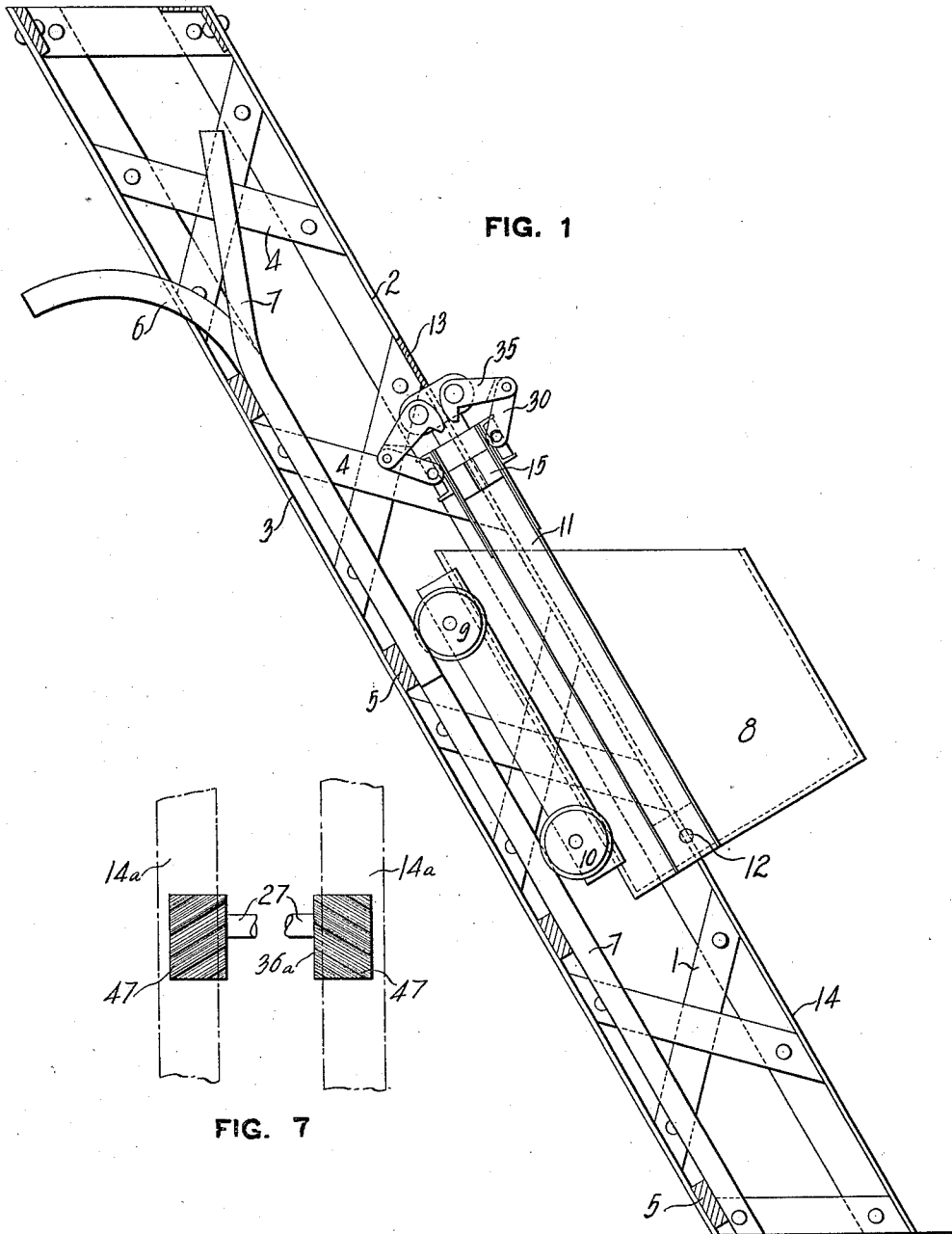


P. HINKEL.
 AUTOMATIC SAFETY DEVICE FOR FURNACE SKIPS OR ELEVATORS.
 APPLICATION FILED DEC. 26, 1911.

1,043,834.

