April 15, 1924. 1,490,271

F. A. HECHT, JR

ELEVATOR

Filed Oct. 20, 1920 3 Sheets-Sheet 1

Fig 1

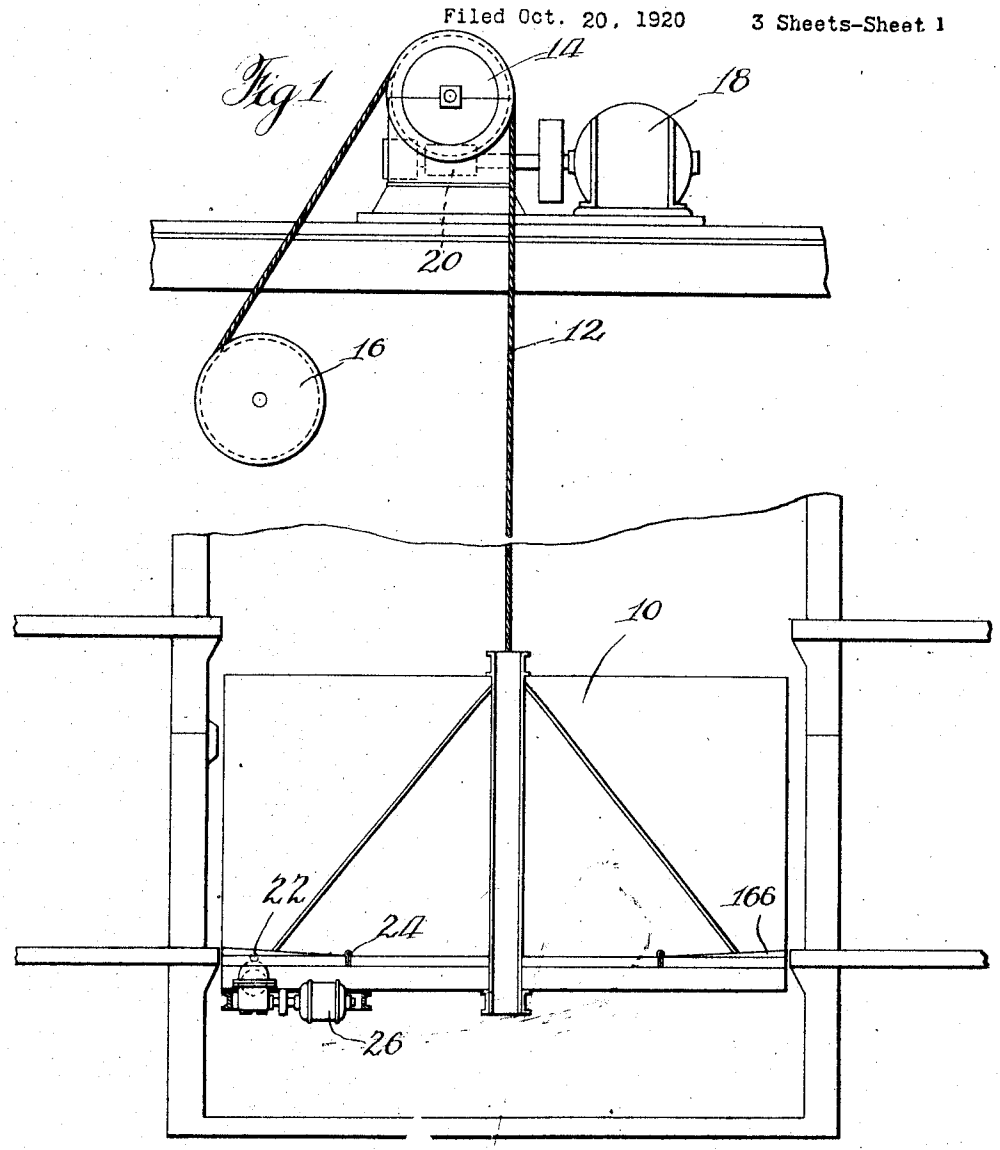
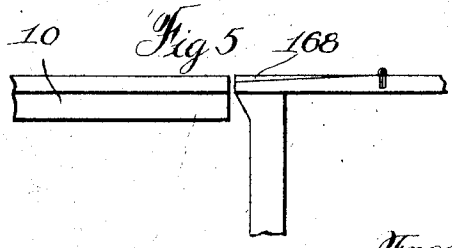


Fig 5



Witness:
David S. Magnuson.

