No. 637,440. Patented Nov. 21, 1899.

H. BAINES.

SAFETY ATTACHMENT FOR ELEVATORS.

(Application filed July 9, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

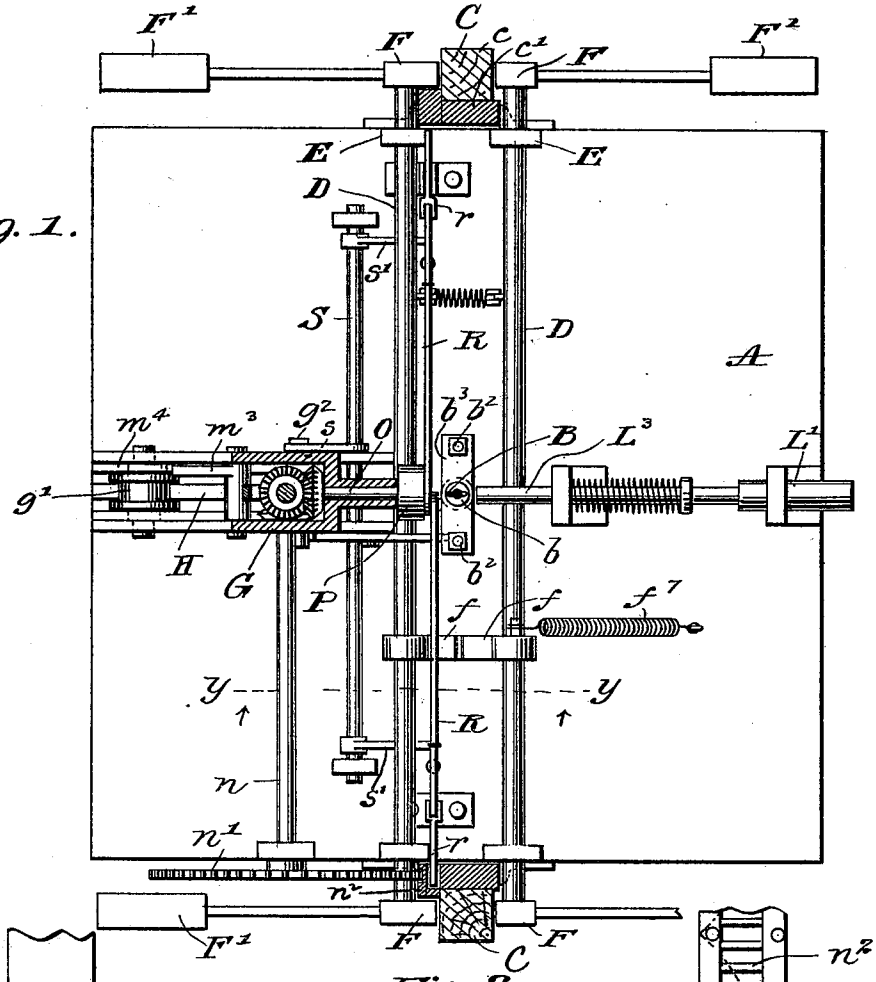

Fig. 2.

