

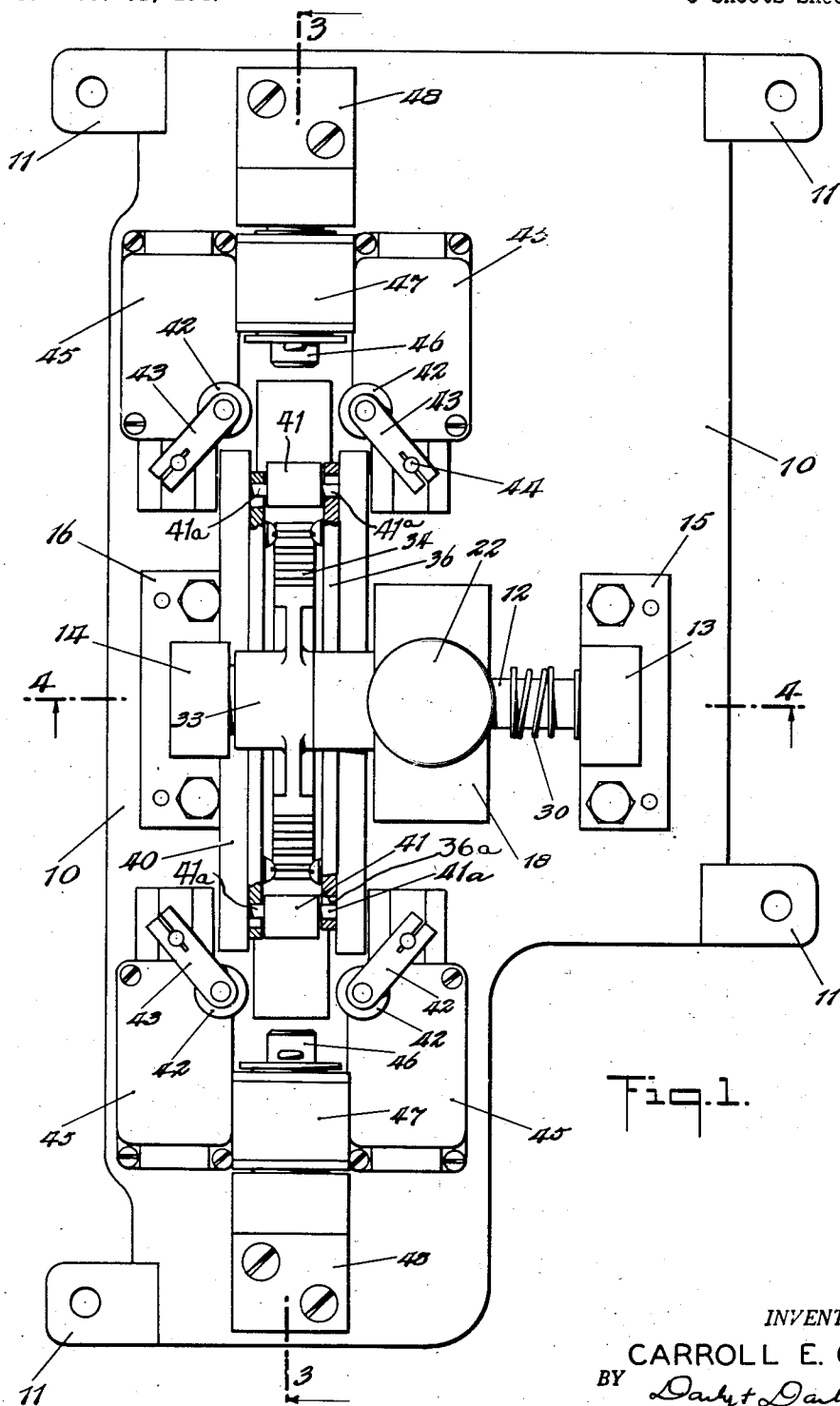
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C. E. ORR
ELEVATOR CAR SWITCH

