

Oct. 13, 1936.

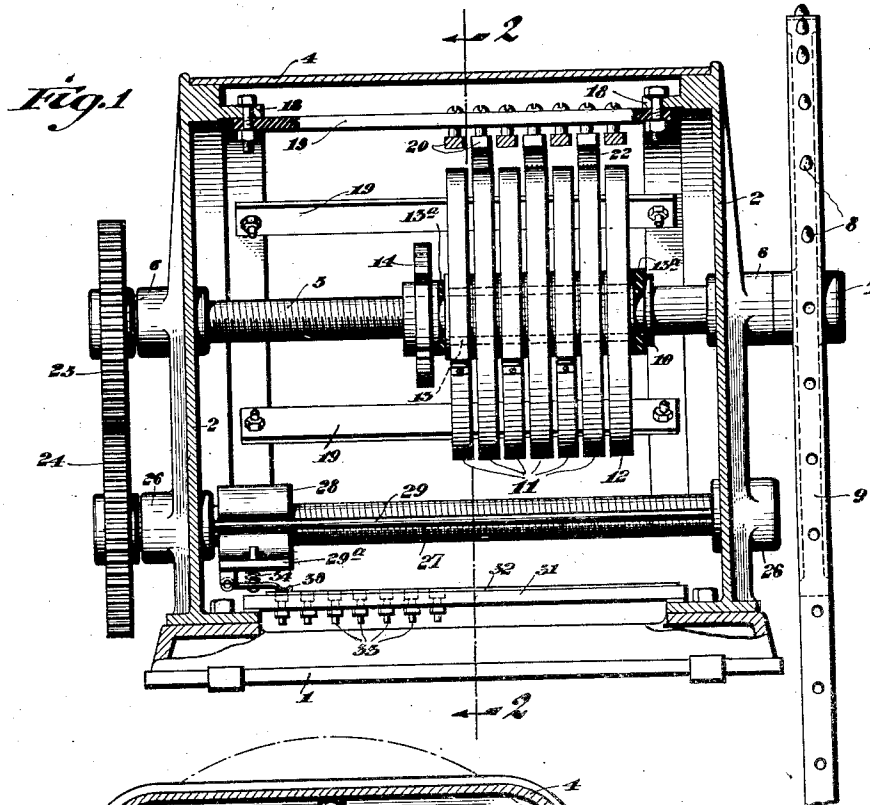
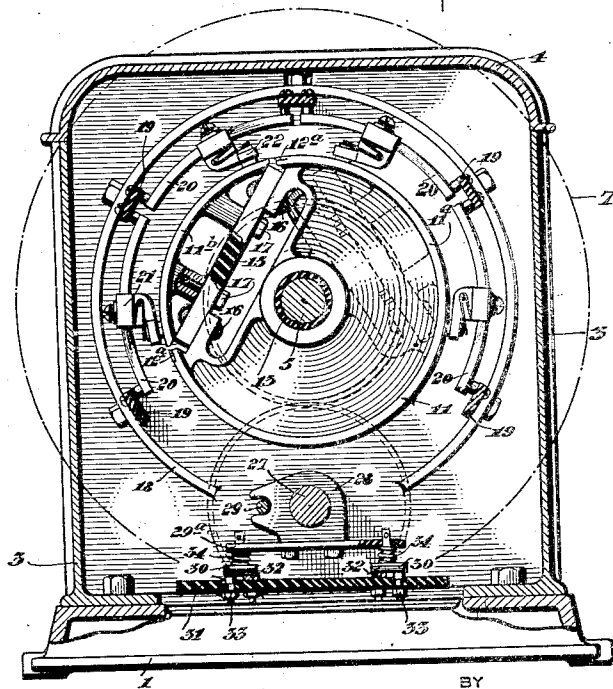
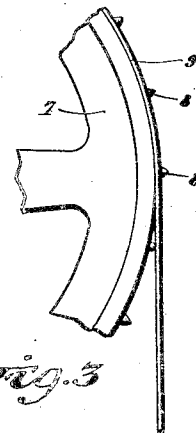
O. F. SHEPARD

2,057,210

FLOOR LEVELER FOR ELEVATORS

Filed Dec. 31, 1934

2 Sheets-Sheet 1



INVENTOR

Oscar F. Shepard

BY

Wood & Wood ATTORNEYS

Oct. 13, 1936.