Patented Nov. 12, 1912.

2 SHEETS—SHEET 1.



WITNESSES
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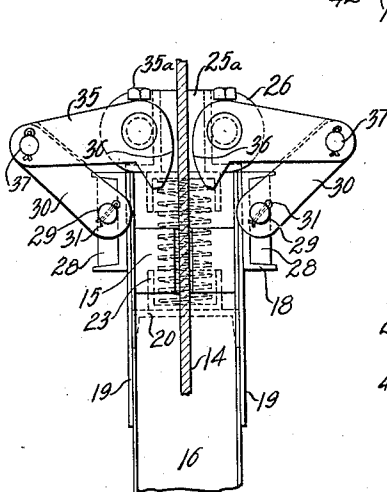
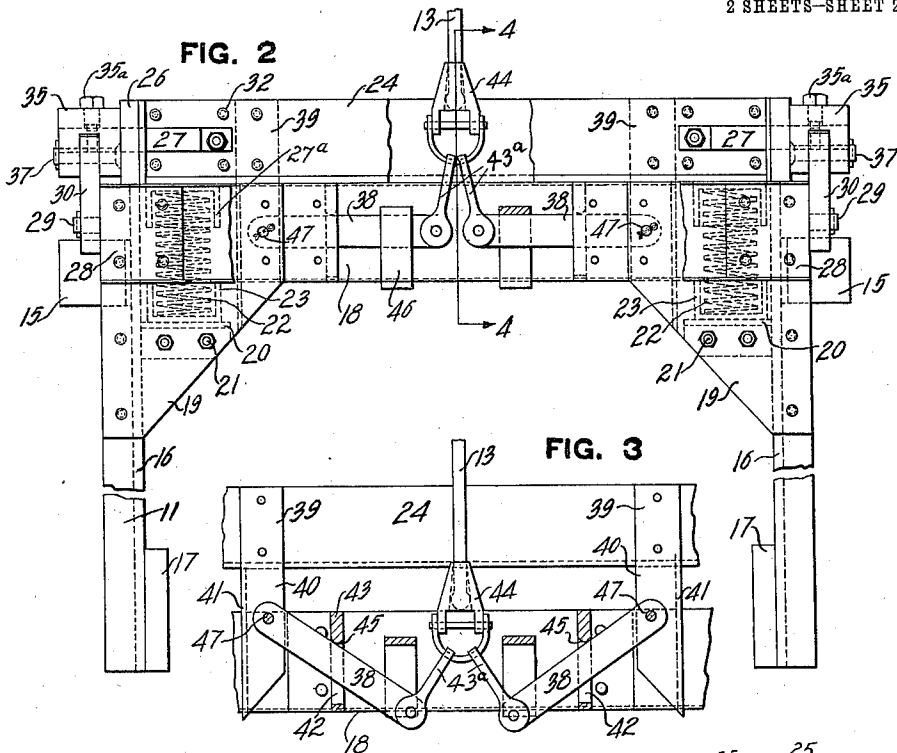