2,581,969

Filed Dec. 31, 1947

3 Sheets-Sheet 1



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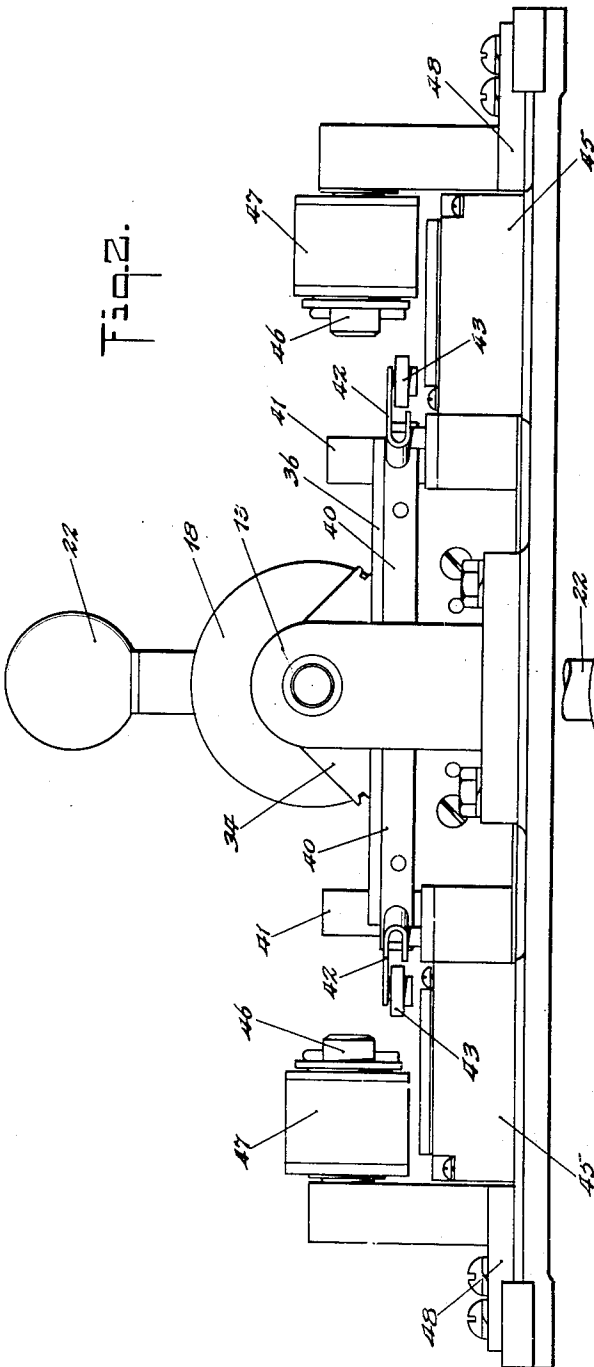
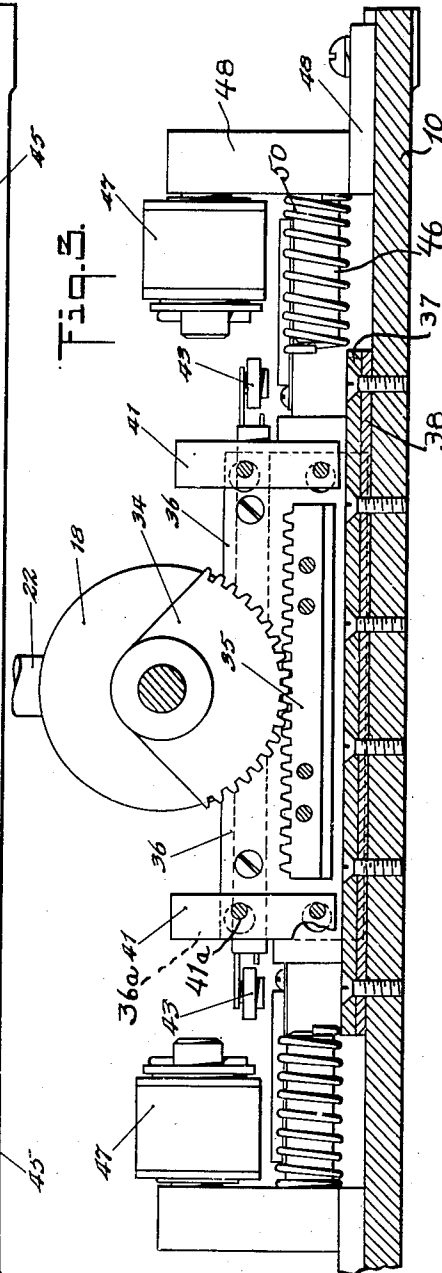
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ELEVATOR CAR SWITCH

