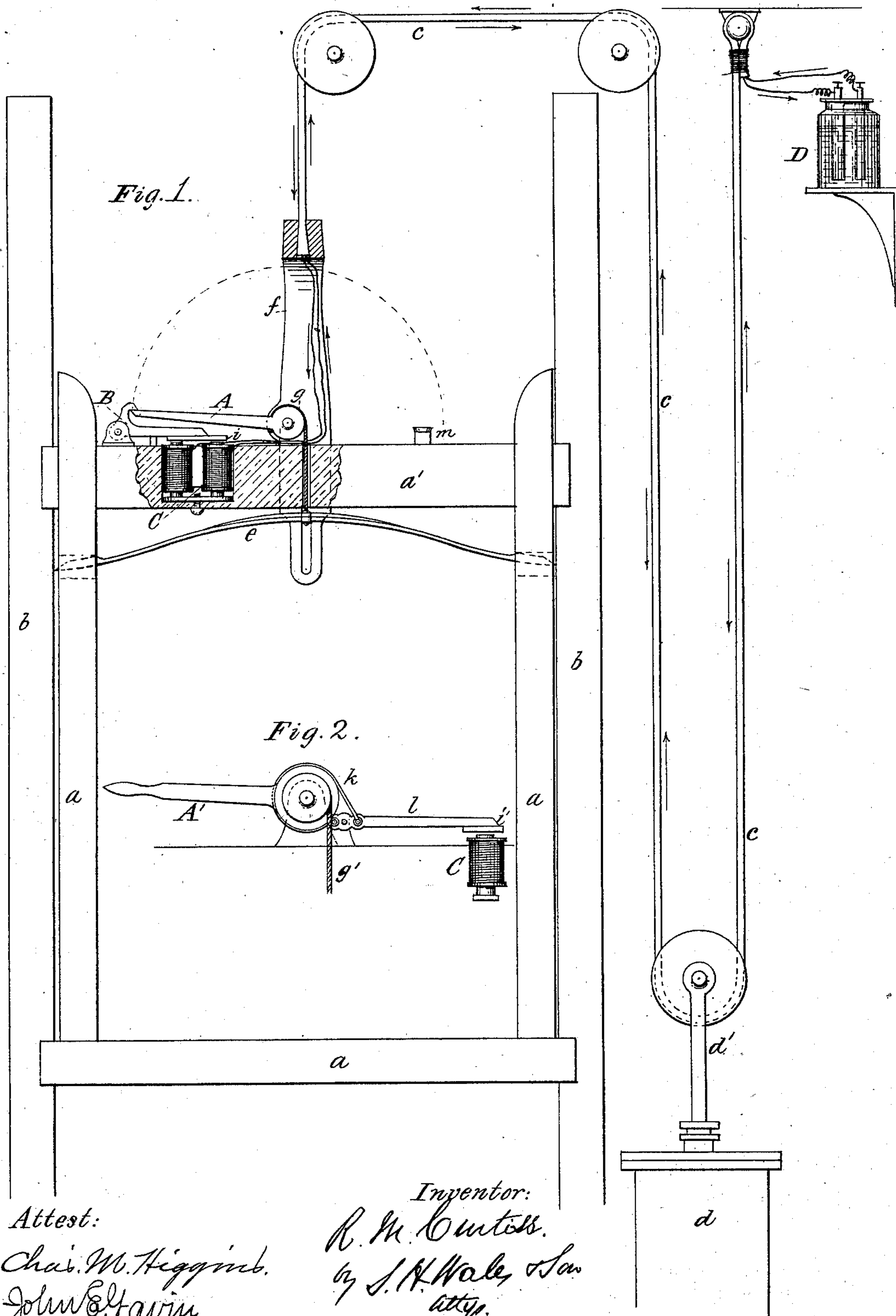


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Safety Device for Elevators.

No. 216,024.

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## IMPROVEMENT IN SAFETY DEVICES FOR ELEVATORS.

Specification forming part of Letters Patent No. **216,024**, dated June 3, 1879; application filed March 29, 1879.

*To all whom it may concern:*

Be it known that I, ROBERT M. CURTISS, of Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Safety Devices for Elevators, of which the following is a specification.

