July 27, 1937. G. MILNE 2,088,212

ELEVATOR CONTROL MECHANISM

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Fig. 1.

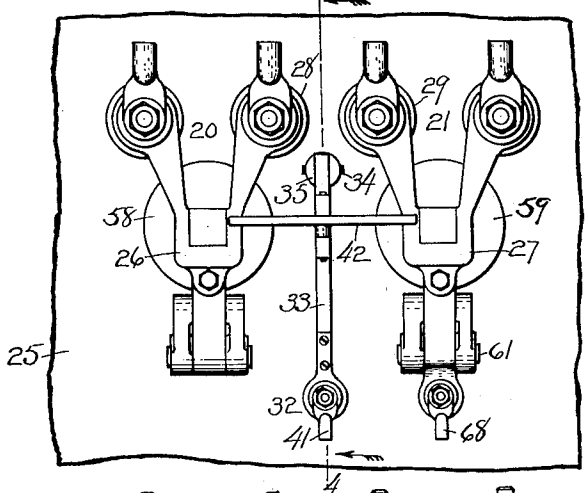
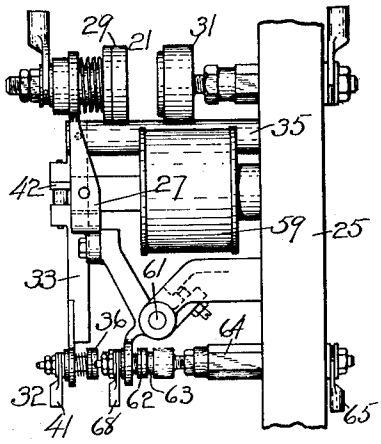


Fig. 2.



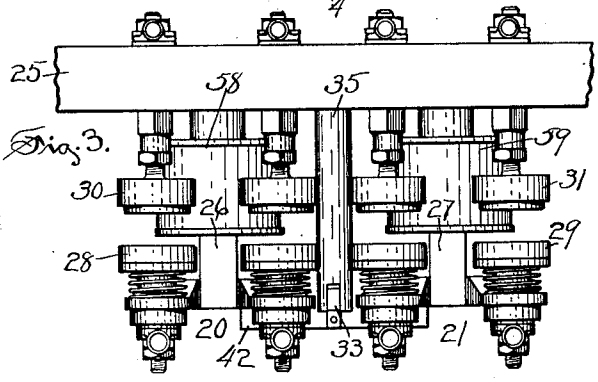


Fig. 3.

Fig. 4.

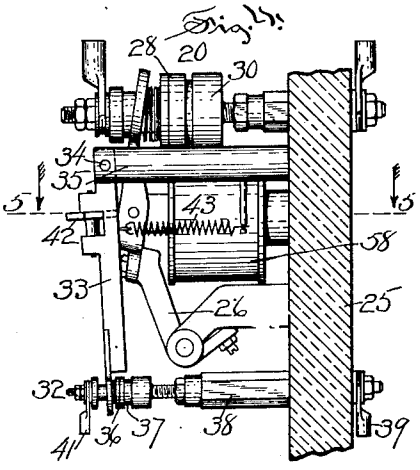
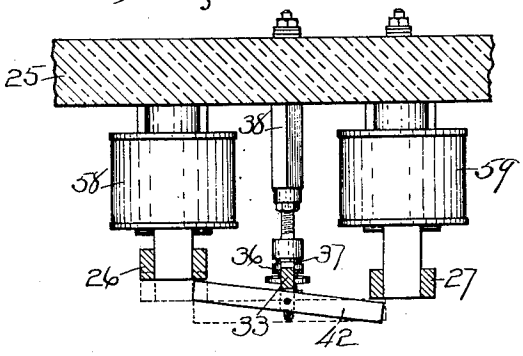


Fig. 5.



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Fig. 6.

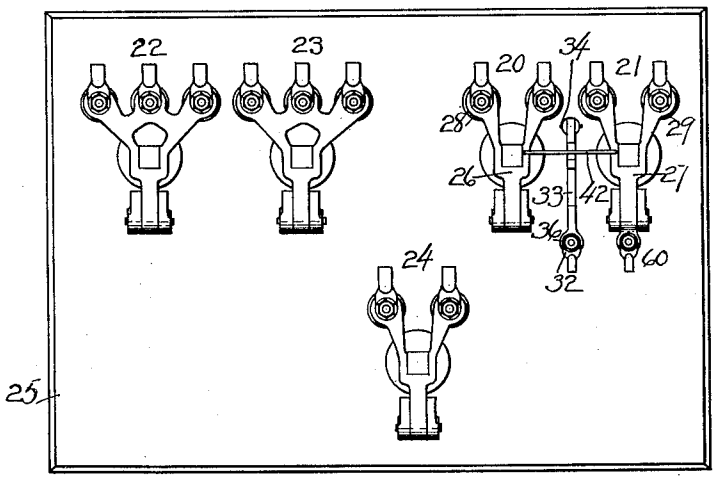


Fig. 7.