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3 Sheets-Sheet 2



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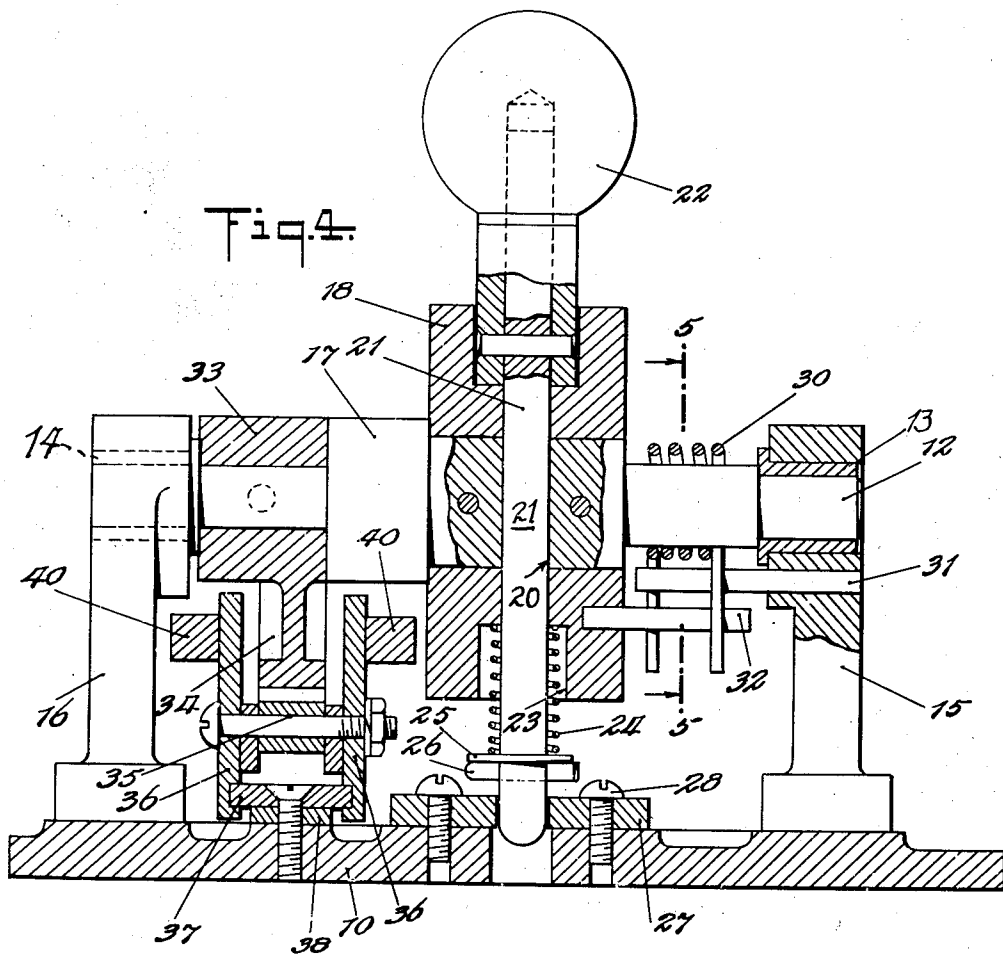
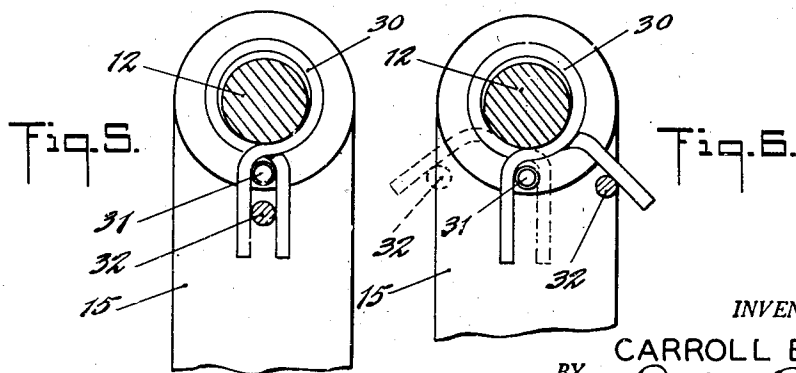
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ELEVATOR CAR SWITCH

