F. BARLOW.

LOCKING MECHANISM FOR ELEVATOR GATES.

APPLICATION FILED OCT. 23, 1913.

1,155,870.

Patented Oct. 5, 1915.

3 SHEETS—SHEET 1.

Fig. 4.

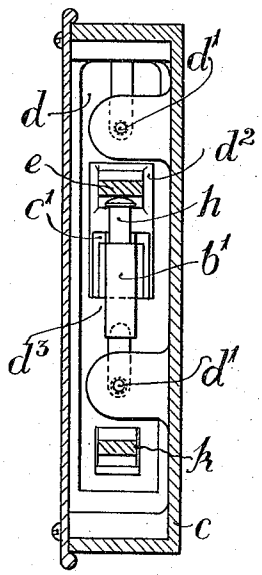


Fig. 5.

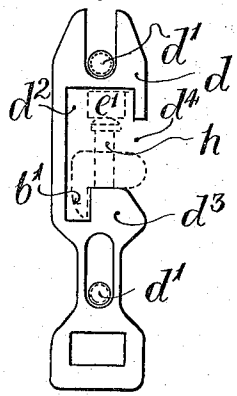


Fig. 1.

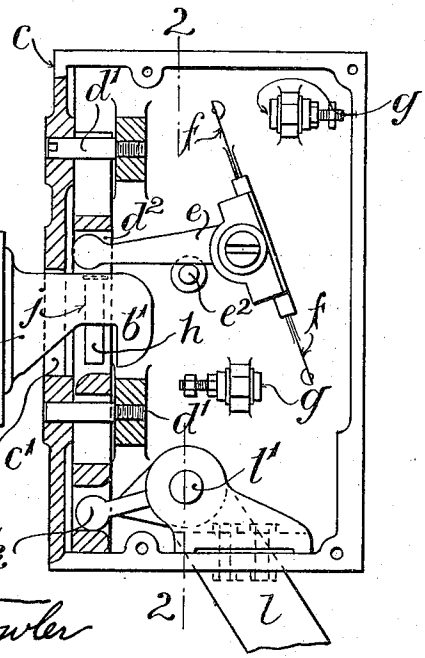
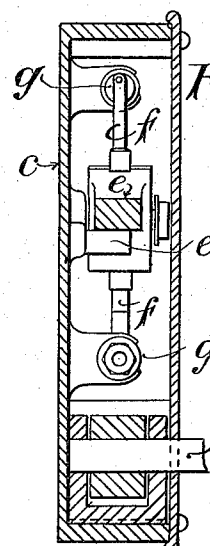


Fig. 2.



Witnesses:

C. W. Fowler

G. Manning.

Inventor:

Frank Barlow.

By P. Walter Fowler

atty.

