J. A. MILLER.

SAFETY DEVICE FOR ELEVATORS.

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942,968. Patented Dec. 14, 1909.

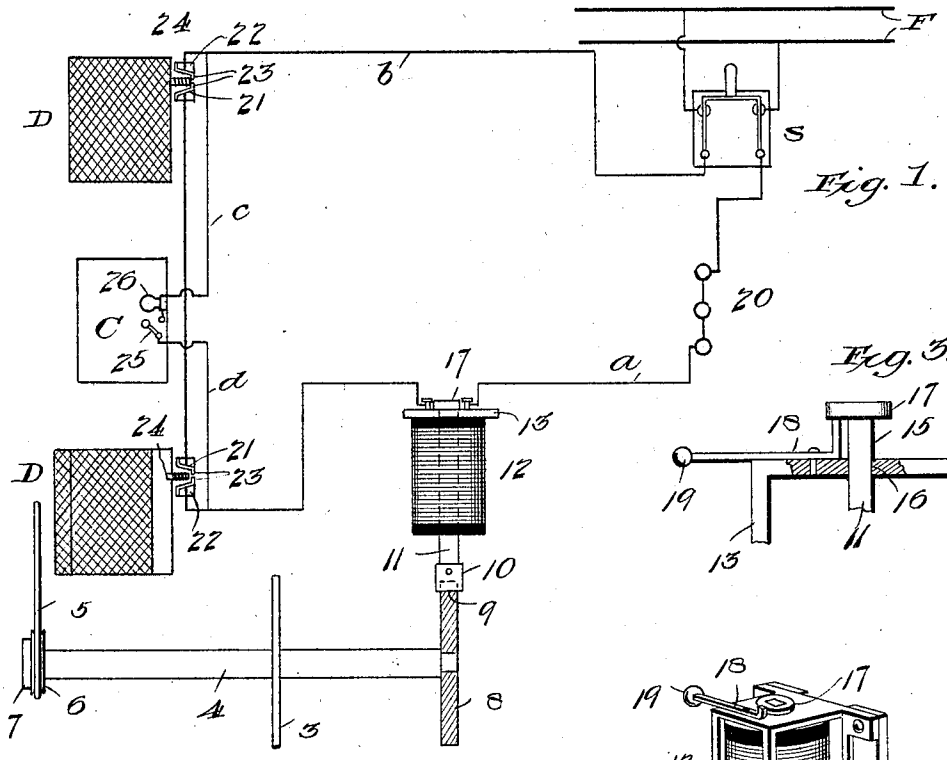


Fig. 1.

Fig. 3.

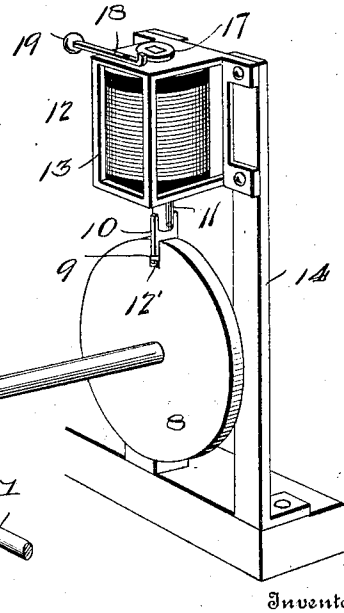
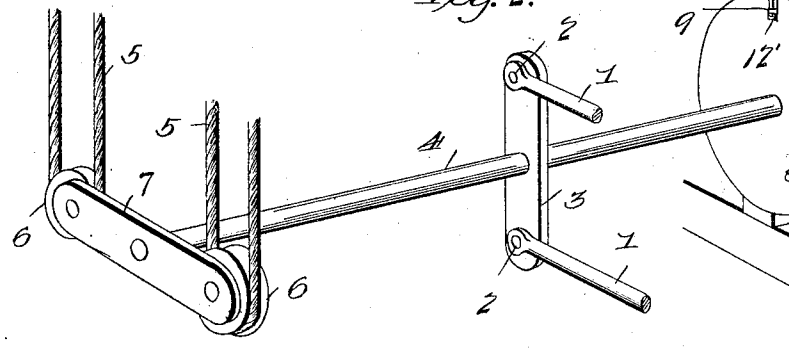


Fig. 2.