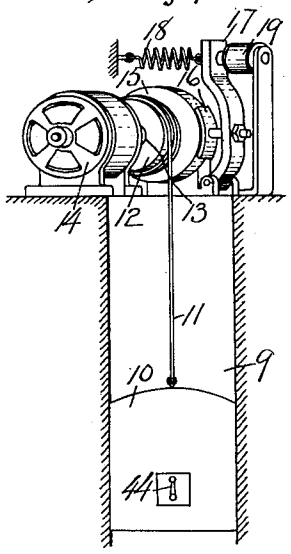
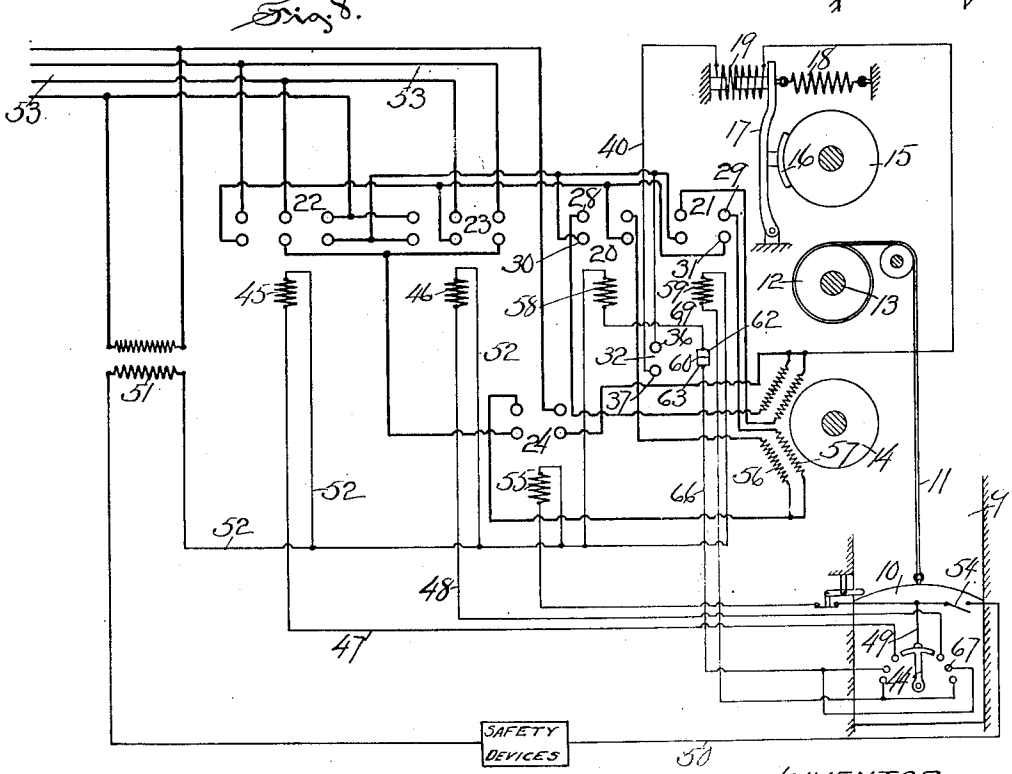


Fig. 8.



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2,088,212

ELEVATOR CONTROL MECHANISM

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Application November 15, 1933, Serial No. 698,037

11 Claims. (Cl. 192—2)

My invention relates to mechanism for controlling the operation of elevators, and an object of my invention, among others, is the production of a mechanism for this purpose which shall be particularly efficient in operation and which will result in a steady movement of the car, particularly at times when the speed is reduced or accelerated.

One form of a mechanism embodying my invention and in the construction and use of which the objects herein set out, as well as others, may be attained, is illustrated in the accompanying drawings, in which—

Figure 1 is a face view of a portion of a panel plate appurtenant to an elevator and showing the speed switches for such elevator with my improved mechanism applied thereto.

Figure 2 is an edge view of the same.

Figure 3 is a top view.

Figure 4 is a view in section on a plane denoted by the dotted line 4—4 of Fig. 1.

Figure 5 is a view in section on a plane denoted by the dotted line 5—5 of Fig. 4.