Inventor:
Frank A. Hecht, Jr.
By Miller Chindahl & Parker
Attys.

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ELEVATOR

Filed Oct. 20, 1920 3 Sheets-Sheet 2

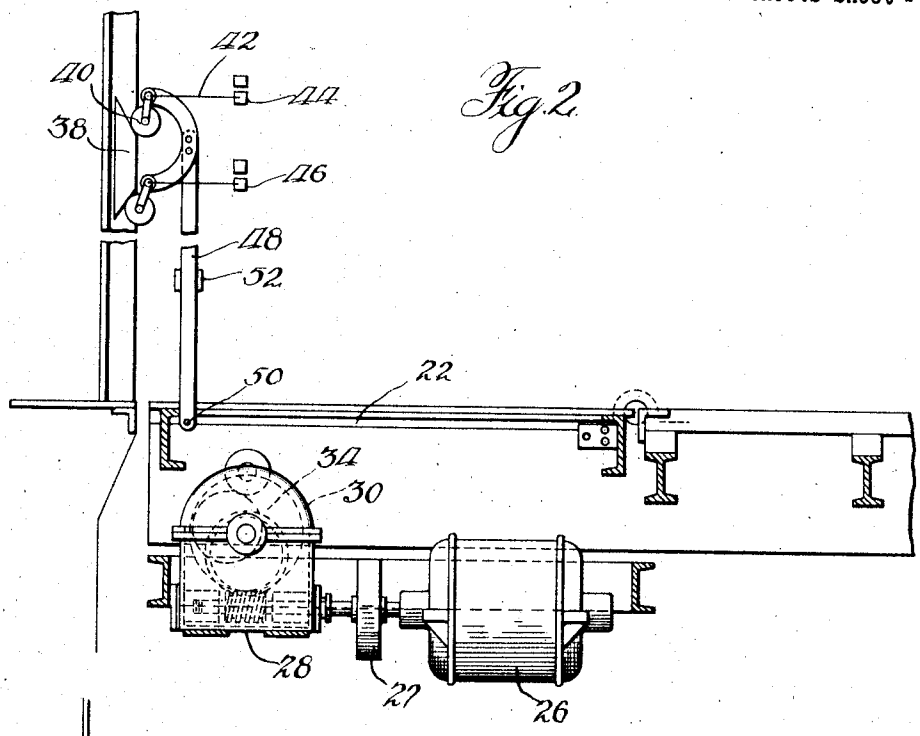


Fig. 2.

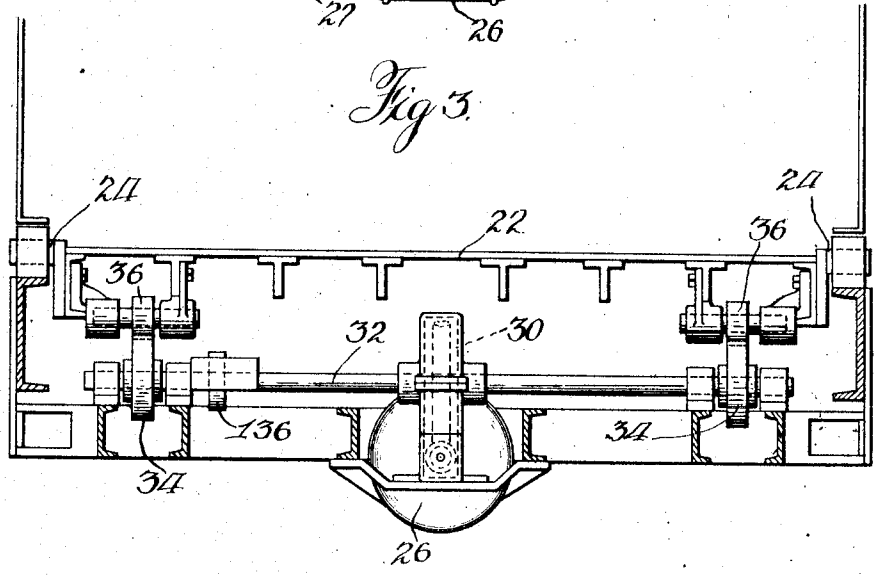


Fig 3.

Witness:
Jas. E. Magnuson.

Inventor:
Frank A. Hecht, Jr.
By Miller Chindahl & Parker
Attys.

