

(No Model.)

A. R. CLARKE.
SAFETY DEVICE FOR ELEVATORS.

No. 568,521.

Patented Sept. 29, 1896.

Fig. 1

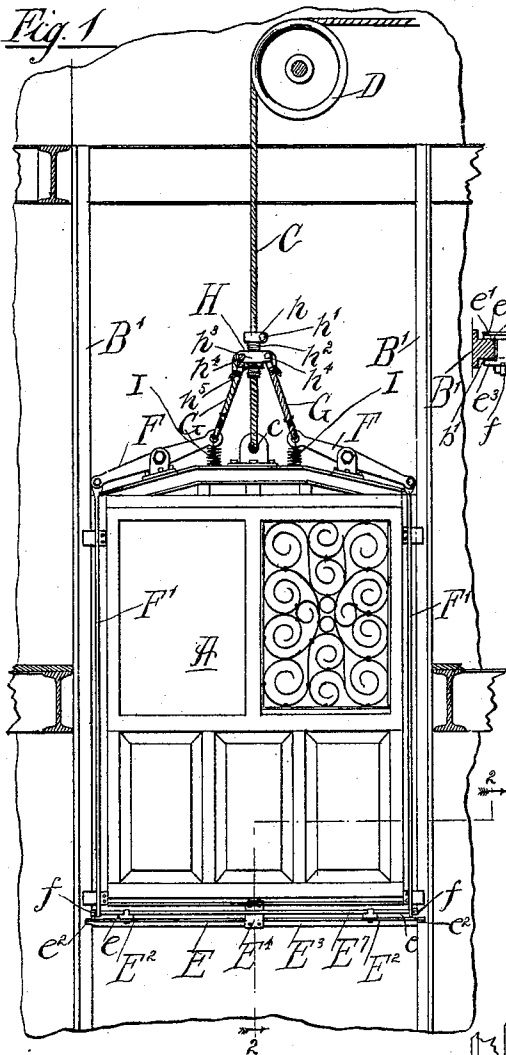


Fig. 3

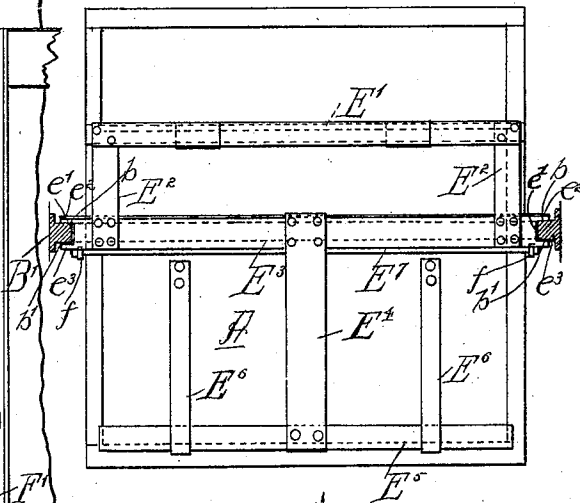


Fig. 4.

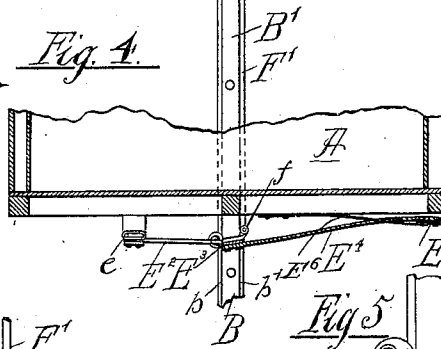


Fig 5

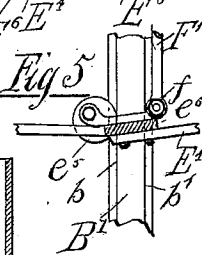
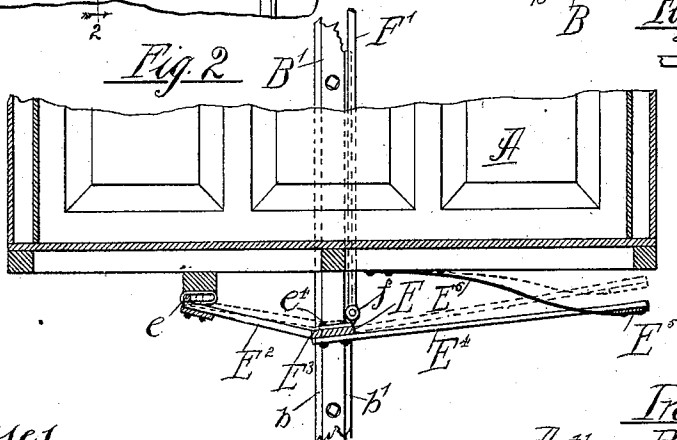


Fig. 2



Witnesses
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UNITED STATES PATENT OFFICE.

