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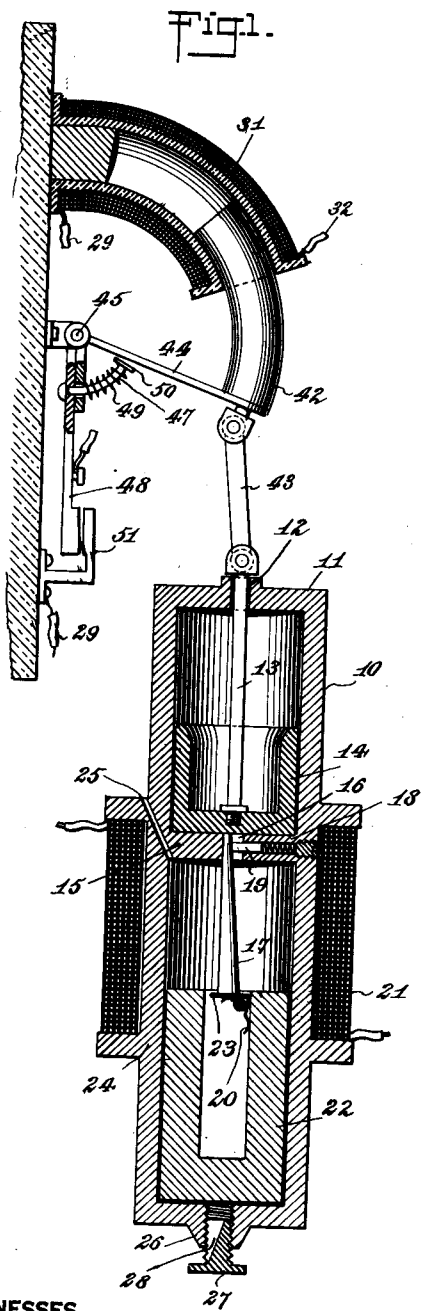
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FLOOR CONTROL DEVICE FOR ELEVATORS

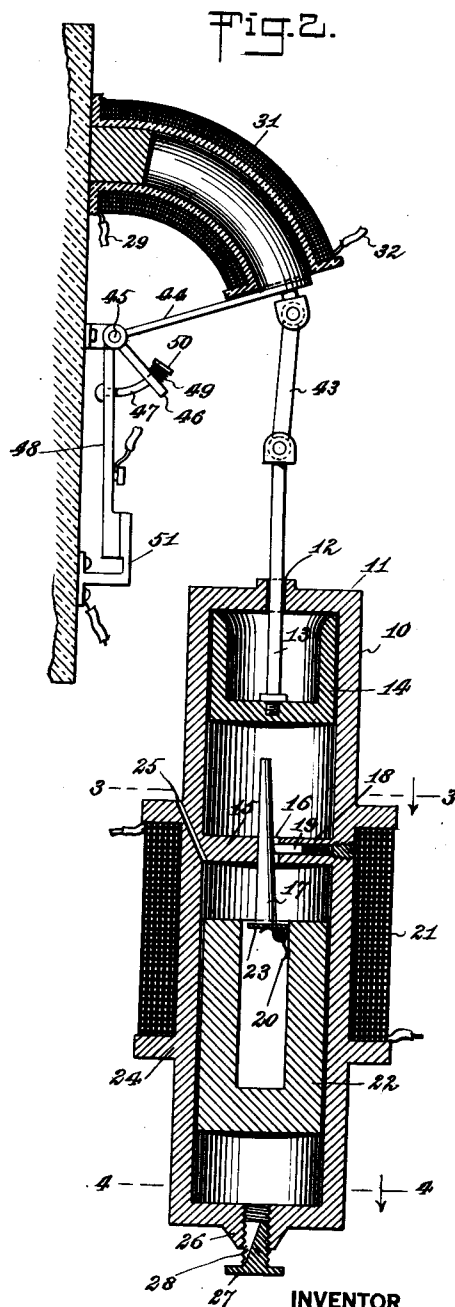
Filed Dec. 13, 1930

2 Sheets-Sheet 1



WITNESSES

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Fig. 3.