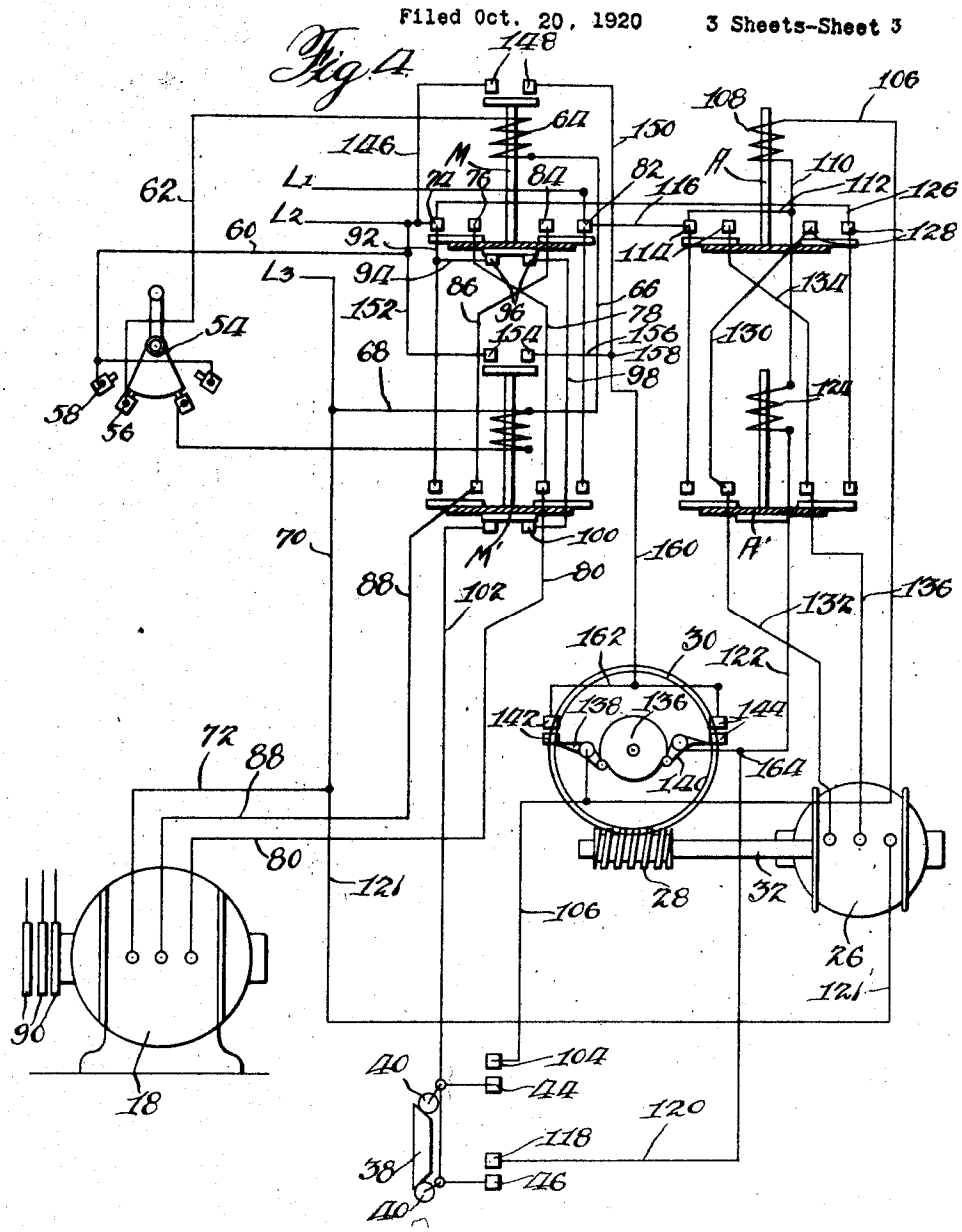
April 15, 1924. 1,490,271

F. A. HECHT, JR

ELEVATOR

Filed Oct. 20, 1920 3 Sheets-Sheet 3

Fig. 4.



Witness:
Jas. E. S. Magnusson.

Inventor:
Frank A. Hecht, Jr.
By Miller Chindahl & Baker
Attys.

Patented Apr. 15, 1924. 1,490,271

UNITED STATES PATENT OFFICE.

FRANK A. HECHT, JR., OF CHICAGO, ILLINOIS.

ELEVATOR.