ARTHUR R. CLARKE, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO
LYNDEN EVANS, OF SAME PLACE.

SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 568,521, dated September 29, 1896.

Application filed October 2, 1895. Serial No. 564,392. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR R. CLARKE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in Safety Devices for Elevators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference
10 marked thereon, which form a part of this specification.

This invention relates to improvements in elevators, and pertains more specifically to improvements in safety devices designed to
15 automatically engage a fixed part of an elevator shaft or well upon the breakage of any part of the hoisting apparatus, so as to prevent the elevator from dropping.

Described more particularly the invention
20 embraces a gripping device carried by the elevator-car provided with a jaw or engaging member which travels adjacent to and tends to normally close upon or engage a suitable way or structural part of the shaft under
25 spring-tension, but which is normally held free from engagement by the tension of the hoisting-cable of the car, so that whenever such tension is released the gripping device
30 will instantly engage and prevent any substantial descent of the car, the construction and arrangement being such that the greater the weight of the car the more firmly will the gripping device be forced into engagement.

The object of the invention is to provide
35 an improved construction in devices of the character above referred to; and it consists of the matters hereinafter described, and more particularly pointed out in the appended claims, and will be readily understood from
40 the following description, reference being had to the accompanying drawings, in which—

Figure 1 is a rear elevation of an elevator-car equipped with my invention. Fig. 2 is a
45 central vertical section of the lower part of a car and safety device applied thereto, taken on line 2 2 of Fig. 1. Fig. 3 is a bottom plan view of the same, showing the guideways of the elevator-shaft in horizontal section. Fig. 4 is a view similar to that of Fig. 2 reduced in
50 size somewhat, showing a modification. Fig. 5 is an enlarged fragmentary detail of the end

of the gripping-bar and the eccentric carried thereby.

As shown in said drawings, A designates as a whole an elevator-car which may be of any
55 usual or desired construction and is mounted to slide upon suitable ways B' B', secured vertically upon the framework of the elevator-shaft B, as usual. The ways B' B', which serve to guide the elevator-car within the
60 shaft, are arranged centrally of the opposite sides of the shaft and are preferably constructed of wood of substantial strength to afford a certain and reliable hold for the gripping devices, as hereinafter described. 65

The elevator-car A is actuated within the shaft by means of a hoisting-cable C, connected with the car, as at c, trained over a suitable sheave D at the top of the shaft and
70 thence to any suitable motor.

The controlling devices for regulating the ascent and descent of the car in its ordinary movements may be of any desired or usual construction, and inasmuch as the said devices have no particular connection with the
75 present invention they are for the sake of clearness and brevity omitted from the description and drawings herein.

Now referring to the safety devices, E designates as a whole a rigid swinging frame pivoted to the car, preferably to the bottom side thereof, so as to oscillate on a horizontal axis extending transversely of the car and parallel with the plane of the ways B' B'. The frame
80 E has pivotal engagement with the car A by means of horizontally-slotted bearings secured to the under side of the car at some distance apart, with which slots the pivot
85 of the frame E is engaged, so as to afford a limited reciprocatory movement of the frame back and forth, said pivot being herein shown
90 as conveniently formed by means of a straight rod or shaft E', rigidly secured at each end to the frame E and extending through said slots. The frame E embraces side members or bars
95 E² E², which are of proper length and are arranged to extend rearwardly and obliquely downward from the point of pivotal attachment of the frame with the car A to points
100 between the ways B' B' and some distance below or removed from the bottom of the car. Said depending rear ends of the members E²

are curved upwardly and have rigidly secured thereto a gripping-bar E^3 , which extends between the ways $B' B'$ and is notched or recessed at each end, as at $e' e'$, to receive the latter, those portions of the bar extending on each side of or embracing the ways forming pairs of biting jaws $e^2 e^2 e^3$, adapted for engagement with the opposite sides $b' b'$ of the ways B' . The width of said notches or recesses e' is greater than the thickness of the ways B' , so that when said bar E^3 is carried to the position shown in the drawings, with its plane inclined somewhat from a horizontal plane, just sufficient room will be provided for the ways to pass freely through said notches, but when the free end of the frame E is swung upwardly upon its pivotal axis, so as to approach the bottom of the car, the biting jaws $e^2 e^2$, moving on an arc struck from said pivotal axis, will be caused to wedge against or into the sides of said ways B' and thus arrest the downward movement of that end of the frame E . The further descent of the car will carry the front or pivotal end of the frame downward, thus oscillating said frame on a pivotal axis extending through points $e^4 e^4$, formed by the engagement of the jaws $e^2 e^2$ with the front sides of the ways, (such oscillatory movement being permitted by the slotted form of connection of the frame E with the bottom of the car,) and thus bringing the opposite jaws $e^2 e^2$ into biting contact with the opposite sides b' of the ways B' .