My invention aims to provide an electric safety-catch for elevator-cars to sustain the car in case of breakage of the suspending-ropes; and the main feature of my invention may be stated to consist in a catch or pawl held out of engagement with the car-guides by the agency of an electric current circulated through the suspending-rope or its equivalent, so that on the breaking of the current by the breakage of the suspending-rope the catch becomes instantly released against the guides to sustain the car.

The invention also consists in the special mechanism employed, as hereinafter set forth.

Figure 1 of the drawings presents a side view of an elevator-car and adjuncts fitted with my electric safety-catch, the parts being somewhat disproportionate, but fully illustrating the operation of my invention. Fig. 2 represents a modification.

In the drawings, *a a* indicate the elevator-car; *b b*, the guiding-ways thereof; *c c*, the suspending or hoist rope or cable, and *d d'* a hydraulic cylinder and piston or other suitable motor for operating the car in the usual manner. *e* is the safety-pawl or pawl-spring, which is of about the usual or adopted form, and is situated in the usual position. The pointed ends of the pawl-spring closely approach the car-guides as usual, being held out of engagement therewith by the upward flexion of the spring, but adapted as soon as released of engaging with the guides, and thus sustaining the car in the well-known manner.

Now, heretofore, as is well known, the safety-pawl or pawl-spring has been flexed and held out of engagement by the strain of the cable, the car end of which has been connected directly to the center of the spring.

In my invention, however, as shown in Fig. 1, the cable has no mechanical connection with the spring, the end of the cable, on the contrary, being connected directly to the car-frame at the top of the arched bail or loop *f*,

which projects rigidly from the center of the cross-beam *a'* of the car.

As shown in Fig. 1, the pawl-spring is raised out of engagement by means of the lever *A*, pivoted on the cross-beam *a'* in the arch of the bail *f*, the latter being sufficiently high to permit the free sweep of the lever *A*, indicated by the dotted arc. The short arm of this lever forms a circular hub or drum, on which a short wire rope or other flexible connection, *g*, attached to the center of the spring, winds when the lever is depressed to raise the spring, as shown.

When the lever is depressed into the horizontal position shown, the extremity of its long arm catches under and is engaged by the hooked short arm of an elbow-lever, *B*, the long arm of which extends over the poles of an electro-magnet, *C*, and is constantly drawn down by the attraction thereof, so as to retain the lever in the engaged position shown, and thus securely hold up the pawl-spring *e*.

The attraction of the magnet is constantly maintained to hold the parts in the engaged position shown by an electric current circulated through its coils from the battery *D* or other source of electricity, situated in suitable position, either on the car or in the engine-room, the current being transmitted through the medium of the hoisting-cable, which thus forms an integral part of the circuit in which the magnet is situated.

It will now be readily observed that so long as the electric current is maintained the attraction of the magnet will retain the parts in the position shown, and securely hold the safety-pawls or pawl-spring out of engagement. Should the current cease, however, by the breaking or straining of the cable in any way, so as to break the circuit, the attraction of the magnet will at once cease. The catch *B*, lever *A*, and with them the pawl-spring will be immediately released with electric certainty, thus allowing the safety-pawl to instantly spring into engagement with the guides, and thus uphold the car.

It will be readily understood that the principle of my invention is not confined to the precise form of mechanism shown. Thus the electric detent may be applied to any of the



existing forms of elevators other than that shown where a safety-catch pawl or pawl-spring of any form and a suspending-rope, or equivalent, are employed.

The electric current may be transmitted directly through the mass of the ordinary cables, or through separate insulated wires fixed on the outside of the cable, or through two mutually-insulated wires within the core of a special cable, as illustrated in the drawings.

The current may also be sent through a small or supplementary cable separate from the main hoisting-cable, but arranged so as to receive the strain or a part of the strain of the car, or in any other way which the skill and judgment of experts may determine as best.

The cable may be provided with one or more series of electric conducting-wires, and one of the series may be used to convey the current for the operation of the usual signal in the elevator-car, or to convey a current to operate the stopping and starting mechanism of the elevator-engines.