Application filed October 20, 1920. Serial No. 418,134.

To all whom it may concern:

Be it known that I, FRANK A. HECHT, Jr., a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

My invention relates to elevators and especially those used to carry freight.

The primary object of the invention is to eliminate the difficulty encountered in moving freight, especially when carried by wheeled trucks, from an elevator onto the floor of a building and vice versa due to inaccuracy in stopping the elevator level with the floor.

In the present embodiment I accomplish this purpose by providing means for tilting a section of the flooring of the elevator or the building to bring the adjacent edges of the elevator floor and the floor of the building to exactly the same level regardless of whether the elevator has been stopped above or below the floor level.

Another object is to provide automatic means suitable for use in connection with either manually controlled or push button controlled elevators for controlling the movement of the tiltable section.

While I have illustrated my invention as embodied in an electric elevator, it will be obvious that in its broad aspect the invention is not limited to an elevator driven by any particular kind of power.

Another object of my invention is to provide automatic means for readjusting the tiltable section while the car is running, to cut down the time required for the automatic adjustment when the car is next stopped.

Further objects and advantages of my invention will become apparent as the description proceeds.

In the accompanying drawings, Figure 1 is a side view illustrating somewhat diagrammatically an elevator and a portion of two floors of a building. Fig. 2 is an enlarged view of mechanical power connections for tilting the movable section. Fig. 3 is a view at right angles to Fig. 2 showing the same parts. Fig. 4 is a wiring diagram and Fig. 5 is a detail view of a modification of the device.

In the embodiment of my invention selected for illustration, an elevator car 10 of a suitable design is suspended in the usual manner by means of cables 12 passing over a hoisting drum 14 and a guide sheave 16 for attachment to the usual counterweight (not shown). An electric motor 18 has been illustrated connected to the hoisting drum by a worm 20. In the embodiment shown in Fig. 1 I provide a section of flooring 22 adjacent the edge of the elevator pivoted at 24 and power means for rocking the section about its pivot to bring the free edge either above or below the level of the main section of the car floor. The power means illustrated for this purpose comprises an electric motor 26 having the usual brake 27 and connected through a worm 28 and worm wheel 30 to a shaft 32 extending parallel to the free edge of the tiltable section 22. Eccentrics 34 at the ends of the shaft 32 support rollers 36 carried by the tiltable section 22. It will be apparent that by rotating shaft 32 the free edge of the tiltable section may be moved up or down to bring it precisely level with the adjacent floor of the building structure.

A suitable cam 38 stationarily mounted in the elevator shaft may be engaged by rollers 40 actuating bell crank levers 42 to make contacts at 44 and 46 for the automatic control of the motor 26. The bell crank levers are preferably supported on a vertical standard 48 pivotally connected at 50 to the tiltable section 22 adjacent its free edge, and sliding vertically through guide brackets 52 carried by the car.

In Fig. 4, I have shown a suitable wiring diagram for the control of the elevator when power is supplied by a three phase alternating current. L', L^2 and L^3 indicate the power mains and 54 is a hand controller. It will be obvious that the contacts established by the hand controller may be controlled by means of push buttons if desired. The main motor 18 is controlled by reversing switches M and M′ and the auxiliary motor by similar switches A and A′. Operation of the controller 54 to connect contacts 56 and 58 will establish a control circuit as follows: from L^2 through wire 60 to contact 58, from contact 56 through wire 62 to operating coil 64 of the switch M and through wires 66 and 68 to L^3. Switch M is thereby closed and establishes power circuits to the main motor as follows: L^3 is always connected through wires 70 and 72 to one of the motor terminals. L^2 is connected through contacts 74 and 76,

wire 78 and wire 80 to another terminal of the motor and L^1 is connected through contacts 82 and 84 and wires 86 and 88 to the third terminal. The acceleration of the motor may be automatically controlled by suitable braking circuits connected to the armature by slip rings 90. As these circuits form no part of my present invention and may be arranged according to any one of a large number of well known systems, detailed description thereof is deemed unnecessary.

