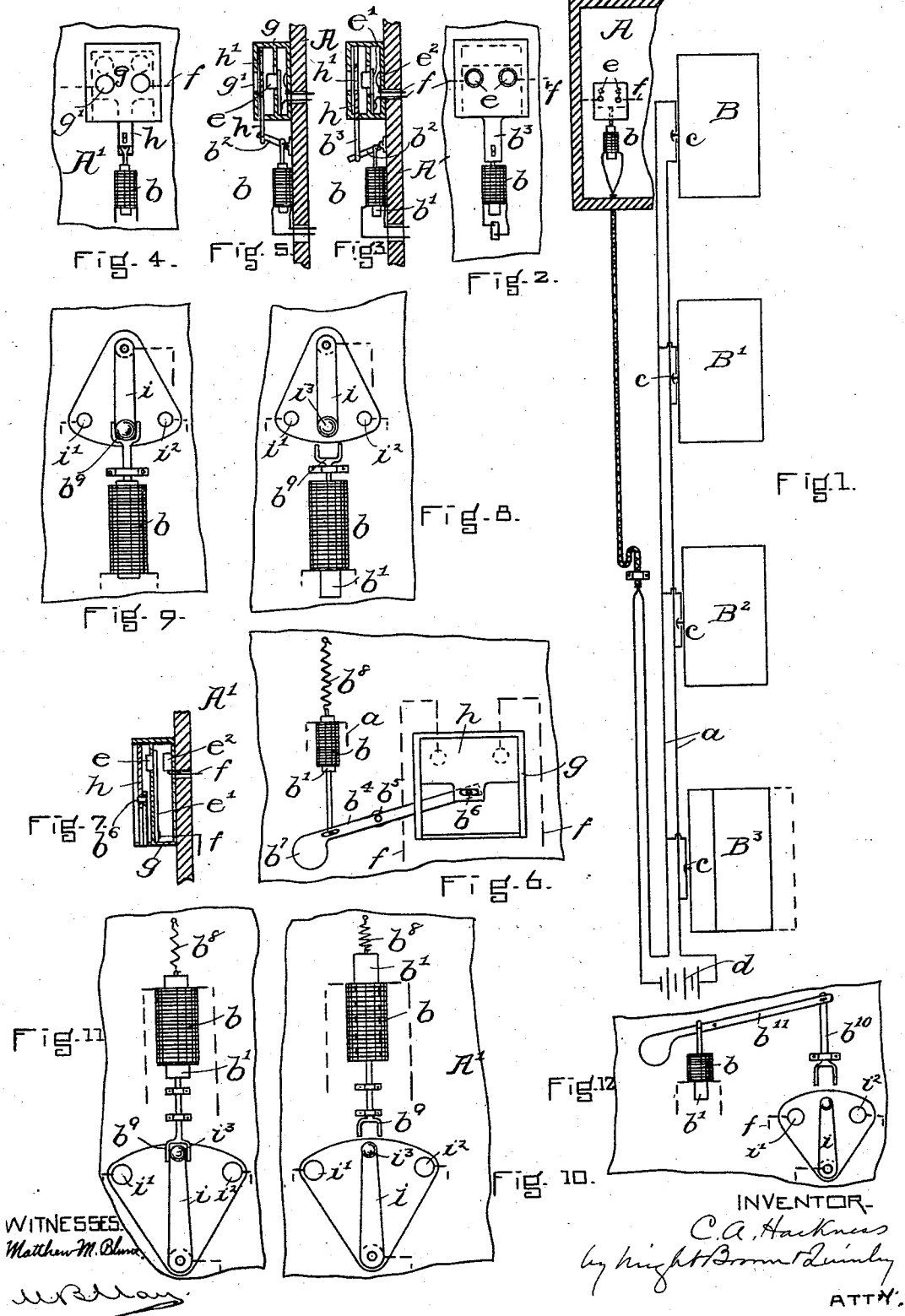


No. 581,115.