The armature *i* of the magnet, which, in Fig. 1, is shown fixed to the catch-lever B, may be fixed directly on the end of the lever A to hold the same down by direct attraction, and the catch-lever B may be then dispensed with; but the combination of the two, as shown in Fig. 1, is preferred, as greater mechanical advantage is thus obtained, which enables a weaker magnet to serve the purpose, as will be observed.

As another modification (shown in Fig. 2) the raising-lever may be held down by the gripe of a brake-band, *k*, operated by the direct attraction of the magnet on the end of the brake-lever *l*, as shown.

The lever A is adapted to be grasped by the hand, and, being of a good length, it thus forms an easy means of raising or flexing the pawl-spring when the catch is to be reset, as will be understood, and may be used with other than an electric detent for holding up the spring.

When the lever flies back on the release of the spring, it strikes upon the buffer *m*, which cushions its recoil, as shown in Fig. 1.

It will now be observed that my invention secures the advantage of perfect safety under almost any circumstances, for as the inaction of the safety-pawls is absolutely dependent upon the continuance of the electric current and the integrity of the suspending-rope, hence as soon as those conditions cease the pawl is released to uphold the car. Hence, should the cable-strands become strained internally, (as often happens before injury is apparent,) in such manner as to rupture or separate the conducting-wires ever so little, it will be instantly indicated by the release of the safety-pawls even before the cable can be severed by the strain of the car.

My invention not only thus serves to uphold the car in case of actual severance of the cable,

but will also indicate, before such severance can occur, any serious injury to the cable.

Another important advantage of this electric device is that, as the cable is independent of connection with the pawl-spring, a much stronger and more effective spring can be used than is now practicable, and moreover a heavier balance-weight may be used to more nearly equalize the weight of the car, and thus still further conduce to safety, and materially reduce the work of the hoisting-engines or other motor. On the contrary, in the present elevator the strength of the spring cannot be much greater than the difference of weight between the car and the counter-balance, and this difference requires to be sufficient so as to leave an effective portion of the strain to be borne by the pawl-spring to hold the same out of engagement, and render its action certain in case of breakage of the cable.

What I claim as my invention is—

1. An elevator-car constructed with safety pawls or catches, and a conductor of electricity passing through one of the suspending or partly suspending ropes of the car, for holding the said pawls out of engagement with the car-guides by the agency of an electric current transmitted through the said suspending or partly suspending conductor, whereby the pawls become automatically released by the breaking of the electric current on the straining or breaking of the conducting-rope, substantially as herein set forth.

2. An elevator apparatus having the hoisting or suspending cable connected directly to the frame of the car, in combination with a safety-pawl or pawl-spring arranged upon the car-frame, and disconnected with the cable, together with a catch or detent arranged to hold the pawl or pawl-spring out of engagement by means of an electric current transmitted through the cable, substantially as and for the purpose set forth.

3. An elevator apparatus constructed with a hoisting or suspending cable arranged in an electric circuit, and in electrical connection with an electro-magnetic catch or suitable detaining or indicating device, which is released by the breaking of the electric circuit, so as to indicate an injury or rupture of the cable or prevent the fall of the car, substantially as herein set forth.

4. In an elevating apparatus, the combination of a hoisting or suspending cable or equivalent forming part of an electric circuit, a battery or other source of electricity arranged to transmit its current through the said cable, and an electro-magnet or equivalent electric detent arranged upon the car, and adapted to hold the safety-pawls out of engagement by the continuance of the said electric current, and to release the same to uphold the car on the breaking of the current, substantially as herein set forth.

5. The combination, in an elevator-car, of a safety-pawl or pawl-spring, *e*, a lever, A, ar-



ranged to raise or retract the said pawl-spring, and a catch, B, arranged to engage the arm of the said lever and hold the pawl out of engagement, substantially as herein shown and described.

6. The combination, in an elevator-car, of a safety-pawl or pawl-spring, a raising-lever or retracting device arranged to hold the said pawl out of engagement, and an electro-magnet or electro-magnetic catch arranged to control the release of the said retracting device and pawl, substantially as herein set forth.

7. In an elevator apparatus, the combination of the pawl-spring e, the raising-lever A, catch B, and electro-magnet C, arranged and operating substantially as shown and described.

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