P. HINKEL.

AUTOMATIC SAFETY DEVICE FOR ELEVATORS.

APPLICATION FILED DEC. 26, 1911.

1,043,833.

Patented Nov. 12, 1912.

2 SHEETS—SHEET 1.

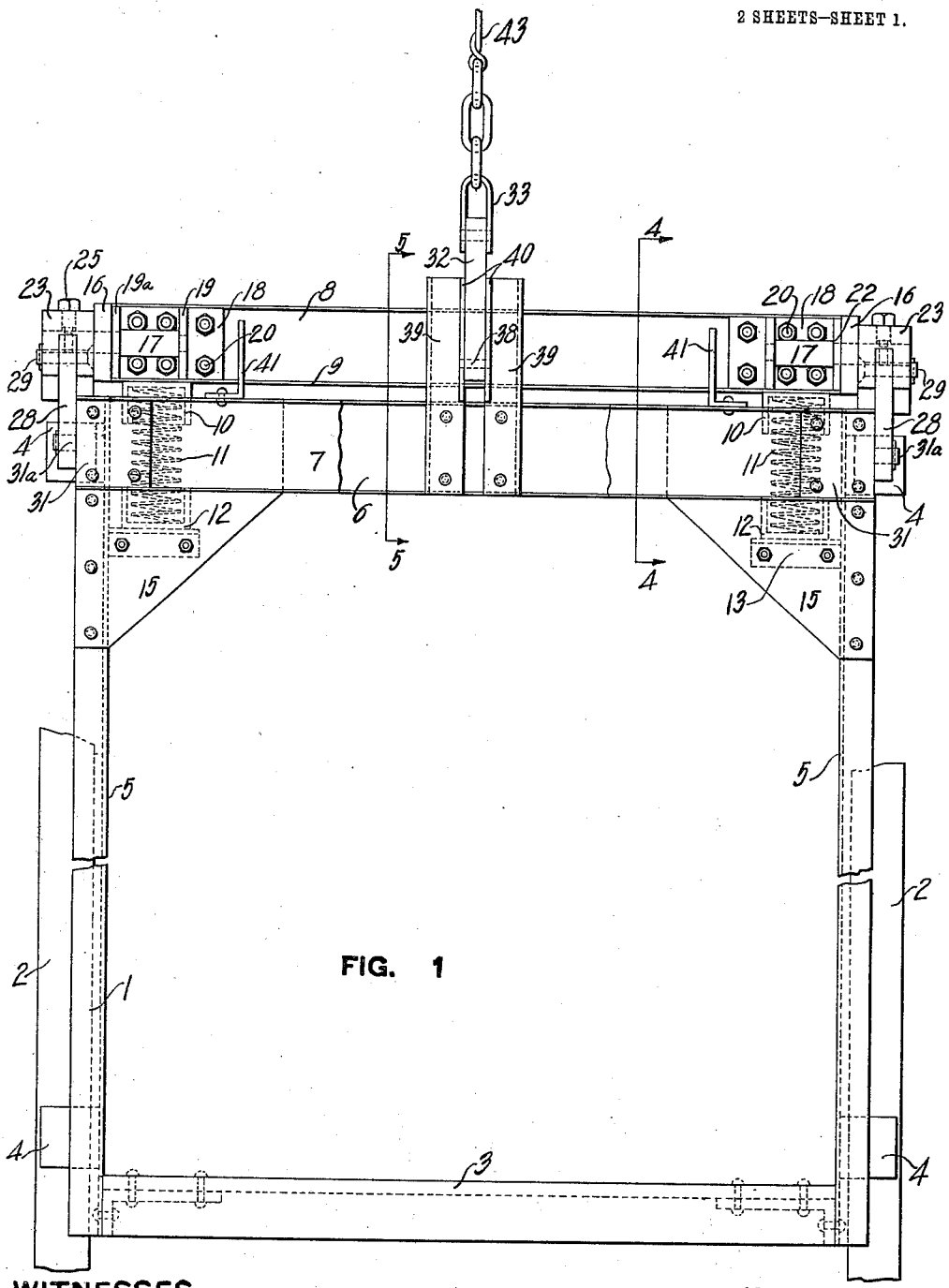

FIG. 1

WITNESSES

W. T. Holman

E. L. Hyde

INVENTOR

Peter Hinkel

By Frederick W. Whitridge

Attorney

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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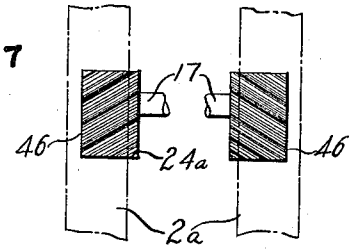
2 SHEETS—SHEET 2.