Patented Apr. 20, 1897.



(No Model.)

C. A. HARKNESS.
ELEVATOR.

2 Sheets—Sheet 2.

No. 581,115.

Patented Apr. 20, 1897.

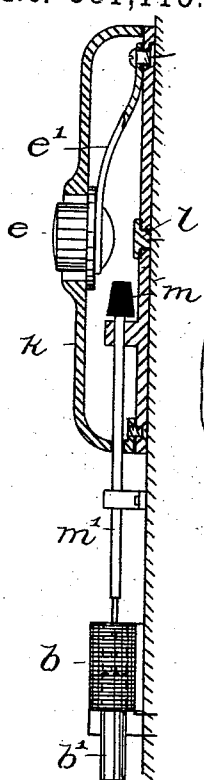


Fig. 14.

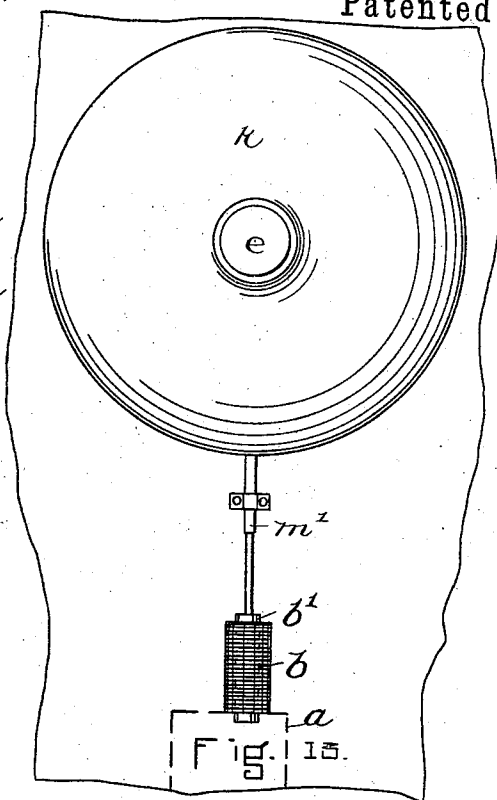


Fig. 15.

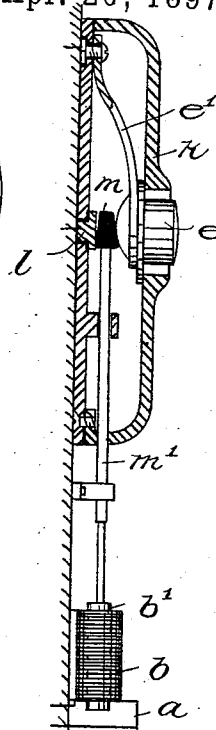


Fig. 16.

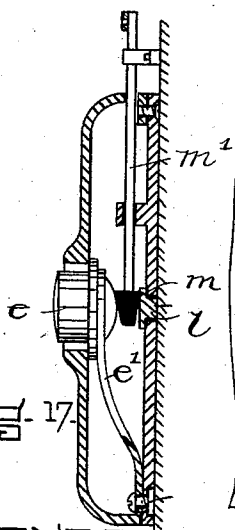


Fig. 17.

