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AUTOMATIC CHECKING DEVICE FOR ELEVATORS.

APPLICATION FILED JULY 10, 1901.

Fig. 1.

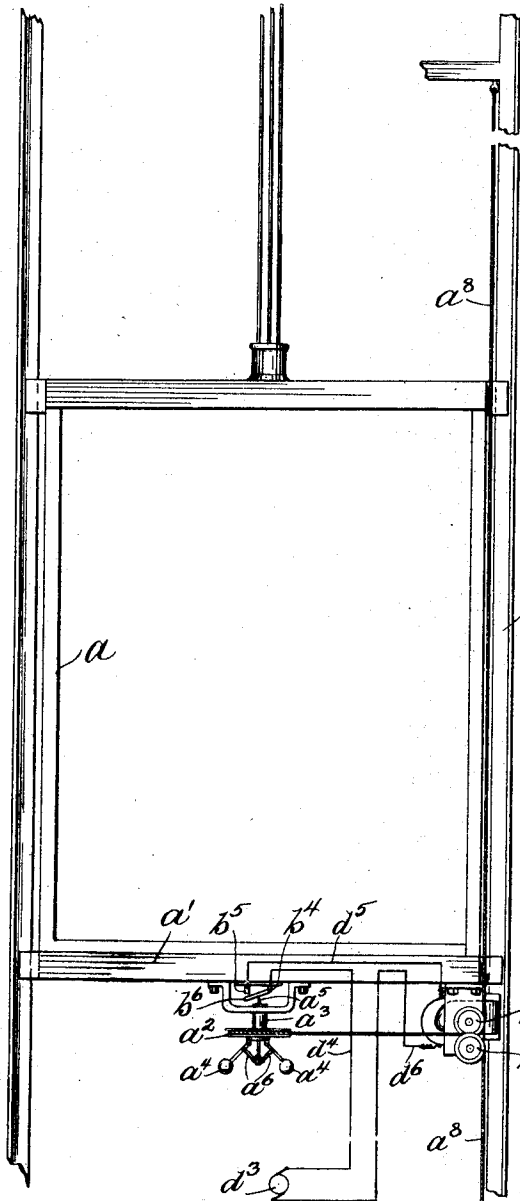


Fig. 2.

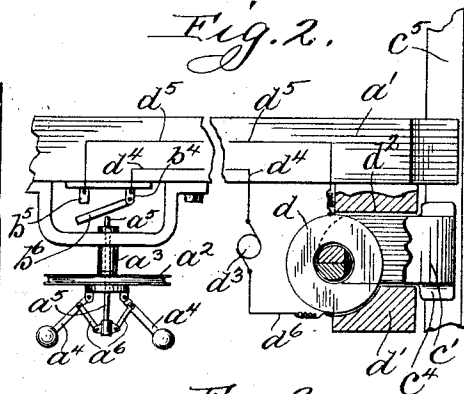


Fig. 3.

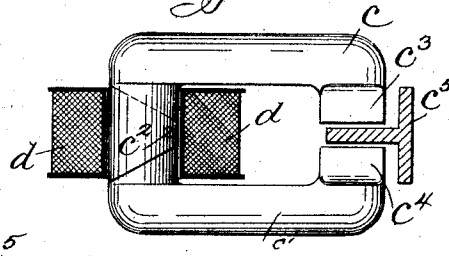
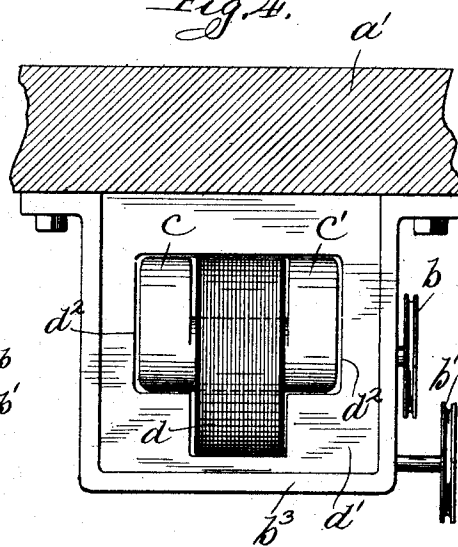


Fig. 4.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC CHECKING DEVICE FOR ELEVATORS.

No. 814,929.

Specification of Letters Patent.

Patented March 13, 1906.

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To all whom it may concern:

Be it known that we, CHARLES G. ARMSTRONG and CHARLES A. DRESSER, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Automatic Checking Devices for Elevators, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to an automatic checking device for elevators, our object being to provide means for automatically stopping an elevator or automatically checking the speed thereof when the speed exceeds a safe limit.

In accordance with our invention we provide an electromagnetic clutch associated with the elevator-car and operated by a governor or device which is responsive to the speed of the elevator-car. When the speed exceeds a safe limit, the clutch is automatically operated to grip a suitable runway or other suitable stationary part to thereby wholly check the movement of the car or to reduce the speed thereof to a safe limit.