E^4 designates an arm rigidly secured to the free end of the frame E , extending rearwardly therefrom and carrying at its outer rear end a transversely-arranged supporting-bar E^5 , with which the bottom of the car is adapted to come into contact after the foregoing-described engagement of the gripping devices has taken place and before the car has descended sufficiently to bring the bottom thereof into direct contact with the bar E^3 , thus serving to arrest the further descent of the car.

$E^6 E^6$ designate springs, herein shown as having the form of flat steel straps or plate springs, which are secured to the bottom side of the car and extend at their free ends beneath the supporting-bar E^5 , said springs being arranged to tend to normally lift or draw the swinging frame E upward toward the bottom of the car.

Obviously means for holding the gripping devices normally out of engagement with the ways and in position to permit the latter to pass freely through the jaws of the gripping-bar, controlled by the tension of the hoisting-cable, may be constructed in various forms, but a practical and preferred form (illustrated herein) is constructed as follows:

$F F$ designate a pair of levers pivoted between their ends upon suitable supports rising from the upper side of the car, said levers being arranged with their opposite ends extending outwardly above the side edges of the car and with their inner ends terminat-

ing near the hoisting-cable. The outer ends of the levers F are connected with the swinging frame E by means of vertically-extending rods or links $F' F'$, which extend downwardly along the side of the car and are connected by means of suitable loops or eyes f with a transversely-extending rod or shaft E^7 , secured to the frame E . The opposite or inner ends of said levers F are each connected with the hoisting-cable by means of cables $G G$, connected with said levers and with an adjustable clamp or clip H , mounted upon the cable at some distance above the levers. Said clamp H is herein shown as comprising a clamping-ring h , provided with a clamping-bolt h' in the usual manner, by means of which it may be closed upon the cable, and having a depending tubular sleeve portion h^2 , exteriorly screw-threaded, through which the cable passes. Upon said sleeve portion is mounted to slide freely a collar h^3 , provided on each side with eyes $h^4 h^4$ for the engagement of the cables $G G$.

h^5 designates an adjusting-nut threaded upon the exterior of the sleeve h' , by means of which the collar h^2 may be raised or lowered thereon.

In use the clamp H will be so adjusted as to hold the inner ends of the levers $F F$ elevated in the position shown in Fig. 1, so as to depress the swinging frame E against the tension of the springs $E^6 E^6$ into position to permit the ways to pass through the gripping-bar freely when the hoisting-cable is taut. Obviously, when thus arranged, if the hoisting-cable should break or its support in any way become loosened, so as to release the tension thereon, the levers would be released and the springs $E^6 E^6$ would instantly draw the swinging frame E up into position to cause the gripping-bar thereof to engage with the ways in the manner hereinbefore described and thus arrest the car. As an additional safeguard to insure this drawing up of the swinging frame independently of the springs $E^6 E^6$, I have provided coil-springs $I I$, secured to the upper side of the car and acting upon the inner ends of the levers $F F$ to draw the latter downward when released.

From the foregoing description it will be seen that I have provided a safety device of simple construction and certain action and that the construction and operation are such that the car will be arrested almost instantly upon the breakage or giving away of the hoisting apparatus and before the car has dropped sufficiently far to acquire any considerable amount of momentum. This is a feature of much importance, inasmuch as it is very difficult to provide safety devices which will not be liable to become unstable or broken under the excessive strain incident to stopping a car after it has acquired the momentum of falling a considerable distance, whereas the device herein shown, by reason of its prompt action in arresting the car, requires to be but little stronger than sufficient to support the

weight of the car when standing, in order to be perfectly safe. Such prompt arrest of the car before it has acquired any considerable momentum also prevents injury to the ways by the gripping devices when arresting the car.