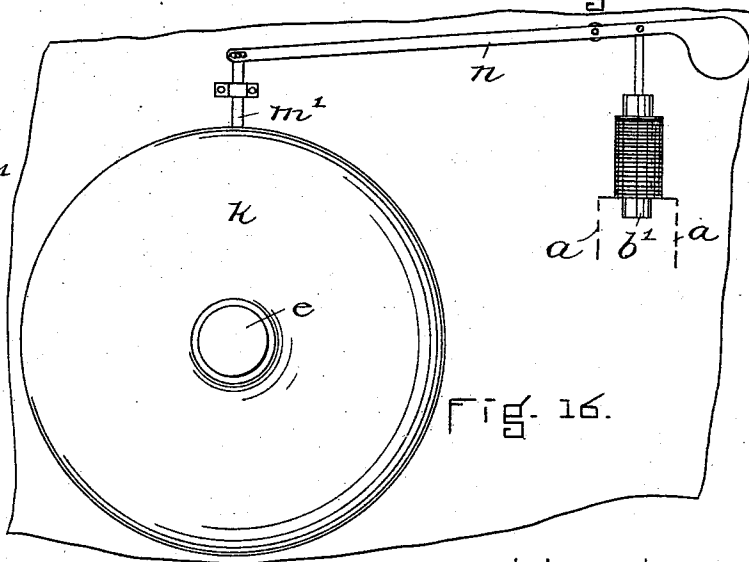


Fig. 18.

WITNESSES.

Matthew M. Blunt

[Signature]

INVENTOR.

C. A. Harkness
[Signature]

ATTY.

UNITED STATES PATENT OFFICE.

CHARLES A. HARKNESS, OF PROVIDENCE, RHODE ISLAND.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 581,115, dated April 20, 1897.

Application filed November 27, 1896. Serial No. 613,480. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. HARKNESS, of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

This invention relates to electrically-controlled elevators, that is, elevators the movements of which are regulated or controlled by push-buttons or switches on the car in circuit with the devices which govern the motor.

The object of the invention is to reduce the element of danger incident to entering and leaving an elevator-car by providing means coacting with the door for preventing the actuation of the push-buttons or switches for starting the motor to elevate or lower the car while the door is open.

To this end my invention consists of a device on the car for preventing access to or the operation of the switches or push-buttons, electrical means for operating said devices, and an electric circuit so arranged that when one of the doors leading into the elevator-well is opened the device on the car is actuated and the attendant is prevented from operating the push-button or switch. While I prefer to employ a normally open circuit which is closed by the movement of the door toward open position for operating the said device on the car, yet a normally closed circuit may be used, if desired, to produce the same results.

Reference is to be had to the accompanying drawings, and to the letters marked thereon, forming a part of this specification, the same letters designating the same parts or features, as the case may be, wherever they occur.

Of the drawings, Figure 1 illustrates diagrammatically an elevator-car provided with push-buttons for controlling the motor, a device on the car to prevent the push-buttons from being operated, a series of doors closing the entrances leading into the elevator-well, one being shown as partially open, and an electric circuit connected with said device and adapted to be closed by any movement of one of the doors toward open position. Figs. 2 to 5, inclusive, are enlarged views illustrating that form of device for preventing the attendant from pressing the push-buttons to start the car which is shown in Fig. 1. Figs. 6 and 7 show in detail another form of elec-

trically-operated device for accomplishing the same purpose. Figs. 8 to 12, inclusive, illustrate different forms of electrically-actuated devices for preventing the actuation of a pivoted switch-lever after a door has been opened. Figs. 13 to 17 illustrate different forms of devices for preventing the attendant from operating a push-button, said devices being constructed and arranged to insulate the two contacts of the button.

Referring to the drawings, and more particularly to Fig. 1, the elevator-car is designated by A, and the corridor-doors which open and close the doorways into the elevator shaft or well are designated by B, B', B², and B³.

a indicates the wires of an electric circuit which includes a magnet *b* of the solenoid type on the car and a suitable source of energy *d*. The circuit is broken at each doorway by the door, which when closed presses against a circuit-closing device *c*, (shown conventionally in Fig. 1,) the said device being arranged to close the circuit in case the door be moved toward open position.

The push-buttons *ee*, Figs. 2 to 7, inclusive, are illustrated as two in number and are included in electric circuits for electrically controlling the car-moving motor, a small portion of each circuit being designated by *f*. Each button is on a metallic spring-strip *e'* and may be pressed against a contact *e²* to complete the circuit, both buttons being mounted in a casing *g*, secured to the wall A' of the car. In front of the casing and in guides therein shields or guards *h* are mounted to slide to expose the buttons or cover them.