FIG. 7



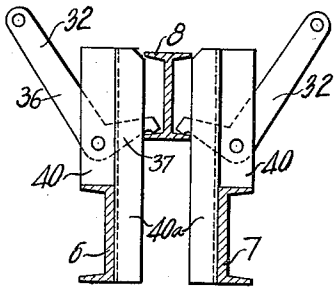
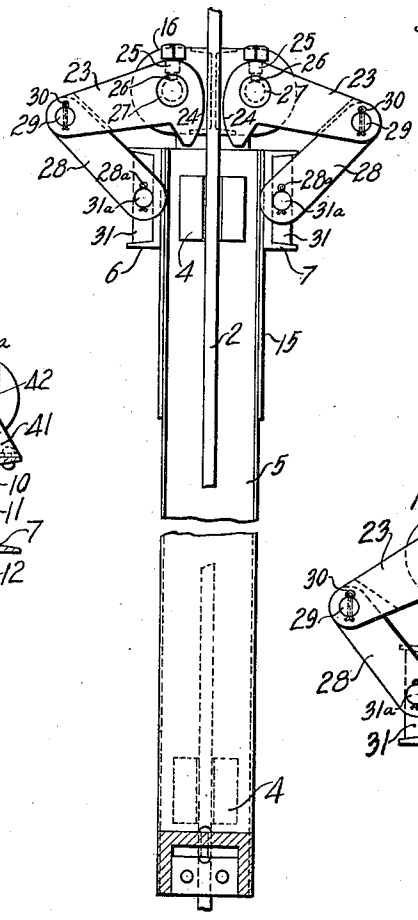


FIG. 6

FIG. 2



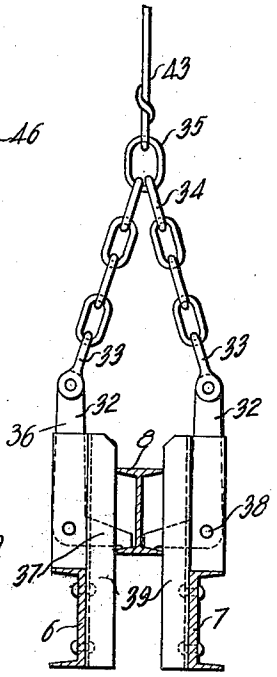


FIG. 5

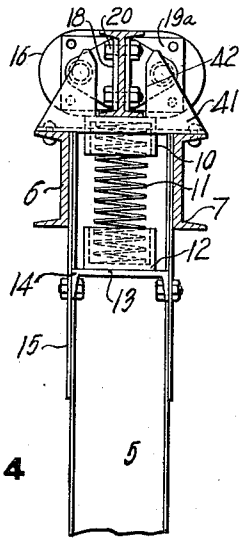


FIG. 4

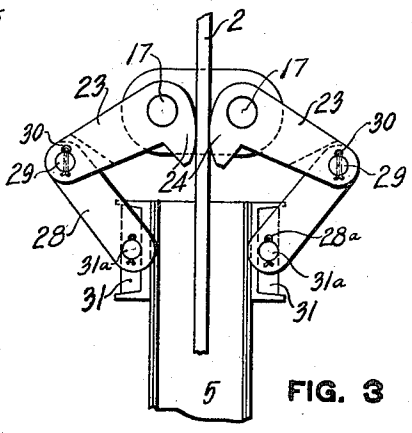


FIG. 3

WITNESSES

W. T. Holman

E. L. Hyde.

INVENTOR

Peter Hinkel,

By Fred'k W. Whitte

Attorney

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

PETER HINKEL, OF ASHLAND, KENTUCKY.

AUTOMATIC SAFETY DEVICE FOR ELEVATORS.

1,043,833. Specification of Letters Patent. Patented Nov. 12, 1912.

Application filed December 26, 1911. Serial No. 667,906.

