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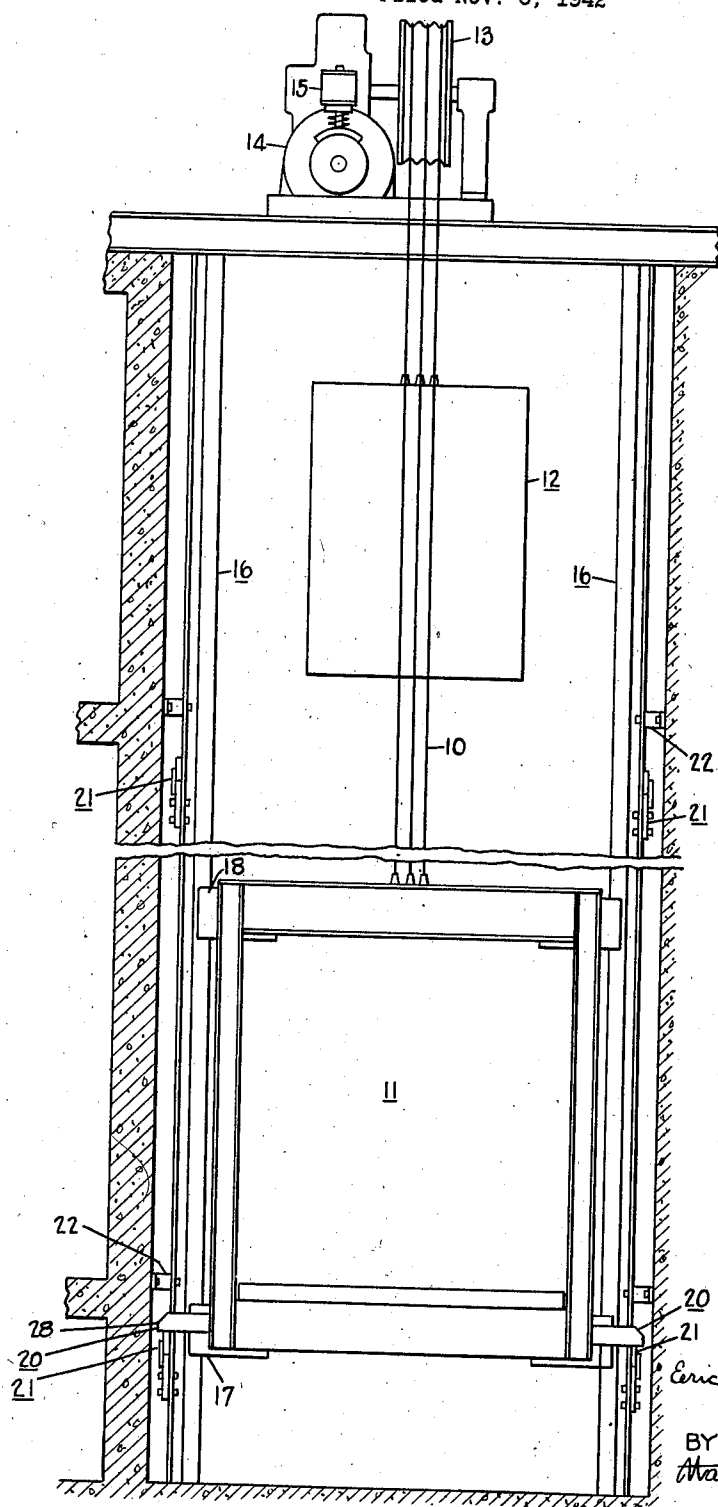
E. A. SAHLIN

