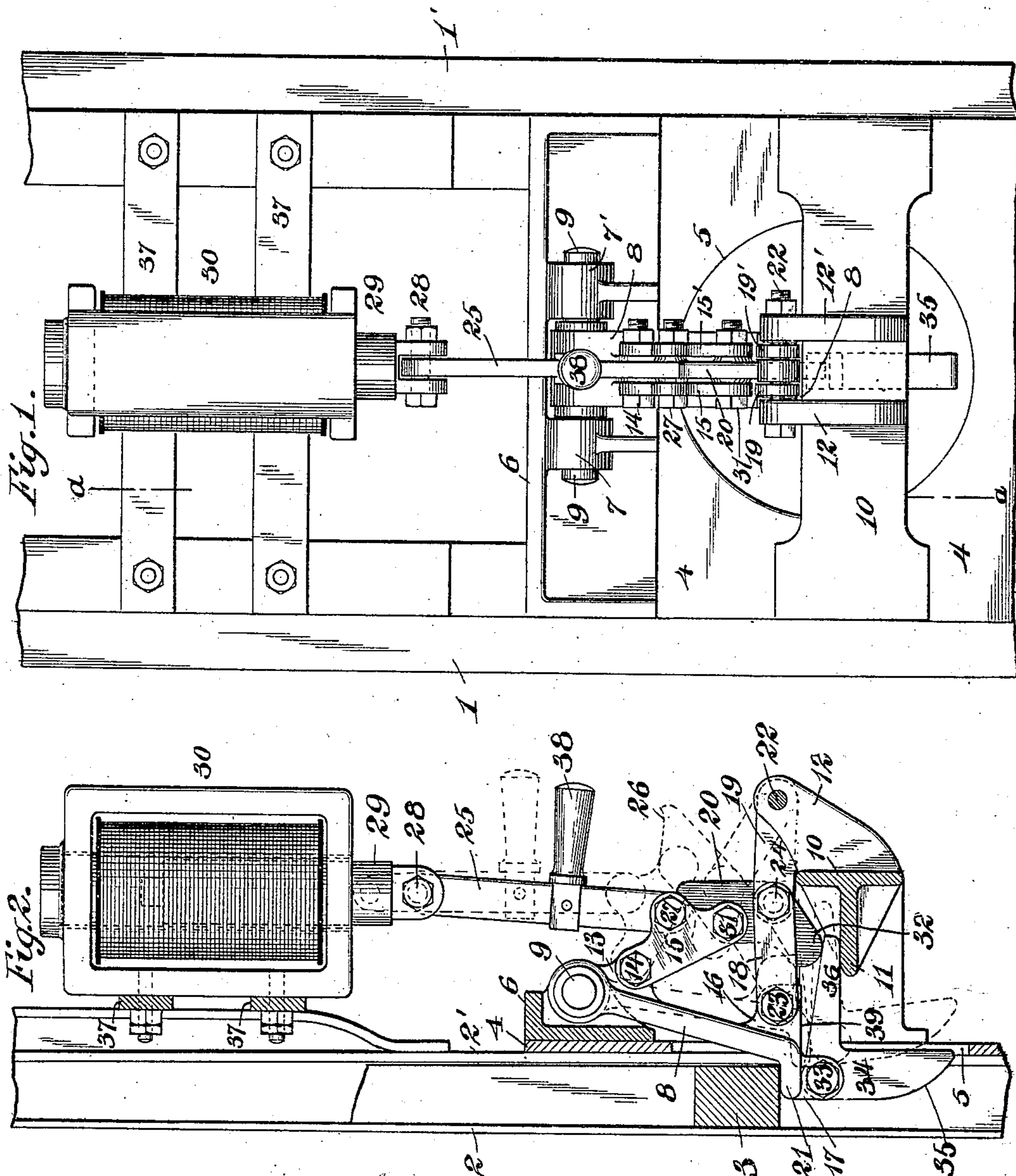


No. 848,373.

PATENTED MAR. 26, 1907.