To all whom it may concern:

Be it known that I, PETER HINKEL, a resident of Ashland, in the county of Boyd and State of Kentucky, have invented a new and useful Improvement in Automatic Safety Devices for Elevators, of which the following is a specification.

This invention relates to improvements in elevators.

The object of the invention is to provide a safety construction for such devices which will be certain and secure in operation and in which the elevator or car will be prevented from falling or dropping in or along its guides should the rope or cable break and in which the speed of descent of the elevator or car will be automatically checked should it become too rapid.

A further object of the invention is to provide gripping jaws for frictionally bearing against or grasping the guideways or tracks in which the elevator car slides and which, if the guides used are of wood, or other compressible material, will grip the same in such manner as to prevent them from springing out from between the gripping jaws.

The invention comprises the construction and arrangement of parts hereinafter described and claimed.

In the drawings Figure 1 is a front view of a skeleton frame for supporting an elevator or car, as arranged according to my invention, certain parts being broken out to show details; Fig. 2 is an end view of the frame work of the car, viewed from the left in Fig. 1 and as the same appears while supported by a cable; Fig. 3 is a view similar to Fig. 2, showing the gripping members in the position of grasping the guide-way; Fig. 4 is a cross sectional view on the line 4—4, Fig. 1, showing the spring at one end of the car frame; Fig. 5 is a cross sectional view on the line 5—5, Fig. 1, showing certain bell crank levers, the parts being illustrated during support of the car by a cable; Fig. 6 is a view corresponding to Fig. 5 showing the position assumed by the bell crank levers upon breaking of the supporting cable, and Fig. 7 is a detail view of a modified form of the invention.

I have illustrated in the drawings a frame work 1 sliding in or along vertical guideways or rails 2. No car has been illustrated in position in the supporting frame 1 but it will, of course, be understood that the lower horizontal beam 3 of the frame work will support the car, which may be of the usual or any preferred construction and shape and secured to the frame in any desired manner. The guideways 2 along which the car frame 1 slides, may be of any desired shape in cross section, rectangular guides being shown, and are firmly supported in the building or structure in which the elevator is used. The rails 2 are embraced by the projecting arms of lugs or projections 4 rigidly mounted at the ends of the frame 1 upon the vertical end members 5 thereof. The car frame comprises bottom horizontal member 3, vertical end members 5 and a horizontal top beam or member 6, the top member 6 being best illustrated in Figs. 1 and 2 taken together. As shown, it comprises a pair of channel members 7 formed of ordinary commercial iron, spaced apart and riveted or bolted at their ends to the flanges of the vertical end members 5 of the frame. The end members 5 are likewise constructed of ordinary channel irons, and the lugs or projections 4 are riveted, welded or otherwise rigidly secured to the web of the channel between its flanges, as shown in Fig. 1. The webs of the spaced channel members 7 of the top member 6 are riveted directly to the flanges of the vertical end members 5.

Mounted above the spaced channel members 7 of the top beam 6 is an operating beam or bar 8, illustrated as comprising an ordinary I-beam, and extending from end to end of the car frame. Firmly riveted or otherwise secured to the lower flange 9 at each end of the operating beam 8 are suitable cup shaped spring boxes 10, preferably formed of pressed steel, but which may be solid and of cast metal if desired. These spring boxes 10 form caps within which the

upper ends of springs 11 rest, which springs are of ordinary spiral form and are seated at their lower ends in pressed steel caps or boxes 12, similar to the caps 10 and supported upon bases 13. The bases 13, as shown, are formed of suitable short sections of ordinary channel iron, having upper flat faces and flanges 14 of which are securely bolted to the inner surfaces of oppositely disposed triangular gussets or corner plates 15. As illustrated in Fig. 1, the gussets or corner members 15 are riveted at one edge to the flanges of the vertical end members 5 of the frame and are also secured to the inner surfaces of the members 7. At each end of the operating beam 8 an oblong or oval shaped end block 16 is provided, firmly secured to the beam 8 and forming a supporting member for shaft 17. Four such shafts are provided, two at each end of the supporting beam on opposite sides thereof. The shafts 17, as shown, are mounted in filling blocks 18 secured at each side of the operating beam 8 and between the flanges thereof. Outstanding lugs or projections 19 are provided on the filling blocks 18 for supporting one end and the intermediate portion of each of the shafts 17. These outstanding lugs or projections are preferably integral with the filling members, but if desired may be separate parts rigidly attached thereto and the end lugs 19^a are securely attached to and form supports for the end blocks 16. As illustrated in Figs. 1 and 4, the filling members or supporting blocks 18, on opposite sides of the beam 8 at each end thereof, are secured together and to the beam by bolts 20 passing through the blocks 18 and beam 8. Ordinary nuts are provided on the bolts for easy assembling and disassembling of the parts. The shafts 17 are of slightly smaller diameter at their outer ends than at their inner ends, providing a shoulder 22 bearing against the inner face of the end projections 19^a to prevent endwise movement of the shaft 17 outwardly through the blocks 16 under conditions of use.