FIG. 5

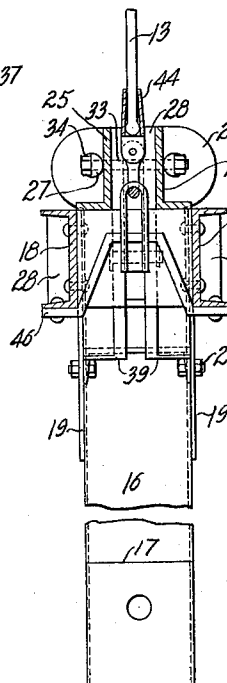


FIG. 4

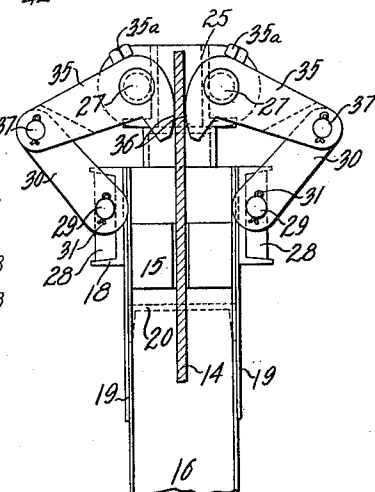


FIG. 6

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AUTOMATIC SAFETY DEVICE FOR FURNACE SKIPS OR ELEVATORS.

1,043,834.

Specification of Letters Patent.

Patented Nov. 12, 1912.

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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 Furnace Skips or Elevators, of which the following is a specification.

This invention relates to improvements in elevators or skip hoists.

The object of the invention is to provide a safety construction for supporting and moving a car, elevator or bucket along or in its guideways, in which the car, bucket or elevator will be prevented from falling or dropping in or along its guides in case the supporting rope or cable breaks, and in which the speed of descent of the elevator bucket or car will be automatically checked if it becomes too rapid.

A further object of the invention is to provide a construction of the character stated which is compact and occupies less room than such constructions as heretofore devised and in which the supporting cable or other means is directly connected to sustain the frame of the car under normal conditions, in such manner that there is no strain upon the safety mechanism during normal use of the car.

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

In the drawings Figure 1 is a side elevation, partly in cross section, showing one embodiment of my invention; Fig. 2 is a front view of the frame of the car shown in Fig. 1, parts being broken away to show details; Fig. 3 is a partial front view corresponding to Fig. 2, showing the position assumed by the operating levers upon action of the safety mechanism; Fig. 4 is a cross sectional view on the line 4-4, Fig. 2, looking in the direction of the arrows; Fig. 5 is a partial end view of the car frame shown in Fig. 2 illustrating the position of the gripping eccentrics under normal conditions; Fig. 6 is a view corresponding to Fig. 5, some parts being omitted, and illustrating the position assumed by the gripping eccentrics upon action of the safety mechanism; and Fig. 7 is a face view of the gripping eccentrics at opposite ends of the car frame, showing a modified form of the same.

My invention is applicable to passenger elevators, freight elevators and other car-

riers which are arranged to travel in a vertical shaft upon guideways or tracks therein, but is also adapted to be used when the tracks or supporting guides are inclined in position as, for example, upon an inclined railway or in skip hoists, such as are used for carrying loads of fuel, ore or other material to the top of blast furnaces or for supplying the fuel to a gas producer.

In the drawings I have illustrated my invention as applied to a skip hoist of the character described, but it is to be understood that this is only for the purpose of illustration and that my invention is not limited to such construction.

The skip hoist illustrated comprises a frame 1 which is of the usual or any preferred construction and arrangement and comprises upper and lower frame members, 2, 3, firmly and rigidly secured together by supporting cross straps and braces 4. Mounted upon the lower inclined frame members 3 are a plurality of transverse ties 5 upon which are supported the tracks or rails 6 and 7 upon which the car 8 is mounted to ride. As illustrated, the rails 6 are curved downwardly and the rails 7 are curved upwardly at their upper ends. The car 8 is provided with forward and rear wheels 9 and 10, the wheels 9 riding upon the interior rails 6 and the rear wheels 10 upon the exterior rails 7. As illustrated, the car is pivotally connected to a frame 11, shown more clearly in Fig. 2, and pivot pins 12 are provided at the lower end of the car 8 upon which the same swings in the frame. As is usual, a supporting rope or cable 13 is attached to the upper end of the car frame 11 to support the same and form a means for raising and lowering the car. As the car rises along its tracks or rails, the forward end thereof drops downward along the curved upper end of rail 6 while the rear or lower end of the car rises upon the outer rail 7 to discharge the contents of the car at the desired point. The construction described up to this point is common and well known and forms no part of my invention, these features of construction being shown merely for purpose of illustration.