As the car approaches a floor level at which a stop is to be made, the controller 54 opens the circuit through contacts 56 and 58 whereupon switch M falls open. This will deprive the main motor of its power supply and also establish connections for the automatic control of the tilting motor 26 as follows: L^2 is connected through wires 92 and 94, back contacts 96 on switch M, wire 98 back contacts 100 on switch M′ and wire 102 to the moving contacts 44 and 46 controlled by the cam 38. From the upper fixed contact 104 current may flow through wire 106 to coil 108 of the switch A and through wires 110 and 112, contact 114, wire 116 and contact 82 to L^1. A similar circuit may be traced from the lower fixed contact 118 through wires 120 and 122 and coil 124 of switch A′ through wires 110 and 112 and to L^1 as before. It will be apparent that the switch A will be actuated by closure of contacts 44 and 104 and that switch A′ will be actuated by closure of contacts 46 and 118.

Assume that the car is stopped below the floor level and contacts 44 and 104 are closed by the cam completing the controlling circuit for switch A which thereupon closes. Power is delivered to motor 26 as follows: L^3 is always connected through wires 70 and 121 to one field terminal. From L^2 current flows through wire 126, contacts 128 and wires 130 and 132 to another field terminal, and from L^1 through wires 116, contacts 114 and wires 134 and 136 to the third terminal. The motor 26 will thereupon be actuated to rotate shaft 32 and tilt the pivoted section until the resultant movement brings the cam 38 into central position between rollers 40 in which position the edge of the tiltable section will be exactly level with the adjacent floor structure.

It will be seen that switches M′ and A′ complete power circuits identical with those controlled by switches M and A except that L^1 and L^2 are interchanged between the switches by crossing wires 78 and 86 between switches M and M′ and wires 130 and 134 between switches A and A′. It will also be apparent that motor 26 cannot be actuated when either switch M or M′ is closed to operate the main motor, as the control circuit for operating switches A and A′ passes through back contacts 96 and 100 on both of switches M and M′.

The means I have provided for automatically bringing the tiltable section to an intermediate position while the car is running comprises in this instance a cam 136 mounted on shaft 32 and adapted to engage rocker arms 138 or 140 to close contacts at 142 or 144. The circuits by which these contacts control the motor are operative whenever either switch M or switch M′ has been closed as follows: from L^2 through wire 146, contacts 148 and wire 150, or through wire 152, contacts 154 and wire 156 to a connecting point 158 and from there through wire 160 and cross wire 162 to contacts 142 and 144. The moving contact 142 carried by rocker arm 138 is connected to wire 106 to deliver power to coil 108 through the same circuit as contacts 44 and 104, and contact 144 on rocker arm 140 is similarly connected at 164 to wire 122 forming part of the circuit from contacts 46 and 118 through coil 124.

Closure of either switch M or M′ will render contacts 44, 104, 46 and 118 inoperative by opening either contacts 96 or 100, and will simultaneously render contacts 142 and 144 operative by closing either contacts 148 or 154. During the movement of the car, therefore, the cam 136 will automatically operate to bring the tiltable section to its intermediate position and when switches M and M′ are both open in stopping the car, the cam 38 in the hatchway will automatically control the same motor to level the edge of the tiltable section with the adjacent floor.

Where the elevator has doors on both sides an additional section 166 may obviously be provided mechanically connected with shaft 32 for similar movement in synchronism with section 22, or provided with an additional motor as may be most convenient. In Fig. 5 I have illustrated the tiltable section 168 as forming part of the floor of the building. It will be obvious that such a section may be controlled in precisely the same manner as the section 22 and with equal facility.

While I have illustrated and described in detail the preferred embodiment of my invention, it should be clearly understood that the disclosure is merely for purposes of illustration and that many modifications and variations will naturally occur to those skilled in the art. I aim in the subjoined claims to cover all such legitimate variations and modifications.

I claim as my invention:

1. In a device of the class described, an elevator car, a vertical hatchway, a stationary cam in the hatchway, a pivoted section forming part of the floor of the car, elec-

;rical means for tilting the pivoted section, electrical contacts controlled by the cam, a main hoisting motor, and electrical connections rendered operative by actuating the controller to stop the main motor, for automatically controlling said tilting means by means of said cam to tilt the section and bring its edge level with the floor of the building.

2. In a device of the class described, a fixed structure, a movable structure, means for bringing the movable structure to rest in the vicinity of the level of the fixed structure, a relatively movable section forming part of one of said structures, cam means fixed with respect to said fixed structure, cam engaging means fixed with respect to said movable section, and means rendered operative by said cam and cam engaging means for moving the section to bring its edge level with the edge of the other structure.