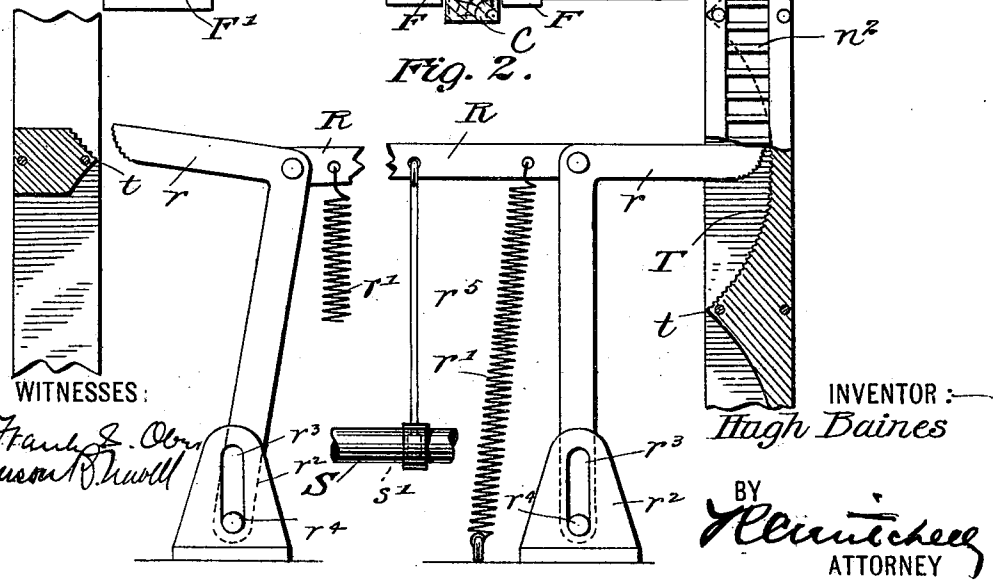

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Fig. 4.

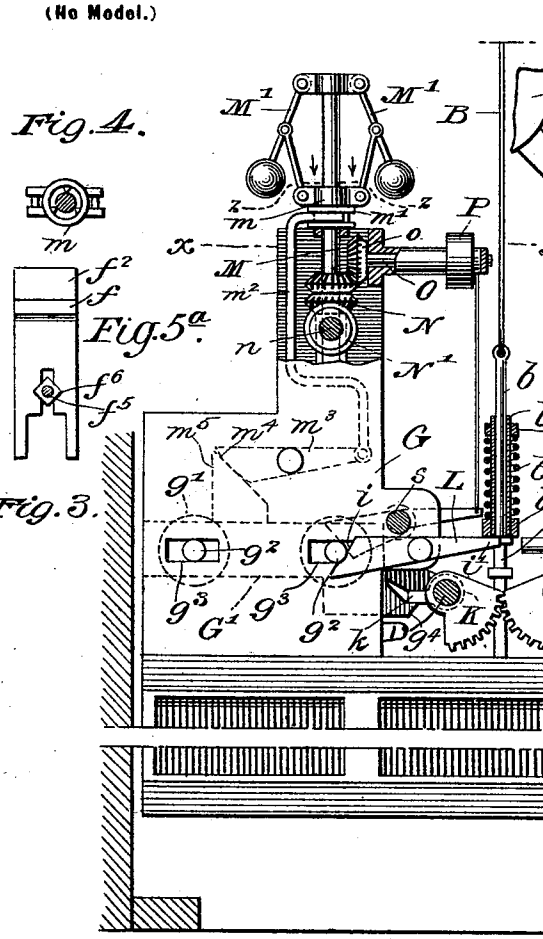


Fig. 5.

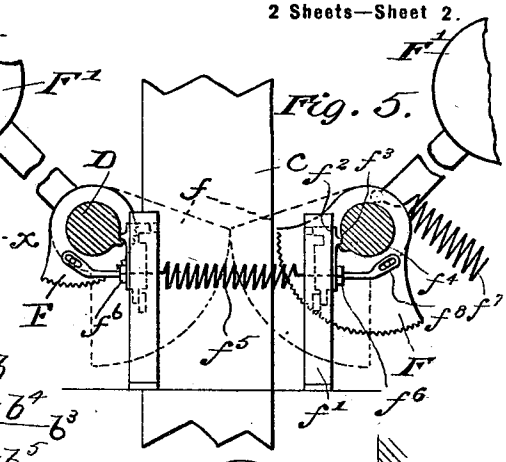


Fig. 5a.

Fig. 3.

Fig. 6.

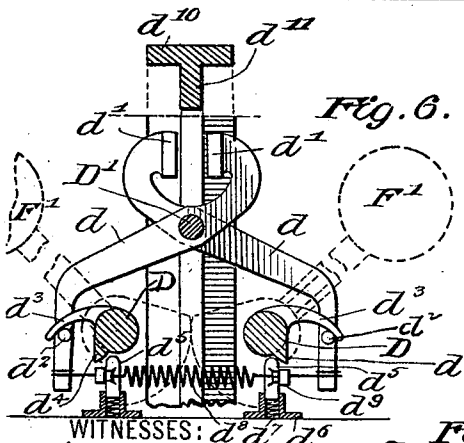


Fig. 7.

