

Jan. 3, 1928.

F. HYMANS

1,654,650

SAFETY APPLIANCE

Filed April 15, 1926

3 Sheets-Sheet 1

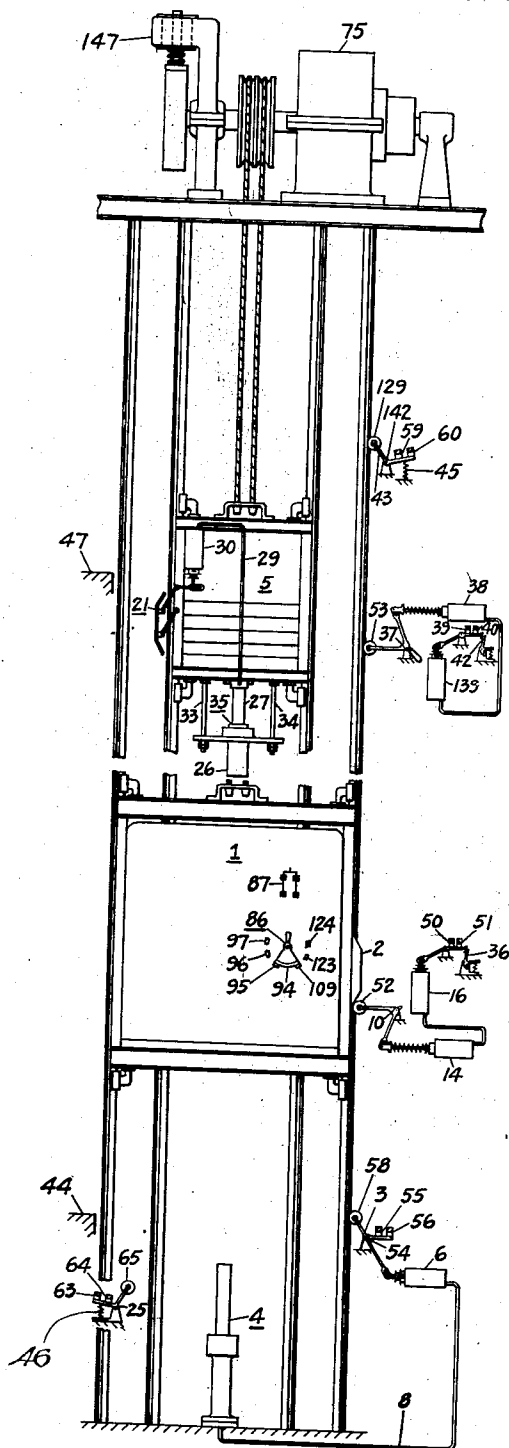


FIG. 1

Frederick Hyman, INVENTOR

BY *Walter E. Bradley* ATTORNEY

Jan. 3, 1928.

