June 28, 1932. J. DUNLOP 1,864,588

AUTOMATIC RESET SAFETY DEVICE

Filed Sept. 6, 1930

Fig. 1.

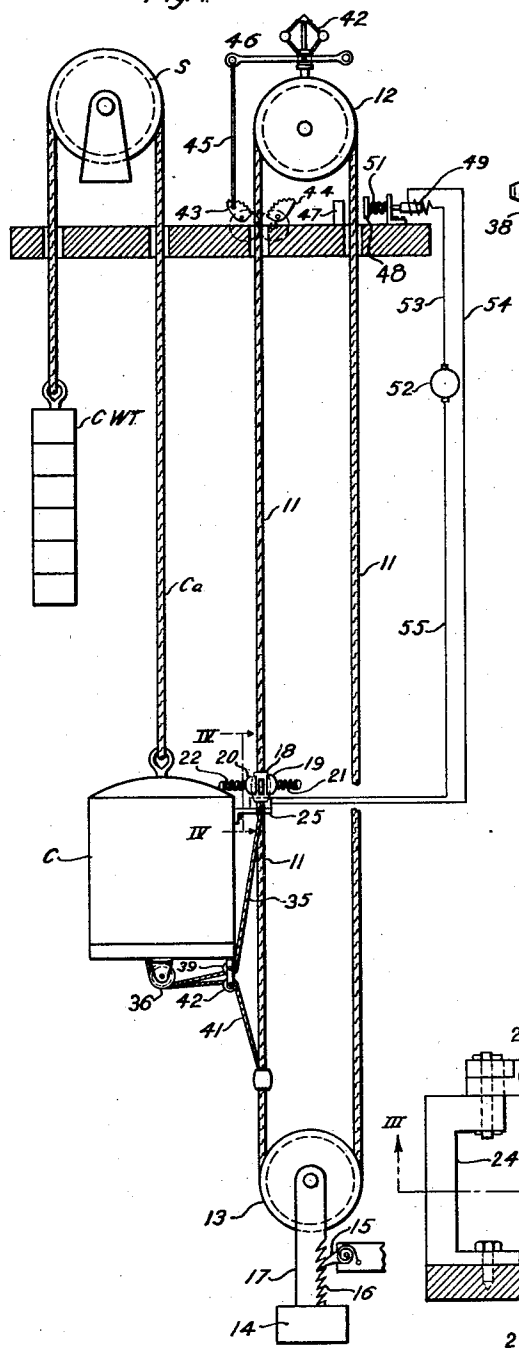


Fig. 2.

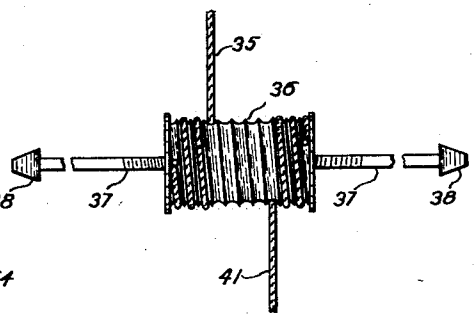


Fig. 3.

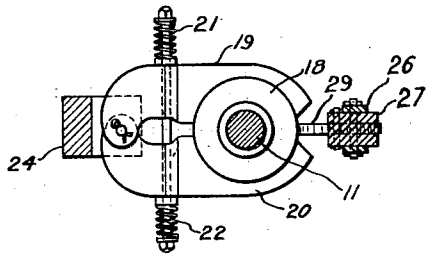
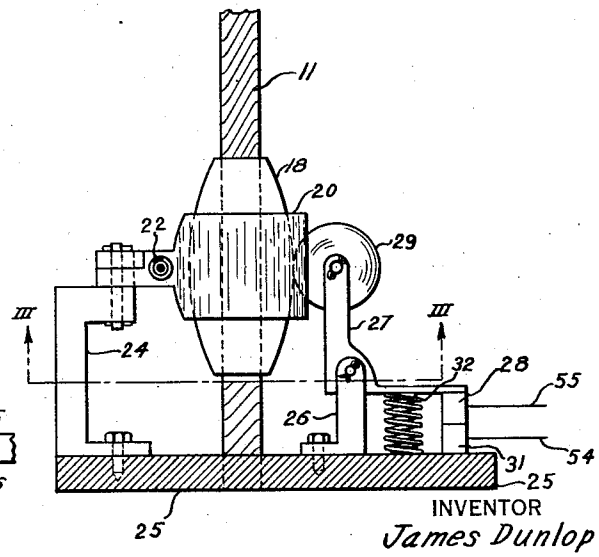


Fig. 4



INVENTOR

James Dunlop

BY

ATTORNEY

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UNITED STATES PATENT OFFICE

JAMES DUNLOP, OF PARK RIDGE, ILLINOIS, ASSIGNOR TO WESTINGHOUSE ELECTRIC ELEVATOR COMPANY, A CORPORATION OF PENNSYLVANIA

AUTOMATIC RESET SAFETY DEVICE

Application filed September 6, 1930. Serial No. 480,095.

