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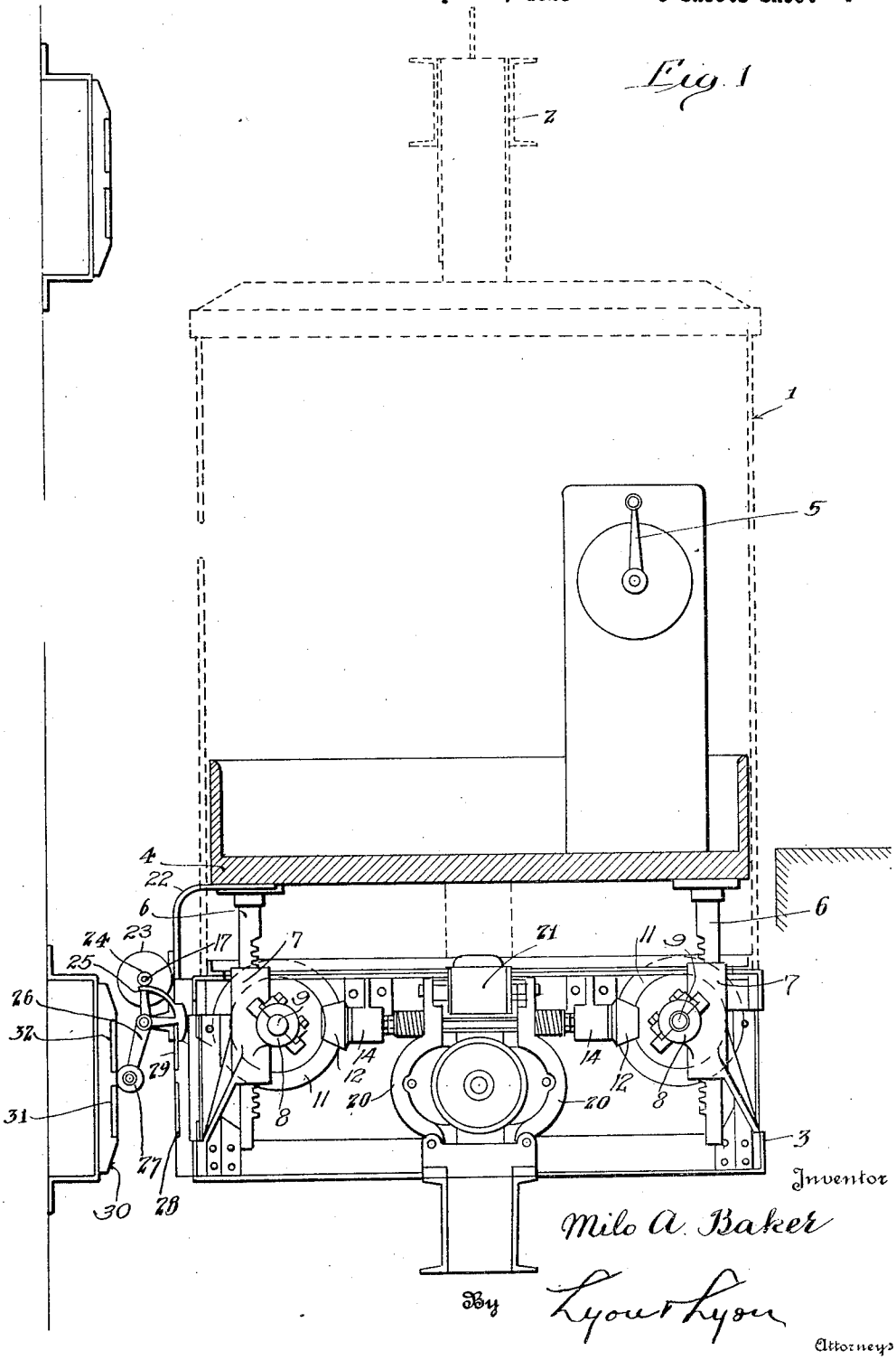
Aug. 28, 1928. 1,682,209