Mounted upon a convenient portion of the fixed frame work 1, along which the car slides, are a pair of oppositely disposed guides or friction rails 14, one being located at each side of the car frame and each having opposite flat faces. Embracing each rail

14 is a slotted block 15 secured to the upper end of one of the vertical end members 16 of the car frame in such manner as to be rigid therewith. These blocks guide the car frame along the main frame and prevent it from being displaced therefrom. They also serve as elements of the safety mechanism hereinafter described.

The car frame shown comprises the end members 16, referred to, which are provided with inner facing blocks 17 at their lower ends, to which are connected the pivot pins 12 upon which the car is mounted. To the upper ends of the vertical end members 16 is secured the upper horizontal beam 18 of the frame, which, as illustrated, comprises a pair of oppositely disposed channel members securely riveted at their ends to the flanges of the vertical end members 16, which are likewise constructed of ordinary channel irons. As illustrated in Fig. 2, substantially triangular gusset or corner plates 19 are provided between the vertical end members and the top beam 18 of the frame, these extending downwardly below the lower flanges of the top beam 18 and being securely riveted to the flanges of the vertical end members 16 and to the inner faces of the channel members of the top beam 18. Mounted between the gusset members at each end of the top beam 18 are spring supports or platforms 20 having flat upper faces and which, as shown, consist of short sections of channel members, the flanges of which are bolted to the gusset plates 19, bolts and nuts 21 being provided for convenience in assembling or disassembling the parts. Supported upon the upper faces of the platforms 20 are boxes 23, firmly riveted or otherwise secured to the upper face of the platforms 20, and in which are seated spiral springs 22.

Mounted above the spaced channel members of the top beam 18 is an operating beam or bar 24 movable with reference to the car frame, and which, as illustrated most clearly in Figs. 4, 5 and 6, comprises a pair of unequal leg angle irons 25, spaced apart horizontally, by filling blocks 25^a, and connected together at their ends by oval or oblong blocks 26 which form supports for shafts 27 hereinafter to be more particularly described. The operating beam or bar 24 extends from end to end of the car frame and upon its lower face are provided upper boxes or seats 27^a which are firmly secured to the lower narrow legs of the angle irons of the operating beam, and form seats for the upper ends of the springs 22 referred to. It will be understood that the boxes or seats 23 and 27^a may be formed either of sheet metal stamped or pressed into shape or of cast steel or iron, pressed steel boxes being shown.

Firmly riveted to the outer faces of the

webs of the channel members of the upper beam 18, at each end thereof, are filling blocks 28, two of these are shown in end view in Fig. 5 and, as illustrated, they are of considerable thickness and are provided at their ends with integral projecting stub shafts 29 upon which are pivotally mounted the lower ends of levers or links 30, cotter pins 31 being provided in the shafts for securing the levers 30 thereon. As stated, between the ends of the angle irons 25 of the operating beam 24, filling blocks 25^a are provided to properly space the same apart. The angle irons 25 and the filling blocks are firmly secured together by rivets 32 passing through apertures therein. The shafts 27, as illustrated in Fig. 2, are horizontally disposed and bear against the side outer faces of the oppositely disposed wide vertical legs of the angle members of the operating beam 24. At their inner ends the shafts 27 are flattened and the shafts on opposite sides of the beam 24 are secured together and to the operating beam 24 by bolts 33, which pass through apertures in the ends of the shafts 27, the angle members 25, and the filling blocks 25^a therebetween. Nuts 34 are provided on the ends of the bolts 33 for convenience of assembling and disassembling the parts. The shafts 27 project through the oblong or oval blocks 26 at the ends of the operating beam 24 and upon their outer ends are mounted gripping levers 35, set screws 35^a being provided in the gripping members having their inner ends engaging annular grooves in the shafts 27 to prevent removal of the gripping levers 35 from the shafts except when desired. The gripping levers 35 are provided on their inner ends with eccentric friction or gripping portions 36 projecting downwardly below the level of the shafts 27. The grippers 35 are provided with flat faces on their eccentric portions which bear against the opposite flat sides or surfaces of the rails or tracks 14 along which the car and its frame slides. At their outer ends, the gripping levers 35 are slotted to embrace and receive the upper ends of the levers or links 30 hereinbefore mentioned, pivot pins or shafts 37 being provided for connecting the levers 35 and links 30.