While I have herein shown what I deem the most practical construction now known to me, yet it will be obvious that various modifications may be made without departure from the spirit of the invention and without involving more than ordinary mechanical skill. For instance, in Fig. 4 I have shown a modification in which, in lieu of the gripping or biting jaws $e^2 e^2$, the gripping-bar E^3 is shown as provided with eccentrics $e^5 e^5$, pivotally mounted upon the bar in position to engage the sides b' of the ways B' when the gripping-bar is swung upwardly, and opposing jaws $e^6 e^6$, which coact with said eccentrics to clamp the interposed ways in an obvious manner. Such a construction has the advantage of being less liable to injure the ways, but at the same time has a perfectly reliable engaging or gripping action. I do not therefore wish to be limited to the precise details of construction shown, nor to the particular application of my invention above described. The particular construction shown is, however, as hereinbefore stated, believed to be specially desirable not only in the general invention, but in the matter of detail, and such construction has therefore been made the subject of specific claims.

I claim as my invention—

1. The combination with an elevator-shaft and an elevator-car guided therein by means of vertical ways located at each side of the car, of a gripping device pivoted horizontally to the bottom of the car with its pivotal axis arranged parallel with the plane of said ways, said gripping device having pivotal engagement with the bottom of the car by means of horizontally-slotted bearings and being provided with gripping-jaws at its free end adjacent to said ways, a spring tending to normally oscillate the gripping device upwardly upon its pivot into engagement with said ways, whereby the car is permitted to have a measurable downward movement after the gripping-jaws have engaged the ways before they begin to arrest the car, and means controlled by the tension of the hoisting-cable of the car for normally holding the gripping device free from engagement, substantially as described.

2. The combination with an elevator-shaft and an elevator-car guided therein by means of vertical ways located at each side of the car, of a gripping device pivoted horizontally to the bottom of the car with its axis arranged parallel with the plane of said ways, said gripping device having pivotal engagement with the bottom of the car by means of horizontally-slotted bearings, permitting a limited bodily reciprocatory movement of the gripping device and said gripping device be-

ing provided at its free end adjacent to said ways with gripping-jaws, a spring tending to normally oscillate the gripping device upwardly upon its pivot into engagement with the ways and means controlled by the tension of the hoisting-cable of the car for normally holding the gripping device free from engagement, comprising an oscillatory lever pivoted between its ends to the car, a link connecting one end of the lever with the gripping device and operative connections between the opposite end of the lever and a hoisting-cable whereby when the latter is held taut the gripping device will be held out of engagement, substantially as set forth.

3. The combination with an elevator-shaft and an elevator-car guided therein by means of vertical ways located at each side of the car, of a gripping device pivotally connected with the bottom of the car by means of slotted bearings, permitting a limited bodily reciprocatory movement of the gripping device and arranged parallel with the plane of said ways, said gripping device comprising a supporting-frame arranged to depend obliquely downward and carrying at its free end a gripping-bar arranged to extend between the ways and provided on each end with gripping devices extending on the opposite sides of the ways, a rearwardly-extending bar connected with said supporting-frame, a transversely-arranged supporting-bar mounted thereon, a spring connected with the bottom of the car and tending to normally draw said gripping devices upward toward the bottom of the car and means for holding the gripping devices depressed, comprising levers pivoted between their ends to the upper part of the car, links connecting the ends of the levers with the supporting-frame of the gripping device and cables connecting the opposite ends of the levers with the hoisting-cable, substantially as set forth.

4. The combination with an elevator-shaft and an elevator-car guided therein by means of vertical ways located at each side of the car, of a gripping device pivotally connected with the bottom of the car by means of slotted bearings permitting a limited bodily reciprocatory movement of the gripping device and arranged parallel with the plane of said ways, said gripping device comprising a supporting-frame arranged to depend obliquely downward and carrying at its free end a gripping-bar arranged to extend between the ways and provided on each end with gripping devices extending on the opposite sides of the ways, a rearwardly-extending bar connected with said supporting-frame, a transversely-arranged supporting-bar mounted thereon, a spring connected with the bottom of the car and tending to normally draw said gripping devices upward toward the bottom of the car and means for holding the gripping devices depressed, comprising levers pivoted between their ends to the upper part of the car, links connecting the ends of the levers

to the supporting-frame of the gripping device, cables connecting the opposite ends of the levers with the hoisting-cable, and coiled springs connected with the ends of said lever
5 and tending to normally hold the levers in position to depress the gripping device, substantially as described.

5. The combination with an elevator-shaft and an elevator-car guided therein by means
10 of vertical ways, of a gripping-bar carried by the car and arranged to extend between the ways and provided on each end with gripping devices arranged to extend at opposite sides

of the said ways, and means for oscillating said bar on its longitudinal axis to bring the
15 gripping devices into engagement with the ways, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 27th day of Sep-
20 tember, A. D. 1895.

ARTHUR R. CLARKE.

Witnesses:

WILLIS D. SHAFER,
ALBERT H. GRAVES.