Filed Dec. 31, 1947

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,581,969

ELEVATOR CAR SWITCH

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8 Claims. (Cl. 200—18)

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The present invention relates to elevator car control switches and particularly to such switches which are adapted to be incorporated in an elevator car control panel and which are arranged so that the switch moves from a running position to another position upon receipt of an outside or floor call.

The switch of this invention is arranged to be mounted on the elevator in such a manner that a movement of the handle in the up direction causes the elevator car to rise and movement of the handle in a down direction causes the car to descend. The handle is moved into either one of its running positions and the switch is arranged so that the handle is held in this position magnetically until a floor signal is received at which time the handle is released and moves under spring tension toward its center or neutral position. The operator may then operate the handle to its center position to stop the car at the floor at which the signal originated or may restore it to its running position and fail to respond to the floor signal. If desired the switch may be so arranged that if the operator does not move the switch subsequent to its actuation in response to a floor signal the car will stop at the floor at which the signal originated. Of course, in this case the operator can bypass the floor only by restoring the switch to its running position.

It is an object of the invention to provide an elevator car switch in which the switch is held in running position by magnetic means.

It is another object of the invention to provide such a switch in which the circuit to the electromagnets is de-energized by operation of a floor signal and the switch spring returned to a new position thus notifying the operator of a receipt of a car signal and making it possible for him to respond to that signal or to ignore it as he desires.

It is another object of the invention to provide such a switch which is compact and which is readily incorporated in the elevator car control panel.

It is a further object of the invention to provide a switch of the type described which may be readily mounted in such a manner that the movement of the switch handle corresponds in direction to the car movement initiated thereby.

Other objects and features of the invention will be apparent from the following description when taken in connection with the annexed drawings in which—

Figure 1 is a front elevation of the switch as

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it would appear installed in the control panel of an elevator, the panel cover, of course, being omitted;

Figure 2 is a side elevation of the switch of Figure 1;

Figure 3 is a longitudinal cross-sectional view of the elevator car switch of my invention, the view being taken on the plane of the line 3—3 of Figure 1;

Figure 4 is a transverse cross-sectional view taken on the plane of the line 4—4 of Figure 1;

Figure 5 is a fragmentary cross-sectional view showing particularly the spring means for returning the switch to its center or neutral position, this view being taken on the line 5—5 of Figure 4; and

Figure 6 is a view similar to Figure 5 but showing the spring in its extended position.

Referring now to the drawings, the switch elements are mounted upon a base 10, this base being generally rectangular in shape and being provided with the four feet 11 by means of which the switch structure is mounted in the elevator car control box.

Extending across the base is a shaft 12 which is mounted in the bearings 13 and 14, these bearings being supported in the outwardly extending bracket arms 15 and 16 (Figures 1 and 4). Shaft 12 has fixed thereto portions of different diameters as 17 and an outer sleeve 18. The sleeve 18 as well as the central portion of the shaft 12 are drilled as indicated at 20 and a plunger 21 extends through the drilled hole being provided at its outer end with a handle 22. The sleeve 18 is counterbored at 23 and a spring 24 is provided which surrounds the plunger 21 and one end of which seats against the base of the counterbore 23, the other end resting upon a washer 25 held in place on the plunger 21 by means of the cotter pin 26. When in its central position, as shown in Figure 4, the inner end of the plunger 21 seats in a hole in the stop plate 27. The stop plate 27 is fastened to the base 10 in any suitable manner, as by means of the screws 28.

It will be seen that in order to rotate the shaft 12 it is necessary to move the handle 22 outwardly against the resistance of spring 24 thus freeing the end of the plunger from the hole in stop plate 27, after which the handle may be returned to its inner position by means of the spring.

