

(No Model.)

2 Sheets—Sheet 1.

A. D. CAYWOOD.
SAFETY DEVICE FOR ELEVATOR SHAFTS.

No. 493,423.

Patented Mar. 14, 1893.

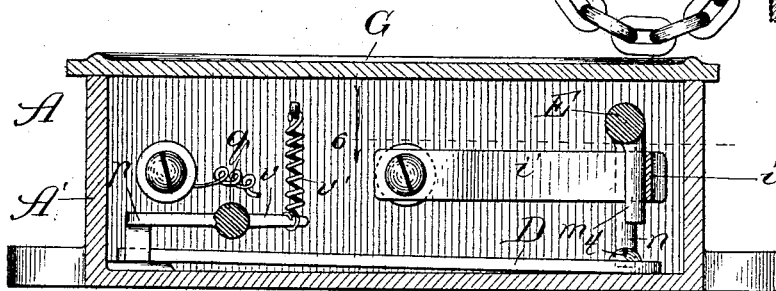
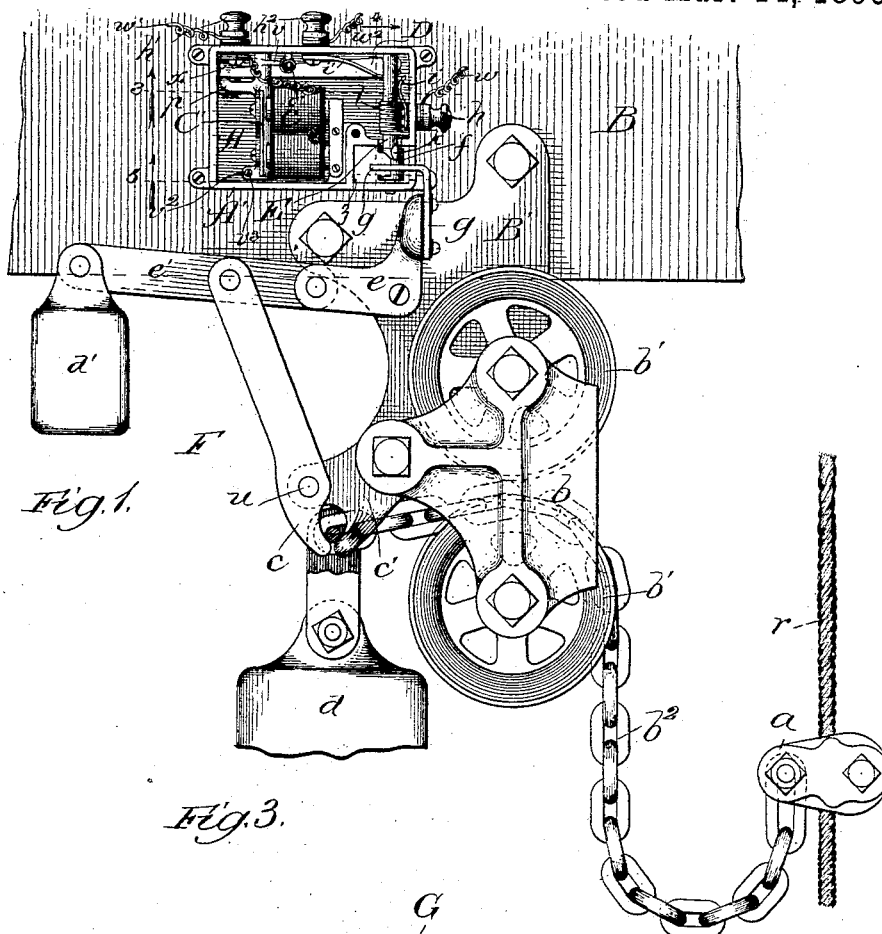
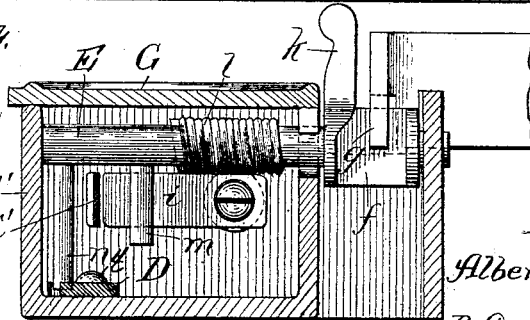


Fig. 4.