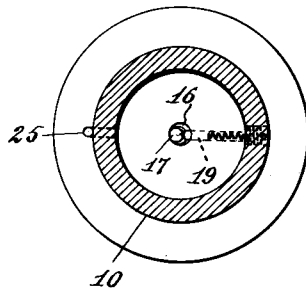


Fig. 4.

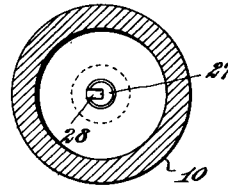
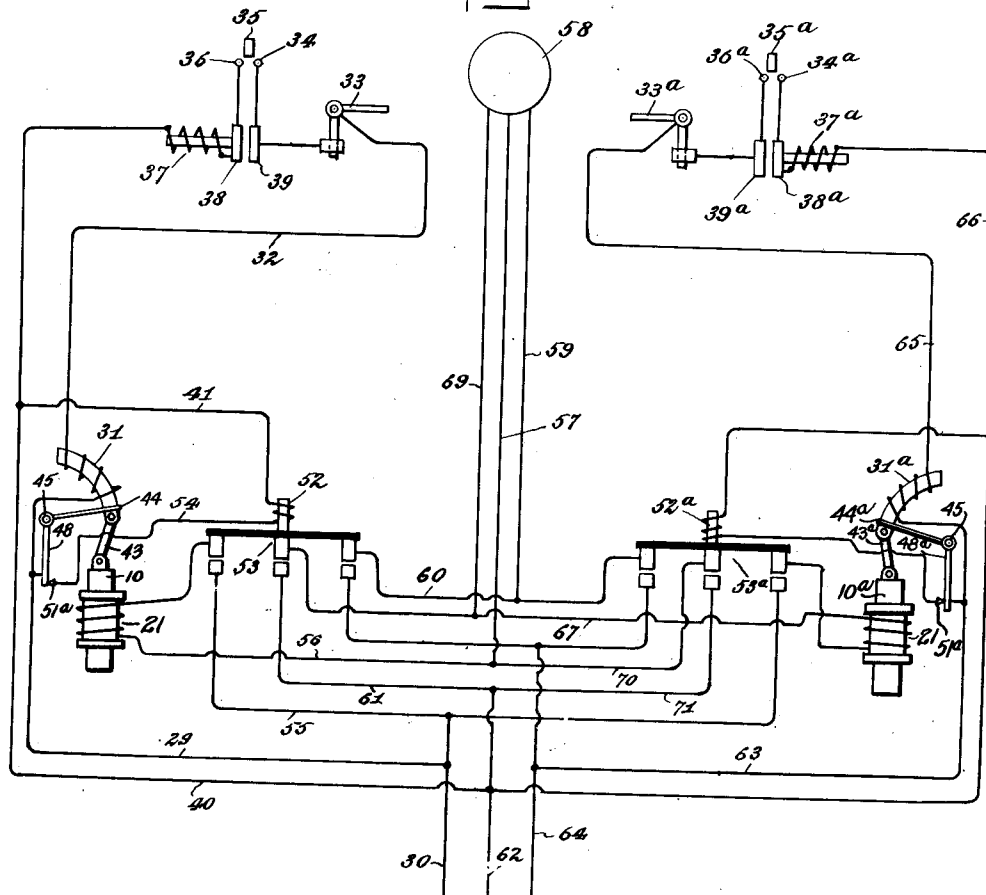


Fig. 5.



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FLOOR CONTROL DEVICE FOR ELEVATORS

Application filed December 13, 1930. Serial No. 502,243.

One of the objects of this invention is broadly to provide a control system for various devices including elevator cars and lifts.

Another object of the invention is to provide control means which while not necessarily to be used therefor is admirably adapted for stopping quickly an elevator car or the like at a floor or other predetermined point, irrespective of the weight which may be carried by the elevator car or other device.

Another object of the invention is to provide control means for stopping an elevator car or the like which are adjusted for operation with reference to the weight carried by the elevator car or other device.

Still another object of the invention is to provide means operable by the current used in the operation of the elevator car or other device, which serves to retard the opening of a switch in the operating motor circuit.