M. A. BAKER

ELEVATOR

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Fig. 1



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Fig. 3

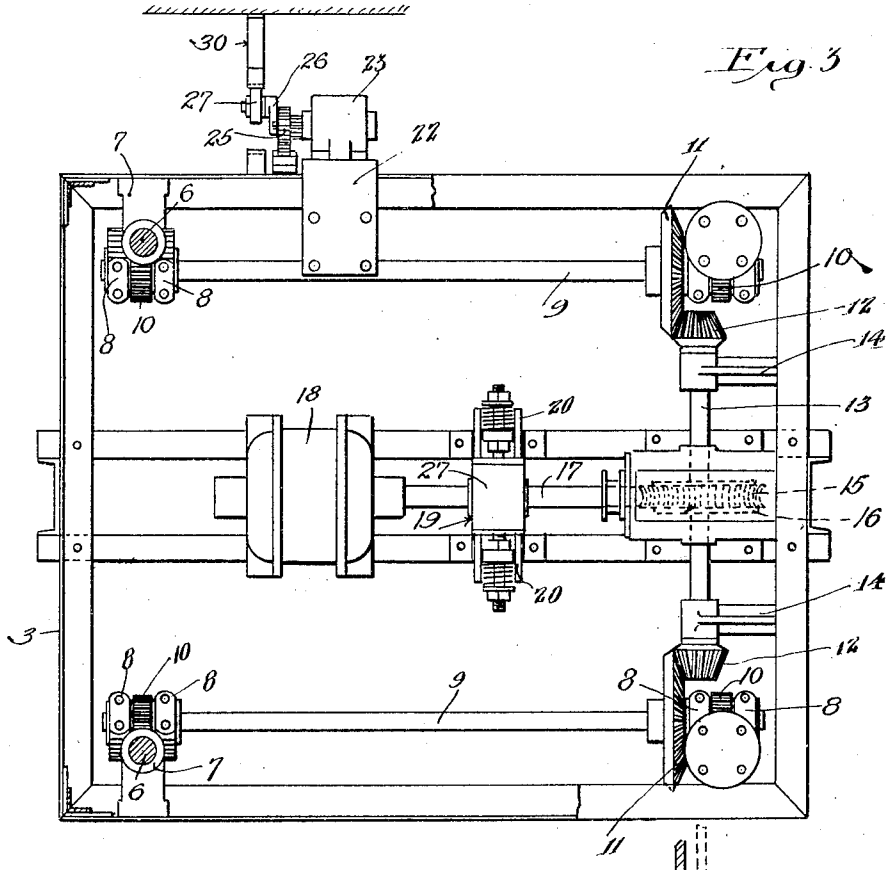
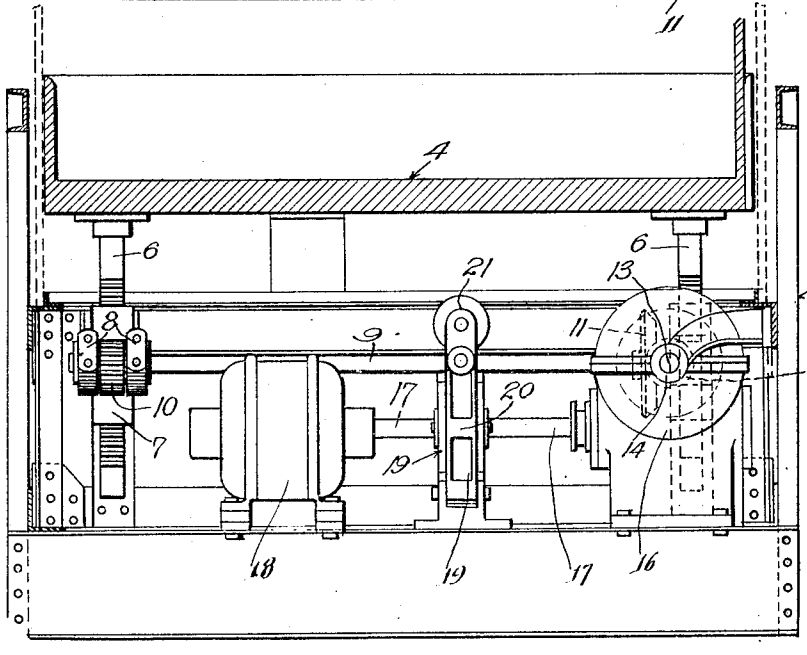