J. D. IHLDER & R. W. SCOTT.
SAFETY CATCH FOR ELEVATORS.

APPLICATION FILED JULY 29, 1905.



WITNESSES:

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JOHN D. IHLDER, OF NEW YORK, N. Y., AND RUMSEY W. SCOTT, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNORS TO OTIS ELEVATOR COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SAFETY-CATCH FOR ELEVATORS.

No. 848,373.

Specification of Letters Patent.

Patented March 26, 1907.

Application filed July 29, 1905. Serial No. 271,824.

To all whom it may concern:

Be it known that we, JOHN D. IHLDER and RUMSEY W. SCOTT, citizens of the United States, and residing, respectively, in New York city, New York county, New York, and in Washington, District of Columbia, have invented certain new and useful Improvements in Safety-Catches for Elevators, of which the following is a specification.

The invention relates to safety devices for elevators.

The object of the invention is to provide a simplified construction and arrangement of parts to constitute an efficient means for arresting, when desired, the movement of the carrier in its downward direction at some predetermined point in the path of its travel.

Other objects of the invention will appear more fully hereinafter.

The invention consists, substantially, of such a construction and relative arrangement of parts that normally, by reason of the force of gravity, said parts shall arrest the movement of the carrier in one direction, but not in the other.

The invention further consists of electrical means for moving said parts against the force of gravity, so that when desired the carrier may move freely in either direction.

Referring to the accompanying drawings and to the views and reference characters thereon, Figure 1 is a view showing in elevation the application of our invention to one type of hoist-guideways. Fig. 2 is a sectional side view taken on line *a a* of Fig. 1 and showing the various parts in detail, as well as the relative location of said parts.

The same part is designated by the same reference character wherever it occurs in the two views.

The guideways of the hoist are designated by the reference characters 1 and 1' and are provided with webs or flanges 2 and 2' to prevent the cross-piece 3 from moving out of its path. This cross-piece 3 is shown in section in Fig. 2 and may be part of the carrier, as in a platform-lift, ammunition-hoist, or furnace-hoist, or it may be a cross-piece attached to the lift, in addition to the other parts thereof, and particularly for the purpose hereinafter set forth.

Suitably secured to the guideways is a base-plate 4, provided at its lower middle

portion with a large opening 5. (Shown in Fig. 1 as a circular opening.) Mounted on the upper portion of the base-plate 4 is a supporting-plate 6, provided at its central portion with bearings 7 and 7', in which is pivotally mounted the catch-lever 8, said lever being securely attached to the shaft 9, shown as extending through bearings 7 7'. At a short distance from the opening 5 and to the right thereof as viewed in Fig. 2 is a T-shaped cross-piece 10, the horizontal portion 11 of which serves as a limit-stop for certain parts, as hereinafter explained. Integral with the cross-piece 10 are shown two forwardly and upwardly extending bearings 12 and 12'.

The lever 8 at its upper portion is provided with a lug 13, on which are fulcrumed at 14 the lever-plates 15 and 15', one on each side. At the lower end of said lever 8 are shown in Fig. 2 two additional lugs, one (designated by the reference-number 16) extending toward the right in Fig. 2 and the other (represented by the reference-number 17) extending downwardly. The lugs 13, 16, and 17 must be rigidly attached to the lever 8 and are herein shown integral therewith. The lower end of the lever 8 is provided with a catch 21, whose upper surface is substantially horizontal and is shown in Fig. 2 as directly supporting the cross-piece 3, and consequently the carrier, of which 3 constitutes a part or to which it is secured.