Figure 6 is a face view on reduced scale of a panel plate provided with various switches appurtenant to an elevator and showing my improved control device applied thereto.

Figure 7 is a diagrammatic view illustrating mechanism for hoisting and lowering a car.

Figure 8 is a view illustrating the wiring diagram for the mechanism shown in Figures 6 and 7.

In the construction of elevators heretofore employed, a brake is made use of to hold the car from backward movement or overrunning, and this brake is so arranged that at any time when the current is interrupted the brake is applied. In such prior apparatus it is usual to reduce the speed of the car before bringing it to a stop, and this momentarily interrupts the electric current with a result that the brake is applied at this time thereby transmitting a sudden jolt to the car at the time the brake takes hold.

My improved apparatus, herein illustrated and described, avoids this objectionable feature and enables the speed of the elevator to be reduced and the car to be brought to a stop without unsteady or uneven movement, in the drawings the numeral 9 denoting an elevator shaft in which an elevator car 10 is supported for vertical movement as by means of a cable 11 passing around a hoisting drum 12, the shaft 13 of which is secured to the shaft of a motor 14. A brake drum 15 is also supported on the shaft 13 by means of which said drum is rotated, and a brake shoe 16 is supported by a brake lever 17 pivotally mounted at one end and having a spring 18 which acts to force said shoe into contact with the brake drum for the purpose of applying the brake thereto. A magnetic coil 19 is employed, when energized, to release the brake from the drum to permit unobstructed movement of the car 10. All of the parts thus far described are of old and well known construction and further and more detailed description and illustration are omitted as unnecessary to a thorough understanding of my invention.

My improved device is applied to the mechanism for controlling the operation of elevator cars and is used particularly in connection with the speed switches commonly employed for electric control of such operation. The numeral 20 denotes a low speed switch, 21 a high speed switch and 22 and 23 direction switches one of which controls the upward movement of the elevator car and the other the downward movement thereof. A potentional switch 24 is employed as circuit breaker for controlling the supply of electric energy to the apparatus, all of said switches being mounted upon a panel board 25. These switches are also of well known construction common to apparatus of this type, therefore requiring no further explanation.

The switches 20—21 are in the main also of well known construction, but I have equipped them particularly for operation thereof in my improved device. Each of these switches includes a switch lever 26 or 27 each of which levers has a pair of contacts 28 or 29 arranged to engage pairs 30—31 of fixed contacts, all of which are shown in Figs. 1, 2 and 3 of the drawings, the pairs 28—29 of contacts being located over the pairs 30—31 of contacts. The levers 26—27 are omitted in the diagrammatic view in Fig. 8, as are also the levers of the switches 22—23 and 24.

In prior devices the magnetic coil 19 has been energized by movement of the levers 26—27 which are under manual control of the apparatus in the car 10 to be hereinafter referred to, the high speed switch lever 27 operating the switch 21 to energize said coil and draw the brake shoe 16 away from the drum 15 and the low speed switch lever 26 operating in the same manner, as hereinafter described with respect to the switch 20. In the interval which exists between the operation of said levers, in changing from high to low speed, and vice versa, the magnetic coil 19 is deenergized and the brake is momentarily applied by the spring 18, and this causes a sudden lessening of the speed of the car which produces a jolt in

the car 10 and also places an undue strain upon the mechanism.

In some equipment the brake remains applied during the low speed operation which is also objectionable.

My improved device eliminates these objectionable features, such device comprising a brake controlling switch 32 including a brake controlling switch lever 33 pivotally mounted as at 34 at one end on a post 35 secured to and projecting from the panel board 25. This lever 33 carries a contact 36 adapted to engage a stationary contact 37 on a binding post 38 projecting through the panel board 25 and having secured thereto the terminal 39 of a wire 40 connected to one terminal of the coil 19, as shown in Figs. 4 and 8 of the drawings, the other terminal 41 of the switch 32 being connected through the direction switches 22 or 23 with the main source of electric supply.

A brake switch controlling bar 42 is pivotally mounted on the lever 33, projecting on opposite sides of said lever and with its opposite ends located in the path of movement of the switch levers 26 and 27, and as shown in Figs. 1 and 5 of the drawings. A spring 43 attached at one end to the lever 33 and at its opposite end to a fixed support holds the lever 33 normally in switch closing position with opposite ends of the controlling bar 42 in contact with both of the levers 26 and 27. It will thus be seen that when the switch 32 is closed the coil 19 will be energized and the brake shoe 16 will be held from contact with the drum 15 and the brake will therefore be actuated only when the switch 32 is in circuit opening position, the action of the spring 43 in drawing the bar 33 to switch closing position thereby placing both ends of the controlling bar 42 in contact with both switch levers 26 and 27 operates to open the switch 36 when either of the levers 26 or 27 move to open position and to close the switch 36 when either of said levers moves to closed position. The small spring inserted behind the contact 36 is to cause said contact to retain pressure on the contact 37 for a slight interval after the lever 33 begins its breaking movement and the breaking of the circuit between contacts 36 and 37 is therefore delayed for an interval after the levers 26 and 27 begin their switch breaking movement.