Fig. 7



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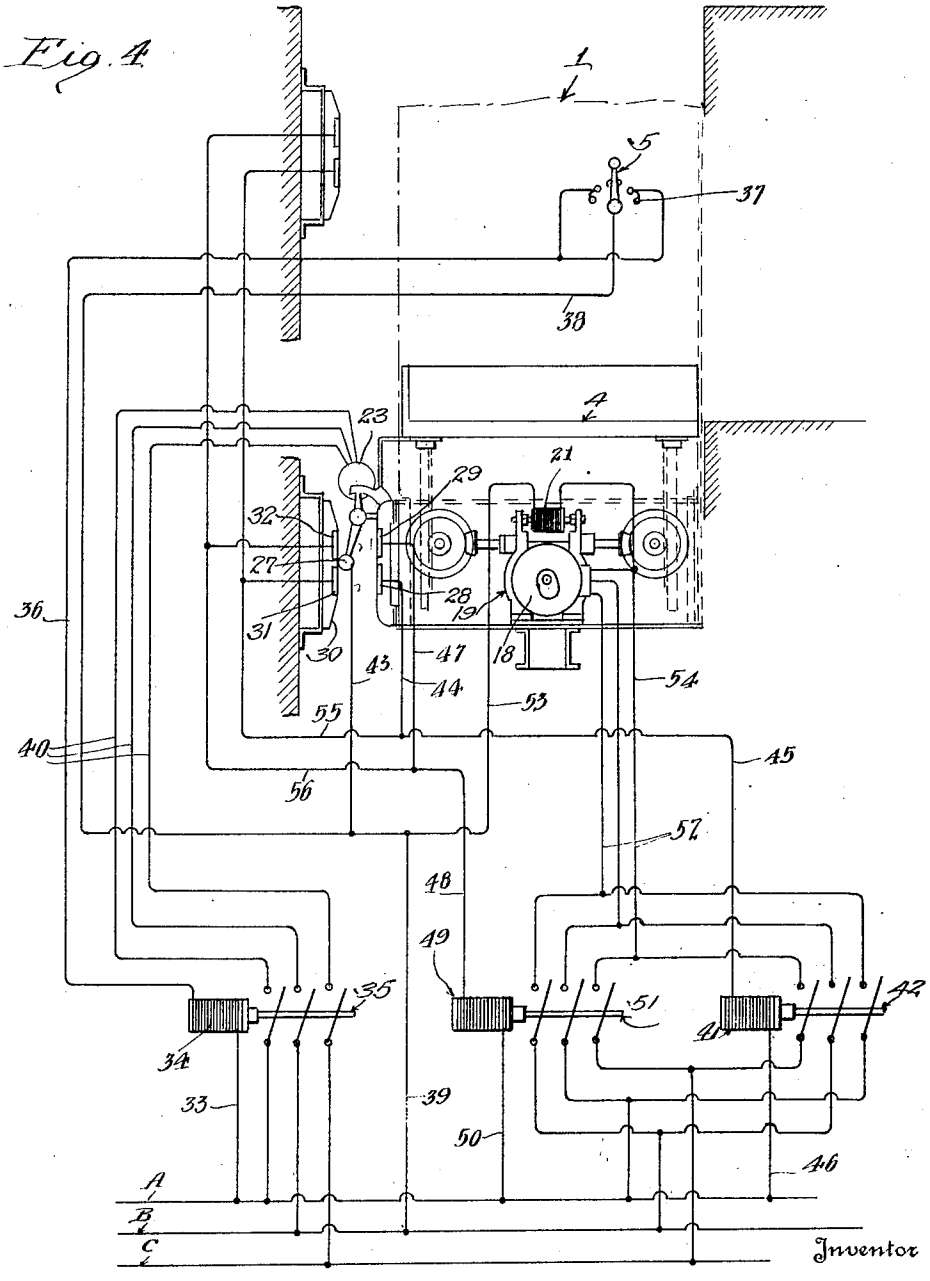
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Filed Sept. 16, 1926 3 Sheets-Sheet 3