Pivoted to the lug 16 at 23 are the link-plates 18 18. The other ends of said plates 18 18 are pivoted to a pair of levers 19 19, which are fulcrumed at their right-hand ends, as viewed in Fig. 2, to the aforesaid lugs 12 12'. Substantially midway between the pivotal points 23 and 22 and between the plates 18 19 and 18 19' is pivoted the intermediate lever-plate 20, which we will call a "locking-lever" or "locking-plate." This plate 20 is of such shape as to form a limit-stop for the catch of the lever 8, projecting into the path of the cross-piece 3. This is accomplished by making the upper portion of said intermediate plate 20 of the shape shown by the dotted lines at 26 in Fig. 2, so that when the parts are in the position shown by the full lines said part 26 will accurately fit the lower end of the link 25, said link 25 being pivoted at its lower end at 27 between the plates

15 15' and at its upper end at 28 to the movable core 29 of the electromagnet 30. Besides being pivoted between the plates 18 19 and 18 19' said intermediate plate 20 is pivoted at 31 between the plates 15 15' and is provided at its lower end with a toe 32. To the lug 17 is suitably fulcrumed at 33 the L-shaped lever 34, the leg 36 of which is substantially horizontal and the leg 35 vertical when the parts are in their normal position, as shown in full lines. The leg 35 is provided with a graduated cam-face, so that when the cross-piece 3 moves up from beneath it can easily move the leg 35 to the right, and consequently the catch and lug 17 out from the path of the cross-piece 3, as hereinafter explained.

The link 25 is provided with an adjustable handle 38 for manual operation—that is, for operation of the catch to move it out of the path of the cross-piece when the magnet 30 is inoperative or deenergized. The magnet 30 is suitably mounted on the guideways, so as not to interfere with the movement of the cross-piece 3. The magnet is herein shown as mounted on the supports 37 37.

The operation of the device will now be described.

Assuming the parts to be in their full-line positions and the cross-piece 3 below the lever 34 and moving upwardly, it is evident that when said cross-piece 3 strikes the cam-surface of the vertical leg 35 of the L-shaped lever 34 the horizontal leg 36 thereof will be moved upwardly. In doing so the right-hand end of said leg 36 engages with the toe 32, which is shown adjacent thereto, and moves the plate 20 on the pivot 24, so that its upper portion will move toward the right, carrying with it the plates 15 15'. The lever 8 is also moved a short distance toward the right by reason of the connection of the plates 15 15' therewith at the point 14. This action continues until the upward movement of the leg 36 is limited by the lower horizontal portion of the lug 16, as at 39. By this time the cross-piece 3 has reached the vertical face of the lug 17 and the catch 21 of the lever 8, after which the main pressure is on the lower end of the lever 8, whose fulcrum-point is then at 9. The parts are then finally forced into their position, as shown in Fig. 2 in dotted lines. When the cross-piece reaches the position as shown in Fig. 2, the parts again assume their full-line position by reason of the weight of the solenoid 29 principally. The upper portion 26 of the plate 20 then contacts with the lower end of the lever 25, so as to prevent the catch 21 from moving too far into the path of the cross-piece 3. Preferably, however, the toe 32 is so constructed that it normally makes contact with the leg 36 and said leg with the horizontal portion 11 of the T-shaped support 10, as shown. On the vertical portion of this sup-

port rest the links 19, the relation between the parts being such that normally the center of the pivot 24 is held above a line drawn through the centers of the pivots 23 and 22. This arrangement is for the purpose of preventing binding when the cross-piece 3 first begins to move the lever 34 bodily toward the right. For the same reason the center of the pivot 31 is held by the portion 26, engaging with the lower end of the link 25 to the right of a line drawn through the centers of the pivots 14 and 24.

It will now be seen that there are two toggles—a main toggle comprising the links 18 and 19 and 18 19', forming a main toggle-joint, and an auxiliary toggle comprising the links 15 15' and plate 20, forming an auxiliary toggle-joint. These toggle-joints are so arranged that a small downward pressure applied at the pivot 27 will enable the catch 21 to support a heavy load without being moved out of operative position.