A means is provided for urging the handle and its cooperating parts just above described toward the central position. This means comprises a spring 30 which is coiled about a reduced portion

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of the shaft 12 and the two ends of which extend downwardly, as seen in Figures 4, 5 and 6, one end lying on either side of a stationary pin 31 fixed in the bracket 15. Extending between the two ends of the spring 30 is another pin 32 which is fixed in the sleeve 18. As will be clear by reference to Figures 5 and 6, movement of the handle assembly in either direction causes extension of the spring which, therefore, causes return of the handle to its central position upon release in a manner which will be hereinafter described.

Fixed to the shaft 12 for rotation therewith is a hub 33 which carries a gear segment 34. The gear segment 34 meshes with a rack 35 which extends longitudinally of the base 10. The rack 35 is part of a frame comprising the two members 36, these members being grooved near their lower edges and being guided for sliding movement along a bar 37 fixed to the base 10 and spaced therefrom by means of the spacer bar 38. The frame member mentioned in addition to the rack 35 and the two bars or frame members 36 includes the switch operating cams 40 and the two magnet armatures 41 (see Figure 1). The elements mentioned are rigidly fastened together to form a unitary structure except that the armatures 41 are mounted on pins 41a which are mounted in holes in the frame bars 36, the holes being considerably greater in diameter than the diameter of the pins 41a. The bars 36 are offset from each other so that any particular pin 41a lies against the forward edge of a hole in one bar 36 and the rear edge of a hole in the second bar 36 when the armature 41 lies against the pole pieces 46 of the holding magnets shortly to be described.

It will be clear from the above description that when the handle 22 is moved in the downward direction the rack 35 and cooperating frame members are moved upwardly as seen in Figure 1. In so moving the frame, operating cams 40 come into contact with the rollers 42. These rollers are mounted at the ends of arms 43 which are fixed to the shafts 44 which shafts are the operating members for switches 45 which are of common form and the interior structure of which is not shown. These switches are connected in the elevator control circuits in a known manner so that closure thereof effects movement of the elevator car in the direction corresponding to the direction of movement of the control handle 22.

Upon movement of the rack frame to either of its extreme positions one of the armatures 41 comes into contact with the faces of the pole pieces 46 of an electromagnet 47, the magnets being mounted one on either end of the base 10 through utilization of a bracket 48. Since the circuits are arranged so that the magnets 47 are energized while the car is in motion, it will be clear that the handle having once been moved into a particular running position is held in that position by virtue of the magnetic circuit through the pole pieces 46 and the armature 41. As stated, the signal circuits are so arranged that upon the operation of a floor signal the magnets are momentarily de-energized. As a result, the armature is released from the magnet pole faces and the spring 30 returns the control handle assembly towards its central neutral position.

The lower pole pieces 46 are provided with coiled springs 50 (see Fig. 3) which extend around them and protrude slightly beyond their ends. These springs serve to aid the armatures 41 in breaking away from the magnet poles and accelerate the initial movement of the rack 35

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and its cooperating frame towards the central position. Springs 50 also give a slight "kick" to the handle 22 thus giving the operator a definite signal that a floor call has been made.

However, the end of the plunger strikes against the plate 27 and, therefore, the handle is not restored to neutral position by the spring alone but must be pulled outwardly against the tension of spring 24 and manually restored to the central position. The switch may be so built that the movement from the extreme running position to the position in which the plunger 21 rests against the stop plate 27 is ineffective to restore the pair of switches 45 to normal in which case the elevator car will go past the floor at which the signal originated unless the operator manually restores the control handle to its neutral position. On the other hand, the bars or cams 40 may be made of such a length that the movement of the rack assembly under urge of the spring 30 permits the switches 45 to restore to their normal position. In this event, the car will stop at the floor in response to the signal and the operator can by-pass that floor only by returning the control handle 22 to its running position.

The armatures 41 are mounted in the bars 36 in a manner which makes it possible to manually operate the switch even though one of the magnets 47 is energized. The armatures 41 are provided with pins 41a which extend into relatively large holes 36a in the bars 36. The two bars 36 are staggered with respect to one another so that when either armature 41 is considered the pins thereof lie one against the forward edge of a hole 36a and the other against the rear edge of the opposite hole 36a. As a result of this arrangement, the armature is rocked into a plane which is at an angle to that of the pole faces prior to disengagement from the pole face, thereby gradually breaking the flux rather than increasing the air gap equally throughout the area of the pole faces.