Fig. 4



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Patented Aug. 28, 1928. 1,682,209

UNITED STATES PATENT OFFICE.

MILO A. BAKER, OF LOS ANGELES, CALIFORNIA.

ELEVATOR.

Application filed September 16, 1926. Serial No. 135,870.

This invention relates to an elevator and refers particularly to an elevator apparatus for automatically leveling the elevator floor with a landing.

An object of the present invention is to provide elevator apparatus designed for automatically leveling the floor of an elevator car with a landing, which apparatus is adapted to effect this operation without movement of the entire elevator car.

Another object of the present invention is to provide a leveling apparatus for an elevator car which is substantially independent of the other apparatus which may be employed for hoisting the car.

Various further objects and advantages of the present invention will appear from a description of a preferred form of an elevator embodying the invention. For this purpose, reference is made to the accompanying drawing in which I have diagrammatically indicated a preferred form of elevator embodying the present invention.

In the drawings:

Figure 1 is an elevation, partially in vertical section, of an elevator car and landing therefor,

Figure 2 is an elevation at right angles to Figure 1 of the elevator car,

Figure 3 is a bottom view of the elevator car, and,

Figure 4 is an electrical diagram of the floor leveling system.

Referring to the drawings, 1 indicates an elevator car provided with means 2 at its upper end by which it may be suspended in an elevator well. The elevator car 1 is indicated as provided at its lower end with a platform frame 3 upon which is a vertically movable floor 4. The floor 4 is indicated as supporting the usual operator's switch 5 which may serve to control the car actuating mechanism of the car. The car actuating mechanism may be of any desired construction, either electrical or hydraulic type, the features of the present invention being largely independent of the type of operating means used for elevating the car 1 as a body. The vertically movable platform 4 is indicated as provided near each of its four corners with depending racks 6. Each of these racks 6 are vertically actuated in guides 7 supported by the platform frame 3. Each guide 7 also serves to mount a pair of bearings 8 which support a pair of parallel horizontal shafts 9, which shafts have between the pairs of bearings 8 gears 10 for engaging the depending racks 6 of the floor 4.

Each shaft 9 is also provided with a bevel gear 11, which bevel gears mesh with bevel gears 12 on the ends of a cross horizontal shaft 13. Said shaft 13 is provided near its ends with bearings 14 supported by the platform frame 3.

The shaft 13 is provided at its center with a worm wheel 15, which wheel in turn is engaged by a worm 16 on the end of a motor shaft 17 driven by an electric motor 18. The electric motor 18 is indicated as supported by the base of the platform frame 3. Between the worm 16 and motor 18, the shaft 17 is indicated as provided with a suitable type of brake 19 having the coacting brake arms 20 adapted to be actuated from the braking position by energizing a magnet 21.

The movable floor 4 of the car is indicated as mounting a bracket 22 supporting a small electric motor 23, which is provided with a pinion 24 on its motor shaft working on a sector gear 25. The sector gear 25 is rigid with a downwardly extending arm 26, which mounts a contact roller 27.