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SAFETY DEVICE FOR ELEVATORS.

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To all whom it may concern:

Be it known that I, JOHN A. MILLER, a citizen of the United States, residing at Baltimore, in the county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Safety Devices for Elevators, of which the following is a specification.

This invention relates to an improved safety device for elevators, and has particularly in view an improved electrically controlled device of this character designed to provide means for obviating accidents occasioned by open elevator doors, while at the same time possessing the distinct advantage of requiring no change in existing apparatus nor any modification in the service of the latter.

The main and primary object of the invention is to provide a simple and thoroughly practical safety mechanism comprising means for compelling the elevator operator to completely close the door or gate before he can start the elevator car, thereby avoiding the many accidents which occur before the door or gate is closed. In this connection the invention provides means by which the elevator car is locked against control by the opening of the landing door. In other words, the opening of the landing door after the operator brings his car to a stop serves to automatically throw the elevator controlling means completely out of operation, whereby the same can only be restored into operative condition by the closing and locking of the door or doors.

With these and many other objects in view which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

The essential feature of the invention involved in the idea of an electrically controlled lock for a power controlling member of the elevator system is necessarily susceptible to structural modification, according to the type of elevator equipment with which the safety device is associated, without departing from the scope of the invention, but a preferred embodiment of the latter is shown in the accompanying drawings, in which,

Figure 1 is a diagrammatic elevation of an elevator system of the hydraulic type equipped with the improved safety mechanism contemplated by the present invention. Fig. 2 is a detail in perspective of the power controlling means of an ordinary type of hydraulic elevator system showing the improved electrically controlled lock in operative relation thereto. Fig. 3 is a detail view showing the use of the temporary latch for the solenoid core.

Like reference characters designate corresponding parts in the several figures of the drawings.

In carrying the invention into effect no change is required in the elevator apparatus either from a structural standpoint or in the movement of parts. Also, the invention is applicable to any type of lifting apparatus involving a power controlling member capable of being locked against movement when the power has been cut off for the purpose of stopping the car. Hence, for illustrative purposes there is shown in the drawings a detail of the power controlling connections of an ordinary type of hydraulic elevator employing a controlling valve subserving the usual functions. This valve (not shown) is operated in various ways in different makes of hydraulic elevator systems, but in the illustration shown in the drawings the same is operatively connected with the valve rods 1 which are in turn connected, as at 2, to the opposite extremities of a cross arm 3 mounted on a valve controlling shaft 4. This valve controlling shaft 4 constitutes the power controlling member with which the present invention is associated and said member is oscillated through the medium of the controller connections in the elevator car, said controller connections including the operating cables 5 connected with the controller lever or equivalent device of an elevator car, and operating around the holding and guiding pulleys 6 supported on the opposite ends of a cross arm 7 fitted on the shaft or member 4.

The foregoing members constitute the usual parts of a common form of hydraulic elevator apparatus and to adapt the present invention thereto simply requires mounting on the said power controlling member or shaft 4 a lock element 8 usually in the form of a wheel provided therein with a catch notch 9 adapted to receive the latching detent 10. The said lock element or wheel

8 is accurately positioned on the power controlling shaft or member 4 so that its catch notch 9 will only lie in position to receive the latching detent 10 when the power controlling connections are in a position for closing the valve of the lifting machinery, hence locking the elevator controlling means against operation until the latching detent is lifted out of the notch 9 and clear of the element or wheel 8.

The latching detent 10 consists of a bolt of any suitable material of sufficient strength for the purpose, and may be separate from or integral with the core 11 of a lock controller solenoid 12. This solenoid 12 is of sufficient strength to provide, when energized, for lifting and holding the latching detent 10, and when the current is broken through the solenoid the core 11 and detent 10 drop by gravity into the notch 9 when the element or wheel 8 is turned to bring the same into the vertical plane of the detent. In this connection, it will be observed that a further detail of the invention resides in fitting in the base of the notch 9 a felt or equivalent cushion 12′ to deaden the click of the detent 10 dropping into the notch and also protecting the parts from undue or rapid wear.

