J. A. THORNHILL.

SAFETY APPLIANCE FOR ELEVATORS.

APPLICATION FILED AUG. 4, 1911.

1,043,881.

Patented Nov. 12, 1912.

2 SHEETS—SHEET 1.

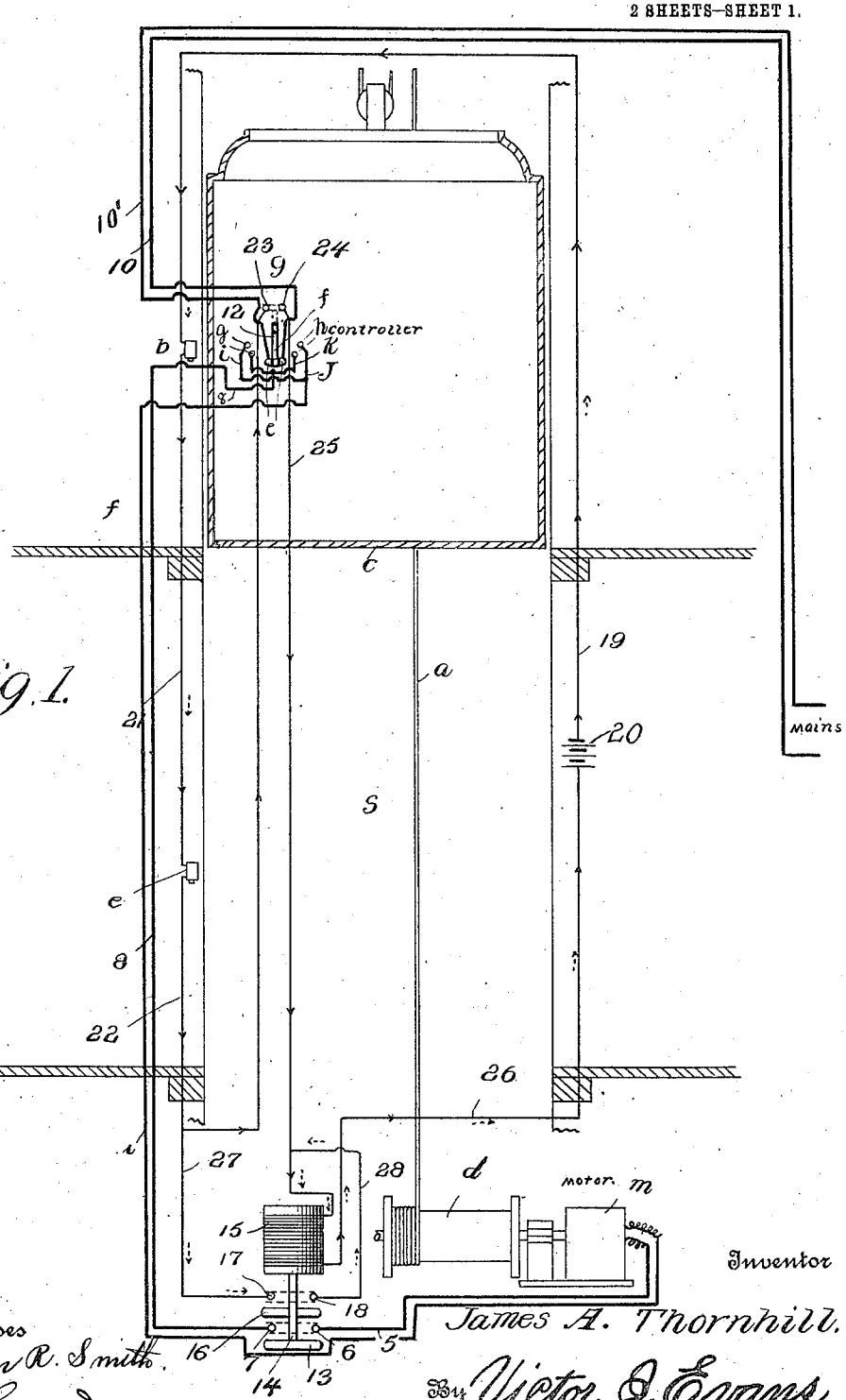

Fig. 1.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

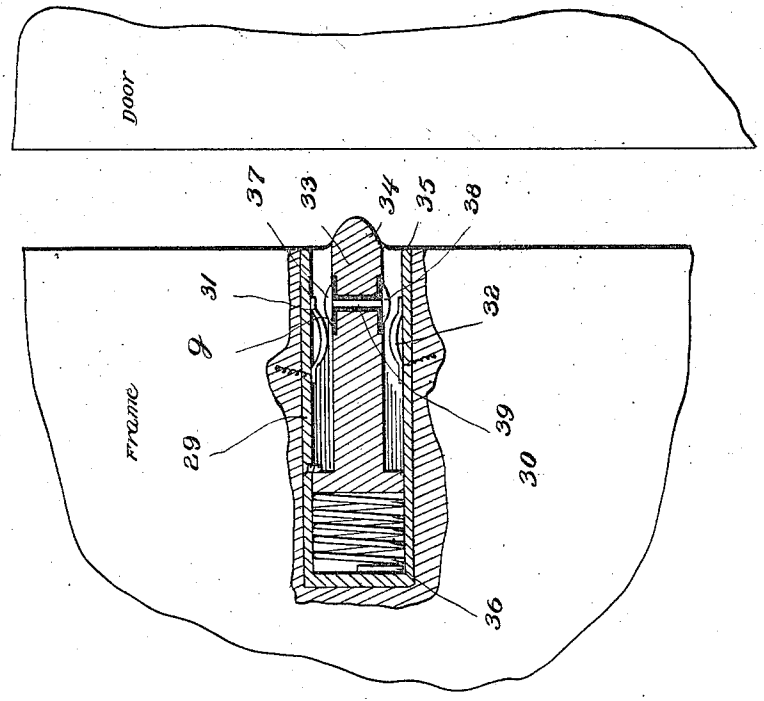
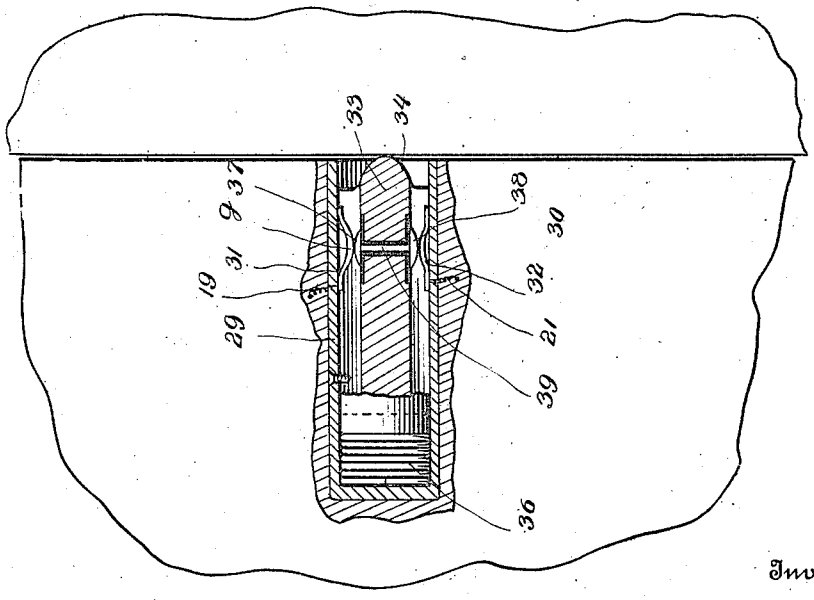


Fig. 2.



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SAFETY APPLIANCE FOR ELEVATORS.

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To all whom it may concern:

Be it known that I, JAMES A. THORNHILL, a citizen of the United States, residing at Champaign, in the county of Champaign and State of Illinois, have invented new and useful Improvements in Safety Appliances for Elevators, of which the following is a specification.

The object of the invention is to prevent the starting of an electric elevator before the shaft doors are completely closed and with the controller moved to starting position.

Other objects will appear and be better understood from the following description taken in connection with the accompanying drawings, in which,

Figure 1 is a diagrammatic view of a conventional elevator system equipped with my invention. Fig. 2 is a sectional detail of a shaft door and frame showing one application of the circuit closer for the same. Fig. 3 is a detail section of the circuit closer shown in Fig. 2 but showing the same in inoperative position as when the door is open.