On the side of the platform frame 3 of the car is positioned up and down contact plates 28 and 29 respectively, adapted to engage the roller 27 in one of its swinging positions whenever the movable floor 4 of the car which is in other than its normal position within the car.

In addition to the contact plates 28 and 29, there are provided cams 30 in the hatchway positioned adjacent each landing. Said cams 30 carry up and down contact plates 31 and 32 respectively, which contact plates are adapted for engagement with the roller 27 in its outer position whenever the car 1 is stopped at a landing with the car floor 4 imperfectly leveled therewith.

Referring to Figure 4 of the drawings, the operation of the elevator car is as follows: The movable floor 4 of the elevator car is leveled automatically with the landings when the car stops at the landings and automatically returned to its normal position in the car when the car leaves the landings through the following means. The control mechanism for the floor is actuated by current from the three-phase mains A, B, and C. The main A is connected by a line 33 with a magnet 34 of a control switch 35 for

the motor 23 of the contact roller 27. Said magnet 35 is also connected by a line 36 to the contacts 37 on the operator's switch 5 within the car 1. The handle of the operator's switch is connected by the line 38 and the line 39 with the main B. Accordingly, whenever the operator's switch 5 is moved in either direction, either to start the car up or down, a circuit is closed through the coil 34 of the motor control switch 35 which closes said switch, thereby passing current through three-phase lines 40 to motor 23. The motor 23 then rotates until it drives the contact roller 27 into contact with the side of platform frame 3. At this time, the contact roller 27 will engage either the up contact 28 or the down contact 29 on the platform frame 3 unless the floor 4 of the car is in the normal position. In case said contact roller 27 engages, for example, the up contact 28 a circuit will be closed through the coil 41 of an up switch 42 which controls the main floor operating motor 18. The circuit for said switch is from main B, line 39, line 43, contact roller 27, up contact 28 on the car frame 3, lines 44 and 45, through coil 41, and line 46 to main A. If the roller 27 had in turn made engagement with the down contact 29, a similar circuit from main B through lines 39, 43, roller 27, down contact 29, lines 47, 48, coil 49, and line 50 to main A, would be established for operating a down switch 51 for the main floor operating motor 18. The up and down switches 42 and 51 control the passage of current through three-phase lines 52 leading to said main motor 18 and, accordingly, the operation of the up or down switches 42 and 51 causes the motor 18 to operate to drive the platform 4 of the car up or down relatively to the remainder of the car in order to bring said floor to a normal position in the car. When the floor reaches said normal position, the contact roller 27 runs off its contact, thereby breaking the circuit to the up switch 42 or the down switch 51, and the motor 18 will stop.

Simultaneously with actuation of either the up switch 42 or the down switch 51, a circuit is established for energizing the coil 21 of the brake 19 on the main motor 18. Said circuit is from main B to lines 39 and 53, coil 21 of the brake 19, line 54, and hence to either up switch 42 or down switch 51. Accordingly the deenergizing of the up switch 42 or down switch 51 when the contact roller 27 rolls off its engaged contact removes the current supply from coil 21 and causes the brake 19 to be applied to maintain the car floor in its normal position within the car. When the lever of the operating switch 5 of the car is centered in order to stop the elevator car 1 at a landing, the circuit is broken which energizes coil 34 of the control switch for the contact roller motor 23. Accordingly, the contact roller motor 23 is no longer energized and the contact roller 27 will swing outwardly from the car in position to engage the cams 30 in the hatchway, the roller 27 being counter-weighted so that normally it is urged by gravity into the outer position. Hence if the car 1 is stopped by the operator with the floor 4 of the car not level with the landing, the contact roller 27 will make engagement with either the up contact 31 or the down contact 32 on the cam 30. The up and down contacts 31 and 32 are connected respectively through lines 55 and 56 respectively of the up and down switches 42 and 51 respectively. Accordingly, depending upon whether the contact roller 27 engages the up or the down contact, the up switch 42 or the down switch 51 will be closed. As before, the closing of either the up switch 42 will drive the elevator floor 4 upward and the closing of the down switch 51 will drive the elevator floor downwardly with the result that the elevator floor is brought to a level with the landing, at which time the roller 27 rolls off the contacts and the up or down switch is opened and the elevator motor 18 stops. The brake 19 is applied and released from said motor 18 during this operation in the same manner as described in connection with the bringing of the car floor to a normal position when the car leaves the landing.