My invention relates to elevator safety devices and more specifically to safety devices which can be automatically reset, after an actuation, to promptly restore the elevator car to an operative condition.

When the usual safety device on an elevator car has been actuated, it is necessary to send a mechanic up to the penthouse to restore the governor mechanism to its normal condition to release the governor rope. Further, it is also necessary that a wrench or key be inserted through the floor of the elevator car to rewind the safety cable on the drum and withdraw the safety jaws from the rails. Hence, the setting of the conventional safety-grip device causes great inconvenience and loss of time before the elevator can be restored to service.

It is an object of my invention, accordingly, to provide for the automatic resetting of the elevator safety device whereby the operator is enabled to promptly restore the elevator car to service after the safety device has set.

It is also an object of my invention to provide means whereby the operator of an elevator car will be enabled to reset the safety device, after it has been actuated, by merely reversing the direction of travel of the car and causing it to move in the opposite direction.

In accordance with my invention, I provide two cables which are wound on the safety drum in opposite directions. One of these cables passes around an idler pulley on the car and extends upwardly for attachment to the governor rope at a point adjacent to, or above, the elevator car. This cable is equivalent to the usual safety cable and is effective to apply the safety device to grip the rails and stop the car when unreeled in the usual manner. The other cable passes around an idler pulley on the car and extends downwardly for attachment to the governor rope at a point somewhat below the car. Since this cable is wound on the safety drum in a direction opposite to that in which the first cable is wound, it is effective when unreeled to withdraw the rail-gripping jaws, rewind the first safety cable and reset the safety device. The operator may accomplish this operation merely by starting the car upwardly.

The governor rope must be locked securely, while the resetting operation is being carried out, and, since the regular governor rope-gripping jaws are only effective to prevent downward movement of the adjacent portion of the governor rope, I provide additional rope-clamping means to be rendered effective by the operation of the safety device.

The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment, when read in conjunction with the accompanying drawing, in which

Figure 1 is a diagrammatic view of an elevator system embodying my invention,

Fig. 2 is a detail view showing the safety cable drum provided with two cables wound in opposite directions,

Fig. 3 is a plan view, partly sectional, taken on line III—III of Fig. 4, and

Fig. 4 is an enlarged side elevational view partly in section taken on line IV—IV of Fig. 1.

Referring to the drawing, the apparatus shown in Fig. 1 comprises an elevator car C which is supported by a hoist cable C*a* passing over a hoist sheave S to a counterweight CWT, in the usual manner. The hoist sheave S may be driven by an elevator motor (not shown), which is controlled and operated in any well known manner.

A governor rope 11 passes over a sheave 12 above the hatchway and under a weighted idler sheave 13 at the bottom of the hatchway. A weight 14 is attached to the idler sheave 13 and serves to automatically tension the rope 11 and to take up any slack. A stationary pawl 15 cooperates with teeth 16 on the side of the clevis 17, thereby permitting the sheave 13 to move freely downwardly but preventing its movement upwardly. The rope 11 will, at all times, be automatically tensioned by the weighted sheave 13 which cannot be lifted by the rope.

Attached to the rope 11 is a "Minié ball" 18 which is detachably secured to the car C

between a pair of clamps 19 and 20 which are tensioned by compression springs 21 and 22. The tension on the clamps 19 and 20 may be adjusted by adjusting the compression on the springs 21 and 22, and is preferably adjusted to hold the "Minié ball" 18 during the normal travel of the elevator car up and down the hatchway, whereby the governor rope 11 moves and drives the governor sheave 12 at speeds corresponding to the speed of the car. The clamps are pivotally mounted on a standard 24 which may be secured to the car in any suitable manner, as by a bracket 25.