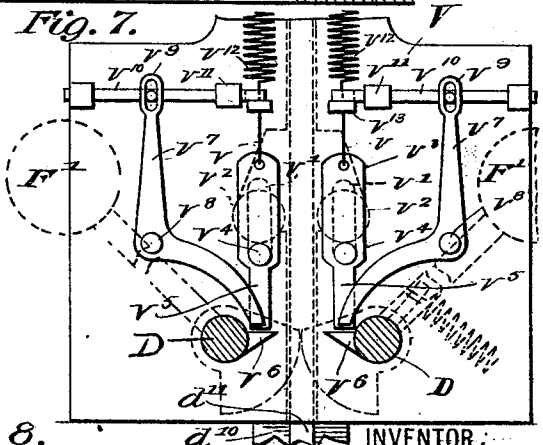
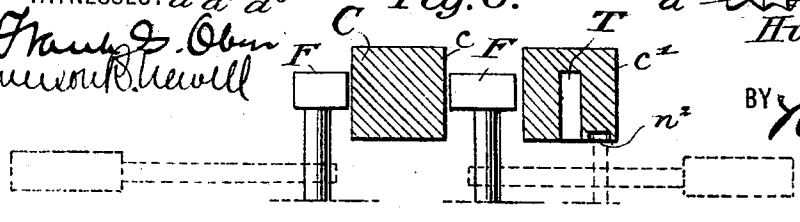


Fig. 8.



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UNITED STATES PATENT OFFICE.

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SAFETY ATTACHMENT FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 637,440, dated November 21, 1899.

Application filed July 9, 1898. Serial No. 685,499. (No model.)

To all whom it may concern:

Be it known that I, HUGH BAINES, a subject of the Queen of Great Britain, residing at New York city, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Safety Attachments for Elevators, of which the following is a full, clear, and exact description.

My invention relates to safety devices for elevators; and my object is to improve the construction of these devices and to provide means which will arrest the fall of the elevator in every case when the hoisting means breaks or the governor fails to work in case of accident and to otherwise improve the construction.

In the accompanying drawings, Figure 1 represents a plan view from above of the top of an elevator-car provided with the preferred form of my device, the parts being in section on the line $x\ x$ of Fig. 3. Fig. 2 is a detailed view of the reciprocating levers and clutches and of the stops and long corrugations in the guideways to stop the elevator when the hoisting mechanism breaks. Fig. 3 is a sectional view of the construction shown in Fig. 1 on the line $y\ y$, looking in the direction of the arrow, parts being broken away. Fig. 4 is a sectional view on the line $z\ z$ of Fig. 3, showing the construction of the lower collar and shaft of the governor. Fig. 5 is a side elevation of a modification of the mechanism for clutching the guideways. Fig. 5^a is a detailed view, in side elevation, of the catch f^2 shown in Fig. 5. Figs. 6 and 7 are also modifications of the clutch mechanism. Fig. 8 is a further modification of the clutch and guideway mechanism, showing the clutch-guideway and rack separated instead of together.

Referring to the drawings showing the preferred embodiment of my invention, A represents the elevator box or car.

B represents the hoisting means, in this case a cable or rope. The cable B is attached to a support b, attached to a guide-sleeve b^4, which carries at its lower end a cross-head b', through which loosely pass supporting-rods $b^2\ b^2$ on top of the car. These supports retain the second stationary cross-head b^3 above the cross-head b', and between the two is a spring b^5. It will be evident, therefore, that when the cable B breaks the spring b^5 will move the cross-head b' downward.

C C are vertical guideways between which the car runs, and in this embodiment consist of a wooden part c and metal face c'. These guideways are situated along the side of the elevator-shaft.