The car *c* in the shaft *s* is operated by the motor *m* which is suitably connected to the car such as by the cable *a*, coiled on the drum *d*. The leading-in wires 10—10′ connect with spaced contacts *e*—*e* carried by the ordinary pivoted controller 12 which forms part of a reversing switch. The board of the reversing switch is arranged in the controller box 9 and the contacts *g*—*g* are arranged so as to be bridged by the contacts *e* when the controller is moved in one direction while the contacts *h*—*h* are arranged so as to be bridged by the contacts *e* when the controller is moved in an opposite direction. A wire *i* connects one of the contacts *g* with the motor *m* and the wire 8 connects the other of the contacts *g* with a contact 7 located at any required distance from the motor *m* and in any convenient portion of the building and arranged in spaced relation to a contact 6 to which is secured one end of a conductor 5 leading to the motor *m*. A wire *j* connects one of the contacts *h* with the wire *i* and a wire *k* connects the other of the contacts *h* with the wire 8. With this construction it will be seen that the motor circuit may not be closed by the controller 12 in the box 9 until the circuit closer 13 contacts with the contacts 6 and 7. The circuit closer 13 is carried by the core of a solenoid 15, the core 14 also carrying a circuit closer 16 adapted to contact with contacts 17 and 18 when the coil of the solenoid is energized and the core sucked thereinto.