It will be seen from the foregoing description that I have provided an apparatus for accurately leveling the floor of an elevator car with the landing, which is not dependent on moving the elevator car as a whole. It will also be seen that the mechanism of the present invention is adapted for operation substantially independently of whatever means are employed for elevating the car 1.

While the particular form of the invention herein described is well adapted for accomplishing the objects of the present invention, various modifications may be made without departing from the invention, and the invention includes all such modifications and changes as come within the scope of the appended claims.

I claim:

1. An elevator comprising a car, a floor for the car, means for moving the floor vertically relative to the car, a brake for said means, an operator lever for the car, means connected with said lever for releasing said brake and energizing said floor moving means when the car leaves a landing until said floor is brought to its normal position in said car, means for then applying said brake, means for releasing said brake and energizing said floor moving means when the car stops at a landing to thereby level said floor with the landing independent of the movement of the car, and means for then applying said brake.

2. An elevator comprising a car, a floor, means for moving said floor relative to said car, depending racks on said floor, a motor

for driving said racks, a contact roller carried by said floor and movable outward for engagement with hatchway cams and inwardly to engage with contacts on the car, said hatchway cams, and said contacts on said car, and control circuits closed by said contact roller engaging said cams for energizing the motor to level the floor with a landing when the car stops at a landing and for energizing said motor to return said floor to a normal position in the car when the car leaves said landing.

3. An elevator comprising an elevator car, a floor for the car, means for moving said floor relative to said car, a switch carried by the floor and movable into engagement with a member in the elevator hatchway and also movable into engagement with means rigid with the car, and circuits connected with said switch operative to level the floor with the landing when the car stops adjacent a landing and to return the floor to its normal position within the car when the car leaves a landing.

4. An elevator comprising a car, a floor, means for moving said floor relative to said car, a switch carried by the floor, means for controlling said floor-moving means including means engageable with said switch in its outward position for leveling the floor with the landing when the car stops at a landing, and means carried by the car engageable with said switch for returning the floor to its normal position within the car when the car leaves a landing.

5. An elevator comprising an elevator car, a floor for the car, said floor being vertically movable relative to the car, means for automatically moving said floor relative to the car to level the floor with the landing whenever the car stops at a landing, and means for equalizing the motion of all portions of the floor.

6. An elevator comprising an elevator car, a floor for the car, said floor being vertically movable relative to the car, means for automatically moving said floor to level the same with a landing whenever said car stops at a landing, means for automatically returning the floor to a normal position in the car when the car leaves a landing, and means for equalizing the motion of all portions of the floor.

7. An elevator comprising an elevator car, a floor for the car, said floor being vertically movable relative to the car, means for moving the floor relative to the car, control means for said last mentioned means automatically operative when the car stops at a landing to actuate said floor moving means to level the same with a landing, and means for equalizing the motion of all portions of the floor.

8. An elevator comprising an elevator car, a floor for the car, said floor being vertically movable relative to the car, means for moving the floor relative to the car, control means for said last mentioned means automatically operative when the car stops at a landing to actuate said floor moving means to level the same with a landing, control means for said floor moving means operative automatically when a car leaves the landing to energize the floor moving means to return the floor to a normal position in the car, and means for equalizing the motion of all portions of the floor.

Signed at Los Angeles, California, this 8 day of September, 1926.

MILO A. BAKER.