D D are rock-shafts extending across the top of the elevator and carrying at the ends thereof cam-faced clutches F, preferably having counterpoise-weights F', which clutches engage a part of the guideways C.

$f\ f$ are toothed segments on these shafts, which mesh with each other, so that both can be operated simultaneously.

f^7 is an auxiliary spring to rock the shafts in the same direction that they are impelled by the counterpoise-weights.

G is a casing carried on top of the car and inclosing a carriage G', having rollers g' supported on shafts g^2, extending through slots g^3 in the sides of the casing G. The shafts g^2 roll on the lower edge of these slots g^3. I may provide a track H for these rollers g'. In this embodiment of my invention this carriage has a foot which carries at its lower inner end a projecting catch g^4.

K is a sleeve fixed on one of the rock-arms D and has a lug k which normally rests on this catch g^4. The normal position of these parts is as shown in Fig. 3. When, however, the carriage is moved to the left in said figure, the lug k will be released from the catch g^4 and the counterweights and the spring f^7 will rock the shafts and clutches into their operative position.

L is a lever pivoted on the casing G and having a cam-face i in engagement with one of the shafts g^2 and also a projection i', which extends under the cross-head b'. When the cable breaks, this cross-head will be forced downward by the spring and rock this lever, which will, by the cam-face i, shove back the carriage, release lug k, and allow the clutch mechanism to operate.

Another device for operating the clutches is by means of a regulator, which will stop the car when the speed thereof has reached a certain limit. M is a rotatable shaft supported on the car and having in this embodiment a

typical ball-governor M'. The lower movable sleeve m of this governor is preferably constructed as shown in Fig. 4. It often happens in elevators having centrifugal governors that when they are most needed they fail to work, because the accumulation of dirt in the collar prevents the collar being raised sufficiently high above its normal position to operate the trip mechanism and stop the car at the critical moment. By separating this collar from the shaft, so that a space is always kept between the same, this accumulation is prevented, for the dust and dirt will fall through. In this embodiment I accomplish this by small lugs extending from the collar and bearing on the shaft, as shown. m' is a recessed sleeve carried by the collar m, and m^2 is a yoke having a forked end embracing this collar and situated in the recess thereof. m^3 is a lever pivoted in the casing G and attached at one end to the yoke m^2. m^4 is a cam-face on the other end of this lever. m^5 is a cam-face on the carriage G'. When the car moves too fast, the governor will raise the collar m, which will tilt the lever m^3 and push back the carriage, as above stated, allowing the clutch mechanism to operate. N are beveled gears carried on shaft M, one of which meshes with a beveled gear N', carried on a shaft n, having the toothed wheel n', which engages with a rack n^2 at the side of the elevator-shaft. O is a shaft carried by the casing G, having at one end a beveled gear o, meshing with one of the beveled gears N, and at the other end a disk or crank P. R R are in this embodiment two reciprocating links eccentrically pivoted to P and have attached to their ends detents r r, preferably in the form of elbow-levers, as shown. r^2 are guides for these detents, which have pivotal trunnions r^4 working in slots r^3 in these supports. r' is a spring to normally hold the detents in their lowest position and to relieve in case of accident a sudden shock on the same. S is a rock-shaft supported on top of the car and having arms s' extending therefrom, the ends of which arms are connected to the reciprocating links R R by the rod r^5. T are preferably long corrugations situated along the elevator-shaft, which form at their ends stops or projections t. At the left of Fig. 2 a modification of these stops is shown as a lug or stud merely. The distance between projections will vary with and be determined by the circumferential relation between wheel n' and the gears between it and disk P, and the depth of motion of the detents between projections may be varied by varying the eccentric throw of disk P. As the car moves along the shaft the wheel n' is rotated, which will rotate the gears N' and disk P, which will in turn give a reciprocating motion to links R R and detents r r. It will be observed that in this embodiment the distance between the outer ends of the detents r r is greater than the distance between vertical planes passing through the ends of the projections t t. The result of this is that one of the detents will always be over a projection when the other detent is just passing one. Consequently a detent will always be over a projection, as is clearly shown in Figs. 1 and 2. These stops t are at such a distance apart that the ends of the detents will move in and out from the same as the car moves along, but will not normally be engaged thereby at any time. If, however, the rotation of the disk P is varied—for instance, as the result of a stripping of some of the teeth on the rack—or stopped in consequence of the breaking of some connecting part, the reciprocating motion of the detents would be varied, and they would not be carried regularly into and out from between the stops, and as a result of this the elevator would not move far before one of the detents would come in contact with some one of the stops. If the elevator should fall, one of the stops would come in contact with one of the projections and one of the detents would be raised, which would raise the links R and connecting-rod r^5, which would raise one end of the levers s' and rock the shaft S. This would throw the cam s downward, and the cam-face thereof would contact with the shaft g^2, shove the carriage backward, and release the clutch mechanism to operate the clutch. I have therefore provided several different means for releasing the clutch mechanism, each of which has some advantage over the others and which when used together afford a practically absolute security against accident resulting from the breaking of the hoisting means.