2,316,976

CAR LOCKING DEVICE

Filed Nov. 6, 1942

4 Sheets-Sheet 1



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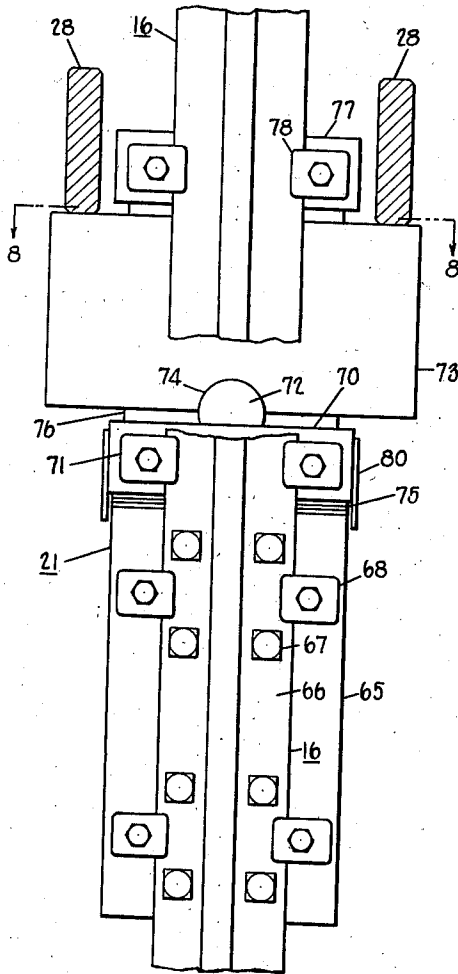


FIG. 6

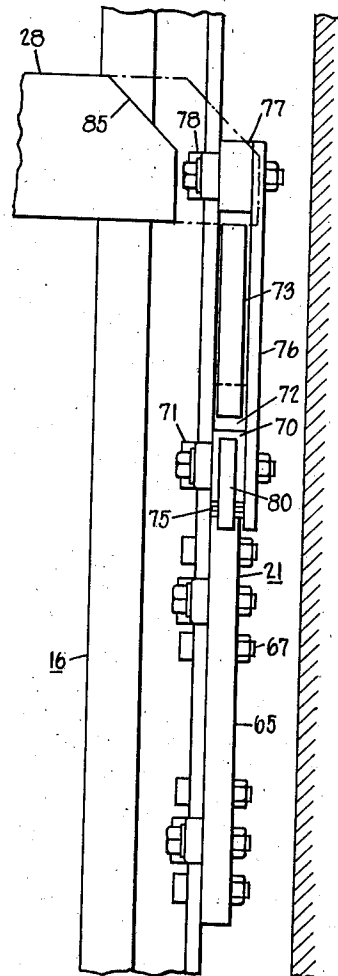


FIG. 7

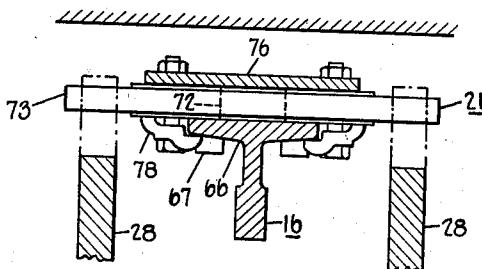


FIG. 8

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2,316,976

CAR LOCKING DEVICE

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7 Claims. (Cl. 187—76)

The invention relates to elevator safety devices and especially to locking devices for elevator cars.

In certain installations, elevators are arranged to lift extra heavy loads, and such elevators have become known as safe lift elevators. The hoisting mechanism is arranged to operate at slow speed for this operation. A locking device is provided to support the elevator car independently of the hoisting mechanism while the load transfer is being effected. This prevents the car descending when the brake does not hold, the power is insufficient or, in case of traction elevators, when the traction is insufficient. The locking device comprises extendible lock bars carried by the car for engaging stops on the guide rails at the landings to support the car. If the hoisting mechanism can lift the car off the stops after it is loaded, the lock bars are retracted for further car operation.

It is the object of the invention to provide an improved car locking device which is positive and reliable in operation and which by its action does not cause bending stresses in the guide rails.

Features and advantages of the invention will be apparent from the following description and appended claims.