The normal position of the pivot 24 should be only slightly above that of a line drawn through points 23 and 22, and the pivot 31 should have the same relation with the pivots 14 and 24. When the whole weight of the lift is supported by the catch 21, the maximum strain is obviously on the lever 8 and shaft 9; but there is also a sidewise pressure through links 18 18 and 19 19' on the shaft at 22 and an upward pressure from point 24. Furthermore, a pressure is exerted from point 14 on lever-plates 15 15' tending to rotate the same about the point 27 and swing the plate 20 about the pivot 24 by reason of the connection of said plates 15 15' with the plate 20 at the point 31. The movement of the lever 20 is limited in its movement toward the left by the stop 26 of the plate 20, but principally by the toe 32 engaging with the leg 36, which in turn contacts with the horizontal portion 11 of the rigid and fixed cross-piece 10. The upward pressure from the point 24 also acts on the plate 20 and tends to move the same about 31 as a fulcrum and produces the same action as before, and therefore increases the effect thereof. It is therefore clear that our arrangement of catch and toggle-joints forms an effective means for preventing the downward movement of the part 3.

Now when it is desired to release the lift so that the cross-piece 3 may move past the catch 21 either the magnet 30 is energized or the lever 38 is manually operated to move the link 25 upwardly into the dotted-line position. If magnet 30 is energized, its core will move into the solenoid. The link 25 being pivoted at 28 will be moved upwardly, swinging the plates 15 about the fulcrum 14 by reason of the connection of the lever 25 therewith at 27. A pulling force will also be exerted on the plate 20 at 31. This force

is transmitted to the levers 18 18 and 19 19', and since the pivot at 22 is fixed the pivot 23 will be drawn toward the right, and therefore the catch 21 will be moved out of the
 5 path of the cross-piece 3, so that the parts will assume their dotted-line positions and the lift can descend. In its upward movement the link 25 through plates 15 exerts a pressure on the lever 8 toward the left; but
 10 the leverage at 14 is so small as compared with that at 23 that it has little effect.

Although we have shown our invention applied to two guideways, it is obvious that it would be within the province of our inven-
 15 tion to use a separate catch electrically operated, as shown, for more than one guideway, and although the invention is particularly adapted to be used near the upward limit of travel of the hoist it may be placed
 20 at any point between the limits of travel, if desired. Furthermore, various changes may be made in the construction and details of our invention without departing from the spirit thereof.

25 The circuits in connection with which the electromagnet herein disclosed may be operated are described and claimed in a co-pending application for an electric-elevator-controlling system by John D. Ihlder and
 30 Rumsey W. Scott, Serial No. 271,823, filed July 29, 1905.

What we claim, and desire to secure by Letters Patent, is—

1. In a hoist, the combination of means
 35 comprising interlocking toggles for preventing movement of a carrier in one direction, and means for actuating said toggles.

2. In a hoist, the combination of means comprising interlocking toggles for prevent-
 40 ing movement of the carrier in a predetermined direction, and an electroresponsive device for actuating said toggles.

3. In a hoist, the combination of means for preventing movement of the carrier in
 45 one direction only, said means comprising toggles, and an electroresponsive device for actuating said toggles.

4. In a hoist, the combination of a catch normally projecting into the path of a part
 50 of the hoist-carrier, and a plurality of toggles associated with said catch, and so constructed and arranged that said carrier shall be resisted in its movement in one direction but not in another.

55 5. The combination with the guideways of a hoist, of a catch normally projecting into the path of a part of the hoist-carrier, a substantially L-shaped lever provided with a cam-surface and fulcrumed to said catch,
 60 and toggles so constructed and arranged that said part of the hoist-carrier can move in one direction in the guideways but not in the other.

6. In a hoist, the combination with a
 65 catch normally projecting into the path of a

part of the hoist-carrier, of a lever pivoted to said catch and having a cam-surface also projecting into the path of said part of the hoist-carrier, and interlocking toggles connected to said catch and associated with said
 70 lever.