We have illustrated our invention in the accompanying drawings, in which—

Figure 1 shows an elevator-car equipped with our invention. Fig. 2 is a detailed view of the governor and a sectional view of the magnetic clutch. Fig. 3 is a plan view of the magnetic clutch, showing the magnet-winding and the elevator-shaft runway in section. Fig. 4 is a side view of the magnetic clutch and its supporting-frame.

Like letters refer to like parts in the several figures.

The elevator-car *a* is provided with a governor of well-known type, the same being mounted on the under side of the car-floor *a'*. The said governor is composed of the pulley *a²*, which is journaled to a hollow shaft which works inside of the tube *a³*, and the governor-arms *a⁴* *a⁴*, which are attached to a rod *a⁵* by means of the links *a⁶* *a⁶*. The rod *a⁵* is adapted to slide up and down inside the hollow shaft to which the pulley *a²* is journaled. The governor rope or cable *a⁸* is attached at the top of the shaft in any suitable manner and passes over the pulley *b*, then around the

governor-pulley *a²* and back over the pulley *b'*, and then to the bottom of the shaft, where a weight *b²* is attached. The pulleys *b* and *b'* are mounted on a frame *b³*, which forms the support for the hereinafter-described electromagnetic clutch.

Above the upper end of the rod *a⁵* and against which the said rod is adapted to be forced is a knife-switch, which is composed of the two terminals *b⁴* and *b⁵* and the blade *b⁶*. The said blade *b⁶* is hinged to the terminal *b⁴* and is adapted to engage terminal *b⁵* when the rod *a⁵* is forced against it.

The electromagnet has a modified horse-shoe field or core which is composed of the two arms *c* *c'* and which are joined by a lap-joint, the arm *c* lapping over the arm *c'*. The arms *c* and *c'* are pivoted at a point *c²*. The object in using this kind of a joint is that the surfaces present good rubbing-faces to reduce the magnetic reluctance and form a strong joint. The arms *c* and *c'* are provided with shoes *c³* and *c⁴*, respectively, which are adapted to slide on opposite sides of the runway *c⁵*, which is made of magnetic material, and when current is switched in by the closing of the knife-switch before mentioned these said shoes are adapted to be drawn together, thereby gripping the said runway *c⁵*. The magnet-winding *d* is adapted to be mounted so as to surround the lap-joint of the arms *c* and *c'*. When the electromagnet is energized, it will be seen that the shoes *c³* *c⁴* will be of opposite polarity.

Inside the frame *b³* is a block of wood or similar material *d'*, in which the electromagnet is set and which forms a firm support for said electromagnet. Due to the existence of the spaces *d²* *d²* between the arms *c* and *c'* and the said block *d'* a lateral movement of the said arms *c* and *c'* is permitted, so that when current is flowing through the magnet-winding *d* the cores or arms *c* and *c'* may move toward each other, thereby causing the shoes *c³* and *c⁴* to grip the runway *c⁵*. Extending from the terminal *b⁴* to one pole of the source of electricity *d³* is a conductor *d⁴*, and extending from the terminal *b⁵* to one end of the magnet-winding *d* is a conductor *d⁵* and from the other pole of the source *d³* to the other end of the magnet-winding *d* is a conductor *d⁶*.

The source of electricity d^3 may be the generator which supplies current for operating the elevator, if it be an electric elevator, or the current supplied to the clutch may be derived from any supply-circuit, or where desired a source of electricity, as a storage battery, may be carried upon the car itself. When the source is exterior to the car, it may be connected therewith in the usual manner by means of flexible cables or the like.

The operation of the herein-described device is as follows: Suppose that the car a moves at a rate of speed faster than the car is designed to run under normal conditions. It therefore will cause the governor-rope a^8 to revolve the pulley a^2 faster than it normally revolves. Consequently due to centrifugal force the governor-arms a^4 a^4 will approach a position nearly parallel to the horizontal, thereby forcing the rod a^5 upward and causing it to close the blade b^6 against the terminal b^5 . The circuit is then closed and the current flows through the magnet-winding d and causes the cores or arms c and c' to come together, thereby gripping the runway c^5 and stopping the elevator or materially checking its speed.

It will be understood that the parts of our invention are susceptible of various modifications without departing from the spirit thereof. For instance, it is not essential that the runway be made of magnetic material, as it may be made of wood or other suitable material, in which case the shoes or gripping faces of the clutch would be properly associated with the movable part of the magnet to cause the shoes to grip the runway when the magnet is energized.

It will be seen that by this construction the elevator-car is provided with a magnetic retarding device having, as it were, a divided or multiplex magnetic circuit, part of which is on the car and part of which is separate from and apart from the car.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination with an elevator-car of a magnetic retarding device having a divided magnetic circuit, one part of which is carried on the car, and another part of which is separate from the car, said latter part attached to a stationary support.