In the apparatus as heretofore arranged the magnet 19 has been energized directly through the switches 20 or 21, and, as heretofore explained, during the interval between the opening of one and closing of the other switch the spring 18 has been operated to apply the brake, causing the aforementioned jolt.

With the present arrangement it will be noted that the coil 19 is continuously energized during the alternate operation of the switches 20 and 21 and the brake is therefore not applied during the interval above mentioned. When, however, the electric current is cut off by the manual operation of the control mechanism located in the car 10 for the purpose of stopping the car, the magnets of the switches 20 and 21 being deenergized, both switches are opened and at this time both ends of the bar 42 are moved to the position shown in Fig. 2, and in dotted lines in Fig. 5, thereby opening the switch 32 and permitting the brake to be applied by the spring 18, said magnets being denoted by the numerals 58 and 59.

When the control lever 44 in the car 10 is moved one step to the left or right from its central position the direction magnet coils 45 or 46 will be energized by current flowing along the wires 47 or 48 and supplied with current from the wire 49 extending from the main wire 50 of the control system and which extends from one terminal of a transformer 51, the other terminal of which transformer is connected by wires 52 with the terminals of the magnetic coils 45 and 46. Energizing of these coils effects closing operation of the switches 22 or 23 for the supply of current from the main power circuit 53 to the low and high speed switches 20 and 21, it being here remarked that a main switch 54 for the control circuit has been manually closed, thereby energizing the magnet coil 55 of the potential switch 24, which closes said switch to permit current to flow from the power circuit 53 through the several switches aforementioned and thereby supplying current through the switches 20 and 21 to the low and high speed windings 56 and 57 respectively of the motor 14.

It is necessary, for obvious reasons, that the switches 20 and 21 shall not be closed at the same time and to prevent this I have retained the electric switch 60 (see Figs. 6 and 8) heretofore employed at the opposite end of the lever 27 from the switch 21, but have omitted a similar switch at the corresponding end of the lever 26, the switch 36 heretofore described taking the place of the said switch at the end of the lever 26. This switch 60 is located on the opposite side of the pivot 61 of the lever 27 from the contacts 29 and comprises contacts 62—63, the former being attached to the lever 27 and the latter to a binding post 64 extending through the panel board 25 and having secured thereto a terminal 65 for a wire 66 extending from the low speed contacts 67 located at opposite sides of the manually controlled mechanism in the car 10 hereinbefore referred to. This end of the lever 27 has attached thereto a terminal 68 for a wire 69 extending to the magnetic coil 58 of the low speed switch 20.

From this arrangement it will be seen that when the control lever 44 is swung in either direction to engage either of the low speed contacts 67 the current will pass through the switch 60 to the coil 58 of the low speed switch 20, thereby operating said switch for low speed. However, when said lever 44 is swung further in either direction to engage the next contact the lever 27 of the high speed switch 21 will be operated and this will, by reason of the construction and operation of the lever 33 and bar 42, cause the contacts 62—63 to be separated as the lever 27 moves to close the contacts 29 and 31, thereby opening the switch 60, deenergizing the magnet coil 58 and causing the lever 26 of the low speed switch 20 to be operated to open said switch, and a reverse movement of the lever 44 will reverse the operation just described. In this operation of the levers 26 and 27 the parts are so arranged that the interval between exciting of the solenoids 58 and 59 does not allow both of their levers to be in their full open position except when they are both shut off for a stop. To effect this the small spring is placed behind the contact 62 to keep said contact closed until after the lever 27 has nearly completed its movement to close the contacts 29 and 31. At this time, just before closing the contacts 29 and 31, the contacts 62 and 63 separate thereby deenergizing the solenoid 58 and opening the switch 20 just before closing of the switch 21. This causes the bar 42 to be rocked on its pivot on the lever 33, the end of the bar in contact with the lever 27 moving backwardly toward the panel board 25 and the opposite end

of the bar moving in a reverse direction without effecting movement of the lever 33 and therefore operation of the switch 36 which remains in its closed position, thereby maintaining current in the solenoid 19 and preventing the operation of the switch.