3. In a device of the class described, a fixed structure, a movable structure, means for bringing the movable structure to rest in the vicinity of the level of the fixed structure, a pivoted section forming part of one of said structures and having its free edge adjacent the other structure, means rendered operative by stopping the movable structure for tilting the pivoted section to bring its free edge level with the edge of the other structure, and means for readjusting the pivoted section to an intermediate position during movement of the movable structure.

4. In a device of the class described, an elevator car, a series of floors, means for moving the same from floor to floor and for stopping it at any desired floor, a relatively movable section forming part of the floor of the car, and means operable when said elevator car is at rest for moving the section to bring its edge exactly level with said desired floor.

5. In a device of the class described, a fixed floor structure, a vertically movable floor structure, means for bringing the movable floor structure to rest in the vicinity of the level of the fixed structure, a relatively movable section forming a portion of one of said structures, and automatic means operable when said movable structure is at rest to move the section to bring its edge level with the other structure.

6. In a device of the class described, a fixed structure, a movable structure, means for bringing the movable structure to rest approximately level with the fixed structure, a pivoted section forming part of one of said structures and having its free edge adjacent the other structure, automatic means rendered operative by stopping the movable structure for tilting the pivoted section to bring its free edge level with the edge of the other structure, and automatic means rendered operative by putting the movable structure in motion to readjust the pivoted section to an intermediate position.

7. In a device of the character described, a fixed floor structure, a vertically movable floor structure, means for bringing the movable floor structure to rest in the vicinity of the level of said fixed structure, a relatively movable section forming a portion of one of said structures, a shaft mounted below said portion, eccentrics mounted on said shaft and engaging the underside of said portion, means for rotating said shaft, and cooperative means carried by said portion and the opposite structure for rendering said last mentioned means operative.

8. In a device of the class described, a fixed structure, a movable structure, means for bringing the movable structure to rest in the vicinity of the level of the fixed structure, a pivoted section forming part of one of said structures and having its free edge adjacent the other structure, means rendered operative by stopping the movable structure for tilting the pivoted section to bring its free edge level with the edge of the other structure, and automatic means for readjusting the pivoted section to an intermediate position during movement of the movable structure.

9. In a device of the class described, a fixed floor structure, an elevator car, a movable section forming part of the floor of said car, a shaft mounted below said portion, means on said shaft for engaging said portion to bring the edge of the latter exactly level with the floor, and means mounted on said car for actuating said shaft.

10. In a device of the class described, a fixed floor structure, a vertically movable floor structure, means for bringing the movable floor structure to rest in the vicinity of the level of the fixed structure, a tiltable section forming a portion of one of said structures, and automatic means for tilting the section up or down from the structure to which it is attached, said means becoming inoperative when the edge of said section is level with the opposed structure.

11. In a device of the class described, a floor structure, an elevator car, a relatively movable section forming part of the car floor, a hoisting motor, automatic means operable over a limited range adjacent the floor level position of the car for bringing the edge of said section level with said floor structure, and automatic means operable during movement of the car from floor to floor for readjusting said first mentioned automatic means preparatory to the next operation.

12. In a device of the class described, an elevator car, a main hoisting motor, means for controlling said motor to stop the car in the vicinity of the level of any floor, said

means including a pair of reversing switches, a pivoted section of flooring on the car, means operable when both reversing switches are open for automatically tilting said pivoted section to bring the edge of the car floor and the edge of the floor of the building to a level, and means operable when either reversing switch is closed to automatically tilt the pivoted section to an intermediate position.

13. In a device of the class described, a fixed floor structure, a vertically movable floor structure, means for bringing the movable structure to rest approximately level with the fixed structure, a relatively movable section forming a portion of one of said structures, means for moving said portion to bring its edge level with the other structure, a cam mounted on said last mentioned means, means for readjusting the movable section to an intermediate position, and connections adapted to be closed by said cam in the initial leveling movement of said portion for actuating said last mentioned means.

14. In a device of the class described, an elevator car, a main hoisting motor, means for controlling said motor to stop the car in the vicinity of the level of any floor, said means including a pair of reversing switches, a pivoted section of flooring forming one of the adjacent edges of the car floor and the floor of the building, means operable when both reversing switches are open for automatically tilting said pivoted section to bring the edge of the car floor and the edge of the floor of the building on a level, and means operable when either reversing switch is closed to automatically tilt the pivoted section to an intermediate position.

In testimony whereof, I have hereunto set my hand.

FRANK A. HECHT, JR.