In the drawings:

Figure 1 is a schematic representation of an elevator installation embodying the invention;

Figure 2 is a plan view of the platform of the elevator car of Figure 1 with parts broken away, illustrating somewhat schematically the lock bars and operating mechanism therefor;

Figure 3 is a view taken along the line 3—3 of Figure 2;

Figure 4 is a view taken along the line 4—4 of Figure 3;

Figure 5 is a view taken along the line 5—5 of Figure 3;

Figure 6 is a view in elevation illustrating the lock bar stop and its mounting on the guide rail;

Figure 7 is a side view of the same; and

Figure 8 is a view taken along the line 8—8 of Figure 6.

Referring to Figure 1, hoisting ropes 10 for the car 11 and counterweight 12 pass over the hoisting drum 13 at the top of the elevator shaft. This drum is driven by means of a hoisting motor 14 to effect the raising and lowering of the car and counterweight. An electromechanical brake 15 is employed to aid in bringing the motor to a stop and to hold the car while at rest. Guide rails 16 are provided for the elevator car. The bottom guide shoes for the car are designated 17, while the top guide shoes are designated 18. These

guide shoes cooperate with the guide rails to guide the car in its movement up and down the elevator shaft.

The lock bars 28 of the car locking device 20 are carried by the elevator car framework beneath the car platform. These bars are extended to rest on lock bar stops 21 secured to the guide rails 16. The guide rails are mounted on brackets 22 which extend them out from the hatchway wall to enable the hook bar stops to be secured to the back of the rails. The lock bar stops are positioned at the various landings so that with the lock bars extended and resting on the stops the car is supported level with the landing.

Reference may now be had to Figures 2, 3, 4 and 5 which illustrate details of the lock bars and their operating mechanism. The lock bars and operating mechanism are mounted between the lower cross channels 25 of the elevator car framework. The elevator car platform 26 is supported on top of these channels. Associated with the channels and beneath the car platform is a sub-frame 27.

There are two spaced lock bars 28 on each side of the car. These lock bars at each side of the car are guided in slots 30 and 31 formed in plate 32 and beam 33 respectively. Plate 32 is secured as by brackets 34 to the channels 25 while beam 33 is secured by brackets 35 to the channels 25. Stops 36 and 37 are provided on one bar on each side for engaging plate 32 and beam 33 to limit the outward and return movement of the bar. Oppositely disposed angle brackets 38 and 40 are secured to the inner ends of the lock bars to extend toward each other. These brackets overlap each other and are vertically spaced to receive the outer end of a link 41. The link is pivotally secured to these brackets by a pivot bolt 42.

The inner ends of the inwardly extending links 41 are pivotally secured as by pivot bolts 43 to the opposite ends of a lever 44 at the mid point of the channels 25. This lever is secured as by a pin to a vertically extending shaft 45. This shaft is pivotally mounted in apertures in plates 46 and 47. The lower plate 47 is mounted on a cross member 48 secured to the bottom of channel members 25 while upper plate 46 is secured to the bottom of a cross beam 49 secured to channel members 25. A lever 50 is secured as by a pin to the lower end of shaft 45. A link 51 is pivotally connected as by a pivot bolt 52 to the outer end of lever 50. This link extends toward the front of the car and is pivotally connected at its other end as by a pivot bolt 53 to the end of a

lever 54. This lever is secured as by a pin to the lower end of a vertically extending operating shaft 55. This shaft is pivotally mounted in a bearing 56 formed on the lower end of a housing 57 embedded in the car platform. The shaft is held in position by means of collars 58 pinned to the shaft on opposite sides of the bearing. The top 60 of the shaft is square in cross section to receive an operating socket wrench. The housing is provided with a removable cover plate 61 to enclose the end of the shaft when the car locking device is not in use.