2. The combination with an elevator-car of a magnetic retarding device having a part on the car, and a part separate from the car, and means on the car for automatically actuating said retarding device under predetermined conditions.

3. The combination with an elevator-car of a stationary runway therefor, an electromagnetic clutch on the car having movable parts opposed to said runway, and adapted to move therealong, said parts forming part of the magnetic circuit of the clutch, and a

governor on the elevator-car responsive to the speed of the car for controlling said clutch.

4. The combination with an elevator-car of a stationary runway separate from the car, an electromagnetic clutch having a movable part adapted to be held by the force of magnetism in contact with the runway under predetermined conditions, said runway of magnetic material so as to attract the energized parts of the electromagnetic clutch a suitable winding, a switch for controlling the circuit through said winding, and a device responsive to the speed of the elevator-car for operating said switch, substantially as described.

5. The combination with an elevator-car of a stationary runway of magnetic material separate from said car, an electromagnetic clutch having shoes adapted to engage and grip said runway, said shoes and runway being included in the magnetic circuit of said clutch, and a governor responsive to the speed of said car to control said clutch, substantially as described.

6. The combination with an elevator-car of a runway for said car, an electromagnetic clutch comprising a winding, a core for said winding comprising two arms, each of which projects partially into said winding, shoes carried on the ends of said arms and adapted to grip the said runway when said electromagnet is energized, said arms of opposite polarity, and a device responsive to the speed of the elevator-car and located beneath it for controlling the circuit through the said electromagnetic clutch, substantially as described.

7. The combination with an elevator-car, of a runway for said car, an electromagnetic clutch comprising a winding, a core comprising two arms pivoted together and of opposite polarity when the magnet is energized, shoes carried on the ends of said arms and adapted to grip the said runway when said electromagnet is energized, and a device responsive to the speed of the elevator-car for controlling the circuit through the electromagnetic clutch, substantially as described.

8. The combination with an elevator-car, of a runway for said car, an electromagnetic clutch comprising a winding, a core comprising two arms pivoted together by means of a lap-joint, one on each side of the winding, and a governor responsive to the speed of the elevator-car and adapted to close a switch for controlling the circuit through the said electromagnetic clutch, substantially as described.

9. The combination with an elevator-car of a stationary runway therefor, a clutch-magnet associated with the car and comprising a movable part adapted to move along and engage the stationary runway to check the movement of the car, said part forming a portion of the magnetic circuit of said mag-

net, a portion of the winding of the magnet being wound therearound substantially as described.

10. The combination with an elevator-car of a clutch-magnet on the car, comprising a pivoted arm contained within and forming a part of the magnetic circuit of the magnet, a stationary part in proximity to the car, along which said movable part of the magnet moves as the car travels back and forth, and means for automatically moving said movable part into contact with said stationary part under predetermined conditions.

11. The combination with an elevator-car of a magnetic retarding device made up of a part on the car and moving therewith, and a stationary part separate from the car so that part of the magnetic circuit of said retarding device when operating is on the car and another part off the car.

12. The combination with an elevator-car, of a runway therefor, a clutch-magnet mounted on the car, said magnet having two arms adapted to engage said runway when the magnet is energized to check the movement of the car, said arms being included in the magnet-circuit of said clutch-magnet so as to be of opposite polarity, substantially as described.

13. The combination with an elevator-car of an electromagnet mounted on said car, a stationary part in proximity to the car and separate therefrom, a movable part associated with said magnet and adapted, when the magnet is energized, to be held by magnetism in contact with said stationary part to retard or stop said car, and an automatic controlling device on the car outside of the control of the operator, which automatically con-

trols the magnet under predetermined conditions.

14. The combination with an elevator-car of an electromagnet mounted on the car and provided with opposed poles, a stationary part extending along the path of the elevator and projecting between said opposed poles, and an automatic controlling device for energizing said magnet under predetermined conditions, so as to cause it to coact with said stationary part to retard or stop the elevator-car.

15. The combination with an elevator-car of a magnetic retarding device located partly on the car and partly separate from the car so that the magnetic circuit is partly on the car and partly off the car, a device located beneath the car and responsive to variations in speed, for automatically setting the electromagnetic retarding device into operation under predetermined conditions.

16. The combination with an elevator-car of a magnetic retarding device having a divided magnetic circuit, one part of which is movably mounted on the car and another part of which is separate from the car and attached to a stationary support, the movable part on the car provided with a winding extending therearound and adapted to be connected in an electric circuit.

In witness whereof we have hereunto subscribed our names in the presence of two witnesses.

CHARLES G. ARMSTRONG.
CHARLES A. DRESSER.

Witnesses:

FANNIE L. WATERS,
W. L. FERGUS.