O. F. SHEPARD

2,057,210

FLOOR LEVELER FOR ELEVATORS

Filed Dec. 31, 1934

2 Sheets-Sheet 2

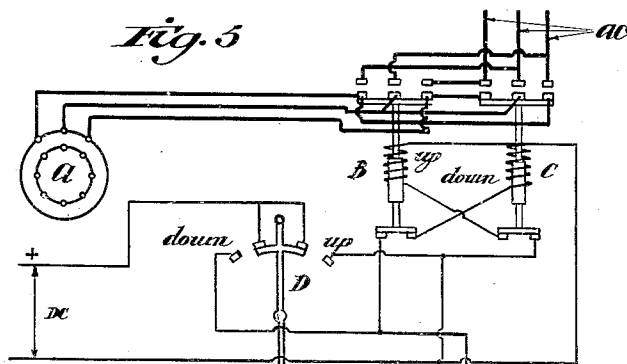
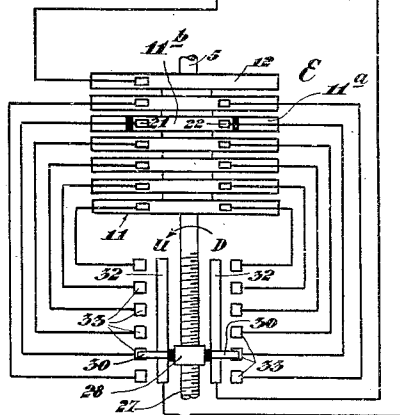


Fig. 4

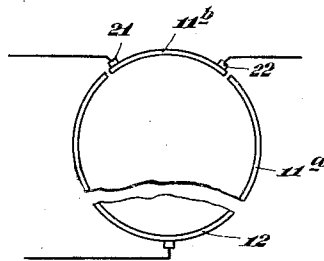
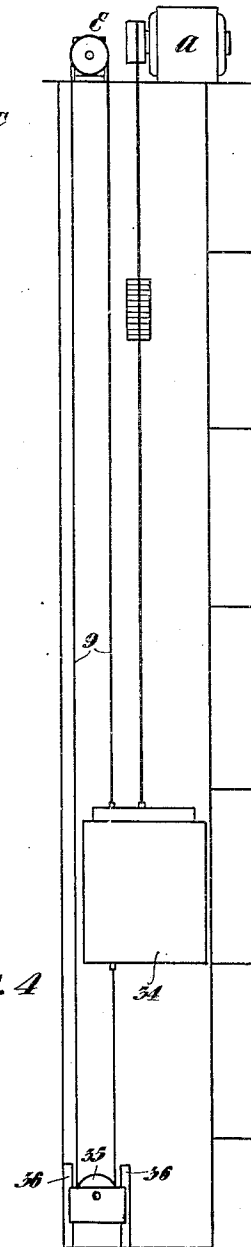


Fig. 6



INVENTOR

Oscar F. Shepard

BY

Wood & Wood ATTORNEYS

UNITED STATES PATENT OFFICE

2,057,210

FLOOR LEVELER FOR ELEVATORS

Oscar F. Shepard, Cincinnati, Ohio

Application December 31, 1934, Serial No. 759,891

7 Claims. (Cl. 187-29)

This invention relates to elevators and is especially directed to a means for providing floor levelling alignment of the elevator cab.

More particularly, my invention is directed to an elevator floor levelling mechanism which is in continuously maintained positive copy relation to the elevator cab. In the elevator art numerous, complex, electrical interlock circuits have been proposed to accomplish automatic stopping of the elevator at predetermined locations. In addition to the disadvantageous complexity of these circuits, the interlocks have necessitated a multiplicity of delicately adjusted electrical contacts, each of which is susceptible to variation during usage.