F. HYMANS

1,654,650

SAFETY APPLIANCE

Filed April 15, 1926

3 Sheets-Sheet 2

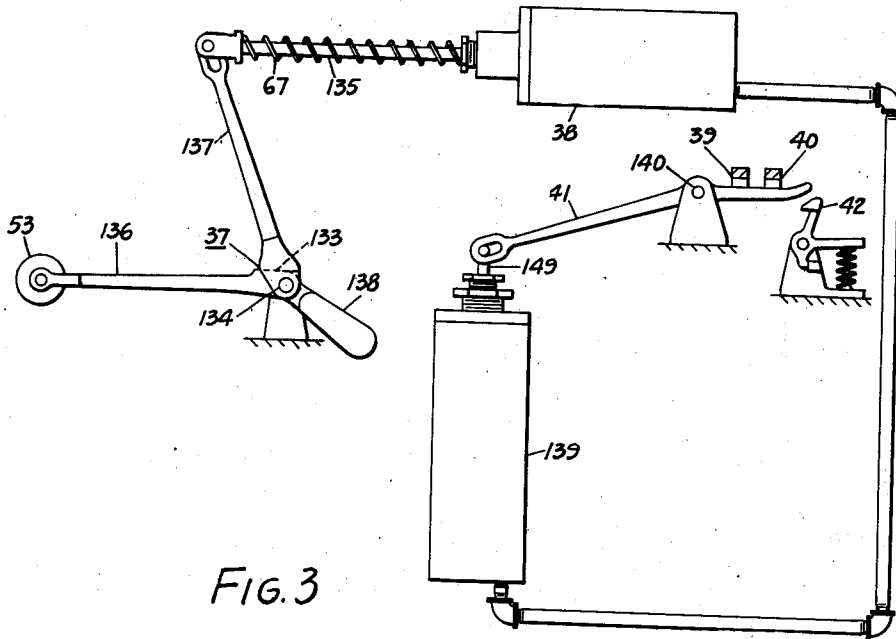


FIG. 3

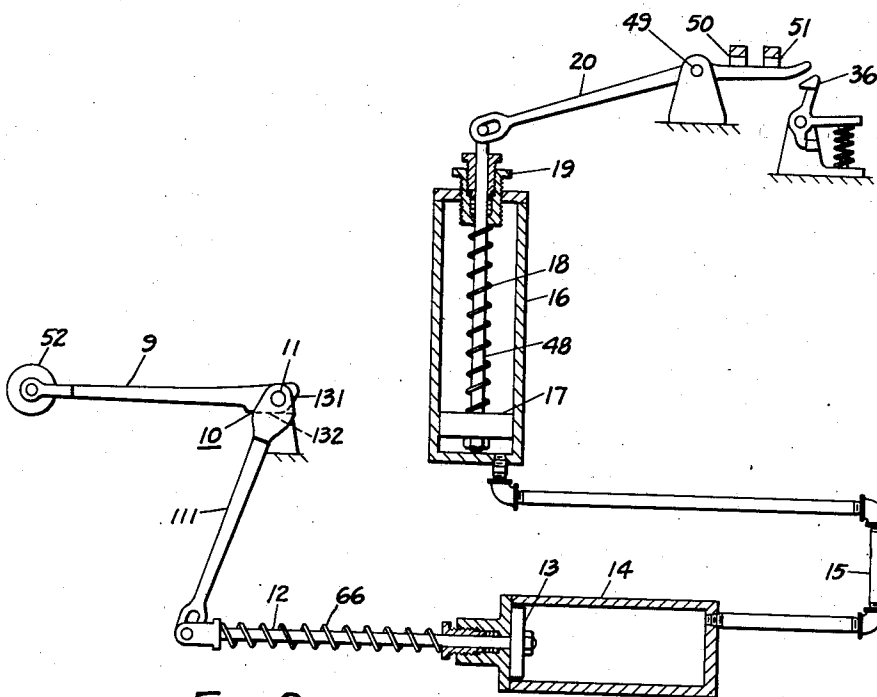


FIG. 2

Frédéric Hyman INVENTOR

BY *Walter E. Bradley* ATTORNEY

Jan. 3, 1928.