A circuit interrupter, which may also be mounted on the bracket 25, comprises a standard 26 which pivotally supports a bell-crank 27 having a contact 28 at the extremity of one arm thereof and a roller 29 at the extremity of the other arm. A stationary contact 31 is mounted on the bracket 25 in cooperative relation to the contact 28 carried by the pivoted bell-crank arm, and a compression spring 32 is interposed between the bracket 25 and the contact arm of the pivoted bell-crank 27 for the purpose of separating the contacts and interrupting the circuit connected therethrough.

The roller wheel 29 is so disposed that the "Minié ball" 18 is in abutting relation thereto when it is clamped between the spring-pressed clamps 19 and 20 to thereby normally hold the contacts 28 and 31 in engaging relation. The operation of the circuit interrupter and the purpose of the circuit controlled thereby will be subsequently set forth.

The elevator car carries the usual safety device comprising jaws which grip the guide rails (not shown) to stop the car when a safety cable 35 is unreeled from a safety drum 36 in the usual manner. The cable 35 is wound on the drum 36 (shown in Fig. 2) in such direction that, when the cable is unreeled, it will cause the drum to rotate in the proper direction to force the threaded shafts 37 and wedges 38 apart, thereby applying the safety device in a well known manner. The safety cable passes around an idler pulley 39 and extends upwardly to the "Minié ball" 18 where it is attached to the rope 11.

In accordance with my invention, I provide a second cable 41 which is so wound on the drum 36 that, when it is unreeled therefrom, it will cause rotation of the drum in a direction opposite to that caused by unreeling the safety cable 35. In other words, the unreeling of cable 41 will cause rotation of the drum 36 in a direction to rewind cable 35 on the drum and retract the threaded shafts 37, thereby resetting the safety device. As shown in Fig. 1, the resetting cable 41 extends around an idler pulley 42 and downwardly for attachment to the rope 11 at a point below the elevator, in any suitable manner.

Associated with the sheave 12 is a speed-responsive device, such as a governor 42, which is driven thereby at speeds proportional to the speed of the elevator car up and down the hatchway. A pair of rope-gripping jaws 43 and 44 are pivotally mounted on opposite sides of the rope 11, and are controlled by the governor through the medium of the interconnected link 45 and the pivoted lever arm 46. The governor actuates the rope-gripping jaws to a position to grip the rope 11 when the speed of the elevator car C becomes excessive. If the adjacent governor rope 11 is moving downwardly when the jaws are moved into engagement therewith, the rope will be locked, and further movement thereof will be prevented.

Mounted adjacent to the governor rope 11, I have also provided an electromagnetically controlled rope-gripping device comprising a stationary gripping surface or jaw 47 and a slidably mounted, spring-pressed rope-gripping jaw 48 mounted at the opposite side of the rope 11. An electromagnet 49 is normally energized for maintaining the slidable rope-gripping jaw disengaged from the rope 11, in opposition to the spring 51. When the electromagnet 49 is deenergized, the spring 51 pushes the slidable member 48 toward the rope which is thereby gripped firmly against the stationary gripping surface 47. This rope-gripping device is effective to grip and hold the rope, irrespective of its direction of motion.

The electromagnet 49 is normally energized through a circuit comprising a suitable source of current 52, conductor 53, electromagnet 49, conductor 54, contacts 31 and 28 on the car C, conductor 55 and the source of current 52. Since the contacts 28 and 31 are maintained closed so long as the "Minié ball" 18 is secured to the car C by the spring-pressed clamps 19 and 20, the circuit for the electromagnet will be normally completed, and the electromagnet will be energized to hold the slidable spring-pressed member 48 away from the governor rope. It is to be understood that the source of current 52 may be any suitable or convenient source.

My invention is best understood, however, when considered with reference to an assumed operation thereof. Assuming that the car C, while traveling down the hatchway, attains a predetermined degree of overspeed, the governor 42 will actuate the jaws 43 and 44 to grip the governor rope 11 and prevent further movement thereof.

After the movement of the governor rope has been checked, the continued downward motion of the car will cause the "Minié ball" 18 to pull away from the spring-pressed clamps 19, 20, and the cable 35 to be unreeled and apply the safety device in a well known manner. When the "Minié ball" 18 pulls away from the clamps 19 and 20, the roller

29 is released, and the contacts 28 and 31 separate, thereby interrupting the circuit and deenergizing the electromaget 49. The slidable member 48, having been released, the spring 51 will force it toward the rope 11 which will be gripped between it and the stationary gripping surface 47.