A general description only of the wiring in the diagram shown in Figure 8 has been made, as much of this is in common use at the present time and will be readily understood by those skilled in the art, the specific wiring operating in connection with my improved device having been particularly set out hereinabove.

I claim:

1. An electric control for a rotatable operating member, a brake therefor and said control including mechanism for applying the brake to said member, mechanism for releasing said brake, one of said mechanisms being electrically operated and including a circuit with a switch therein, a device for effecting different rates of speed of said rotatable operating member, brake control means operated by said device and electrically operatively connected with said brake for operation thereof only in response to release of said device from driving operation of said rotatably operating member, and means for operating said brake control means.

2. An electric control for a rotatable operating member and a brake therefor, said control including means for applying the brake to said member, electrically operated means for releasing said brake, said means including a circuit with a switch therein, a device for effecting different rates of speed of said rotatable operating member, and brake control means operated by said device and electrically operatively connected with said brake releasing means and operative only in response to release of said device from driving operation.

3. An electric control for a rotatable operating member and a brake therefor, said control including a spring for applying the brake to said member, electrically operated means for releasing said brake, said means including a circuit with a switch therein, a device for effecting different rates of speed of said rotatable operating member, means for controlling said speed, an electrical operative connection between said speed controlling means and said device, and brake control means operated by said device and electrically operatively connected with said brake releasing means and operative only in response to release of said device from driving operation.

4. An electric control for an elevator mechanism including a motor, a rotatable operating member and a brake therefor, said control including means for applying the brake to said member and an electrically actuated device for releasing said brake, electrical switches for controlling the speed of said motor, and means electrically connecting said switches and said device and operative only in response to operation of said electrical switches to break the circuit for driving said motor.

5. An electric control for an elevator mechanism including a motor, a rotatable operating member and a brake therefor, said control including means for applying the brake to said member, means for releasing said brake, a pair of switches for controlling speed movements of said motor, means electrically operatively connected with said brake releasing means for controlling operations thereof, and brake control means operative by said switches only in response to their operation to break the circuit for driving said motor.

6. An electric control for an elevator mechanism including a motor, a rotatable operating member and a brake therefor, said control including means for applying the brake to said member, an electrically actuated device for releasing said brake, a pair of switches alternately operable to effect different speed movements of said motor, brake control means operable by said switches to electrically connect them with said device for continuing operations of said switches, and means for operating said brake control means.

7. An electric control for an elevator mechanism including a motor, a rotatable operating member and a brake therefor, said control including means for applying the brake to said member, an electrical device for releasing said brake, a pair of switches for controlling the speed movements of said motor, a switch electrically operatively connected with said device for controlling operations thereof, and a switch controlling member interposed in the path of movement of each member of said pair of switches and attached to said controlling switch for operation of the latter only during simultaneous movements of said pair of switches to break the circuit for driving said motor.

8. An electric control for an elevator mechanism including a motor, a rotatable operating member and a brake therefor, said control including means for applying the brake to said member, an electrical device for releasing said brake, a pair of switches for controlling operations of said motor, a switch electrically operatively connected with said device for controlling operations thereof, and a bar attached to said last mentioned switch and extending into the path of movement of each member of said pair of switches and operable to open said device controlling switch only when both of said members of said pair of switches are moved to open position.

9. An electric control for an elevator mechanism including a motor, a rotatable operating member and a brake therefor, said control including means for applying the brake to said member, an electrical device for releasing said brake, a pair of switches for controlling operations of said motor, a pivotally mounted switch electrically operatively connected with said device for controlling operations thereof, and a bar pivotally attached to said last mentioned switch and with its opposite ends in the path of movement of each member of said pair of switches whereby to prevent opening movement of said device controlling switch only in response to simultaneous movement of the members of said pair of switches to break the circuit for driving said motor.

10. An electric control for an elevator mechanism including a motor, a rotatable operating member and a brake therefor, said control including means for applying the brake to said member, an electrical device operatively connected with said brake for release thereof, a pair of switches for controlling operations of said motor, a switch electrically operatively connected with said device for controlling operations thereof, an electrical connection between said device controlling switch and one member of said pair of switches for preventing simultaneous closing movement of the members of said pair of switches, and a bar pivotally attached to said device

controlling switch and with its ends located in the path of movement of each member of said pair of switches to permit movement of each of said members without operation of said device controlling switch.

11. In an electric control arrangement adapted for controlling the brake of an elevator motor, a pair of speed change switches for the motor, a brake for the motor including means for biasing the brake to brake applying position and electrical means for releasing the brake, said last-named means having a control circuit, the said control circuit including a switch therein and means operated by said pair of speed change switches to open said switch only in response to the movement of both of said speed change switches to off position.

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