F. HYMANS

1,654,650

SAFETY APPLIANCE

Filed April 15, 1926

3 Sheets-Sheet 3

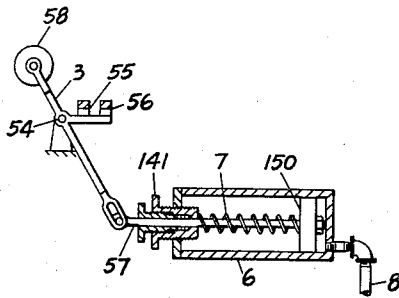


FIG. 4

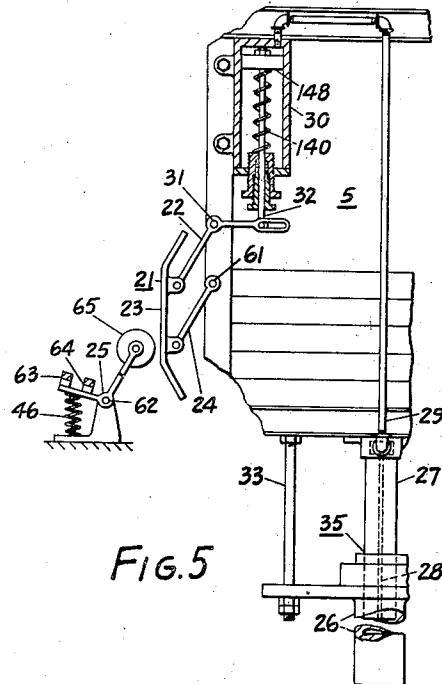


FIG. 5

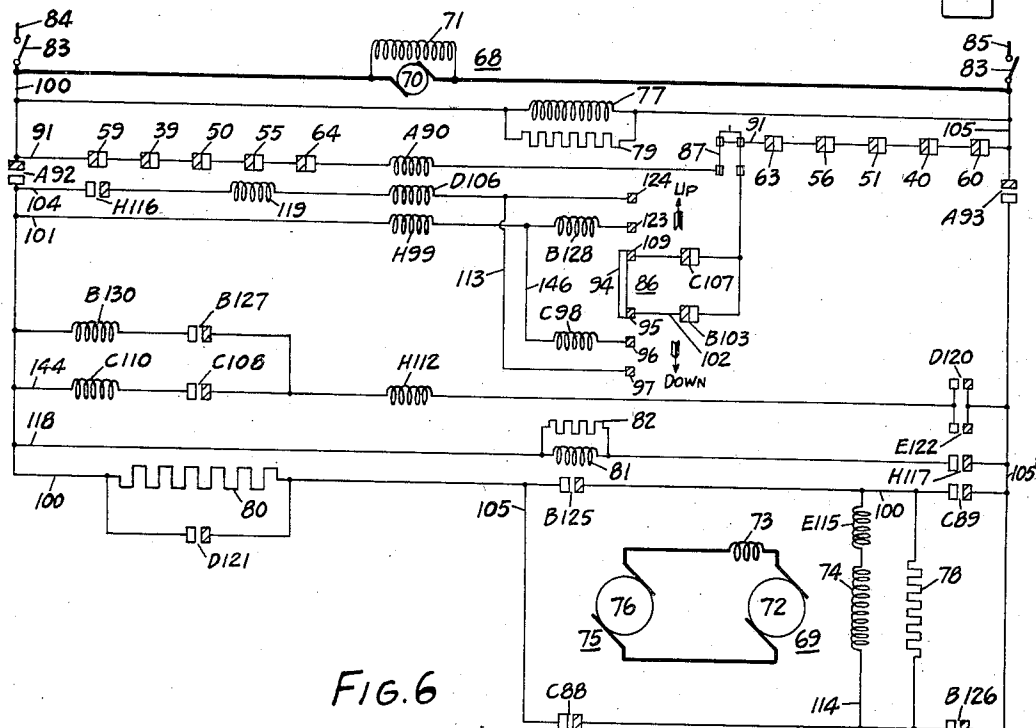


FIG. 6

Frederick Hyman INVENTOR

BY *Walter E. Bradley* ATTORNEY

UNITED STATES PATENT OFFICE.

FREDERICK HYMANS, OF YONKERS, NEW YORK, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SAFETY APPLIANCE.

Application filed April 15, 1926. Serial No. 102,196.

The invention relates to safety appliances and particularly to safety appliances for elevators.

One feature of the invention is to operate a safety appliance when a moving body of an elevator system passes a particular point above a predetermined speed.

Another feature of the invention is to operate a safety appliance when the buffer provided for a moving body of the elevator system is engaged, in the event that the body is traveling above a predetermined speed at the time of engagement.

A third feature of the invention is to insure the slowing down of the elevator car when a moving body of the elevator system passes any one of a number of points in the hatchway above a speed set for the body as a maximum in passing that particular point.

A fourth feature is to utilize the pressure developed in a fluid pressure device actuated by a moving body of the elevator system to operate a safety appliance.

A fifth feature resides in the use of a fluid pressure device actuated by a moving body of the elevator system and in which the pressure developed is a function of the speed of the moving body, the fluid pressure device being arranged to operate a safety appliance upon the pressure developed exceeding a predetermined amount.

Other features and advantages will become apparent from the specification, taken in connection with the accompanying drawings wherein the invention is embodied in concrete form.

In the drawings:

Figure 1 is a schematic representation of a typical elevator system illustrating the invention.

Figure 2 is a detail view, partly in section, of a cam operated fluid pressure apparatus and switch, arranged for actuation by a descending body.

Figure 3 is a detail view of a cam operated fluid pressure apparatus and switch, arranged for actuation by an ascending body.

Figure 4 is a detail view of a buffer operated, or cam operated, fluid pressure device with its associated switch.

Figure 5 is a detail view of a buffer and fluid pressure device mounted on a movable body and an associated switch.

Figure 6 is a wiring diagram illustrating the manner in which the safety appliances may be arranged in an elevator control system.

Referring to the drawings in detail, as illustrated in Figure 1, an elevator car 1 carries a projecting cam 2. This cam in its movement engages the rollers 129, 53, 52 and 58 of the bell cranks 43, 37, 10 and 3 respectively. These bell cranks are pivoted at fixed points in the elevator hatchway. The counterweight 5 carries a retiring cam 21 for engaging the roller 65 of the bell crank 25, also pivoted at a fixed point in the hatchway.