When the car is lowered to the bottom of the shaft and allowed to rest there, the cable B will slacken, which if some locking mechanism were not provided would allow b' to be forced downward and operate the clutch mechanism. This locking means I provide by the shaft L', spring-pressed into its position shown in Fig. 3 and carrying at one end a projection L^3. When the car reaches the bottom of the shaft, the cam-face on the end of L' strikes against a projection L^2 on the side of the shaft, which pushes the projection L^3 under the cross-head b' and prevents said cross-head being forced downward and operating the clutch mechanism.

In Fig. 5 I show a modification of the clutch mechanism. F F are the cam-faces, as in Fig. 1, on the ends of the shafts D D. f' are supporters on top of the car and carrying in grooves therein sliding catches f^2, each of which has a projection f^3 engaged by a projection f^4 on the shaft D. f^5 is an auxiliary spring attached at each end to one of the cams F and having adjustable stops, such as nuts f^6. In the normal operation of the car the parts are in the position shown in said figure, the spring extending through vertical slots in the slides f^2 and being held in this position by the stops or nuts f^6, resting on said slides, as shown in Fig. 5^a. The pin-and-slot connection between the spring and cam, as shown at f^8, allows a certain movement of this cam

before the projection f^4 will raise the slide f^2 sufficiently for the stop f^6 to ride off from the end of the slide and allow the auxiliary springs to operate on the clutches. This takes the force of this spring off from the cams till the catch has been tripped, and consequently off from the catch g^4, and as a result of this less force is required to operate the trip mechanism. This is important where a centrifugal governor is used, for the force exerted by it is not usually great. In this way great power may be applied to the clutches without necessitating the use of a more powerful governor.

Fig. 6 shows a further modification. In this case the part C consists of a T-rail having a base d^{10} and a web d^{11}. D' is a shaft over the car, and on this shaft are pivoted arms d, having cam-faces d' to clutch the sides of this web. d^2 are pins on the ends of these arms. d^3 are fingers carried on the shafts D and which engage these pins when said arms are rocked and operate the clutches. An auxiliary spring to aid the operation of the clutches is shown at d^8. d^5 are movable stops for this spring, which prevent its immediate operation when the clutch mechanism is to be brought into action. These stops d^5 are supported in sleeves d^6 and are kept in their upward position by springs d^7. d^9 are adjustable nuts on this spring, which abut against these stops d^5. d^4 are cams carried by the shafts D, which press the stops d^5 downwardly and release the spring d^8 after said clutches have moved a certain distance.