Further, great difficulty has been experienced in the synchronization of pilot circuits to elevator cab movement. In any device which is proposed to accomplish self-levelling of cabs it is highly desirable that adjustment of the mechanism be continuously maintained without exacting supervision. This is especially true in automatic elevators. Any deviation from exact alignment of the elevator cab to the stopping position presents an inherently dangerous condition. Furthermore, modern, high-speed elevators are impractical unless the stopping and levelling stages are as proportionately rapid as the actual speed of travel of the cab itself.

It is therefore an object of this invention to provide a simple mechanism adapted to accomplish automatic levelling of an elevator cab.

It is a further object of this invention to provide a levelling or stopping mechanism by means of which the actual stopping points and the desired stopping points are maintained in continued alignment over long periods of usage.

It is a still further object of this invention to provide an elevator levelling mechanism which can be rapidly adjusted to any given set of conditions.

It is a still further object of this invention to provide a simple, synchronizing mechanism adapted to maintain accurate relationship between the elevator cab and the levelling mechanism.

Other objects and further advantages will be more fully apparent from a description of the accompanying drawings, in which:

Figure 1 is a longitudinal cross sectional view through the levelling mechanism.

Figure 2 is a transverse cross sectional view through the levelling mechanism.

Figure 3 is a fragmentary side view of the levelling drive mechanism.

Figure 4 is a diagrammatic view showing the relationship between the levelling mechanism, and the driving means of the elevator cab.

Figure 5 is a diagrammatic view of the electrical levelling circuit.

Figure 6 is a diagrammatic view of the electrical connections to a levelling mechanism disc showing the position of the disc to the contacts at stopped position.

Essentially, my invention resides in the combination of a plurality of energized conductor discs, one for each stop position, with part of each disc isolated by insulation, a pair of brushes, one for each direction of rotation for each disc, engaging the periphery of the discs, and laterally spaced to engage the termini of the insulated portion concurrently, and a series of selector contact switches, the moving element of which is in electrical connection with the brushes and bears copy relation to the movement of the conductor discs, the selector switches adapted to complete the electrical circuit between the brushes and relays adapted to control the direction of rotation of the elevator motor, with which the conductor discs are in transmitting connection.

One electrical circuit to which my invention is applicable comprises a manual control circuit in combination with an automatic levelling control circuit in which the levelling circuit is energized when the manual control circuit is de-energized.

Referring to the drawings, upon a base 1 are fixedly, rigidly mounted a pair of flanged end plates 2, 2 and a pair of side plates 3, 3, both of which cooperate to support a removable cover plate 4. A shaft 5, partially threaded, is rotatable within appropriate journals 6, 6, of the end plates 2, 2. One end of the shaft 6 carries a fixedly annexed sprocket wheel 7, on the periphery of the said wheel, there being equidistantly mounted a plurality of pin teeth 8. Over the outer periphery of the sprocket wheel 7, is carried a perforated cab travel copying tape 9, the perforations of which are in registration with the pin teeth 8. The tape 9 is adapted to positively rotate the shaft 6 in accordance with the movement of the elevator cab, whereby the shaft and consequently the levelling mechanism is put into copy relation with elevator cab movement.

A plurality of adjacently disposed discs 11, termed "electric current conductor discs", each of segmental rim form, and an end disc 12 of full rim form, termed a "feeder disc", are carried on the shaft, insulated therefrom and adapted to be

clamped together and to the shaft for unitary rotation with the shaft, and independently rotatably adjustable thereon. Each disc has a hub extending from opposite sides thereof and of a dimension when engaged with the hub of its next adjacent disc provides a rim spacing. The hubs of the discs are engaged over an insulator sleeve 13 on the shaft having insulator collars 13^a, 13^b respectively at each of its opposite ends, the insulator collar at one end being engaged against a collar 10 fixed on the shaft and at the opposite end, an insulator collar bearing against a spanner lock nut 14 screw threaded upon the shaft.