Referring particularly to Figure 2, the bell crank 10 turns on the fixed shaft 11 and is connected by a slot and pin to the piston rod 12. The piston rod is attached to the piston 13 which is slidably mounted in the cylinder 14. The cylinder 14 is filled preferably with a non-compressible fluid such as oil, the piston 13 having definite clearance to provide a restricted passage for fluid within the cylinder from one side of the piston to the other. The bell crank is made up of two separate links 9 and 111, so interconnected, that when the roller 52 is struck by cam 2, with the car descending, causing link 9 to swing downwardly about the fixed shaft 11, the motion of this link will be transmitted by link 111 and the slot and pin connection to the piston rod 12. This angular motion of link 9 is transmitted to link 111 by the engagement of the underside of link 9 with the bottom of the U-shaped slot of the forked end of link 111, as shown at 132. When the roller is struck by cam 2, with the car ascending, link 9 turns freely about the shaft 11 in a clockwise direction. When the cam has passed roller 52, with the car ascending, the weight of link 9 will return it to the horizontal position. Excessive upward swinging movement of lever 9 is prevented by a shoulder 131 on this lever engaging the bottom of the U-shaped slot of the forked end of link 111, so that link 9, never reaching a vertical position, will always drop back into the

position shown in Figure 2. A compression spring 66 normally keeps the piston rod 12 in its outwardly extended position thereby maintaining the link 9 horizontal.

5 Connected to the cylinder 14 by the piping 15 is the cylinder 16 mounted at any convenient location. Within this cylinder is a snug-fitting piston 17, secured to the piston rod 48. A spring 18, the force of which may be varied by the threaded bushing 19, bears against the piston 17 and urges the latter inwardly of the cylinder. The piston rod 48 is connected to the switch lever 20 fulcrumed on the fixed shaft 49. The switch lever 20 carries two contacts for cooperating with two fixed contacts, the pairs of cooperating contacts being designated 50 and 51. When the lever 20 moves to cause the separation of the cooperating contacts, a latch 36 operates to lock the lever, and hence the contacts are maintained separated. The bell crank 10 is positioned in the hatchway so as to be actuated by cam 2 carried by the car as the car, moving downwardly, approaches a lower terminal landing. During normal operation, the car will be slowing down at the time of this actuation.

The bell crank 37, as shown clearly in Figure 3, is fulcrumed on fixed shaft 134 and like bell crank 10 is connected by a slot and pin connection to a piston rod 135 operating a piston in cylinder 38. Bell crank 37 is composed of two links 136 and 137. Upward angular movement of link 136, caused when the car is ascending by cam 2 striking the roller 53, will be transmitted to link 137 by the engagement of the upper surface of link 136 with the bottom of the U-shaped slot of the forked end of link 137, as shown at 133. Downward angular movement of link 136, caused when the car is descending by cam 2 striking the roller 53, will be a free motion of this link about the shaft 134 without affecting the position of link 137. A weight 138 will maintain the link 136 horizontal as shown in Figure 3, except when the link is held out of this position by engagement of cam 2 with roller 53. A compression spring 67 will keep the piston rod 135 in its outwardly extended position except when compressed by an ascending cam striking roller 53. Cylinders 38 and 139 and their interior working parts are similar in construction to corresponding cylinders 14 and 16 and their interior parts. It is believed, therefore, that no detailed description of this particular mechanism need be given.

As in the case of switch lever 20, switch lever 41 fulcrumed on fixed shaft 140, carries two contacts for cooperating with two fixed contacts, the pairs of cooperating contacts being designated 39 and 40. When the lever 41 is moved by piston rod 149 to cause the separation of the cooperating contacts, a

latch 42 operates to lock the lever, and the contacts are maintained separated. The bell crank 37 is positioned in the hatchway so as to be actuated by cam 2 carried by the car as the car, moving upwardly, approaches an upper terminal landing. During normal operation, the car will be slowing down at the time of this actuation.

The bell crank 3, as illustrated in Figure 4, is fulcrumed on fixed shaft 54 and carries two contacts for cooperating with two fixed contacts, the pairs of cooperating contacts being designated 55 and 56. The bell crank 3 is connected by a slot and pin connection to the piston rod 57 of the snug-fitting piston 150 in the cylinder 6. A compression spring 7, the force of which may be varied by adjusting the threaded bushing 141, bears against the piston 150 and urges the latter inwardly of the cylinder. Piping 8 connects the cylinder 6 with the cylinder of the buffer 4. Referring again to Figure 1, the bell crank 3 is so positioned that the car, as it descends, engages the buffer 4 before the cam 2 engages roller 58.

Bell crank 43, fulcrumed on the fixed shaft 142, carries the roller 129 on one arm thereof, and two contacts on the other arm thereof, said contacts cooperating with two fixed contacts, the pairs of cooperating contacts being designated 59 and 60. These contacts are biased to closed position by spring 45.

The counterweight 5 carries buffer 35, the cylinder 26 of which is movable on the guides 33 and 34 rigidly secured to the counterweight. The plunger 27 of the buffer, also rigidly secured to the counterweight, is longitudinally bored as shown at 28 (see Figure 5). This bore connects the interior of the cylinder 26 with a pipe 29 threaded into the plunger 27 at its upper end. The pipe 29 is connected to a cylinder 30 secured to the counterweight. The cylinder 30 and its inner working parts are similar in construction to cylinder 16 and its inner working parts already described and hence need no further explanation. The piston rod 32 is connected to the bell crank 22 of the retiring cam 21 comprising levers 22 and 24 and cam plate 23. Levers 22 and 24 are pivoted on the counterweight on shafts 31 and 61.