The safety circuit extends by a conductor 19 from a suitable source of electric energy such as a battery of cells 20, the said conductor 19 being herein shown as extending through the shaft *s* and to the circuit closer *b* at the top door thereof. From the circuit closer *b* the safety circuit extends by a conductor 21 to a circuit closer *e* at the door on the floor below, this arrangement being continued throughout the various floors through which the shaft *s* extends, the circuit closer at the lowermost door of the shaft having a conductor 22 connected thereto at one end and at its opposite end with a contact 23 in the controller box 9. From a contact 24 adjacent to the contact 23 in the controller box 9 extends a conductor 25 which connects with one terminal of the coil 15 the other terminal of the coil being connected to the battery by a conductor 26. The auxiliary circuit extends by a conductor 27 connected at one end with the conductor 22 and at its opposite end with the contact 17, a conductor 28 connecting the contact 18 with the conductor 25.

The controller 12 is adapted, when in neutral position, to close the safety circuit by contacting with the contacts 23 and 24 and assuming that the said controller is in the last named position and the various doors closed so as to close the circuit closers *b* and *e* the safety circuit will extend by the conductors 19, 21, 22, contact 23, controller 12, contact 24, conductor 25, coil 15, conductor 26 to battery 20. As shown the core 14 moves vertically and when the coil is deënergized the circuit closers 13 and 16 will be below and spaced from the contacts 6, 7, 17, and 18 so that when the safety circuit is completed as just described the coil 15 will be energized whereby the core 14 will be sucked thereinto and the circuit closers 13 and 16 engaged with their respective contacts. When the parts are so positioned the motor circuit will be closed whereby the motor will move when the controller 12 is operated in the usual manner. In the present instance the controller 12 is of the oscillating type and when it is moved to either the right or left the safety circuit in the controller box will be broken. It will be

observed, however, that before the safety circuit is thus broken the core 14 will have been raised whereby the auxiliary circuit will be completed through the conductors 27 and 28 and contacts 17 and 18 and circuit closer 16, so that instead of the core falling as it would naturally do if the safety circuit were broken in the controller box and the auxiliary circuit not provided, the coil will now be energized by the current flowing through the auxiliary circuit.

In the event of the operator's failing to close any of the shaft doors, for instance the upper door *f*, the current through the safety circuit will flow only to one side of the circuit closer *b* whereby it will be impossible to close the circuit to the motor *m* until the said door is closed completely and the circuit established through the coil of the solenoid. So also, in the event of throwing the controller 12 to starting position before any door is completely closed, it will be impossible for the car to move since the current will pass through the conductors 19, 21, and 22, and to the contact 23, but not to the contact 24 and conductor 25 until the controller is moved to neutral position as previously described whereby the danger of the car's starting through the carelessness of the operator's moving the controller before completely closing the doors will be prevented.

The contacts *g* may be arranged so as to be operated by the various types of doors now employed in elevator systems. In the present instance I have shown the device arranged to be operated by a single sliding door although the same might be operated equally as well where more than one sliding door is employed or where the doors are foldable. As shown in Fig. 2 a casing 29 suitably connected to a support such as a door frame 30 is interiorly provided with contacts 31 and 32 arranged in spaced relation to which are secured the sections of the wire 19 such as the latter wire and wire 21. A plunger 33 has a rod 34 extending through an opening in an end plate 35 carried by the casing 29 and held projected by a thrust spring 36 arranged in the casing and bearing on the plunger and inner end of the casing. The plunger carries contacts 37 and 38 which are adapted to contact with the contacts 31 and 32 when the plunger is moved inwardly such as by the side of the door striking the rod 34 and moving the latter and plunger inwardly against the action of the spring 36, this inward movement of the plunger forming an electric connection between the contacts 31 and 32, it being understood that the contacts 37 and 38 are electrically connected in any preferred manner such as by the conductor 39. With this construction it will be seen that when the pressure is removed from the rod 34 the plunger will move outwardly under the action of its spring 36 thus operating automatically to break the safety circuit when the door is open.

Although I have shown and described one embodiment of my invention it is to be understood that I am not to be limited to the specific structure herein shown and described, nor to the particular arrangement of the parts, since it will be seen that various changes may be made, in the scope of the appended claims without departing from the spirit or sacrificing any of the advantages of the invention.

What I claim as new is:

1. In an electric elevator, the combination with a car and an electric motor for operating the same; of a safety circuit, means energized thereby for closing the motor circuit, a controller in the car for closing the safety circuit and an auxiliary circuit for energizing the motor circuit closing means when the safety circuit is broken by the controller.

2. In an electric elevator, the combination with a car and an electric motor for operating the same; of a safety circuit, means energized thereby for closing the motor circuit, a controller in the car for closing the safety circuit, and an auxiliary circuit connected in the safety circuit for the purpose described.

3. In an electric elevator, the combination with a car, a shaft door and an electric motor for operating the car; of a safety circuit, a circuit closer operated by the shaft door for closing the safety circuit, means energized by the safety circuit for closing the motor circuit, a controller in the car adapted to complete the safety circuit after the same is closed by the said circuit closer, and an auxiliary circuit for energizing the closing means for the motor circuit when the safety circuit is broken by the controller.

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

JAMES A. THORNHILL.

Witnesses:
J. R. JOHNSON,
CHAS. EGAN.