The discs 11 are of duplicate construction and each, as shown in Figure 2, is segmented to provide a major segmented rim portion 11^a, in electrical connection with the feeder disc 12, and a minor segmented rim portion 11^b in non-electrical or insulated connection with the disc, its opposite rim ends spaced from the relative opposite rim ends of the major rim portion, its under side carrying a pair of lugs engaging an insulator plate 15 and secured thereto by screws 17, the insulator plate being secured to the discs by rivets 16. At each open end of the major segmented rim portion is located a spark preventing insulator insert 12^a, 12^b.

Fixed to the housing, preferably by means of flanges 18, 18 of end plates 2, 2, are a plurality of insulator pole bars 19, parallel to and laterally spaced in a circle about, the shaft 6. Annexed to the pole bars 19 are a plurality of brush carrier ring segments 20, two adjacent, but insulated from each other by means of the pole bar 19 for each conductor disc 11. The ring segments 20 respectively carry brushes 21—22 in spring engagement with a conductor disc 11. A pair of ring segments and a pair of brushes are employed for each conductor disc 11.

The brushes 21—22 are spaced from each other on the adjacent ring segments 20 so that the distance therebetween will place the brushes apart slightly short of the chordal distance of the total minor or insulated rim segment 11^b. Thus during rotation of the conductor discs 11 each of the brushes will, concurrently, at a certain time during the rotation concurrently engage the minor insulated segment 11^b, for elevator motor stopping and cab levelling, and further incremental rotation of the disc will cause one or the other of the brushes to ride on the major or electrically connected portion 11^a, for elevator motor reversing in an appropriate direction, to bring the cab to a floor level. It may be said that the brush mounts disclosed are of the usual construction, and are held immovable on the ring segments by means of the screws 23.

For convenience and accessibility, the brushes for one disc are preferably located at one side, and the brushes for a next adjacent disc alternately at an opposite side, as shown in Figure 2.

A threaded shaft 27 is in transmitting connection with the shaft 6, through a pair of intermeshing gears 24 and 25 and rotatable within appropriate journals 26, 26 of end plates 2, 2. A nut 28, channeled at one longitudinal face to receive a cross guide rod 29, annexed to the end plates 2, 2, and adapted to prevent nut rotation, is in threaded engagement with shaft 27.

Annexed rigidly to another longitudinal face of the nut 28, so as to be movable therewith, is an insulator plate 29^a. This plate carries, hingedly annexed thereto, a plurality of brushes 30, 30 in the form of plates. Adjacent to said brushes 30, 30 is an insulator bar 31, rigidly mounted to

the base 1, upon which in engageable relation to the brushes 30, 30, are mounted a plurality of bus bars 32, 32, one for each brush 30, and a plurality of sets of stationary contacts 33, 33, each set adjacent to each bus bar. The brushes 30, 30, are each by means of compression springs 34, 34 respectively maintained in continuous electrical connection with the bus bars 32, 32, and the lateral width of said brushes is such that the contacts 33, 33 may be serially or consecutively connected electrically as the nut carrying the brushes translates upon the shaft 27.

One set of the contacts 33 is adapted to cooperate with the conductor discs 11, and one brush 22 to control levelling of the cab, say during upward movement, and the other set is similarly adapted to control levelling during downward movement. Thus, of each plurality of contacts, two contacts, one from each set, are to correspond to a given floor and are spaced to be in electrical connection with their respective bus bar 33 through brushes 30, when that floor is reached. The pitch of the thread of shaft 27, the gearing ratio of gears 24 and 25, and the diameter of sprocket wheel 7, and the spacing of contacts 33 must therefore be such that when such floor level is reached, the nut 28 will have translated to carry the brushes to the set of contacts corresponding to that floor. Meanwhile, the adjustment of the radial position of the insulated minor segment 11^b of the conductor disc 11, must be such that the brushes are at the extremities, but within the confines of that segment.