Bell crank 25 (see Figure 1) is fulcrumed on shaft 62 secured in the hatchway and carries two contacts for cooperating with two fixed contacts, the pairs of cooperating contacts being designated 63 and 64. These contacts are biased to closed position by spring 46.

Referring to the wiring diagram of Figure 6, no attempt is made to show the coils and contacts of the various electromagnetic switches in their associated positions, a "straight" diagram being employed wherein the coils and contacts of the various

switches are separated in such manner as to render the circuits involved relatively simple. Also the parts of other switches and apparatus are separated in the interest of simplifying the diagram. For a clearer understanding of the invention, the stationary contacts of the switches are illustrated in cross section. It is to be understood that the system illustrated is chosen merely for convenience of description.

The diagram shows a system of the Ward Leonard type in which the motor generator set comprises a driving motor 68, illustrated for convenience as of the direct current type, and a variable voltage direct current generator 69. The armature of the driving motor is designated 70 and its field winding 71. The generator 69 comprises the armature 72, series field winding 73, and the separately excited field winding 74. The elevator motor is designated as a whole by the numeral 75, its armature being designated 76 and its field winding 77. Discharge resistance 78 is provided for the generator separately excited field winding. Discharge resistance 79 is provided for the elevator motor field winding. A resistance 80 is provided for controlling the strength of the generator field and therefore the voltage applied to the elevator motor armature. The release coil for the elevator motor electromagnetic brake 147 (see Figure 1) is designated 81 and is provided with a discharge resistance 82. A double pole knife switch 83 is used for connecting the system to the supply mains 84 and 85. In order to suit the type of diagram employed, the blades of this switch are shown separated. The car switch is designated as a whole by the numeral 86. 87 is the safety switch in the car. The various door and gate contacts have been omitted to simplify the description.

The electromagnetic switches have been designated as follows:

- A—potential switch,
- B—up direction switch,
- C—down direction switch,
- D—accelerating switch,
- E—maintaining relay,
- H—brake switch.

Throughout the description which follows, these letters, in addition to the usual reference numerals, will be applied to the parts of the above enumerated switches. For example, contacts B 125 are contacts on the up direction switch, while actuating coil A 90 is the coil that operates the potential switch. The electromagnetic switches are shown in their deenergized positions.

Upon the closing of knife switch 83, the driving motor 68, the elevator motor field winding 77 and potential switch actuating coil A 90 are energized, the circuit for coil A 90 being by way of line 91 including contacts 59, 39, 50, 55 and 64 of the safety ap-

pliances; safety switch 87 in the car, and the other contacts 63, 56, 51, 40 and 60 of the safety appliances. The driving motor 68 starts in operation, bringing the generator 69 up to full speed. Starting means for the driving motor are omitted to simplify the description. The potential switch, upon operation, causes the engagement of contacts A 92 and A 93 preparing the circuits for the generator separately excited field winding and the electromagnetic brake release coil as well as the control circuits. The condition of the circuits so far described might be termed normal.

The operation of the system is as follows:

Assume that the car is at rest at an upper terminal 47 (see Figure 1). In order to start the car in the down direction, the operator moves the car switch into the position where its contact segment 94 bridges contacts 95, 96 and 97. Upon the contact segment engaging contact 96, a circuit is completed for the actuating coil C 98 of the down direction switch and the actuating coil H 99 of the brake switch. This circuit may be traced from the left-hand blade of switch 83, by way of line 100 through contacts A 92, by way of line 101 through coil H 99, by way of line 146, through coil C 98, contacts 96 and 95 of the car switch, by way of line 102 through contacts B 103, switch 87, by way of line 91 through contacts 63, 56, 51, 40 and 60, by way of line 105 to the right-hand blade of switch 83. The engagement of the contact segment and contact 97 prepares a circuit for the actuating coil D 106 of the accelerating switch. Upon operation of the down direction switch in response to the energization of its actuating coil C 98, contacts C 107 separate and contacts C 88, C 89 and C 108 engage. The separation of contacts C 107 breaks the circuit leading from the car switch up feed contact 109, contacts C 107 and the corresponding up direction switch contacts B 103 serving as electrical interlocks. The engagement of contacts C 108 prepares the circuit for the down direction switch holding coil C 110 and the brake switch holding coil H 112. The engagement of contacts C 88 and C 89 completes a circuit for the generator separately excited field winding. This circuit may be traced from the left-hand blade of switch 83, by way of line 100 through contacts A 92 and resistance 80, by way of line 105 through contacts C 88, by way of line 114 through field winding 74 and actuating coil E 115 of the maintaining relay, back to line 100 and through contacts C 89, back to line 105 and through contacts A 93 to the right-hand blade of switch 83. Relay E does not operate at this time as insufficient current is supplied to its actuating coil.