In order to reset the safety and restore the car to service, it is only necessary to start the car in the opposite direction. Since the governor rope 11 is locked between gripping jaws 47 and 48 and its lower end is latched by the sheave 13 and pawl 15, the lower end of the reset cable 41 will thereby be held stationary and will be unreeled as the car moves upward. As previously set forth, the rotation of the safety drum 36 caused by unreeling cable 41 will be in a direction to cause the retraction of the threaded shafts 37 and will release the safety device. The safety cable 35 will be simultaneously rewound, and the safety device will be restored to its original condition for normal operation of the elevator car. When the "Minié ball" is reengaged by the clamps 19 and 20, the wheel 29 will be reengaged to thereby close the contacts 28 and 31. The closure of contacts 28 and 31 will complete the energizing circuit for the electromagnet 49 which will pull the spring-pressed gripping member 48 back to disengaging relation, and the governor rope will again run free. The elevator safety and actuating system will, therefore, be restored to normal operating condition.

It will be seen that I have provided an elevator safety device which, when actuated to stop the car, may be promptly restored to normal operating condition by merely causing the car to move in the opposite direction.

I do not wish to be restricted to the specific structural details and arrangement of parts herein set forth, inasmuch as various modifications thereof may be employed without departing from the spirit and scope of my invention. I desire, therefore, that only such limitations shall be imposed as are necessitated by the prior art and the scope of the appended claims.

I claim as my invention:

1. The combination with an elevator system comprising an elevator car, a safety device operable by unreeling a safety cable from a safety drum, means responsive to overspeeding of the elevator car for unreeling the safety cable to set the safety device and stop the car, of means for automatically rewinding the safety cable and releasing the safety device when the elevator car moves in the opposite direction.

2. The combination with an elevator system comprising an elevator car, a safety device operable by unreeling a safety cable from a safety drum, means responsive to overspeeding of the elevator car for unreeling the safety cable to set the safety device and stop the car, of means for automatically rewinding the safety cable and releasing the safety device when the elevator car moves in the opposite direction, said means comprising a second cable wound on the safety drum in the opposite direction relative to said first cable.

3. In combination, an elevator car operable up and down a hatchway, a safety device carried by the car including a safety drum and an actuating cable wound thereon for actuating the same, a speed-responsive device, a governor rope detachably secured to said car and attached to said safety cable for operating said speed-responsive device at speeds corresponding to the speed of the car up and down the hatchway, means actuated by said speed-responsive device when the car attains a predetermined speed for gripping and holding said governor rope, whereby the continued movement of the car is rendered effective to unreel the safety cable and apply the safety device, and a second cable wound on said safety drum in the opposite direction and attached to said rope, whereby the actuating cable may be rewound and the safety be reset by moving the elevator car in the opposite direction.

4. In combination, an elevator car operable up and down a hatchway, a safety device carried by the car including a safety drum and an actuating cable wound thereon for actuating the same, a speed-responsive device, a governor rope detachably secured to said car and attached to said safety cable for operating said speed-responsive device at speeds corresponding to the speed of the car up and down the hatchway, means actuated by said speed-responsive device when the car attains a predetermined speed for gripping and holding said governor rope, whereby continued movement of the car is rendered effective to unreel the safety cable and apply the safety device, a second cable wound on said safety drum in the opposite direction and attached to said rope, whereby the actuating cable may be rewound and the safety be reset by moving the elevator car in the opposite direction, and an additional rope-gripping means for holding the rope while the safety-actuating cable is being rewound and the safety device released.

5. In combination, an elevator car operable up and down a hatchway, a safety device carried by the car including a safety drum and an actuating cable wound thereon for actuating the same, a speed-responsive device, a governor rope detachably secured to said car and attached to said safety cable for operating said speed-responsive device at speeds corresponding to the speed of the car up and down the hatchway, means actuated by said speed-responsive device when the car attains a predetermined speed for gripping and holding said governor rope, whereby the con-

tinued movement of the car is rendered effective to unreel the safety cable and apply the safety device, a second cable wound on said safety drum in the opposite direction and attached to said rope, whereby the actuating cable may be rewound and the safety be reset by moving the elevator car in the opposite direction, an additional electromagnetic rope-gripping device operable to grip and hold the governor rope, irrespective of its direction of movement, and circuit-controlling means responsive to the release of the governor rope from the car for actuating said electromagnetic rope-gripping device.

In testimony whereof, I have hereunto subscribed my name this 22nd day of August, 1930.

JAMES DUNLOP.