In the present construction the eccentric grips are rotated upon the shafts 27 to frictionally grasp the guides 14 by the springs 22 which press upon the lower face of the bar 24 and move the same upwardly with reference to the top beam 18. Normally, however, when the car is properly supported by its cable the bar 24 is pressed downwardly toward the beam 18 and against the springs 22 to separate the grippers 36 and release them from the guides.

The operation stated is accomplished by a pair of operating levers 38, the outer ends

of which are pivotally connected to the operating beam or bar 24 and which bear against fixed portions of the beam 18 to form loose pivots, the inner ends of the levers being connected to the supporting cable.

As illustrated in Fig. 3, a pair of supporting members 39 is provided for the fixed pivot of each of the operating levers 38. Each of the supporting members 39 comprises an ordinary angle iron having a leg 40 parallel with the operating bar 24 and a leg 41 normal thereto. The upper ends of the transverse legs 41 are cut away in such manner that the longitudinal legs 40 may be securely riveted or otherwise fastened to the inner faces of the vertical legs of the angle members of the operating beam 24. The transverse legs 41 of the supporting members 40 project outwardly into close proximity to the inner faces of the channel members of the top beam 18 and guide the bar 24 in its movement. The operating levers 38 heretofore referred to, are each mounted at one end upon a pivot pin 47 supported by a pair of the legs 40 and project through slots 42 in channel members or braces 43, the flanges of which are riveted to the inner faces of the channel members of the top beam 18. At their inner ends, the operating levers 38 are provided with pivoted yokes 43^a which are connected to a clevis 44 to which one end of the supporting rope or cable 13 heretofore mentioned is securely fixed. Adjacent to the inner ends of levers 38 are a pair of supporting straps or bands 46 which are formed of flat strips of iron or steel, the ends of which are firmly riveted to the lower flanges of the top beam 18 and which, as shown in Fig. 4, are bent upwardly into inverted U-shape.

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 car, bucket, or elevator to be at rest under normal conditions, the frame and car are supported from the cable or rope 13 which engages with the clevis 44, and the parts of the safety mechanism occupy the positions illustrated in Fig. 2. Under such conditions, the operating beam or bar 24 is pulled downwardly toward the top beam 18 of the car frame against the action of the springs 22, and the levers 38 are substantially horizontal in position, their upper surfaces engaging with the lower faces of the U-shaped supports 46. At this time, the beams 24 and 18 are practically integral and the levers 38 are substantially directly connected to the beam 18. The entire weight of the car and its frame will then be supported by the pivot pins 47, cross braces 43 and U-shaped supports 46. So long as the tension upon the supporting