In Fig. 7 the guideways at the side of the elevator-shaft are shown at d^{10} and d^{11} and are the same as in the preceding figure. V is a part of the side of the car or may be a continuation of one side thereof above the top and embraces the web d^{11}. v is a cam-aperture in V, opening into the groove containing the web d^{11}, as shown, and has within the same a ball v^2. Slots v' are also made in V, communicating with this aperture. v^3 is a slide having a pin v^4 extending through slot v' under the ball to raise the same, which will, on account of the cam-face of the aperture, as shown, throw the ball into engagement with the web and constitute a lock for the car. v^5 is a projection on the lower end of this slide, which is engaged by a projection v^6 on the arm D. v^7 is an elbow-lever pivoted at v^8 and having a slot at its upper end, as shown at v^9. v^{10} is a bolt on V, sliding in supports v^{11}. v^{12} is a spring to raise the slide and has an adjustable nut v^{13} engaging the end of this bolt, as shown. When the arms D are rocked, the slide is pushed upward slightly before the projection v^6 comes into contact with the lower end of the lever v^7, as shown. This will raise the ball slightly and will engage it with the web before the lever v^7 has released the nut v^{13}, holding the spring. When this is released, however, the slide and ball will be pulled upward violently and quickly and the car will be at once arrested in its fall.

Fig. 8 shows a slight and different modification of the locking mechanism to arrest the fall of the car. In Fig. 1 I have shown guideway C as composed of, preferably, a wooden part c and a metal face c' in one piece. The cam-faces of the clutch operate more surely and quickly on wood than on metal. The pressure of the clutches on these wooden ways when a car drops and is arrested by them is very great, and if the notches T are in these ways, there is danger of the sides thereof being then crushed together, which would prevent the proper passage therethrough of the ends of detents r when the car is again operated. To prevent any danger of the above happening, the parts c and c' may be made separate, as shown in Fig. 8, one serving to be engaged by the clutches and the other to be operated upon by the detents and the wheels n'.

It will be evident that very many changes may be made in the construction herein shown without departing from the spirit of my invention, and I do not limit myself to the form or arrangement herein disclosed.

What I claim is—

1. In an elevator in combination, a car, a relatively stationary part at the side of the path of movement of said car, stops located along the same, a plurality of movable detents carried by said car, automatic means to move said detents alternately into and out from between said stops during the normal movement of said car and pass one of said detents in between said stops before the other passes out far enough to clear the same, whereby one of said detents will be always over one of said stops, a clutch carried by said car to engage said stationary part and mechanism to operate said clutch when said detent engages one of said stops.

2. In an elevator in combination, a car, a relatively stationary part at the side of the path of movement of said car, a series of stops along the same, a plurality of detents carried by said car, a rack along said path of movement, a toothed wheel engaging therewith, and a connection between the same and said detents to move said detents alternately into and out from between said stops during the normal movement of said car, whereby one of said detents is always over one of said stops, said stops being at a greater distance apart than the teeth on said rack, a clutch carried by said car to engage said stationary part, and mechanism to operate said clutch when said detent engages one of said stops.

3. In an elevator in combination, a car, a relatively stationary part at the side of the path of movement of said car, a series of stops along the same, a detent carried by said car, means embracing a rack along said path of movement, a toothed wheel engaging therewith, and a connection between same and said detent to move said detent into and out from between said stops during the normal movement of said car, said stops being at a greater distance apart than the teeth on said rack, a

clutch carried by said car to engage said stationary part, and mechanism to operate said clutch when said detent engages one of said stops.

4. In a governor in combination, a rotatable shaft, means carried by said shaft and movable relatively thereto by centrifugal force, and a collar on said shaft moved relatively thereto by said means, said collar separated from contact with said shaft so as to leave a space therebetween.

5. In an elevator in combination, a clutch, a spring to aid the operation of said clutch, and means to hold said spring out of operation during a partial movement of said clutch, and to release said spring upon a further movement of said clutch.

6. In an elevator in combination, a car, a relatively stationary part at the side of the path of movement of said car, a series of stops along the same, a detent carried by said car, means to move said detent into and out from between said stops during the normal movement of said car, a clutch carried by said car to engage said stationary part and having a cam-face, a catch to keep said cam-face normally out of engagement with said stationary part and mechanism connected with said detent to release said clutch when said detent engages one of said stops.

Signed at New York city, New York, this 2d day of July, 1898.

HUGH BAINES.

Witnesses:
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