Witnesses:
Carl Caywood,
Clifford White.

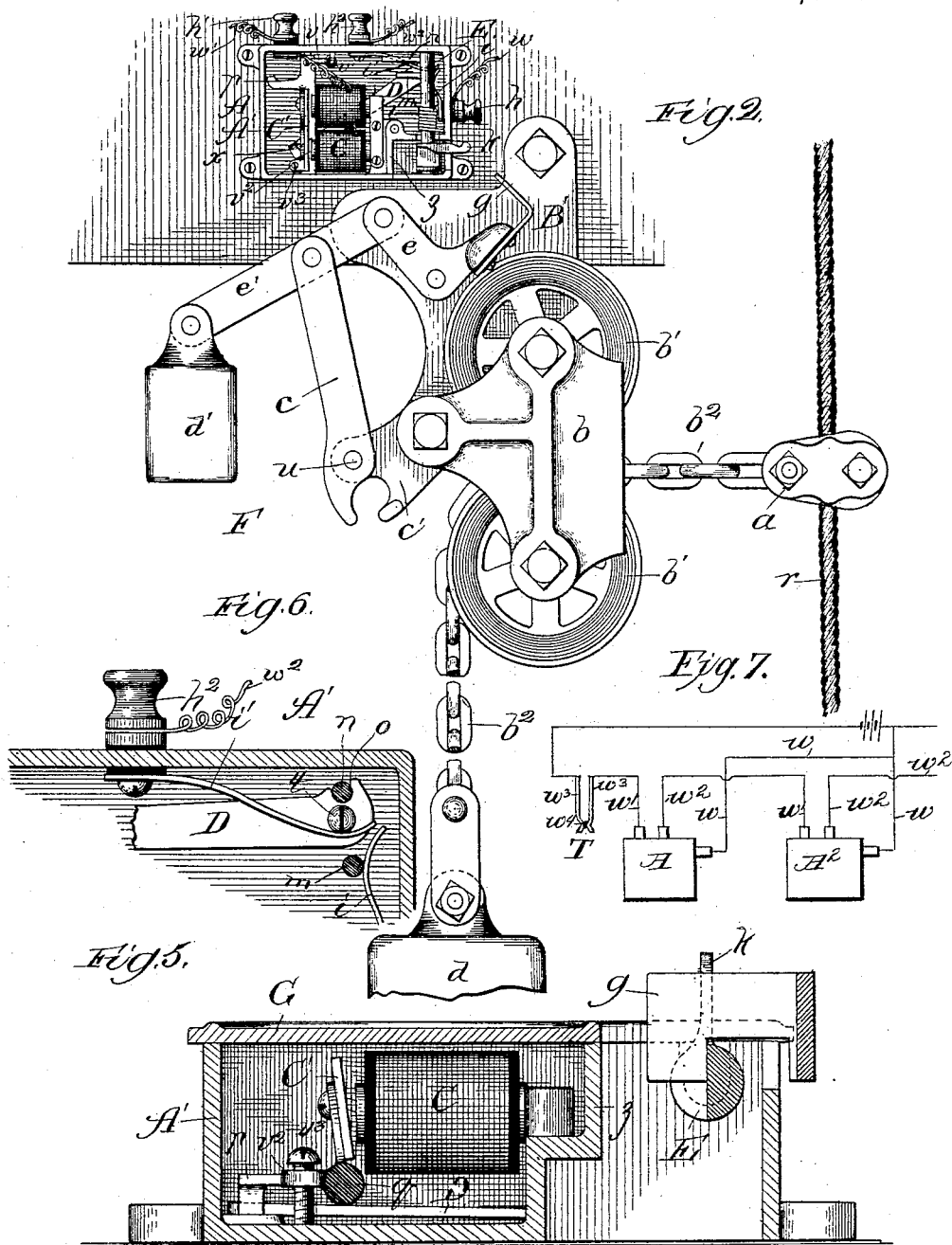


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UNITED STATES PATENT OFFICE.

ALBERT D. CAYWOOD, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE UNDER-
WRITERS' HATCH-DOOR COMPANY, OF SAME PLACE.

SAFETY DEVICE FOR ELEVATOR-SHAFTS.