cable or rope 13 remains above a given minimum, the car may be moved safely up and down or along its tracks and rails without alteration in the condition or arrangement of the operating parts of the safety mechanism. If the rope or supporting cable 13 breaks, however, the springs 22 in the boxes 23 and 27^a immediately begin to push upwardly upon the upper boxes 27^a which are mounted upon the lower face of the operating beam or bar 24, thus causing the latter to rise away from the top beam 18, the bar 24 being guided in its upward movement by the engagement of the edges of the flanges 41 with the inner faces of the channels of the top beam 18. By reason of the slots 42 in the channel members 43, the levers 38 are pulled through and drawn around the rounded edges 45 at the ends of the slots 42 as floating or loose pivots and begin to assume the position shown in Fig. 3. Under some circumstances, only partial movement of the parts of the safety mechanism will take place, as, for example, when a break occurs in any of the mechanism of the winding drum or its operating parts, permitting the friction of the mechanism to drop very low. It may thus happen that the springs 22 are of some strength and, in fact, they may be made strong enough to operate the lever mechanism and overcome the friction in the winding drum mechanism, thus checking too rapid descent of the car under the conditions mentioned. It is to be understood, however, that when the tension upon the rope becomes zero by reason of breaking or parting of the cable, the levers and other parts immediately assume the positions shown in Fig. 3 which illustrates the extreme safety position. As the levers 38 oscillate about the pivots 45 and the operating bar 24 moves away from the top beam 18, the flat faces upon the eccentrics 36 of the levers 35 begin to engage with and press upon the guide rails 14. There being a pair of these eccentrics 36 at opposite sides of each guide rail, the latter are each frictionally gripped or grasped between a pair of eccentrics 36. It is obvious that the amount of friction between the faces of the eccentrics 36 and the guides 14 will increase directly as the pull or tension upon the rope or cable 13 decreases. Under extreme conditions, should the rope or cable break or be severed entirely, the eccentric grippers 36 are moved inwardly and, operating as they do substantially upon the principle of the ordinary toggle joint, the friction between them and the guides 14 increases to such an extent that the car and frame are supported entirely upon or by them. As will be obvious, the greater the weight of the car, the greater is the leverage which is imposed upon the friction faces 36 and the holding force exerted thereby upon the

guide rails 14. The eccentric faces 36 are comparatively close to the shafts 27 upon which the levers 35 are mounted and since the weight of the car is imposed at the extreme outer ends of the levers, a tremendous gripping force is brought to bear upon the guide rails, as is obvious.

I may use the construction described in connection with guide rails formed of either wood or metal. In the construction of a skip hoist of the character illustrated, it is usual to form the frame 1 mainly of steel or iron and the guide rails 14 will, in such cases, be likewise formed of such material. In some instances, however, particularly when the invention is applied to other constructions than skip hoists, as for example, inclined railways or freight elevators, wooden guide rails are advisable and are often used. Under such conditions, I prefer to form the face of the eccentric gripping portions 36 of the levers 35 with grooves and ribs after the manner illustrated in Fig. 7, which shows a face or end view of two gripping levers 35 at opposite sides of their car frame, and on the same sides of their respective guide rails. These grooves are slightly inclined to the horizontal and in construction are of the configuration of ordinary corrugated sheet iron and arranged in such manner that no sharp edges exist which may mar or injure the substance of the wooden rails. The grooves and ribs 47 on the faces of the eccentrics 36 are inclined downwardly and outwardly away from the car frame, from opposite the inner edge of the guide rail to a point opposite the outer portion of the rail, in such manner that the tendency of the ribbed faces of the gripping portions 36^a is to draw the rails or guides 14^a inwardly toward the car, as the eccentrics grip the rails, or when the car and frame are supported by the grippers. Otherwise, the construction is the same as that illustrated in Fig. 1. The arrangement described is novel with me and prevents the possibility of the guide rails springing apart or moving outwardly and away from the range of gripping action of the friction holding members.

It will be observed that in the construction heretofore described, I have provided an improved safety construction for skip hoists or elevators which is compact, strong and secure. As illustrated in end view in Fig. 4, none of the parts of the safety mechanism project sidewise from the face of the supporting frame, except the ends of the levers 35 and 30. In practice, these levers are comparatively short with reference to the entire frame as a whole and as a consequence, no danger exists of projecting portions of the safety mechanism contacting with the frame work along which the car rides, with the possibility of breakage or