A further object of the invention is to provide means adjustable relatively to the amount of current used in the operation of the elevator car or other device which serves to retard the opening of the operating switch.

The invention further comprehends the use of a solenoid connected with the motor circuit which serves to adjust means for retarding the operation of the main operating switch.

The invention further comprehends the use of a solenoid in a relay or floor control circuit which operates a switch in the motor circuit, there also being a solenoid in the motor circuit which serves to adjust means which retard the operation of the switch in the motor circuit.

The invention further comprehends a dash pot device having a casing with an opening through which a tapered pin is disposed and which is held yieldingly in adjusted position to partially close the opening, the portion of the opening left open depending on the position of the pin, a core of a solenoid in the motor circuit serving to move the pin in one direction, and a piston in the dash pot device serving to move the pin in an opposite direction, the piston being connected to a switch

in the motor circuit and being operable by means such as in a floor circuit of an elevator-car system.

Additional objects of the invention will appear in the following specification in which the preferred form of the invention is described.

In the drawings similar reference characters refer to similar parts in all the views, of which

Figure 1 is a sectional elevation illustrating the dash pot device and the means for operating the same,

Figure 2 is a sectional view similar to the view illustrated in Figure 1, but with the parts in a different position,

Figure 3 is a sectional view on the line 3—3 of Figure 2,

Figure 4 is a sectional view on the line 4—4 of Figure 3, and

Figure 5 is a diagrammatic view illustrating the connections and circuits.

The invention which is the subject matter of this application may be employed in various ways but it is particularly well adapted for use in connection with elevators, and the drawings therefor illustrate the invention as used in this manner.

By referring to the drawings it will be seen that a dash pot casing 10 is provided having a head 11 with an opening 12 through which a piston rod 13 is disposed, the piston rod 13 being secured to a piston 14 and the dash pot casing having another head 15 with an opening 16. In this opening 16 there is disposed a tapered pin 17, there being a recess 18 in the head 15 in which is disposed a pin 19 which is held in engagement with the tapered pin 17 by a spring 20. It will, therefore, be seen that the tapered pin 17 will be held in adjusted position by the pin 19.

The lower portion of the dash pot casing 10 is formed as a solenoid with windings 21 which are in series with the motor circuit, which will shortly be described. The core 22 of this solenoid has a spring platform 23 which serves to engage the bottom of the tapered pin 17 to raise the tapered pin 17 as the core 22 is moved upwardly under the influence of the current in the windings 21.

It will, however, be understood that the tapered pin 17 is free from the platform 23 so that when the tapered pin 17 has been raised by means of the core 22 and the spring platform 23 it will be held in adjusted position by means of the pin 19. The upper portion of the solenoid casing 24 has an opening 25 communicating with the atmosphere and the bottom of this casing 24 has a threaded opening 26 in which meshes a screw 27 having a port 28 to afford communication from the bottom of the casing 24 with the atmosphere.

By referring to Figure 5 of the drawings it will be seen that there is a circuit 29 from the wire 30, through the arcuate solenoid 31, through the wire 32, the floor switch 33 to a terminal 34, which may be connected by a button 35 with a terminal 36, a solenoid 37, which serves to move the contact member 38 to contact with the contact member 39 so that when the circuit has been closed by the button 35 it will remain closed until opened by the floor switch 33, the circuit passing from the solenoid 37 through the wire 40 to the wire 62. When the button 35 has been moved to connect the terminals 34 and 36, the circuit will be closed and the solenoid 31 will be energized, the core 42 of this solenoid being connected by a link 43 with the piston rod 13 and as the solenoid 31 is energized the core 42 will serve to move the piston 14 to the position illustrated in Figure 2 of the drawings. At the same time the arm 44, which is secured to the solenoid and is pivoted at 45, will be moved to the position indicated in Figure 2 of the drawings. This arm 44 is secured to an arm 46 having an opening through which an arcuate pin 47 is disposed, the arcuate pin 47 being secured to a switch member 48 and there being a spring 49 on the arcuate pin 47 which is held between the arm 46 and the head 50 on the arcuate pin 47. When the arm 44 has moved to the position indicated in Figure 2 of the drawings, it will be understood that the switch member 48 will, by the means described, be moved to the position illustrated in the said figure, so that it will contact with a switch member 51. The closing of this switch will complete a circuit through the wire 41 leading from the wire 40 through the solenoid 52, serving to operate the reverse switch 53 having the six terminals shown in the drawings, through the wire 54 and through the switch members 51 and 48 to the wire 29. The closing of the switch 53 will close the motor circuit leading from the wire 30 to the wire 55, through the switch 53, through the solenoid 21, and the wire 56 to the wire 57, through the motor 58, the wire 59, the wire 60, through the switch 53, the wire 61 and the wire 62.