In Figs. 2 to 5, inclusive, Figs. 2 and 3 illustrate the guard *h* as having two apertures *h'* to coincide with the buttons and the apertures *g' g'* in the casing *g* when it is in a normal inoperative position, and Figs. 4 and 5 show the guard raised to prevent the attendant from actuating the buttons. The guard is thrust upward, when the circuit through the magnet *b* is closed, by an armature *b'*, pivoted to a hinged lever *b²*, connected at its outer end to an arm *b³*, projecting downward from the guard. Normally the armature is dropped, as shown in Fig. 3, and when the magnet is energized it is raised, as illustrated in Fig. 5.

In Figs. 6 and 7 the guard is shown as en-

tirely exposing the push-buttons when it is depressed, and it is operated by a lever b^1 , fulcrumed at b^5 and having a pin b^6 extending into a slot in the guard, said lever being
 5 secured by a pin-and-slot connection to the armature b^7 . The end of the lever has a weight b^7 , which is sufficient to raise the guard in front of the buttons, while the armature is held upward by a spring b^8 , strong enough to
 10 more than counterbalance the weight, so as to allow the guard to remain normally below the push-buttons. When the magnet is energized, the armature is drawn downward against the stress of the spring b^8 to allow the
 15 weight to lift the guard in front of the buttons and so prevent their being actuated. Thus from the foregoing it will be seen that when the elevator-car has been brought to a state of rest beside a landing, and the corridor-door is opened, immediately upon the first
 20 movement of the door toward open position the device on the car for preventing the operation of the electrical means or push-buttons is operated, and the latter cannot be actuated until the door has been fully closed.

It is evident that my invention is equally applicable for systems requiring the employment of a switch-lever such as illustrated in Figs. 8 to 12, inclusive. The switch-lever i
 30 there shown, which is connected with one limb of the circuit, is illustrated as lying at an intermediate point between them, to which point it was moved to break the circuit and bring the car to a state of rest. The lever
 35 may be moved to impinge against contacts i^1 i^2 to start the motor to move the car in one direction or the other.

In Figs. 8 and 9 the magnet is energized to lift the armature against its own weight to
 40 cause the forked end or guard b^9 thereof to engage the handle i^3 of the switch-lever to prevent its being operated, while in Figs. 10 and 11 the armature is held upward by a spring b^8 and is thrust vertically downward to prevent
 45 the switch-lever from being actuated when the magnet is energized.

In Fig. 12 a fork b^{10} is held upward by a weighted lever b^{11} , which is operated by an armature thrust upward by the energizing of
 50 the magnet.

I have also provided for preventing the operation of each push-button by a separate device, and in Figs. 13 to 17, inclusive, I have illustrated means for accomplishing this purpose.

55 The push-button e bears against the spring-contact strip e' and is mounted in a casing k , being provided with a flange bearing against the interior of the casing. The stationary contact l is mounted on the rear wall of the casing and by pressing the button inward the circuit through the two contacts is closed as soon as they touch.

I provide means for temporarily separating the contacts by insulating material consisting
 65 of a guard m , mounted upon the end of a rod m' , operated by the armature of the magnet. In Figs. 13, 14, and 15 the magnet is arranged

directly below the push-button and the guard is raised against its own weight by the armature upon the magnet being energized, while
 70 in Figs. 16 and 17 the armature is operated to raise the weighted end of a lever n , fulcrumed at n' and tending normally to hold the guard elevated for permitting the push-button to be freely actuated.

In all of the herein-described forms of my invention it will be seen that the opening of one of the corridor-doors causes an electrically-operated device to prevent the actuating
 75 of the electrical means which control the movements of the motor.

I do not wish to be understood as limiting myself to any of the details of construction illustrated upon the drawings and herein described, as they may be varied as desired; 85 nor do I limit myself to any particular style of magnet, for though I have chosen to show a solenoid-magnet for operating the guard or "electrically-operated device for preventing the actuation of the electrical motor-control-
 90 ling means," yet any other magnet may as well be used.