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

F. BARLOW.

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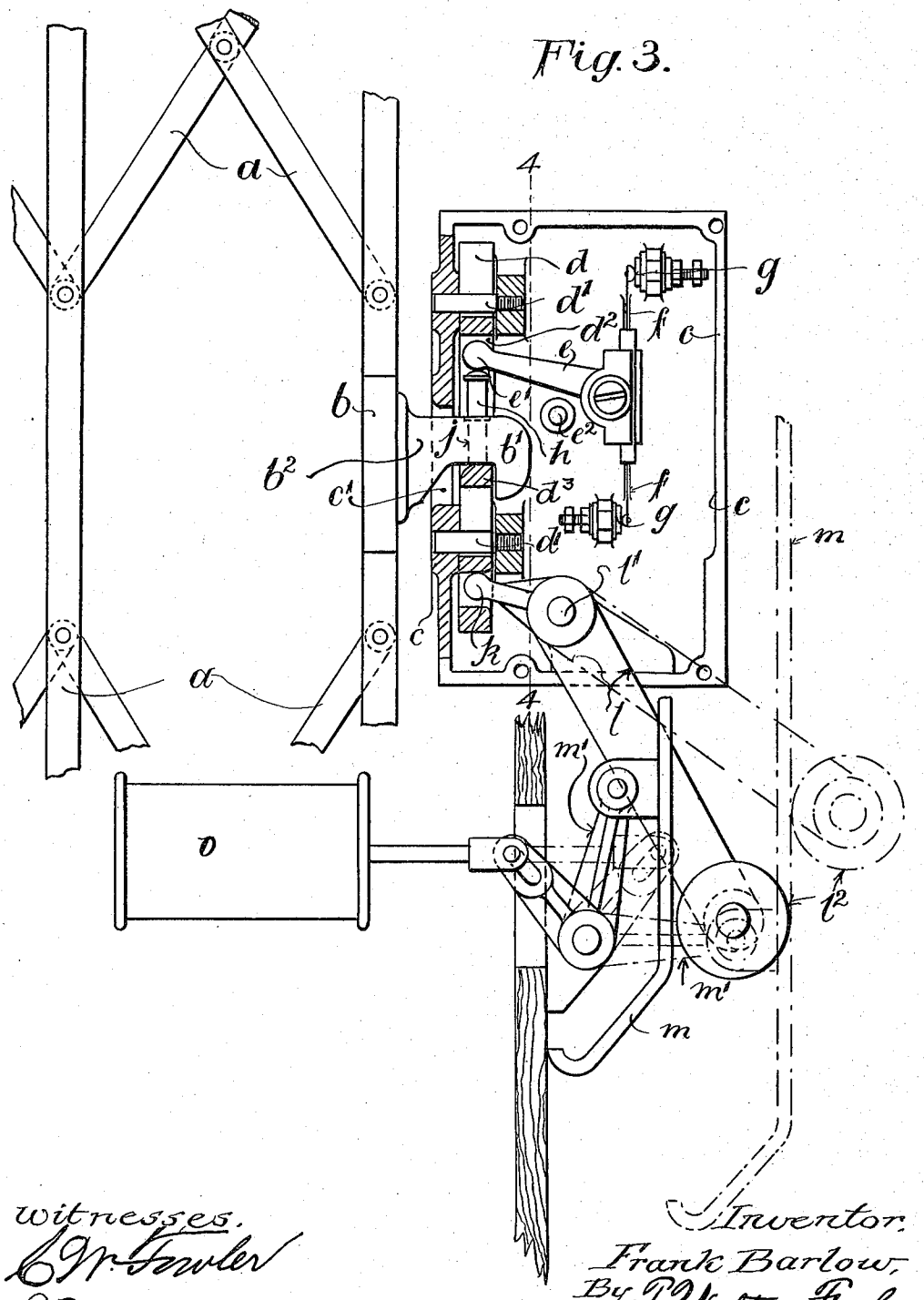
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3 SHEETS—SHEET 2.

Fig. 3.



Witnesses.
G. P. Fowler
G. Manning

Inventor.
Frank Barlow,
By J. Walter Fowler
atty.