By the standard equipment the motor current is considerably reduced after the elevator car is started and it will, therefore, be

seen that when the motor current energizes the solenoid 21 it will move the core 22 to a position where the tapered pin 17 will be adjusted in the opening 16 and will be held by the pin 19 in this position when the core 22 recedes due to the reduced current in the motor circuit after the elevator car has been started.

When the elevator car reaches the desired floor and the floor switch 33 is operated in the customary manner, it will open the circuit energizing the solenoid 31 and the core 42 would fall to the position indicated in Figure 1 if it were not for the piston 14 in the dash pot casing 10. This piston 14 may only descend as the air passes through the opening 16 in the head 15 and as this opening 16 has been partially closed by means of the tapered pin 17, it will be seen that the downward movement of the core 22 will be retarded, depending on the upward position of the tapered pin 17 relatively to the opening 16, for it will be understood that the farther up the tapered pin 17 is disposed in the opening, the smaller will be the outlet to permit the air to pass from below the piston 14. It will also be understood that the greater the current passing through the motor circuit and the solenoid 21, the higher the tapered pin 17 will be raised by means of the core 22 and that when the load in the elevator car is great and subsequently the current is increased, the tapered pin 17 will be raised accordingly to retard the descent of the arm of the core 42, which serves to move the switch member 48 away from the switch member 51, which breaks the circuit which energizes the solenoid 52 controlling the main switch 53 and which serves to open the motor circuit.

The circuits which have been described may be the circuits for raising the elevator car by means of the motor 58 and the usual connections, and such being the case the circuits at the right in Figure 5 will be the circuits for lowering the elevator car in the elevator shaft, the push button being shown at 35^a, the floor switch at 33^a, the terminals connected by the floor switch 35^a at 34^a and 36^a, and the contact member 38^a operated by the solenoid 37^a for connecting the contact member 38^a with the contact member 39^a.

The circuit for the descent of the elevator car consists of the wire 63 from the wire 64, through the solenoid 31^a the wire 65 leading to the floor switch 33^a, the wire 66 leading from the solenoid 37^a to the wire 62. When the solenoid 31^a is energized it serves to move the switch member 48^a in contact with the switch member 51^a to close the circuit energizing the solenoid 52^a which operates the main switch 53^a. The circuits through the main switch 53^a during the descent of the elevator car lead from the wire 30, the wire 55, the switch 53^a, through the solenoid 21^a

the wires 67 and 69, through the motor 58, through the wire 57, the wire 70, the switch 53^a, the wire 71 and the wire 62.

From what has been said with reference to the circuits for raising the elevator car, the circuits for lowering the elevator car will be readily understood. When the circuit through the solenoid 31 has been closed, the solenoid 31 will serve, by the means described, to close the circuit, energizing the solenoid 52, which will close a circuit to operate the motor and the solenoid 31, by the means described, will also raise the piston 14. The motor circuit will energize the solenoid 21, which will move the core 22 to raise the tapered pin 17. The tapered pin 17 will be raised a distance corresponding with the amount of current used in the motor circuit, thereby regulating the size of the opening 16 at the side of the tapered pin 17. When the floor switch 33 is opened, the piston 14 will descend at a speed regulated by the size of the opening 16 at the side of the tapered pin 17, and when the tapered pin has been raised relatively high, because of the use of considerable current in the motor, which current also energizes the solenoid 17, the passage 16 at the side of the tapered pin 17 will be constricted and the downward movement of the piston 14 will be delayed and the opening of the circuit at the switch members 48 and 51 will also be delayed to delay the opening of the switch 53. Therefore, the more motor current which it is necessary to use for the normal operation of the elevator, the greater the delay in the opening of the motor circuit when the floor switch is opened.