SPECIFICATION forming part of Letters Patent No. 493,423, dated March 14, 1893.

Application filed August 29, 1892. Serial No. 444,341. (No model.)

To all whom it may concern:

Be it known that I, ALBERT D. CAYWOOD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Safety Devices for Elevator-Shafts, of which the following is a specification.

It is common to provide elevator-shafts in buildings with hatch-doors normally fastened in open position by electric locks adapted to be actuated by the effect on thermostatic connections with the locks of the heat of fire in the building to release the doors and permit their automatic adjustment across the shaft, thereby to prevent the latter from operating as a flue to promote the progress of the fire. Such an apparatus is set forth in Letters Patent of the United States No. 416,103, dated November 26, 1889, wherein there is provided an array of locks, one for each hatch-door, and an electrical switch in combination with mechanism for operating the bolt under an arrangement whereby the sliding of the bolt in the operation of unlocking will cut the electro-magnet of the lock out of the circuit and form a connection with extended wires arranged to carry the circuit farther on. The closing of the hatch-doors is liable to be produced at any time, even while an elevator is moving in the shaft, by fire in the building; and the cause may also be accidental or mischievous operation of the locks to release the doors, in either case rendering the arrest of the elevator-car necessary to prevent it from striking the doors and producing material damage.

The object of my improvement is to provide a safety-attachment adapted to operate, whenever a hatch-door is closed from any cause, or whenever the electrical impulse is produced that will release the hatch-doors, to hold the elevator-car against moving from any position in which it may be at the time of its arrest.

My improvement involves as its essential features an electric lock adapted to be placed in circuit with the hatch-door lock or locks of the nature of those hereinbefore referred to, and an arrester in some suitable form normally engaged by its lock and connected with any suitable part of the operating mechanism

of the elevator, as with the operating rope or lever, and operating when released by the lock to exert its arresting effect on the elevator-car.

My improvement is represented, as to mechanism and arrangement which at present appear best adapted to the purpose, in the accompanying drawings, in which—

Figure 1 is a view in side elevation, partly broken, of my improved attachment, with the cover of the lock-chamber removed to display details of construction and showing the arrester-portion of the attachment as held in its normal non-operating position by the lock. Fig. 2 is a similar view of the same showing the arrester-portion released from the lock and in its operating position. Figs. 3, 4 and 5 are sections taken respectively at the lines 3, 4 and 5 on Fig. 1, viewed as indicated by the arrows and enlarged. Fig. 6 is a broken sectional view taken on the line 6 of Fig. 3 and viewed in the direction of the arrow. Fig. 7 is a diagrammatic view illustrative of the battery circuits.

A is an electric lock comprising a metal case A' containing the electrical mechanism, the lock being shown as fastened upon a base B, which may be a mere block of wood adapted to be secured in convenient position relative to the operating rope *r* for an elevator-car (not shown) as to a wall of the elevator-shaft near its base.

C is an electro-magnet supported in the case A and provided with an armature C' on a rock-shaft *q* and controlled by a spring *v'*, attached to an arm *v* extending transversely from the rock-shaft near one (its upper) end, to tend normally to withdraw from the magnet. Toward its lower end the armature-shaft *q* is provided with an arm *v*² (Fig. 5) forming a bearing for a set-screw *v*³ operating against the back of the case A' contrarily to the spring *v'*, to limit the extent of withdrawal of the armature; and on the same side of the armature-shaft as the arm *v*², but near its upper end, is a bent finger *p* extending at its outer end in the normal condition of the armature, under the free end of a lever D, said end having a slightly beveled upward extension *x*, the lever being fulcrumed at *t*, near its opposite

end, to the back of the lock-case and recessed, as shown at *o* (Fig. 6) in its upper edge near the fulcrum.