If electrical leads be taken therefore, from the respective contacts to the brushes engaging the corresponding discs 11, it will be seen that the minor insulated segment position may qualify as a leveller circuit control switch. Further, if the bus bars 32, 32, adjacent to each of the contacts 33, be connected to respective upward and downward travel motor control relays, then over travel of the disc 11 in one direction or the other, will energize the proper relay to reverse the motor and return the disc to its radial "dead" position.

One circuit to which the mechanism of this invention is applied is shown in Figure 5, wherein the elevator motor is marked A, direction control relays are marked B and C, these being respectively adapted to control up and down travel of the cab, the manual control switch is marked D and the leveller mechanism is marked E. Power is applied to the manual control switch D, which is in circuit with the leveller when in the off position, e. g. the leveller is energized only when the control switch D is in stop position.

As shown in Figures 4 and 5, the brushes for the second conductor disc of the group are centered on the isolated segment when the elevator is aligned with second floor landing or stop. In this circuit, if downward overtravel occurs, the brush 22 will be in circuit connection with the feeder disc 12, and through appropriate contacts of the translatable switch brushes 30 the up relay B of direction control switch is actuated for motor operation in a direction for upward cab travel. As the motor rotates to lift the cab, the discs will be rotated until coincidence of the brushes 21—22 and the isolated segment 11^b occurs, at which time the leveller circuit will be de-energized and the up relay B will be released.

Obviously, the mechanism disclosed herein may be utilized for controlling the energization of many different circuits operable on A. C. and

D. C., where translation of an element is affected by energization of the circuit.

For application to a particular elevator installation, it is preferable that the tape 9 be maintained in tension at all times. To obviate the necessity of a translating weight, Figure 4 discloses the tape fastened at each end to an elevator cab 34, and including at one point of return, the leveller mechanism, and at the other a weighted sheave 35 slidable within guideways 36, 36.

Having described my invention, I claim:

1. An automatic elevator stop position controller, comprising in combination a plurality of discs rotatable in relation to elevator movement, one for each stop, an electrically isolated segment in each of said discs, a feeder energizing all of said discs from a manual control circuit, a set of brushes contacting said discs, one for each direction of elevator movement, laterally spaced to concurrently engage the termini of the isolated segment, a pair of pluralities of contacts, each pair corresponding to a direction of movement, and each contact of one plurality corresponding to a contact of the other plurality in stop position, each respectively connected to one of said brushes, a bus bar adjacent to each plurality of contacts, a direction control relay connected to each of said control bus bars, and a pair of selector switches movable in copy relation to said elevator, one engaging each plurality of contacts and adapted to complete the circuit between the contacts and the bus bars alternately but prior to, during, and subsequent to coincidence of isolated disc segment with both of said brushes.

2. In combination, in a device of the class described, an elevator motor and cab, a manual control for energizing said motor, and an electrical circuit, including said manual control switch, which is energized when the switch is in the off position, said electrical circuit including a levelling mechanism rotatable in copy relation with said motor, which comprises, a plurality of conductor discs, one for each elevator stop position, a segment of each disc isolated by insulation from the remainder, a plurality of pairs of brushes, one brush of each of said pairs for upward overtravel and the other for downward overtravel, engaging the periphery of said discs, laterally spaced to be registrable with the termini of said isolated segment concurrently, a series of selector contact switches, one corresponding to and in electrical connection with each of said brushes, the moving element of said switches bearing copy relation to the movement of the elevator cab, and up and down motor control switch relays, the moving element of said contact switches adapted to energize one or the other of said relays when over travel of the conductor discs beyond the isolated segment brush coincidence occurs, whereby the elevator overtravel will be compensated.