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

F. BARLOW.

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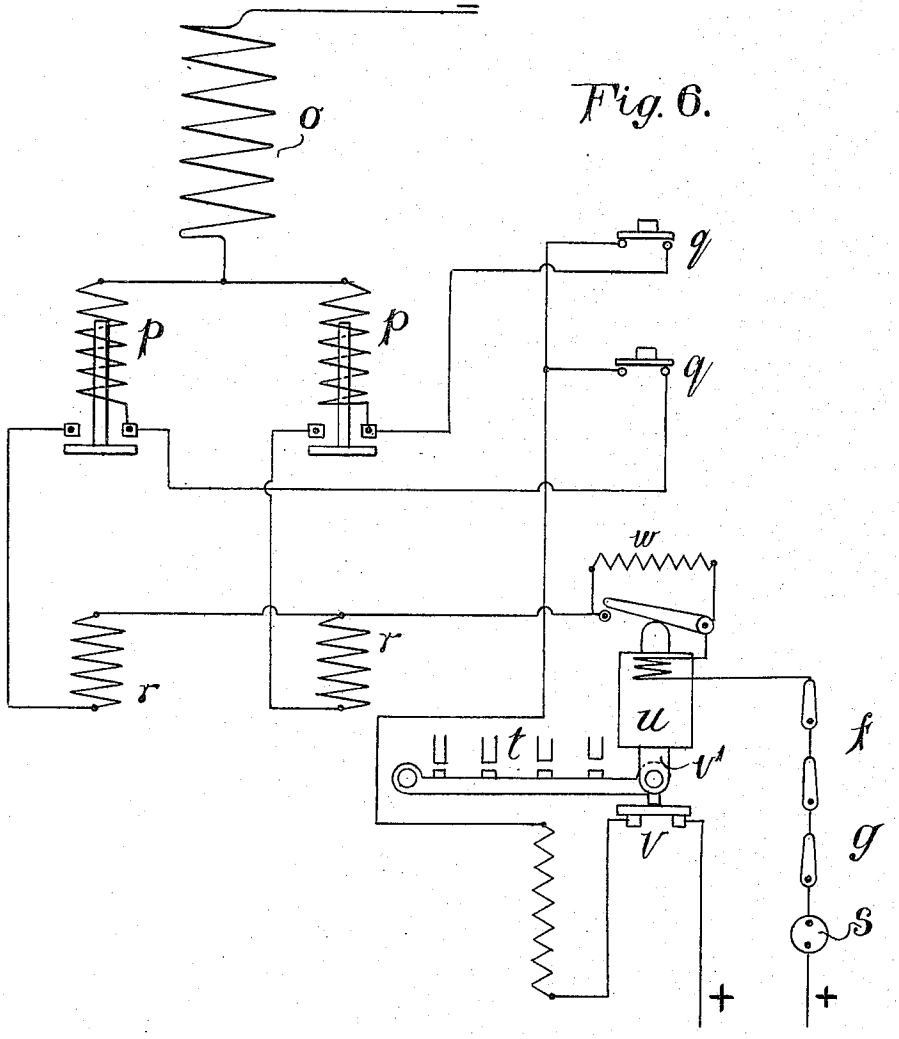
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3 SHEETS—SHEET 3.

Fig. 6.



Witnesses.
C. W. Fowler
G. Manning

Inventor.
Frank Barlow.
By J. Walter Fowler
atty.

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C

UNITED STATES PATENT OFFICE.

FRANK BARLOW, OF LONDON, ENGLAND.

LOCKING MECHANISM FOR ELEVATOR-GATES.

1,155,870. Specification of Letters Patent. Patented Oct. 5, 1915.

Application filed October 23, 1913. Serial No. 796,810.

To all whom it may concern:

Be it known that I, FRANK BARLOW, of 6 Medina road, Finsbury Park, London, England, engineer, subject of the King of England, have invented certain new and useful Improvements in Locking Mechanisms for Elevator-Gates, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to electrically controlled elevators and the like, and consists of an improved locking mechanism for the gates, doors or shutters guarding the entrances to the shaft or well.

In the accompanying drawings which illustrate one form of construction of the invention:—Figure 1 is an elevation in part section showing the safety locking mechanism in the position ready for opening. Fig. 2 is a vertical section on line 2—2 of Fig. 1. Fig. 3 is an elevation in part section showing the safety locking mechanism in the locked position. Fig. 4 is a vertical section on line 4—4 of Fig. 3. Fig. 5 shows a suitable form of sliding bolt for swinging doors. Fig. 6 represents the connections for a push-button system of control.

The sliding or collapsible gate a carries upon the front picket a locking catch b having an undercut beak or hook b^1. The lock casing c is slotted at c^1 for the passage of this beak, and within this case there is mounted a slidable bolt d guided upon studs or pins d^1. The sliding bolt d has a longitudinal slot d^2 through which the beak of the locking catch b passes, one end of this slot forming a ledge d^3 over which the beak is hooked in the closed position as shown in Fig. 3. The other end of the slot d^2 receives the extremity e^1 of the horizontal arm of a switch lever e, which may be of bell crank form, this arm being approximately at right angles to contact fingers f mounted upon the lever. The two fingers are preferably elastic and they may be arranged side by side, or as in the construction illustrated they may extend respectively upward and downward, so as in either case to connect two insulated studs or contacts g to which the controlling or motor starting circuit connections are led.

In the shank of the locking catch b immediately behind the undercut beak, there is provided a sliding pin h which is capable of a limited vertical movement through a hole or socket j in the shank. When the beak b^1 of the locking catch passes over the ledge d^3 of the sliding bolt d, the latter in rising behind the undercut beak pushes up the vertical pin h, which in its turn raises the extremity e^1 of the switch lever and so closes the circuit upon the studs g through the fingers f. The upward movement of the vertical pin h carries it beyond the upper end of the slot c^1 and thereby affords an additional safeguard so that a double locking action is provided.