Upon the outer ends of the shafts 17 are mounted gripping members 23, shown in end view in Figs. 2 and 3, and which are provided at their inner ends with eccentric gripping portions or arms 24 projecting downwardly below the level of the shafts 17. The grippers 23 are provided with flat faces on their eccentric portions or arms 24, which bear against the opposite faces of each of the rails or tracks 2 upon or along which the car and its frame slide. The levers 23 are rotatable upon the shafts 17 and are held thereon by set screws or pins 25 mounted in apertures in the upper faces of the levers and having inwardly projecting ends 26 each engaging with an annular groove 27 in its shaft 17. The outer ends of the levers 23 are slotted to engage and span the upper ends of arms 28, pivot pins 29 being provided projecting through the upper ends of the arms 28 and outer slotted ends of levers 23. The pins 29 are preferably provided with countersunk heads on their inner ends and cotter pins 30 at their outer ends for convenience of assembling and disassembling. The levers or links 28 are each mounted upon an end of one of the channel members of top beam 6, to the ends of which are securely riveted filling blocks 31 carrying integral projecting stub shafts 31^a at their ends upon which the levers 28 are pivoted. Cotter pins 28^a are provided in the shafts for holding the levers 28 thereon.

Secured to the opposed members of the upper portion of the frame are a pair of bell crank levers 32 to the upper ends of which are connected clevises 33, to which are coupled the end links of a chain 34, to the upper link 35 of which is secured the rope, cable or other supporting means 43 for the elevator. As shown most clearly in Fig. 5, the levers 32 are each formed with one long leg 36 and a short leg 37, and are each mounted between a pair of oppositely disposed supporting members 39 upon pivot pins 38 projecting therethrough. The members 39, as shown, are formed of Z-bars having outwardly projecting flanges 40, the lower portions of which are cut away so that the ends of flanges 40 rest directly upon the upper flanges of the oppositely disposed channel members of the top beam 6. These outer flanges 40 provide supports for the pins 38 upon which the bell cranks 32 are pivoted, as shown in Fig. 1. The inner flanges 40^a of the Z-bars or supporting members 39 project downwardly between the channel members 7 of the main beam 6, and also upwardly to the limit of movement of the operating beam 8, as shown in Fig. 5, and the inner edges thereof are spaced apart to form guides for the operating beam 8 during the course of its movement as hereinafter described.

Mounted upon the upper faces of the flanges of oppositely disposed channel members 7, near the ends thereof, are additional supports and guides 41, shown in Fig. 4, which are slotted at their central portions and provide inner edges 42 which engage with the edges of the lower flange of the operating beam 8 and assist in guiding the same. As illustrated in Fig. 5, the inner ends of the lower arms 37 of the bell cranks 32 engage with and normally rest upon the upper faces of the lower flange of the operating I-beam 8.