E is a bolt in the form of a rock-shaft journaled in vertical position in the sides of the case A' near the end thereof opposite that containing the armature-shaft, and carrying at its upper end a transversely extending finger *n* and below but parallel with the latter a similar finger *m*. The shaft E is controlled by a spring *l* tending to turn it into the position in which it is represented in Fig. 2, wherein the fingers *n* and *m* extend lengthwise of the lock-case; and turning the shaft, (through the medium of a thumb-piece *k* provided on it for the purpose) in the direction to cause the fingers to extend transversely of the lock-case sets the spring and causes the finger *n* to enter the recess *o* in the lever D and by bearing, on its way to the recess, against the shoulder shown as in advance of it, raise the lever from the fallen position in which it is illustrated in Fig. 2 to that in which it is shown in Fig. 1, in which last-named position it rests at its free end on the armature-shaft finger *p*; having been enabled by its beveled extension *a*, to wedge its way past the latter in attaining its raised position, but being stopped by the finger from falling after being so raised and in this position of the shaft E the finger *m* bears against a flat contact-spring *i* connected with a binding-post *h* from which the outgoing circuit wire *w* leads back to the battery, the inleading wire *w'* being connected with a binding-post *h'* on the upper side of the box, whence connection is made with one end of the magnet C. Another binding-post *h²* also on the upper side of the box, carries a contact-spring *i'* and has connected with it the conductor *w²*, which leads to a hatch-door lock (indicated at A² in Fig. 7) of the kind hereinbefore referred to and which is thus included in the circuit of the lock A, and which, furthermore, might involve the same construction as the lock A, provided it has a suitable catch on the bolt E to engage its adjacent hatch-door and hold it open.

The finger *m* on the rock-shaft E, by normally bearing against the spring *i* holds it out of contact with the spring *i'* and closes the circuit from the wire *w'* and binding-post *h'*, through the magnet, thence through the case A', bolt E, finger *m* and spring *i* through the conductor *w*, until, under the conditions hereinafter described, the bolt E is turned to withdraw the finger *m* from the spring *i*, when the latter makes contact with the spring *i'* and closes the circuit through the conductor *w²*. Below the thumb-piece *k*, the cylindrical bolt E is flattened and enlarged at *f* (see Fig. 4) to afford a catch for a hook *g* forming an end of the elevator-car arrester F, of which the following is a description:

A bell-crank lever *e* is fulcrumed at its angle on a suitable base B' which may be connected with or form part of the base B, and termi-

nates at one arm in the hook *g* already referred to, being pivotally connected at its other arm with a link *e'*, with which it forms a species of toggle. The link *e'* carries at its free end a weight *d'* and has pivoted between its ends one member *c* of a pair of jaws, the other member *c'* thereof, with which it is pivotally connected at *u*, forming a rigid part of the base B', and adjacent to which is a bracket *b* supporting a pair of sheaves *b'* between which extends a chain *b²* or other medium normally held between the jaws and carrying at one end a weight *d*, the other end being immovably fastened, as through the medium of a suitable clamp *a* with the operating cable *r* of the car, or otherwise with any suitable part of the elevator controlling mechanism.

A bearing *z* is provided in the case to receive the screw which fastens the cover G in place.

The operation is as follows: It is to be understood that only one arrester is required for an elevator and is intended to be connected with but one (preferably the lowermost) of the series of locks. The parts of the device are shown in their normally relative positions in Fig. 1, wherein the armature is withdrawn from the magnet, the lever D is held from dropping by resting at its free end on the finger *p* and the bolt E is held, by the finger *n* in the recess *o*, in position to present its flattened or catch portion *f* to the hook *g*, thereby maintaining the link *e'* in horizontal position against the tendency of the weight *d'* to turn it to the position in which it is represented in Fig. 2 and thus open the member *c* of the jaws to release the chain *b²* held between them, and which is normally slack between the sheaves and cable *r* to avoid interference with the operation of the latter. When, from any cause the circuit is closed on the inleading wire W', the armature C' is attracted by its magnet C energized by such closure of the circuit, the finger *p*, turning with the armature-shaft, is removed from its position of sustaining the lever D, which drops on its pivot *t* to the position in which it is represented in Fig. 2, thereby releasing the finger *n* from the recess *o* (by the then inclined, or fallen, position of the lever D removing the shoulder adjacent to the recess from the path of the finger *n*) and permitting the recoil of the spring *l* to turn the bolt E. The bolt by so turning breaks contact between the finger *m* and spring *i*, thereby permitting the latter to contact with the spring *i'* and thus shunt the current to the hatch-door lock A² to which the wire *w²* leads; and, furthermore, it releases the hook *g* by removing from opposition to it the flat side or catch-portion *f*. On the release of the hook *g*, the gravity of the weight *d'* forces the bell-crank *e* and link *e'* to the relative positions in which they are illustrated in Fig. 2, thereby turning the jaw *c* in the direction to open

it and free the chain b^2 , when the weight d falls and exerts its gravity, through the chain, on the elevator-cable r to stop the car. Thus, as will be seen the first effect of the generation of the electrical impulse, (whether it be to open or close it, the parts being relatively arranged accordingly) is to operate the arrester F; though the arrangement might, obviously, but not so desirably, be such as to operate the arrester secondarily as the result of the primary operation of a hatch-door lock.