In order to open the gate or door, it is first necessary that the beak b^1 of the locking catch be released by a downward movement of the sliding bolt d. This movement positively operates the switch-lever e to break the circuit at f g before the beak b^1 is released; at the same time the vertical pin h is pushed downward by the extremity e^1 through its socket j in the shank of the locking catch. When the bolt is down at the bottom of its stroke as seen in Fig. 1, the locking catch b can be withdrawn through the slots d^2 c^1 in the bolt and in the lock casing respectively, leaving the switch lever e engaged by the sliding bolt with the contacts f in the open position.

It will be understood that in applying the invention to a hinged door, the locking catch upon the latter will enter the lock casing not through an opening or slot (as c^1) in the side but through an opening in the front or face of the casing. In this case the locking bolt d may be arranged as shown in Fig. 5, with a gap d^4 in one side of the slot d^2 affording at the bottom a ledge d^3 which engages the locking pin h and the door catch as indicated in dotted lines. The lock is released by lowering the sliding bolt, as already described.

The sliding bolt d is operated by means of a tappet k mounted upon the spindle l^1 of an arm l carrying a roller l^2 which projects in line with a striker m carried upon the lift cage or the like. This striker is movable under the action of the cage-controlling device, for example by means of the solenoid o, which normally retains the striker m out of contact with the roller-fitted arms l l of the several entrances. Fig. 6 represents diagrammatically the electrical connections for controlling the circuits. The solenoid o is connected in series with the main controlling circuit and the push button circuit, these two being in parallel to one another. The push button circuit extends from + through v up to one or the

other of the push-buttons, q, thence to p, through o and to —. As soon as this current raises the armature of p, the main controlling circuit is established from + through s, f, g, u, (w), and r (one or other), to p as before, and then through o to — at starting, and then after the lever arm, t, has lifted, o, p and r are in series. The relays p p are connected to the respective push-buttons q q, which are located at the several floors or landings. The operation of a relay by its push-button circuit energizes the main controlling circuit through the same relay p and corresponding circuit-breaker r, and through the several gate-switches f g which therefore must all be in the closed position with their respective gates locked before this main controlling circuit is completed. The circuit breakers r, r are employed to open or close the motor circuit and they therefore control the motor circuit in the well known manner. While the lift is running, the solenoid, o, is in series with the circuit breakers, r, r, and therefore when the circuit is opened, *e. g.* by opening the switch, the lift cage stops and the striker, m, falls into the engaging position. A stop button s in the controlling circuit is provided for stopping the cage.

The lever arm t of the starting resistance or rheostat of the motor (not shown) is operated by the coil u which also breaks the push-button circuit at v as soon as its armature u^1 moves in consequence of the energization of this coil. A resistance w is provided to reduce the current through this coil when the movement of its armature is completed.

If the solenoid or control circuit is opened intentionally to stop the elevator or from any cause, the striker then falls forward to the position shown in dotted lines in Fig. 3 so as to contact with the next of the roller-fitted arms and stop the cage at that level. The striker is preferably arranged vertically and supported by two or more hinged links m^1 in the manner of a parallel ruler; one of the links may be formed as a bell crank having its other arm m^2 connected to the armature of the solenoid o. The striker is allowed to fall by an automatic release of the solenoid at the floor at which the car is to stop. The arm l will then be raised, the switch opened, and the gate unlocked.

Upon closing the gate, the catch b^1 enters into the casing as shown in Fig. 1, depressing if necessary the bolt d; when the striker m returns to its normal position toward the cage, for example by the energization of the solenoid o consequent upon the actuation of a push-button, this allows the lever l to fall under the influence of gravity, so raising the bolt d to lock the gate and close the gate-switch, as above described. It will be noted therefore that the improved double locking mechanism fulfils the following requirements:—The cage cannot be started or the controlling circuit closed unless all the gates are locked. The gates cannot be opened while the cage is moving nor unless the cage is standing opposite the respective entrance. Should any working part fail, either the elevator would not work or the gate could not be opened. No springs are necessary. Should the brake fail or break, the vertical pin would prevent the gate or door from being opened. Should the solenoid circuit be broken *e. g.* by failure of the winding, the lock would be released, the cage would stop on arrival at the next floor, and the elevator could not be re-started until the solenoid had been repaired. The solenoid may however be totally inclosed.