Referring now to Figures 6, 7 and 8 each lock bar stop 21 comprises a foundation plate 65 secured to the base 66 of the guide rail 16 by bolts 67. The foundation plate is held in position by means of rail clips 68 while the holes for the bolts 67 are drilled. On top of the foundation plate is a fulcrum bar 70. This bar is secured to the guide rail by rail clips 71. A semi-cylindrical fulcrum 72 is secured as by welding to the top of bar 70 at the mid point thereof. The bar is mounted on the guide rail so that the center of the fulcrum is on the longitudinal center of the guide rail, i. e. so that the center of the fulcrum lies in a plane extending longitudinally of the rail through the center of the face of the rail and perpendicular to the base of the rail. This fulcrum pivotally supports a rocker plate 73 upon which the lock bars are supported. This rocker plate is provided with a semi-cylindrical aperture 74 into which the fulcrum 72 extends. Spacer shims 75 are provided beneath the bar 70 to adjust the vertical position of the rocker plate. Shim retainers 80 are secured to the ends of the fulcrum bar. A retainer is provided for the rocker plate in the form of a back plate 76 secured as by welding to the fulcrum bar and having a top bar 77 secured as by welding to the top of the back plate. Clips 78 secure the retainer to the guide rail at the top thereof. The thickness of bars 70 and 77 is such as to provide ample space between the base of the guide rail and the back plate for the rocking of the rocker plate on its fulcrum. Also, space exists between the top of fulcrum bar 70 and rocker plate 73 and between the top of rocker plate 73 and spacing bar 77 to allow for the rocking of the rocker plate on its fulcrum.

In operation, when it is desired to take on an exceptionally heavy load, the car is first moved upwardly an inch or so above the floor. The lock bars are then extended over the lock bar stops. To extend the lock bars, the cover plate 61 is removed and shaft 55 is turned by its socket wrench in a clockwise direction as shown in Figure 2. This causes clockwise rotative movement of shaft 45 to force links 41 outwardly, thereby moving the lock bars 28 from their retracted positions as shown in Figure 2 to extended positions shown in dot-dash lines. The car is then lowered until it is supported by the lock bars on the rocker plate, the rocker plate rocking on its fulcrum to equally distribute the load on the two lock bars in case of misalignment or from some other cause it is not in proper position initially to do so. A cam 82 is secured to shaft 45 for engaging the operating roller 83 of an interlock switch 84. Switch 84 is arranged in the control circuits for the hoisting motor to prevent operation of the car above a very slow speed when the lock bars are extended. This prevents the car being lowered too fast onto the lock bar stops.

After the load has been taken on the car, the hoisting motor is energized to see if the car can

be lifted off the lock bar stops. If it can be, after a short amount of upward movement the lock bars are retracted by the wrench and the car is then moved upwardly or downwardly to carry the load to its destination. In this connection the lock bars are bevelled at 85 on top at their ends so that, should they fail to be retracted and the car is moved upwardly, the bevelled portions will hit on the bottom of the rocker plates at the next landing forcing the lock bars inwardly. The top bars 77 limit the amount of upward movement of the rocker plates so as to prevent the rocker plates coming off their fulcrums.

The above construction prevents the transmission of any substantial bending stresses to the guide rails through the locking device. This is due to having two lock bars, one on each side of each guide rail, supported by a rocker plate pivotally mounted on a fulcrum on the longitudinal center of the guide rail. For example, as the load is being moved into the car there is at first a very heavy load on the front of the car platform which tends to tilt the car forward. This results in rocking of the rocker plate to equalize the forces exerted on the ends of the rocker plate by the lock bars.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In an elevator installation in which an elevator car is movable in the elevator hatchway and in which a car locking device is provided for supporting the car at a landing, said device comprising; a stationary member mounted in the hatchway adjacent the car and having a fulcrum; a stop member pivotally supported on said fulcrum; and a pair of extendible members carried by the car adapted when extended to engage said stop member, one on each side of said fulcrum, to support the car.

2. In an elevator installation in which an elevator car is movable on guide rails in the elevator hatchway and in which a car locking device is provided for supporting the car on the guide rails at a landing, said device comprising for each guide rail; a member having a fulcrum; means securing said member to said guide rail with its fulcrum on the longitudinal center of the guide rail; a stop member pivotally supported on said fulcrum; and a pair of lock bars carried by the car and extendible into position to engage said stop member, one on each side of said fulcrum, to support the car.