The brake switch H operates simultaneously with the direction switch C. Switch H,

upon operation, causes the engagement of contacts H 116 and H 117. The engagement of contacts H 117 completes the circuit for the brake release coil 81. This circuit may be traced from the left-hand blade of switch 83, by way of line 100 through contacts A 92, by way of line 118 through coil 81 and contacts H 117, by way of line 105, through contacts A 93, to the right-hand blade of switch 83. The engagement of contacts H 116 completes the circuit for the accelerating switch actuating coil D 106. This circuit may be traced from the left-hand blade of switch 83, by way of line 100 through contacts A 92, by way of line 104 through contacts H 116, inductance coil 119 and coil D 106, by way of line 113 through contacts 97 and 95 of the car switch, by way of line 102 through contacts B 103, switch 87, by way of line 91 through contacts 63, 56, 51, 40 and 60, by way of line 105 to the right-hand blade of switch 83.

The brake release coil 81 being energized and current being supplied from the generator armature 72 to the elevator motor armature 76, due to the generator field winding 74 being energized, the elevator motor starts.

The accelerating switch does not operate immediately the circuit for its actuating coil D 106 is completed, its action being delayed by the inductance coil 119. Upon operation, switch D causes the engagement of contacts D 120 and D 121. The engagement of contacts D 120 completes the circuit for holding coils C 110 and H 112. This circuit is from the left-hand blade of switch 83, by way of line 100 through contacts A 92, by way of line 144 through coil C 110, contacts C 108, coil H 112, and contacts D 120, by way of line 105 through contacts A 93 to the right-hand blade of switch 83.

The short-circuiting of resistance 80 by contacts D 121 increases the voltage applied to the generator field winding 74, thus bringing the generator voltage up to its full value and at the same time sufficient current is supplied to the coil E 115 to cause the operation of the maintaining relay. Contacts E 122 are thus closed, by-passing accelerating switch contacts D 120.

Assume that the car approaches landing 44 and the operator centers the car switch in order to stop. The disengagement of contact 97 and contact segment 94 breaks the circuit for the accelerating switch actuating coil D 106. The accelerating switch, therefore, drops out, causing the separation of contacts D 120 and D 121. The separation of contacts D 120 is simply in preparation for the next starting operation, the circuit for coils C 110 and H 112 being maintained by contacts E 122. The separation of contacts D 121 removes the short-circuit for resistance 80, decreasing the strength of the generator field winding 74. Thus the gener-

ator E. M. F. is decreased and the speed of the elevator motor is reduced. Discharge resistance 78 acts to smooth out the retardation. The disengagement of contact 96 and contact segment 94 breaks the circuit for actuating coils C 98 and H 99. The down direction switch and brake switch are maintained in operated condition, however, by their holding coils C 110 and H 112 respectively. Relay E drops out as soon as the current flowing through its actuating coil drops to a predetermined value, the current being sustained by the action of the field winding 74 and discharge resistance 78. As a result, contacts E 122 separate, deenergizing holding coils C 110 and H 112, thus permitting the direction and brake switches to drop out to deenergize the generator field winding and to cause the application of the brake 147.

During the stopping of the car as it approaches the landing 44, cam 2 engages roller 52 of the bell crank 10 and, as the lower oblique surface of the cam passes over the roller, the bell crank is moved about its pivot in a direction to cause movement of piston 13 inwardly of its cylinder. The speed of movement of the bell crank and, therefore, that of the piston depends upon the speed of the car at the time that the engagement of the cam and roller occurs. When the speed of movement of the piston is below a predetermined value, owing to the clearance between the piston and cylinder wall, enough fluid is permitted to leak past the piston to prevent the building up of sufficient pressure to cause movement of piston 17 to effect the separation of contacts 50 and 51. During the normal operation of stopping the car at this landing, the car switch will have been centered and the car will have been slowed down to such extent, at the time of engagement of the cam and roller, that the speed of movement of the piston will be below the predetermined value and contacts 50 and 51 remain in engagement. However, if for any reason, such as the failure of operation of certain switches or the neglected centering of the car switch, the speed of the car, at the time of engagement of the cam and roller, is such as to cause the speed of movement of piston 13 to exceed the predetermined value, enough pressure is built up and transmitted to piston 17 to cause its movement, against the force of spring 18, to effect the separation of contacts 50 and 51. These contacts, upon separation, break the circuit for the actuating coil A 90 of the potential switch and the potential switch drops out to deenergize the generator field winding 74 and to cause the application of the brake to stop the car.