It is to be clearly understood that I do not limit my improvement to the particular construction shown and herein described in detail, for the same result may be attained in various other ways that may suggest themselves to those skilled in the particular art, but which I intend shall be included as within the spirit of my invention.

The course of the current will be clearly understood by reference to Fig. 7. In this figure is represented, as a circuit-closing medium, a well-known kind of thermostat T, comprising two contact-springs w^3, w^3 , in the line w' , normally insulated by a readily fusible insulating medium w^4 , such as wax. In case of fire, the heat will melt the insulation w^4 , thereby producing contact of the springs w^3 and closing the circuit, to cause the current to flow from the battery over the wire w' through the lock A and produce the operation thereof hereinbefore described; and from that lock the current proceeds over the wire w to the opposite pole of the battery. When, by the action of the magnet in lock A, the springs i, i' therein make contact, the current is shunted to the wire w^2 , over which it passes to the lock A^2 and through that lock over its return-wire w back to the battery; the shunted current in the lock A^2 passing over the wire w^2 to another hatch-door lock A^2 (not represented) and so on to the end of the series of hatch-door locks, each one of which is actuated in turn by the current to release a hatch-door as hereinbefore mentioned.

What I claim as new, and desire to secure by Letters Patent, is—

1. In combination with an elevator car, controlling mechanism therefor, two or more electric locks electrically connected in series in normally open circuit provided with automatic circuit closing means, and an arrester connected with said controlling mechanism and normally engaged by one of said locks, whereby closure of the circuit actuates the several locks in succession and, by actuating the arrester-engaging lock, releases the arrester to operate the said controlling mechanism, substantially as and for the purpose set forth.

2. In combination with an electric lock, an arrester comprising a chain adapted to be connected at one end with the controlling mechanism of the elevator and carrying at its opposite end a weight, pivotally connected gripper-jaws normally held by the lock in closed condition and sustaining the weight-carrying chain, and means for actuating the gripper-mechanism to disengage the chain when said mechanism is released by the lock, substantially as and for the purpose set forth.

3. In combination with an electric lock, an arrester F comprising a suitable base carrying a bell-crank e having a hook g on one arm to engage with the lock, a gripper-jaw c' , a pair of sheaves b' , a weighted link e' pivotally connected with the other arm of the bell-crank and carrying a pivotal gripper-jaw c , and a chain extending between the sheaves b' and carrying at one end a weight d and adapted to be connected at its opposite end with the controlling mechanism of the elevator, substantially as and for the purpose set forth.

4. In combination an arrester F for connection with the controlling mechanism of an elevator and an electric lock comprising a suitable case containing an electro-magnet C and circuit therefor, a pivotal armature C' provided with an arm p , a recessed lever D normally supported by the said arm, contact-springs i and i' in said circuit and a spring bolt E carrying a finger n to engage the lever at its recess and a finger m normally maintaining the springs out of contact, the said bolt normally engaging with the arrester, substantially as and for the purpose set forth.

5. In combination an arrester F for connection with the controlling mechanism of an elevator and an electric lock comprising an electro-magnet C and circuit therefor, a pivotal armature C' provided with an arm p , a lever D having a recess o and normally supported by said arm, contact-springs i and i' in said circuit, and a spring bolt E carrying a finger n to engage the lever at its recess and a finger m normally bearing against the spring i to maintain it out of contact with the spring i' , a thumb-piece k on the bolt and a flat portion thereon below the thumb-piece and affording in the normal position of the bolt a catch for the hook-end of the arrester, substantially as and for the purpose set forth.

ALBERT D. CAYWOOD.

In presence of—

J. W. DYRENFORTH,
M. E. WINN.