3. In an elevator installation in which an elevator car is movable on guide rails in the elevator hatchway and in which a car locking device is provided for supporting the car on the guide rails at a landing, said device comprising for each guide rail; a stop member; means secured to said guide rail for supporting said stop member midway its ends for pivotal movement in a plane parallel to the base of the guide rail on a fulcrum aligned with the longitudinal center of the guide rail; a pair of lock bars carried by the car, one for each end of said stop member; and means for moving said lock bars into position to engage said stop member to support the car.

4. In an elevator installation in which an elevator car is movable on oppositely disposed guide

rails in the elevator hatchway and in which a car locking device is provided for supporting the car on the guide rails at a landing, said device comprising for each guide rail; a stop member in back of said guide rail; means secured to the base of the guide rail at the back thereof for supporting said stop member midway its ends for pivotal movement in a plane parallel to the base of the guide rail on a fulcrum aligned with the longitudinal center of the guide rail; a pair of lock bars carried by the car, one for each end of said stop member; and means mounting said lock bars for horizontal sliding movement to extend them over said stop member for engagement with said stop member on the top thereof when the car is lowered thereon with the bars extended.

5. In an elevator installation in which an elevator car is movable on oppositely disposed guide rails in the elevator hatchway and in which a car locking device is provided for supporting the car on the guide rails at a landing, said device comprising for each guide rail; a bar having a fulcrum on the top thereof; means mounting said bar on said guide rail in back thereof and with said fulcrum aligned with the longitudinal center of the guide rail; a rocker plate above and pivotally mounted on said fulcrum midway between its ends and parallel to the base of the rail; a pair of lock bars carried by the car beneath the car platform, one for each end of said rocker plate; means mounting said lock bars for horizontal sliding movement to extend them over said rocker plate for engagement with said rocker plate on the top thereof when the car is lowered thereon with the bars extended; and means carried by the car for extending and retracting said lock bars.

6. In an elevator installation in which an elevator car is movable on oppositely disposed guide rails in the elevator hatchway and in which a car locking device is provided for supporting the car on the guide rails at a landing, said device comprising for each guide rail; a fulcrum bar having a semi cylindrical fulcrum on the top thereof; means mounting said fulcrum bar on said guide rail in back of and parallel to the base of the rail and with said fulcrum aligned with the longitudinal center of the guide rail; a rocker plate above and pivotally mounted on said fulcrum bar

parallel to the base of the rail, said rocker plate having a semi cylindrical aperture in the bottom thereof and midway its ends into which said fulcrum extends to form the pivot; means for retaining said rocker plate on said fulcrum; a pair of lock bars, one for each end of the rocker plate; means mounting said lock bars beneath the elevator car platform for horizontal sliding movement to extend them over said rocker plate, one on each side of the fulcrum, to engage said rocker plate on the top thereof when the car is lowered thereon with the bars extended; and means carried by the car for extending and retracting said lock bars.

7. In an elevator installation in which an elevator car is movable on oppositely disposed guide rails in the elevator hatchway and in which a car locking device is provided for supporting the car on the guide rails at a landing, said device comprising for each guide rail; a foundation plate secured to the back of the base of the guide rail; a fulcrum bar mounted on top of said foundation plate parallel to the base of the rail and having a semi cylindrical fulcrum on the top thereof aligned with the longitudinal center of the guide rail; a rocker plate above and pivotally mounted on said fulcrum bar parallel to the base of the rail, said rocker plate having a semi cylindrical aperture in the bottom thereof and midway its ends into which said fulcrum extends to form the pivot; a spacing bar above said rocker plate; a retaining plate in back of said rocker plate extending from said fulcrum bar to said spacing bar; means securing said retainer plate and said bars to the base of the guide rail, the thickness of said bars and their distance apart being such as to enable rocking of said rocker plate on said fulcrum; a pair of lock bars, one for each end of the rocker plate; means mounting said lock bars beneath the elevator car platform for horizontal sliding movement to extend them over said rocker plate, one on each side of the fulcrum, to engage said rocker plate on the top and near the ends thereof when the car is lowered thereon with the lock bars extended; and means carried by the car for extending and retracting said lock bars.

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