itself into a non-interfering position with respect to the other of said members, and means for automatically returning said projection to its normal position with respect to said support as soon as the force exerted against said projection is withdrawn.

9. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, and means for moving said landing door in unison with said gate comprising a driving member on the elevator and a driven member connecting with the landing door and engageable by said driving member, both said members being normally positioned so as to clear each other when the elevator passes the landing without stopping, means for bringing said members into engagement when the

elevator is stopped at said landing and for causing the driven member to move laterally with the driving member when a lateral surface of one of said members engages the other member, and means associated with one of said members to cause it to recede from its normal position upon being struck from above or below by the other member, said receding means comprising a relatively stationary support, a projection extending from said support and operable to turn about said support upon the application of force against said projection from either a downward or upward direction, thereby swinging itself into a non-interfering position with respect to the other of said members, and means for automatically returning said projection to its normal position with respect to said support as soon as the force exerted against said projection is withdrawn.

10. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, and means for moving said landing door in unison with said gate comprising a driving member on the elevator and a driven member connecting with the landing door and engageable by said driving member, both said members being normally positioned so that when the elevator is stopped at said landing the driving member exerts a lateral pressure against the driven member in response to the operation of said gate operating means, means associated with one of said members to cause it to recede from its normal position upon being struck from above or below by the other member, said receding means comprising a relatively stationary support, a sleeve adapted to turn upon said relatively stationary support, a projection operable to turn said sleeve about said relatively stationary support upon the application of force against said projection from either a downward or upward direction, thereby swinging itself into a non-interfering position with respect to the other of said members, and means for automatically returning said sleeve to its normal position with respect to said support as soon as the force exerted against said projection is withdrawn, said automatic returning means comprising a coiled spring having one end abutting said sleeve and the other end abutting said support.

11. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, and means for moving said landing door in unison with said gate comprising a driving member on the elevator and a driven member connecting with the landing door and engageable by said driving member, both said members being normally positioned so as to clear each other when the elevator passes the landing without stopping, means for bringing said members into engagement when the elevator is stopped at said landing and for causing the driven member to move laterally with the driving member when a lateral surface of one of said members engages the other member, and means associated with one of said members to cause it to recede from its normal position upon being struck from above or below by the other member, said receding means comprising a relatively stationary support, a sleeve adapted to turn upon said relatively stationary support, a projection operable to turn said sleeve about said support upon the application of force against said projection from either a downward or upward direction thereby swinging itself into a non-interfering position with respect to the other of said members, and means for automatically returning said sleeve to its normal position with respect to said support as soon as the force exerted against said projection is withdrawn, said automatic returning means comprising a coiled spring having one end abutting said sleeve and the other end abutting said support.

12. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, and means for moving said landing door in unison with said gate comprising a driving member on the elevator and a driven member conecting with the landing door and engageable by said driving member, both said members being normally positioned so that when the elevator is stopped at said landing the driving member exerts a lateral pressure against the driven member in response to the operation of said gate operating means, means associated with one of said members to cause it to recede from its normal position upon being struck from above or below by the other member, said receding means comprising a relatively stationary support, a sleeve adapted to turn upon said relatively stationary support, a projection operable to turn said sleeve about said relatively stationary support upon the application of force against said projection from either a downward or upward direction, thereby swinging itself into a non-interfering position with respect to the other of said members, and means for automatically returning said sleeve to its normal position with respect to said support as soon as the force exerted against said projection is withdrawn, said automatic returning means comprising a coiled spring having its ends abutting both said sleeve and said support.

13. In combination with an elevator gate and a door at a landing served by the elevator, means on the elevator for opening said gate, and means for moving said landing door in unison with said gate comprising a driving member on the elevator and a driven member connecting with the landing door and engageable by said driving member, both said members being normally positioned so as to clear

each other when the elevator passes the landing without stopping, means for bringing said members into engagement when the elevator is stopped at said landing and for causing the driven member to move laterally with the driving member when a lateral surface of one of said members engages the other member, and means associated with one of said members to cause it to recede from its normal position upon being struck from above or below by the other member, said receding means comprising a relatively stationary cylindrical shell, a sleeve adapted to turn upon said relatively stationary cylindrical shell, a projection operable to turn said sleeve about said cylindrical shell upon the application of force against said projection from either a downward or upward direction thereby swinging itself into a non-interfering position with respect to the other of said members, and means for automatically returning said sleeve to its normal position with respect to said cylindrical shell as soon as the force exerted against said projection is withdrawn, said automatic returning means comprising a coiled spring having one end abutting said sleeve and the other end abutting said cylindrical shell

Signed at Hoboken, in the county of Hudson and State of New Jersey, this 4th day of June A. D. 1928.

HAROLD W. SHONNARD.