The pressure applied to piston 17, and therefore the force tending to overcome spring 18 and effect the separation of con-

tacts 50 and 51, varies as the square of the speed of piston 13. This is in accordance with the well-known law of hydraulics relating to orifices that the pressure is equal to the square of the velocity divided by twice gravity, or

$$h = \frac{v^2}{2g}$$

The orifice in this case is formed by the clearance around piston 13 in cylinder 14. Hence a large change in the amount of force exerted by spring 18, obtained by turning the threaded bushing 19, results in a relatively small change in the value of speed required to overcome the spring. As the speed of piston 13 is dependent upon the speed of the elevator car at the time that cam 2 passes over roller 52, this large change in the amount of force exerted by spring 18 also results in a relatively small change in the value of car speed required to cause the building up of a pressure sufficient to overcome the force of the spring and effect the separation of the contacts. Thus, when it is desired to alter the value of car speed required to effect the separation of contacts 50 and 51, a fine adjustment can be made by the turning of bushing 19.

The exact location of the bell crank 10 in the hatchway depends upon the requirements of the particular installation. That is, for high speed installations with greater slow down range, the bell crank would preferably be positioned so that its roller would be engaged by the cam with the car at a greater distance from landing 44 than for slow speed installations. Also the depth of the elevator pit, where landing 44 is the bottom terminal landing, would be another factor upon which the position of the bell crank 10 would be dependent. In the case of installations having a shallow pit, the bell crank would be located for cooperation with cam 2 with the car at a greater distance from the landing than where the pit is deep, thus tending to bring the car to a stop before it travels an undesirable distance into the pit.

Under certain conditions of operation, such as where the contacts 50 and 51 fail to separate due to faulty operation or where the bell crank 10 and its associated mechanism is not provided and the elevator car has been improperly controlled or the system has functioned improperly, the car may run past landing 44 to the extent of striking the buffer 4. In the event that the speed of the car is below a predetermined value at the time that the car strikes the buffer, owing to clearance between the buffer piston and cylinder wall, enough fluid is permitted to leak past the buffer piston to prevent the building up of sufficient pressure to cause the movement of piston 13 to

effect the separation of contacts 55 and 56. In such case, the stopping of the car is effected by the normal action of the buffer. Should the car engage the buffer while traveling at a speed above this predetermined value however, the fluid pressure developed in the buffer cylinder will be sufficient to overcome the force of spring 7 in connected cylinder 6 and effect the separation of contacts 55 and 56. As in the case of contacts 50 and 51, the separation of contacts 55 and 56 breaks the circuit for the actuating coil of the potential switch A. As a result, the circuit for the generator field winding is broken and the brake is applied, aiding the buffer in bringing the car to a stop. The speed of the car required to cause the separation of contacts 55 and 56 is determined by the force of spring 7 adjustable by the threaded bushing 141.

Should the car engage the buffer while traveling at a speed below the predetermined value but continue in motion, cam 2 on the car will engage roller 58 of bell crank 3 to cause the separation of contacts 55 and 56. Thus the circuit for the potential switch actuating coil will be broken, causing the potential switch to drop out, deenergizing the generator field winding and applying the brake to bring the car to a stop. The face of the cam is of such length that the contacts 55 and 56 are maintained separated upon a full compression of the buffer.

Upon movement of the car in the up direction a sufficient distance to cause the disengagement of cam 2 and roller 58, the spring 7 will act to cause the reengagement of contacts 55 and 56.

The starting of the car in the up direction is accomplished in a similar manner to the starting of the car in the down direction. The operator moves the car switch to cause segment 94 to bridge contacts 109, 123 and 124. The engagement of segment 94 and contact 123 completes the circuit for the brake switch actuating coil H 99 and the actuating coil B 128 of the up direction switch. The up direction switch, upon operation, causes the separation of contacts B 103 and the engagement of contacts B 125, B 126 and B 127, corresponding with down direction contacts C 107, C 88, C 89 and C 108 respectively. The holding coil of the up direction switch is designated B 130. As a result of the operation of switches H and B, the brake is released and the motor starts. The engagement of segment 94 and contact 124 prepares the circuit for the actuating coil D 106 of the accelerating switch to be completed by the engagement of contacts H 116. The accelerating switch operates to cause the motor to be brought up to full speed. As previously described, upon upward movement of the car, the cam 2 passes

by the roller 52 without causing movement of piston 13.