While I have described a preferred embodiment of my invention, it will be understood that modifications thereof may be utilized within the scope and spirit of my invention. Consequently, I wish to be limited not by the foregoing description but, on the contrary, solely by the claims granted to me.

What is claimed is:

1. In an elevator car switch, in combination, a base, a shaft mounted in bearings fixed to said base, a handle mounted on said shaft for oscillation therewith and independently of said shaft for reciprocation in a plane transverse to the shaft axis, means urging said handle towards said base, a depression in said base cooperating with one end of said handle and normally locking said shaft in a particular rotative position with respect to said base, a second spring means urging said shaft towards a central position, a gear segment fixed to said shaft and rotatable by movement of said handle, a rack slidably mounted on said base, said rack meshing with said gear segment, contact operating means mounted adjacent either end of said rack, said contact operating means being adapted to be operated upon movement of the rack to either of its extreme positions, and magnetic means for holding said rack in either of its extreme positions.

2. In an elevator car switch, in combination, a base, a shaft mounted in bearings fixed to said base, a handle mounted on said shaft for oscil-

lation therewith and independently of said shaft for reciprocation in a plane transverse to the shaft axis, means urging said handle towards said base, a depression in said base cooperating with one end of said handle and normally locking said shaft in a particular rotative position with respect to said base, a second spring means urging said shaft towards a central position, a gear segment fixed to said shaft and rotatable by movement of said handle, a rack slidably mounted on said base, said rack meshing with said gear segment, contact operating means mounted adjacent either end of said rack, said contact operating means being adapted to be operated upon movement of the rack to either of its extreme positions, electromagnetic means mounted on said base adjacent the extreme position of said rack, magnet armatures mounted on each end of said rack, said armatures being adapted to cooperate with said electromagnetic means to hold said rack in either of its extreme positions, and said second mentioned spring serving to return said handle, gear segment and rack towards the central position upon deenergization of said electromagnetic means.

3. A device according to claim 2 characterized in that the magnet armatures are mounted for limited pivotal movement with respect to said rack, whereby the mechanism may be readily manually restored to its central or neutral position without instantaneously interrupting the flux path through said electromagnet and armature.

4. A device as claimed in claim 2 characterized in that each electromagnet comprises a pair of pole pieces having a magnet wound thereon and further characterized in that one of the pole pieces is provided with an encircling coil spring which cooperates with the associated magnet armature to aid in the initial restorative movement of the mechanism towards its central or neutral position.

5. A device as claimed in claim 2 characterized in that the magnet armatures are provided with pins extending laterally therefrom, said pins protruding into enlarged openings in bars fixed to the rack, whereby pivotal movement of the armatures is brought about upon manual restoration of the device towards its central position.

6. A device according to claim 2 characterized in that the magnet armature is provided with laterally extending pins, said pins extending into enlarged holes in bars fixed to said rack, said bars and holes being offset with respect to each other, whereby movement of the mechanism towards its central position causes pivotal movement of the armatures with respect to the pole

faces of said electromagnets to render the mechanism more readily manually restored towards central position.

7. A device according to claim 2 characterized in that the mechanism is restored towards central position, the handle end preventing complete restoration except when the handle is manually moved transversely of the shaft against the spring tension.

8. In an elevator car switch, in combination, a base, a shaft mounted in bearings fixed to said base, a handle mounted on said shaft for oscillation therewith and for reciprocation in a plane transverse to the shaft axis independently of said shaft, means urging said handle toward said base, a depression in said base cooperating with one end of said handle, normally locking said shaft in a particular rotative position with respect to said base, a spring means urging said shaft towards a central position, a gear segment fixed to said shaft and rotatable by movement of said handle, a rack slidably mounted on said base, said rack meshing with said gear segment, contact operating means mounted adjacent each end of said rack, said contact operating means being adapted to be operated upon movement of the rack to either of its extreme positions, magnetic means for holding said rack in either of its extreme positions, and means for preventing movement of said shaft to its central position under the urge of said spring means whereby movement of said shaft toward central position upon release by said holding means serves as a signal to the operator who may manually restore said gear segment and handle to central position in response to such signal.

CARROLL E. ORR.

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