As has been stated, the elevator starter is shown at 35 and the floor switch is shown at 33. It is understood that the elevator may be of any convenient type and may be suspended on cables in any customary manner to be operated by the motor 58.

What is claimed is:—

1. In a device of the class described having a motor with a circuit, a switch in the motor circuit, means to release the switch from a predetermined position, means to retard the operation of the first mentioned means, and a solenoid in the motor circuit having a core for adjusting the second mentioned means.

2. In a device of the class described having a motor with a circuit, a switch in the motor circuit, means to release the switch from a predetermined position, means to retard the operation of the first mentioned means, and means for adjusting the operative position of the second mentioned means relatively to the amount of current passing through the motor circuit.

3. In a device of the class described having a motor with a circuit, a switch in the motor circuit, a second circuit having means for operating the switch, and means operable by the

current in the motor circuit for moving the first mentioned means to operative position.

4. In a device of the class described having a motor with a circuit, a second circuit having a switch, a switch in the first mentioned circuit operable by the current in the second mentioned circuit, a third circuit having means for operating the first switch, and means for retarding the operation of the first mentioned switch when freed from the control of the third mentioned circuit.

5. In a device of the class described having a motor with a circuit, a second circuit having a switch, a switch in the first mentioned circuit operable by the current in the second mentioned circuit, a third circuit having means for operating the first switch, and means adjustable by the current in the first mentioned circuit for retarding the operation of the first mentioned switch when freed from the control of the third mentioned circuit.

6. In a device of the class described having a motor with a circuit, a second circuit having a switch, a switch in the first mentioned circuit operable by the current in the second mentioned circuit, a third circuit having means for operating the first mentioned switch, means for retarding the operation of the first mentioned switch, and means operable by the current in the first mentioned circuit for adjusting the second mentioned means in operative position.

7. In a device of the class described having a motor with a circuit, a second circuit having a switch, a switch in the first mentioned circuit operable by the current in the second mentioned circuit, means to open the first switch, and means operable by the current in the first mentioned circuit to retard the operation of the first mentioned means.

8. In a device of the class described having a motor with a circuit, a second circuit having a switch, a switch in the first mentioned circuit operable by the current in the second mentioned circuit, means to open the first mentioned switch, means to retard the operation of the first mentioned means, and means operable by the current in the first mentioned circuit for adjusting the operative position of the second mentioned means.

9. A floor control device for elevators having a motor circuit, a casing having a dash pot chamber with two openings, a piston in the chamber, a piston rod disposed in an opening and secured to the piston, a tapered pin in the other opening for engagement by the piston, means for holding the tapered pin yieldingly relatively to the casing, a solenoid in the motor circuit having a core for adjusting the position of the tapered pin, a switch in the motor circuit, and means for releasing the switch from a predetermined position connected with the piston rod to be retarded thereby.

10. In a floor control device for elevators

having a motor circuit, a casing having a dash pot chamber with two openings, a piston in the chamber, a piston rod disposed in one opening and secured to the piston, a tapered pin in the other opening for engagement by the piston, means for holding the tapered pin yieldingly in the last mentioned opening, a solenoid in the motor circuit having a core for adjusting the position of the tapered pin, a switch in the motor circuit, a second circuit having means for operating the switch, a switch in the second mentioned circuit, and means connecting the piston rod with the second mentioned switch for retarding the operation of the latter.

11. A floor control device for elevators having a motor circuit, a casing having a dash pot chamber with two openings, a piston in the chamber, a piston rod disposed in an opening and secured to the piston, a tapered pin in the other opening for engagement by the piston, means for holding the tapered pin yieldingly relatively to the casing, a solenoid in the motor circuit having a core for adjusting the position of the tapered pin, a switch in the motor circuit, a second circuit having means for operating the switch, a switch in the second circuit, a floor circuit having means for closing the second mentioned switch, and means connecting the piston rod with the second mentioned switch for retarding the operation of the latter.

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