The lock and switch automatically adjust themselves for wear, so that if undue wear should take place, the elevator cannot be started without the gates being locked, because starting is dependent upon the sliding pin closing the circuit. When in that position for closing the circuit the gate is locked.

In locking mechanisms of the usual type, when the gate is closed and the controller operated to start the cage, the locking of the gate takes place after the cage has traveled a sufficient distance to allow the customary controlling rail or incline on the cage to move away from the trigger lever or striker arm projecting into the well. Moreover, the incline engages the lever at each floor or gate so that each gate in turn is unlocked and may therefore be opened at the time the cage passes this position even though it is not stopping at that floor.

By the present invention the locking of the gate is made to take place not as the final of a series of operations but as one of a number of interconnected and substantially simultaneous steps, each of which determines in a definite manner the next step in the action. Thus the actuation of the controlling device, push-button or the like, operates the striker or incline and allows the trigger lever to fall by its own weight; this lever raises the sliding bolt which locks the gate; the rise of the locking bolt, provided the gate-catch is in position and properly engaged by the bolt, closes the contacts of the gate-switch; the controlling circuit is thereby completed at that gate, and the cage will be allowed to start, provided the circuit is also completed at all other points.

According to the present invention, the gate is automatically locked prior to the closing of the controlling circuit to start the cage or the like; the locking catch upon the sliding gate or the like, which is provided with a beak or the like adapted to

enter into the lock casing through a slot in the face of the latter, is engaged by a locking bolt, the movement of which is determined by the actuation of the controlling device so as to engage a bell crank lever or the like carrying one or more contacts adapted to close the controlling or motor circuit. The beak may be undercut or barbed in the manner of a spearhead to insure engagement, and the sliding bolt is preferably arranged to rise vertically so as to engage beneath the undercut beak of the locking catch while the contacts are brought into the closed position by the corresponding movement of the bell crank.

Having thus described my invention, what I claim as such and desire to secure by Letters Patent is:—

1. A locking mechanism for elevator gates, comprising in combination with a cage a gate catch, means for engaging said gate catch, a movable member mounted upon said gate-catch, said movable member actuated by said engaging means, and a switch operated by the actuation of said movable member, said switch serving to start and stop said cage.

2. A locking mechanism for elevator gates, comprising in combination with a cage a gate-catch, means for engaging said gate-catch, a member movably mounted upon said gate-catch, said movable member actuated by said engaging means, and a switch serving to start and stop said cage, said switch being operated in one direction by said movable member and in the other direction by said engaging means.

3. A locking mechanism for elevator gates, comprising in combination with a cage a gate-catch, means for engaging said gate-catch, and a switch determining the movements of the cage, said switch being operated by said engaging means, the operation in one direction being conditional upon the engagement of said gate-catch.

4. A locking mechanism for elevator gates, comprising in combination with a cage means for controlling said cage, a striker, said striker being mounted upon the cage and being movable under the action of said controlling means, a lever adapted to be actuated by said striker in one position of the latter, a gate-catch, means for engaging said gate-catch, said engaging means operated by said lever, and a switch serving to start and stop said cage, said switch operated by said engaging means, the operation in one direction being conditional upon the engagement of said gate-catch.

5. A locking mechanism for elevator gates, comprising in combination with a cage a gate-catch, a bolt adapted to engage said gate-catch, a pin loosely mounted in said gate catch, said pin being actuated by said bolt in engaging said gate-catch, and a switch serving to start and stop said cage, said switch being operated to start the cage by the actuation of said pin.

6. A locking mechanism for elevator gates, comprising in combination with a cage a gate catch, a bolt adapted to engage said gate-catch, a pin slidably mounted in said gate-catch, said pin being actuated by said bolt in engaging said gate-catch, a switch serving to start and stop said cage, and an arm operating said switch, said arm entering between an extremity of said slidable pin and a portion of said bolt.