3. An elevator landing levelling controller adapted for use in conjunction with an elevator cab, a manual direction control switch, an elevating motor and motor direction control relays, comprising, a disc rotatable in copy relation to elevator cab movement, an electrically isolated zone on one portion of the disc periphery, an electrically energizable zone on the remainder of the disc periphery, a pair of brushes riding said disc, each respectively connectable to a motor direction control relay and spaced apart scant of the

extremities of the electrically isolated zone, and means for establishing electrical connections between the brushes and their respective direction control relays at the time both brushes lie within the confines of the isolated zone of the disc, whereby if overtravel occurs the elevating motor direction will be reversed to re-establish coincidence of the brushes and the electrically isolated zone of the conductor disc.

4. An elevator landing levelling controller adapted for use in conjunction with an elevator cab, a manual direction control switch, an elevating motor and motor direction control relays, comprising, an electrical circuit between the elevating motor and each of the motor direction control relays, a disc rotatable in copy relation to the elevator cab movement, an electrical connection to said disc from the manual direction control switch whereby the disc is energized when the switch is in neutral position, a neutral isolated zone on one portion of the disc periphery, a pair of brushes riding said disc periphery, each respectively connectable to a direction control relay and spaced apart scant of the extremities of the electrically isolated zone, and a pair of cab movement copying contactors, one for each of said brushes adapted to interconnect the said brushes to their respective motor control relays just previous to, during and just subsequent to coincidence of the engagement of said brushes with said electrically isolated zone, whereby upon continued rotation of the said disc the brush corresponding to the opposite direction motor control relay establishes an electrical connection through the corresponding contactor with the selected motor control relay to reverse elevating motor direction and reversingly rotate said disc until coincidence of the isolated zone and both of said brushes occurs.

5. An elevator controller for landing levelling control in combination with a cab, elevating electric motor and an electric motor starting and direction electric controller, in combination with a car levelling controller for operating said motor direction controller for levelling the car with a selected floor landing, comprising, a plurality of electric conductor discs, one for each floor served by the car, rotatably journaled as a unit, a tape belt connecting with the cab and transmittingly with said discs for rotatably transmitting the same during the travel of the car, a pair of brushes respectively for each disc of the group, each for a control of an operating circuit for said direction controller, and a floor selector switch translating in copied relation with the car for controlling a partial circuit selectively and independently to the brushes of the discs of the group, each of said discs having a neutral non-current carrying zone traversed by the brushes of the disc and set for adapting the brushes to simultaneously contact therewith when the car is level with its related floor landing, and for appropriate direction control for said direction controller when a brush over-rides said neutral zone.

6. An elevator controller for landing levelling control in combination with a cab elevating electric motor and an electric motor starting and direction electric controller, in combination with a car levelling controller for operating said motor direction controller for levelling the car with a selected floor landing, comprising, an electric conductor disc for a floor served by the car, rotatably journaled, a tape belt connecting with the cab and transmittingly with said disc for rotatably transmitting the same during the travel of the

- car, a pair of brushes for the disc for a control of an operating circuit for said direction controller, said disc having a neutral non-current carrying zone traversed by the brushes and set
5 for adapting the brushes to simultaneously contact therewith when the car is level with the floor landing, and for appropriate direction control for said direction controller when a brush over-rides said neutral zone.
- 10 7. An elevator car controller for landing levelling control, the combination of a cab, cab elevating electric motor, an electric motor starting and direction controller, a rotatively journaled electric conductor disc for a selected floor served
15 by the car, a belt connecting with the car and transmittingly with said disc for disc rotation, a pair of brushes contacting the disc, each for a control of an operating circuit for said direction controller and relative alternate motor direction control, said disc having a neutral non-current carrying zone traversed by the brushes and set
5 for simultaneously contacting with both brushes when the car is level with the floor landing, thereby disrupting the control circuits for said electric motor starting and direction controller, the brushes respectively effective after the motor starting and direction controller has been neutralized for a stopping of the elevator car at the selected floor for operating said controller for a motor starting and appropriate direction levelling control when one of said brushes over-rides said
15 neutral non-current carrying zone of said disc.

OSCAR F. SHEPARD.