It is believed that the operation of my improved safety stop mechanism will be obvious from the accompanying drawings and the foregoing description of the same. Assuming the elevator to be at rest under normal conditions, the frame and car are supported from the cable or rope 43 which engages with the upper link 35 of the chain, and the bell cranks 32 are in the position illustrated in Fig. 5 with their long legs 36 vertically and their short legs 37 horizontally disposed. The engagement of the inner ends of the short legs 37 with the operating beam 8, presses the latter down against the springs 11 between its guides 39 and 41 to the position shown in Fig. 5. In this position of the parts, the springs 11 are compressed between their upper and lower caps 10 and 12 and the levers 23 and 28 assume the position illustrated in Fig. 2, thus rotating as it were, the upper levers 23 about their shafts 17 as pivots. The rotation of the levers 23 causes the flat gripping faces of the eccentric portions 24 of the levers to be moved away from engagement with the tracks or guides 2 with which the frame engages and the elevator car is free to move up or down. In this condition of the parts, the car may be moved up or down along its guideways in the shaft as long as the tension upon the rope or supporting cable 43 keeps the latter taut. If the rope or supporting cable 43 breaks, however, the springs 11 immediately begin to push upwardly upon the upper bearing caps 10 mounted upon the lower face of the operating beam 8, thus causing the latter to rise away from the beam 6 between its supports and guides 41 and 39. This movement of the beam 8 causes the shafts 17 to rise with respect to the supporting stub shafts 31^a and the levers 23 and 28 begin to assume the position illustrated in Fig. 3. As the levers 23 rotate about the shafts 17, the flat faces on the eccentric portions 24 of the levers begin to engage with and press upon the guideways or rails 2 and, there being a pair of these eccentric portions 24 at opposite sides of each guide rail, the latter are each frictionally gripped between the eccentrics 24. It is obvious that the amount of friction between the faces of eccentrics 24 and the rails 2 will increase directly as the pull or tension upon the rope or supporting cable 43 decreases. Under extreme conditions, should the rope or supporting cable 43 break or be severed entirely, the eccentric portions 24 of the levers 23 are moved inwardly to grasp the guides and the friction between them and the guides 2 increases to such an extent that the car and frame are supported entirely between them. Should such an accident as that described occur the levers 23 and 28 immediately assume the positions indicated in Fig. 3, by reason of the action of springs 11, and the car is firmly and rigidly held stationary in its guides. As will be obvious, the greater the weight of the car, the greater is the leverage which is imposed upon the friction faces 24 and the clamping force exerted thereby.

I may use the construction described in connection with guide rails formed of either wood or metal. Metallic guide rails are preferred, but in some instances wooden guide rails are advisable. Under such conditions, I prefer to form the faces of the eccentric gripping portions 24 with grooves and ribs therein after the manner shown in Fig. 7, which illustrates a face view of the gripping levers at opposite ends of the car, the guide rails 2^a, indicated diagrammatically in that view, being in front of the grippers. These grooves are slightly inclined to the horizontal and in cross section are the configuration of ordinary corrugated sheet iron and arranged in such manner that no sharp edges exist to mar or injure the substance of the rails. The grooves and ribs 46 on the faces of eccentrics 24^a are inclined downwardly from a point opposite that portion of the rail nearest to the car to a point opposite that portion of the rail farthest from the car, or away from the car, in such direction that the tendency of the ribbed faces of the gripping portions 24^a is to draw the rails inwardly toward the car as the eccentrics grip the rails, as shown in Fig. 7. Otherwise the construction is the same as that illustrated in Fig. 1. This arrangement is novel with me and obviously prevents the possibility of the rails springing apart or moving outwardly endwise from between the grippers or friction holding members.

It will be noted that in the construction hereinbefore described and illustrated in the drawings, I have provided an improved safety arrangement for elevators in which the operating mechanism is compact, strong and secure. The shafts at the ends of the device, which support the operating levers, links and eccentrics, are seated upon the ends of the operating beam and are of considerable length, having a firm bearing in the beam, and the levers or eccentrics are mounted upon the ends of the shafts. The set screws 25, cotter pins 30 and 28^a permit easy removal of the levers 23 and 28 endwise from their shafts when it is desired to repair or replace the same. Likewise, the filling blocks or plates 18 may be removed bodily with the shafts 17 from the beam 8 by removal of the bolts 20. By locating the gripping levers 23 upon the ends of the shafts, it is possible to provide wide grip-

ping surfaces on the levers for contact with the guides or rails 2 upon the shaft frame. These guides and the gripping levers may be made as wide as desired and a proper amount of friction produced for securing support of the car upon accident to the normal supporting cable thereof.