It will be understood that by my invention any manipulation of the push-buttons or switches is prevented, for although it does
 95 not operate to break the circuit connecting the buttons or switches with the motor-controlling mechanism, yet it prevents the attendant from pressing the button or shifting the switch to start the car. Hence when I
 100 employ the term "manipulation" I mean that while the button or switch is still in circuit with the motor-controlling mechanism it is guarded against being moved with the hands, while by stating that the "actuation" of button or switch is prevented I mean, broadly,
 105 that the motor-controlling mechanism cannot be actuated by the attendant.

I do not herein make specific claim to the device for insulating the two contacts of a
 110 push-button when the door is open, as it is made the subject-matter of claims in my copending application, Serial No. 613,479, filed November 27, 1896; nor do I herein claim any
 115 other of the subjects-matter of the claims in my said copending application.

Having thus explained the nature of the invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it
 120 may be made or all of the modes of its use, it is declared that what is claimed is—

1. In an elevator, a car, an electric push-button device on the car for electrically controlling the movements of the motor, a movable door, and electrically-actuated means
 125 coacting with the door for preventing the manipulation of said electric push-button device when the door is partially or entirely open.

2. In an elevator, a car, an electric push-button device on the car for electrically controlling the movements of the motor, a movable door, and electrically-actuated means on
 130 the car and coacting with the door for pre-

venting the actuation of said electric push-button device when the door is partially or entirely open.

3. In an elevator, a car, an electric push-button device on the car for electrically controlling the movements of the motor, a movable door, a guard for preventing the actuation of said electric push-button device, an electromagnet on the car for operating said guard, and an electric circuit including said magnet and arranged to cause the magnet to effect the movement of the guard to prevent the actuation of the electric push-button device on the car when the door is partially or entirely open.

4. In an elevator, a car, an electric push-button on the car for electrically controlling the movements of the motor, a movable door, a guard for preventing the actuation of said electric push-button, an electromagnet on the car to operate said guard, and an open electric circuit adapted to be closed by the opening of said door and including said magnet, whereby when the door is partially or entirely open the guard is operated to prevent the actuation of said push-button on the car.

5. In an elevator, a car, an electric device on the car for electrically controlling the movements of the motor, a movable door, a guard adapted to cover the electric device to prevent its being actuated, and means coacting with and operated by the door for operating said guard when the door is partially or entirely open.

6. In an elevator, a car, an electric device on the car for electrically controlling the movements of the motor, a movable door, a sliding guard adapted to cover said electric device to prevent its being actuated, and means coacting with and operated by the door for operating said guard when the door is partially or entirely open.

7. In an elevator, a car, an electric device on the car for electrically controlling the movements of the motor, a movable door, a

guard adapted to cover the electric device to prevent its being actuated, and an electromagnet coacting with the door, to operate said guard when the door is partially or entirely open.

8. In an elevator, a car, an electric device on the car for electrically controlling the movements of the motor, a movable door, a sliding guard adapted to cover said electric device to prevent its being actuated, and an electromagnet coacting with the door, to operate said guard when the door is partially or entirely open.

9. In an elevator, a car, one or more push-buttons on the car to electrically control the movements of the motor, a guard to cover said buttons to prevent their being actuated, a door, and means coacting with and operated by said door for operating said guard when the door is partially or entirely open.

10. In an elevator, a car, one or more push-buttons on the car to electrically control the movements of the motor, a guard to cover said buttons to prevent their being actuated, a door, and an electromagnet coacting with the door to operate said guard when the door is partially or entirely open.

11. In an elevator, a car, one or more push-buttons on the car to electrically control the movements of the motor, a guard to cover said buttons to prevent their being actuated, a door, an electric circuit adapted to be closed by the opening of said door, and an electromagnet included in said circuit, and energized when said door is partially or entirely open to operate the said guard.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 24th day of November, A. D. 1896.

CHARLES A. HARKNESS.

Witnesses:

MARCUS B. MAY,
C. C. STECHER.