injury of either the car frame, its operating parts, or the main guiding frame. The shafts 27 at the ends of the operating bar are comparatively long and are firmly and rigidly secured to the ends of the beam. Since they project endwise from the beam, it is possible to make the grippers as wide as possible and thus to obtain as large an amount of friction surface for grasping of the guide rails as is desired. The set screws 35^a which engage shafts 27, and cotter pins in the ends of shafts 29 and 37 permit easy endwise removal of the levers 35 and 30 from their shafts when it is desired to repair or replace the levers. Likewise, the shafts 27 may be removed bodily from the operating bar 24 by removal of the bolts 34 which secure the same in place. The springs 22 are easily assembled and are pushed upwardly from underneath the operating bar 24, the supports or platforms 20 being forced up into the springs and then bolted in place. It will also be seen that the construction as an entirety is formed of ordinary commercial iron which may be had in such shapes and sizes as is desirable. The end members 16 of the frame and the top beam 18 are formed of commercial channels and the operating bar 24 of ordinary angle irons. For other parts of the device, sections of channels are used.

What I claim is:—

1. The combination with a car frame having a beam, and guide rails therefor, of an operating bar mounted for movement relative to said beam, gripping levers connected to said beam and bar for engaging said guide rails, levers pivotally connected to said bar and arranged to engage said beam, means for moving said bar with reference to said beam, and means connected to said levers for supporting the frame.

2. The combination with a car frame having a beam, and guide rails therefor, of an operating bar mounted for movement relative to said beam, guides mounted on said bar and arranged to engage said beam for guiding the bar in its movement, gripping levers connected to said beam and bar for engaging said guide rails, levers pivotally mounted on said bar and arranged to engage said beam, springs between said beam and bar for moving the latter, and means connected to said levers for supporting the frame.

3. The combination with a car frame having a beam, and guide rails therefor, of an operating bar mounted for movement relative to said beam, projections on said bar arranged to engage said beam to guide the bar during its movement, gripping levers connected to said beam and bar for engaging said guide rails, levers pivotally mounted on said projections and arranged to engage said beam, means for moving said bar

with reference to said beam, and a supporting cable connected to said levers.

4. The combination with a car frame having a beam, and guide rails therefor, of an operating bar mounted for movement relative to said beam, gripping levers connected to said beam and bar for engaging said guide rails, supports at each end of said bar, levers having ends pivotally connected to said supports, means on the beam adapted for engagement by the levers for supporting the frame, and means connected to the other ends of said levers for supporting the frame.

5. The combination with a car frame having a beam, and guide rails therefor, said beam comprising members spaced apart and having slotted braces seated therebetween, an operating bar mounted for movement relative to said beam, gripping levers connected to said beam and bar for engaging said guide rails, levers connected to said operating bar and projecting through the said slotted braces, and frame supporting means connected to the levers.

6. The combination with a car frame having a beam, and guide rails therefor, said beam comprising members spaced apart and having slotted braces seated therein, gripping levers connected to said beam and bar for engaging said guide rails, guiding supports upon said bar arranged to engage the inner faces of said spaced beam members and projecting therebetween, levers connected to said supports and projecting through said slotted braces, and frame supporting means connected to said levers.

7. The combination with a car frame hav-

ing a beam, and guide rails therefor, said beam comprising members spaced apart, of slotted braces in said beam, an operating bar movably mounted with reference to said beam, gripping levers mounted upon said bar and arranged to engage said guide rails, levers connected to said operating bar and projecting through said slotted braces, straps secured to the beam, said levers being arranged to normally engage said straps to support the frame, and frame supporting means connected to said levers.

8. The combination with a car frame having a beam, of an operating bar movable with respect thereto, said bar comprising a pair of spaced angle members, spacing blocks between the angle members, end blocks mounted at the ends of the bar, a pair of shafts at each end of said bar supported in said end blocks, bolts passing through said shafts, angle members and filling blocks for detachably securing the shafts in place, gripping levers connected to said beam and bar, said levers having eccentric portions adapted for engagement with fixed rails for supporting the car, operating levers connecting said beam and bar, and frame supporting means connected to said operating levers and extending between said spaced angle members.

In testimony whereof, I have hereunto set my hand.

PETER HINKEL.

Witnesses:

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