The device as constructed is also conveniently assembled. For example, the springs 11 are assembled from beneath the beam 8. They are pushed upwardly into their top seats or boxes 10 and after compression, the platforms or supports 13 are pushed upwardly underneath the springs and then bolted to the gussets or corner brackets 15. The entire construction as illustrated is made up mainly of segments or pieces of ordinary commercial iron which may be had in any size or shape desired. The bottom beam 3 and end members 5 are all formed of ordinary channel irons, as are likewise the members 7 of the top beam 6. The operating beam 8 is a section of an I-beam. As hereinabove stated, the supports 39 are formed of short sections of Z-bars cut to shape to rest upon the channels of the top beam and the supports 13 are formed of short sections of the same type as those used for the end members 5. The levers 32 which support the car are pivotally mounted close to the upper surface of the top beam 6 and, being formed as bell cranks with short and long legs, are enabled to impose considerable leverage upon the operating beam 8, as illustrated in Fig. 5. The construction described is such that the parts of the operating mechanism, including the bell cranks, are brought close to the top beam 6 and occupy very little space vertically or longitudinally of the elevator shaft over and above what is necessary for the support of an ordinary elevator car and frame. The entire frame is securely riveted and bolted together and is practically rigid or integral under normal conditions of use, when the bell cranks 32 occupy the position shown in Fig. 5 and the operating bar 8 is pressed downwardly close to the beam 6 and the eccentrics 24 are opened or released from the guides or rails 2.

What I claim is:—

1. The combination with a car frame and guide rails therefor, of a horizontal bar mounted on the frame and arranged to have limited vertical movement relative thereto, said bar having oppositely disposed flanges, levers mounted upon the frame for engaging said flanges, means connected to said levers for supporting the car, springs engaging said bar, and gripping levers on the bar and connected to the frame and arranged for engagement with the guide rails.

2. The combination with a car frame and guide rails therefor, of an operating bar movably mounted on said frame, levers fulcrumed in the frame at the sides of the bar and arranged to swing in a plane transverse to the length thereof and each having an inwardly projecting leg engaging said operating bar, means connected to the opposite ends of said levers for supporting the car frame, springs engaging said bar, and gripping levers on the bar and connected to the frame and arranged for engagement with the guide rails.

3. The combination with a car frame and guide rails therefor, of an operating bar movably mounted on said frame and provided with opposite flanges, levers mounted upon the frame at the sides of the bar and each having an inwardly projecting leg engaging a flange of said bar, means connected to the opposite ends of said levers for supporting the car frame, springs engaging said bar, and gripping levers on the bar and connected to the frame and arranged for engagement with the guide rails.

4. The combination of a frame comprising members spaced apart and guide rails therefor, of an operating bar movably mounted in the frame, levers mounted in said frame and engaging said bar, means connected to said levers for supporting the car frame, said frame being provided with corner gussets, channel sections secured between said gussets and spiral springs mounted upon said channel sections and between the spaced members of said frame and engaging the underside of said bar for moving the same.

5. The combination with a car frame and guide rails therefor, said car frame having a beam comprising channels spaced apart, of a pair of Z-bars connected to each channel and having inturned guiding flanges, an operating bar mounted for movement with respect to said beam and guided between said Z-bar flanges, levers pivotally mounted in said Z-bars and arranged to engage said operating bar, means connected to said levers for supporting said car frame, springs for moving said bar, and grippers mounted thereon arranged to engage the guide rails upon movement of the operating bar.

6. The combination with a car frame and guide rails therefor, said car frame having a beam comprising spaced channels, of an operating bar comprising an I-beam mounted for movement with reference to said beam, levers pivotally mounted upon said beam and having short legs arranged to engage the lower flanges of said bar, shafts mounted on the ends of said channels, links supported upon said shafts, other shafts mounted at the ends of the operating bar and projecting endwise therefrom, gripping levers pivotally mounted upon said latter shafts and connected to said links, said grippers being ar-

ranged to engage said guide rails for supporting the car.

7. The combination with a car frame and guide rails therefor, said car frame having a beam comprising spaced channels, of an operating bar comprising an I-beam mounted for movement with reference to said beam, levers pivotally mounted upon said beam and having short legs arranged to engage the lower flanges on said bar, shafts mounted at the ends of said channels, links supported upon said shafts, other shafts mounted at the ends of the operating bar and projecting endwise therefrom, gripping levers mounted upon said latter shafts and connected to said links, said grippers being arranged to engage said guide rails for supporting the car, and springs arranged to move said bar against the action of said levers, upon breaking of the supporting cable.

In testimony whereof, I have hereunto set my hand.

PETER HINKEL.

Witnesses:
W. R. VANSANT,
N. A. HOLMES.