7. In a hoist, the combination with a catch normally projecting into the path of a part of the hoist-carrier, of interconnected
 75 toggles connected to said catch to hold the latter in fixed position when the carrier is supported by said catch, and electromagnetic means for actuating said toggles and releasing the catch to permit the hoist-carrier to move past said catch.
 80

8. In a hoist, a catch, an L-shaped lever provided with a cam-face, said cam and lever projecting normally into the path of a part of the hoist-carrier, and interconnecting tog-
 85 gles connected to said catch to hold the latter in fixed position to prevent said part from moving in one direction, but permitting the catch to be released when said part engages said cam-surface in moving in the op-
 90 posite direction.

9. The combination in a hoist, with means for preventing movement of the carrier in one direction; said means comprising a lock-
 95 ing device; of a lever, part of which normally projects into the path of part of the carrier, and another part of which is constructed and arranged to unlock said locking device when the carrier moves in another direction.

10. The combination, in a hoist, with a catch, of an L-shaped lever, one leg of which
 100 has a cam-surface and with said catch projects into the path of a part of the carrier of the hoist, and interconnecting levers and links connected to said catch, and comprising a locking device to hold the catch in
 105 fixed position and prevent movement of said part of the carrier in one direction, said lever being arranged to actuate said locking device to release said catch and permit free move-
 110 ment of said part in the opposite direction.

11. The combination with guideways of a hoist, of a base-plate mounted thereon, levers pivotally connected to said base-plate, inter-
 115 mediate levers, one of which is a locking-lever pivotally connected to the first-named levers, a catch, an additional lever connected to the aforesaid levers and carrying said catch at its outer end in the path of a part of a carrier of the hoist, and a cam-shaped lever pivoted to said catch and having one leg
 120 thereof projecting with said catch into the pathway of said part of the carrier, and having the other leg thereof associated with said locking-lever to actuate the same and effect the release or lateral movement of the catch
 125 when said part of the carrier engages the cam in its upward movement.

12. The combination with guideways of a hoist, of a base-plate mounted thereon, a piv-
 130 oted lever having a catch at its end project-

ing normally into the path of a part of the carrier, a double set of toggles connected between said base-plate and said lever, means for normally holding the toggles in locking position, and a bell-crank lever pivoted to said catch and having one arm cam-faced and projecting with the catch into the path of said part of the carrier, said bell-crank lever having its other arm associated with said toggles to unlock the same when said cam-faced arm is engaged by said part of the carrier.

13. In a latch device, the combination with a pivoted lever having a catch at its end, of a fixed support, a double set of toggles connected between said lever and fixed support, means for limiting the downward movement of said toggles, and a bell-crank lever associated with said toggles to move the same and release the catch.

14. In a latch device, the combination with a pivoted lever having a catch at its end, of a fixed support, toggle mechanism connecting said lever to said support, a bell-crank lever adapted to be actuated to unlock the toggle mechanism and release the catch, means for limiting the downward movement of the toggle mechanism, and an electroresponsive device for actuating said means to move said toggle mechanism upwardly and said catch laterally.

15. The combination with the guideways of a hoist, of a pivoted lever having a catch at its lower end normally projecting into the path of a part of a hoist-carrier to prevent downward movement thereof, a double toggle, means acting on said toggle to hold said

catch in fixed position, a stop for limiting the downward movement of said toggle, a cam-lever actuated by said part of the carrier in its upward movement to operate said toggle and move said catch out of said path of travel.

16. In a hoist, the combination with a pivoted lever having a catch rigid therewith and projecting normally in the path of a part of said carrier to prevent its downward movement, of toggle mechanism for holding said catch in fixed position, means for holding said toggle mechanism in locking position, and a manual device for actuating said toggle mechanism to release the catch.

17. In a hoist, the combination with a pivoted lever having a catch fixed thereto and projecting into the path of a movable body to prevent movement thereof in a predetermined direction, of toggle mechanism for locking said catch in fixed position, means for holding said toggle mechanism in locking position, and an electroresponsive device for actuating said toggle mechanism to release the catch.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN D. IHLDER.
RUMSEY W. SCOTT.

Witnesses for Ihlder:

CHARLES M. NISSEN,
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Witnesses for Scott:

J. C. WILSON,
GEORGE J. JOHNSTON.