The lock controller solenoid is preferably mounted in a carrying boxing or casing 13 which, in turn, is suitably fastened to rigid supports 14 for securing the solenoid in a rigid and firmly braced position over the lock element or wheel 8. In connection with the mounting of the solenoid in its boxing or casing, provision is preferably made for preventing the solenoid core 11 from rotary movement by forming the core with an angular or square upper end 15 working through a correspondingly shaped guide opening 16 provided in the top of the boxing or casing 13. It is also preferable to form the extreme upper end of the core 11 with a holding head 17 beneath which is adapted to be swung a temporary latch 18, which latch may be conveniently in the form of an angled plate or lever pivotally mounted on top of the carrying boxing or casing 13 and provided with a finger piece 19 which may be readily engaged by the fingers of the hand for throwing the said latch in and out of use. If it is desired for any reason to secure the electrically controlled lock entirely out of action so as to disconnect, as it were, the safety mechanism from the elevator, it is simply necessary to manually lift the core 11 and throw the latch 18 into the position shown in Fig. 3 of the drawings.

The lock controller solenoid 12 is included in series in a normally closed safety circuit *a*—*b*, which circuit also includes a source of electrical energy, a series of resistance lamps 20, and a plurality of door switches 21, one of which latter is arranged for operation in connection with the door or gate at each landing of the elevator shaft. The switches 21 are connected in series with the solenoid 12 and the resistance lamps 20 are introduced in multiple or parallel in the line of one of the circuit wires *a*, thereby providing an arrangement whereby, when all of the door switches 21 are closed, the current will flow through the solenoid 12 and the lamps 20 with the result of energizing the solenoid and causing the latching detent 10 to be lifted and held out of engagement with the lock element or wheel 8. This normal condition of the safety mechanism is indicated by the lighted lamps 20 which, at the same time, being introduced in sufficient numbers, serve as resistance to prevent burning out of the solenoid.

Each of the door switches 21 consists of a suitable boxing 22 inclosing therein a pair of terminal contacts 23 between and against which is arranged to operate a spring projected contact button or pin 24 arranged in the path of movement of the elevator door D and adapted to be moved inward into contacting relation with the contacts 23 when the door is fully closed and latched.

The safety circuit *a*—*b* may take its source of energy from batteries or any other suitable electrical supply, but ordinarily in buildings having an electrical supply the safety circuit wires *a*—*b* are connected with the feeding mains or wires F by means of a suitably interposed double pole cut-out switch S and wire connections between such switch and the said mains F.

As a part of the safety mechanism the elevator car, designated by C in the diagram, is preferably equipped with a single throw or equivalent emergency switch 25 included in an emergency bridging circuit *c*—*d*, the separate wires of which are connected respectively with the safety circuit wires *a*—*b* at points bridging all of the door switches 21 so as to shunt or cut out such switches when the emergency switch 25 is closed. Also, the emergency bridging circuit *c*—*d* preferably includes a signal lamp 26 located within the elevator car C which serves as a signal to the elevator operator to notify him to open and keep open the emergency switch 25, except when needed.

From the foregoing it will be understood that when the operator manipulates his controller lever to bring the same to a centered position and thereby close the valve of the hydraulic mechanism, the lock element of wheel 8 brings the notch 9 into the vertical plane of the latching detent 10, so that when the operator opens the door D at the landing where he has stopped, the door switch 21 at such point will break the safety circuit thereby deënergizing the solenoid with the result of causing the latching detent to drop by gravity and engage in the notch 9. This

latching action locks the power controlling connections against movement until the elevator operator has closed and latched the door, thereby restoring the normally closed condition of the safety circuit. In the event of a condition arising where a door has been opened and the car has been stopped above or below a landing, the operator may regain temporary control of the car by closing the safety circuit by means of the emergency switch 25.

I claim:

In a safety mechanism for elevators, the combination of the shaft of an elevator controlling mechanism, a lock wheel mounted on said shaft and provided with a catch notch, a cushion in the base of said notch, a solenoid, a latching detent carried by the core of the solenoid, guiding means for holding the solenoid core against rotation, a temporary latch for supporting the solenoid core against downward movement, a series of door switches, and a normally closed safety circuit including said switches and said solenoid.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

JOHN A. MILLER.

Witnesses:
EDUARD QUANETT,
R. C. MILLER.