7. A locking mechanism for elevator gates, comprising in combination with a cage means for controlling said cage, a gate-catch, a bolt adapted to engage said gate-catch, a movable member mounted upon said gate-catch, said member actuated by the engagement of said bolt with said gate-catch, a striker, said striker being mounted upon the cage and being movable under the action of said cage-controlling means, a lever adapted to be actuated by said striker in one position of the latter, a tappet engaging said bolt, said tappet connected to said lever, and a switch serving to start and stop said cage, said switch being operated by said bolt and said movable member.

8. A locking mechanism for elevator gates, comprising in combination with a cage means controlling said cage, a gate-catch, a bolt adapted to engage said gate-catch, a movable member mounted upon said gate-catch, said member actuated by the engagement of said bolt with said gate-catch, a striker, said striker being mounted upon the cage and being movable under the action of said cage-controlling means, a lever adapted to be actuated by said striker in one position of the latter, a tappet engaging said bolt, said tappet connected to said lever, and a switch serving to start and stop said cage, said switch being operated by said bolt and said movable member and the operation in one direction being controlled by said movable member and thus being conditional upon the engagement of said gate-catch.

9. A locking mechanism for elevator gates, comprising in combination with a cage, means for controlling said cage, a gate-catch, a bolt adapted to engage said gate-catch, a movable member mounted upon said gate-catch, said member actuated by the engagement of said bolt with said gate-catch, a striker, said striker being mounted upon the cage, and being movable under the action of said cage-controlling means, a lever adapted to be actuted by said striker in one position of the latter, a tappet engaging said bolt, said tappet connected to said lever, and a switch serving to start and stop said cage, said switch being operable in one direction by said bolt and in the other direc-

tion to start the cage through said movable member.

10. A locking mechanism for elevator gates, comprising in combination with a cage a gate-catch, a bolt adapted to engage said gate-catch, a movable member loosely mounted in said gate-catch, said member being actuated by said bolt in engaging said gate-catch, a switch lever, an arm of said switch lever engaged by said bolt and said movable member, and contacts controlled by said switch lever.

11. A locking mechanism for elevator gates, comprising in combination with a cage a gate-catch, a bolt adapted to engage said gate-catch, a pin slidably mounted in said gate-catch, said slidable pin being actuated by said bolt in engaging said gate-catch, and a switch lever serving to start and stop said cage, an arm of said lever entering between an extremity of said slidable pin and a portion of said bolt, said lever arm being thereby operated in one direction to stop the cage by the bolt directly and in the other direction to start the cage through the intermediation of the slidable pin.

12. A locking mechanism for elevator gates, comprising in combination with a cage a gate-catch, a lock-casing through an opening into which said gate-catch enters, means for engaging said gate-catch, a movable member mounted upon said gate-catch, said movable member actuated by said engaging means, said member movable behind an edge of said opening, and a switch operated by said engaging means, said switch serving to start and stop said cage.

13. A locking mechanism for elevator gates, comprising in combination with a cage a gate-catch, a shank and a hook-shaped beak on said gate-catch, a lock-casing through an opening into which said gate-catch enters, a vertical sliding bolt mounted within said casing, guide-pins for said bolt, said bolt having a vertical slot into which said gate-catch enters, a ledge forming the bottom of said slot, said ledge engaging behind said hook and contacting with said shank, a vertically slidable pin mounted in said shank, said pin lying within said slot when said gate-catch is engaged by said bolt, a switch lever, an arm of said switch lever entering between the head of said pin and the upper extremity of said slot, contact-fingers on said switch lever, contact studs adapted to be connected by said contact fingers to start said cage, a cage-controlling device, a striker mounted upon the cage, said striker being movable under the action of said cage-controlling device, a spindle mounted in said lock-casing, a trigger-lever mounted on said spindle, a roller carried at the extremity of said trigger-lever, said roller adapted to contact with said striker in one position of said lever, and a tappet mounted on said spindle, said tappet engaging said bolt.

14. The combination with electric terminals, of a movable member for connecting said terminals, a gate-catch, means for engaging said gate-catch, and a sliding pin mounted in said gate-catch, said sliding pin being actuated by the engagement of said gate-catch, and the actuation of said pin operating said movable member.

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

FRANK BARLOW.

Witnesses:

VICTOR FALLON FEENY,

CYRIL JOSEPH FEENY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."