During the stopping of the car at the landing 47, the roller 53 of the bell crank 37 is actuated by the cam 2 in the same manner that the roller 52 and bell crank 10 were actuated during the stopping of the car at landing 44. In case the cam engages the roller with the car traveling at or above the predetermined speed set for causing the separation of contacts 39 and 40, the separation of these contacts will be effected, causing the dropping out of the potential switch and the stopping of the car as before. The exact location of the bell crank 37, as in the case of bell crank 10, will depend upon such factors as the normal car speed and the amount of overhead room.

Under certain conditions of operation such as those analogous to the conditions enumerated for causing the car to run past the landing 44, the car may continue past landing 47 to such an extent that the descending counterweight buffer strikes the bottom of the hatchway. In the event that the speed of the counterweight is below a predetermined value at the time that its buffer strikes the bottom of the hatchway, owing to clearance between the buffer piston and cylinder wall, enough fluid is permitted to leak past the buffer piston to prevent the building up of sufficient pressure to cause the extension of retiring cam 21 by piston 148 to effect the separation of contacts 63 and 64. The counterweight in coming to rest will release the tension in its hoisting ropes, thus relieving the tractive force between the ropes and the hoisting drum and effecting the stopping of the car. Should the counterweight buffer strike the bottom of the hatchway while traveling at a speed at or above this predetermined value however, the fluid pressure developed in the buffer cylinder will be sufficient to overcome the force of spring 140 and cause the extension of the retiring cam 21. As the retiring cam will be opposite bell crank roller 65 at this time, the extension of the retiring cam will cause the separation of the contacts 63 and 64 in the circuit for the potential switch actuating coil. The potential switch, upon dropping out, breaks the circuit for the generator field winding and causes the application of the brake, thus hastening the stopping of the car.

Should the counterweight buffer strike the bottom of the hatchway while the counterweight and car are traveling below the predetermined speed set for effecting the separation of contacts 63 and 64, and yet should these bodies continue in motion, cam 2 on the car will engage roller 129 of the bell crank 43 to cause the separation of contacts 59 and 60. As in the case of the contacts

of the other appliances, contacts 59 and 60 break the circuit for the actuating coil of the potential switch, causing the stopping of the car.

It will thus be seen that irrespective of the normal operating speed of the elevator car, which may be extremely high in the case of high-rise elevators, the safety appliances herein disclosed insure the car being brought safely to rest under all conditions.

It is to be understood that certain of the appliances may be omitted if desired, particularly where other safety apparatus is employed. For example, either the bell cranks 10 and 37 and their associated mechanisms or the buffer operated mechanisms may be omitted. Also, the roller 58 and roller arm of bell crank 3 may be omitted. It is to be further understood that the various contacts of the appliances may be arranged in other of the control circuits.

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 system comprising; a movable body in the hatchway; a safety appliance for said body, said body, in the event that it is traveling at or above a predetermined speed when it reaches a certain point in the hatchway, causing the operation of the safety appliance and, in the event that the body reaches said point, causing the operation of said appliance upon continued movement for a predetermined distance beyond said point.

2. In an elevator system; a movable body in the hatchway; a safety appliance for said body; and a buffer for said body, said body, in the event that it is traveling above a predetermined speed at the time its buffer is operated and also in the event that it compresses its buffer above a predetermined amount, causing the operation of said safety appliance.

3. In an elevator system; a movable body in the hatchway; a safety appliance for said body; and a buffer for said body, said buffer, in the event that it is operated at a time the body is traveling above a predetermined speed, causing the operation of said safety appliance, and said body, in the event the safety appliance is not operated by the buffer, causing the operation of said safety appliance should the body reach a certain point in the hatchway.

4. An elevator system comprising; a mov-

able body in the hatchway; a retiring cam carried by said body; a buffer for said body; and a safety appliance, said buffer causing the extension of the cam to operate the safety appliance in the event that the buffer is operated at a time the body is traveling above a predetermined speed, without causing the extension of the cam and the operation of the safety appliance when the speed of the body at the time of operation does not exceed said value.

5. In an elevator system; an elevator car; a counterweight for the car; a motor for raising and lowering the car and the counterweight; a brake for the motor; a buffer for the car; a buffer carried by the counterweight; a safety appliance for causing the

deenergization of the motor and the application of the brake to stop the motor, said first named buffer causing the operation of said safety appliance in the event that the car engages said buffer while traveling above a predetermined speed; and an additional safety appliance for causing the deenergization of the motor and the application of the brake to stop the motor, said second named buffer causing the operation of said additional safety appliance in the event that the counterweight buffer is engaged at a time the counterweight is traveling above a predetermined speed.

In testimony whereof, I have signed my name to this specification.

FREDERICK HYMAN.