Nov. 25, 1924.

1,517,042

C. J. ANDERSON

ELEVATOR CONTROL

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Fig. 1

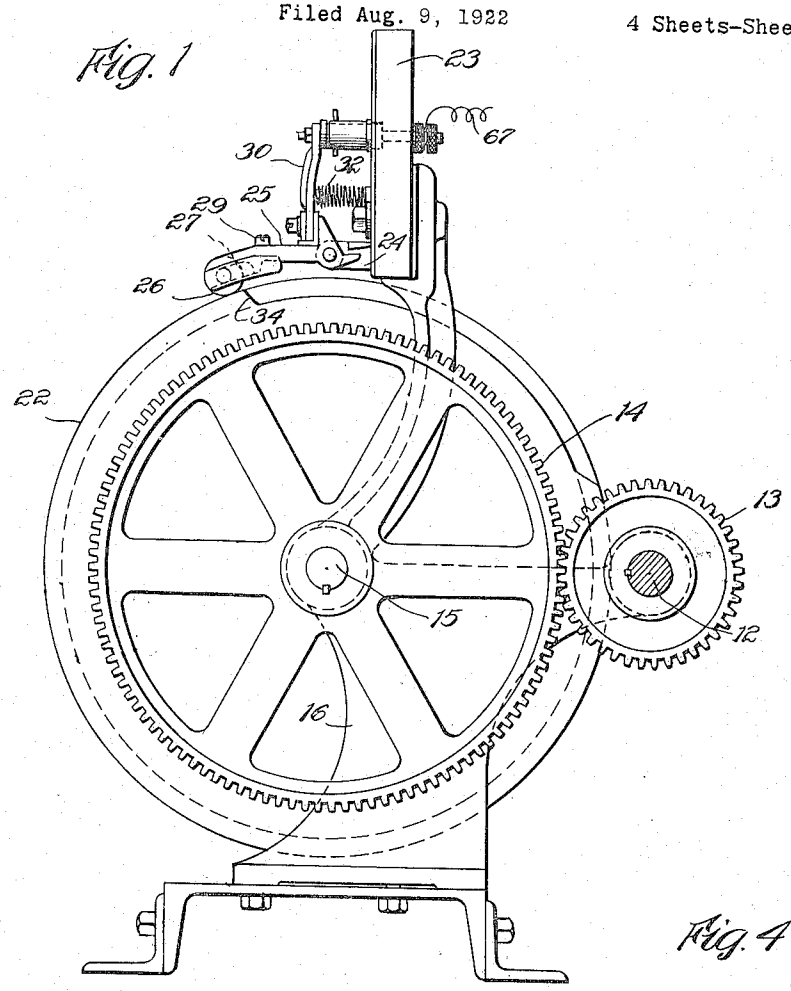


Fig. 4

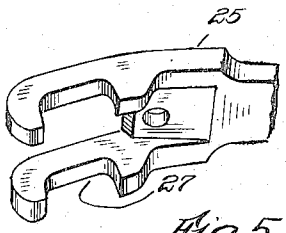


Fig. 3

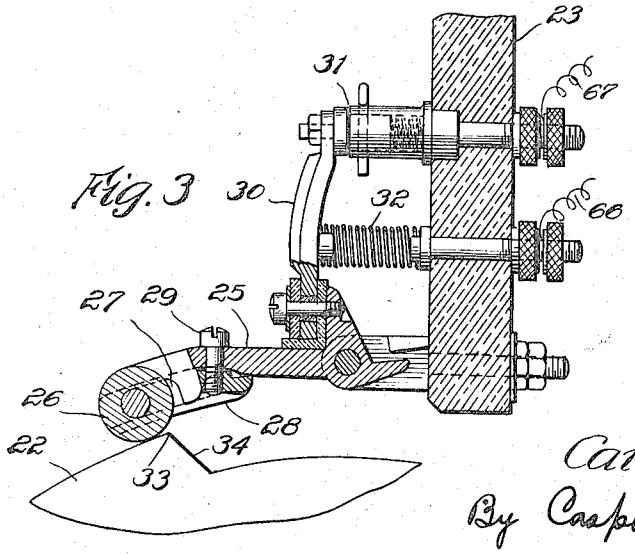
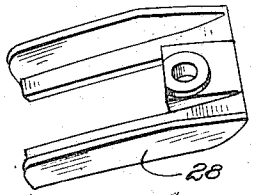


Fig. 5



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Fig. 2

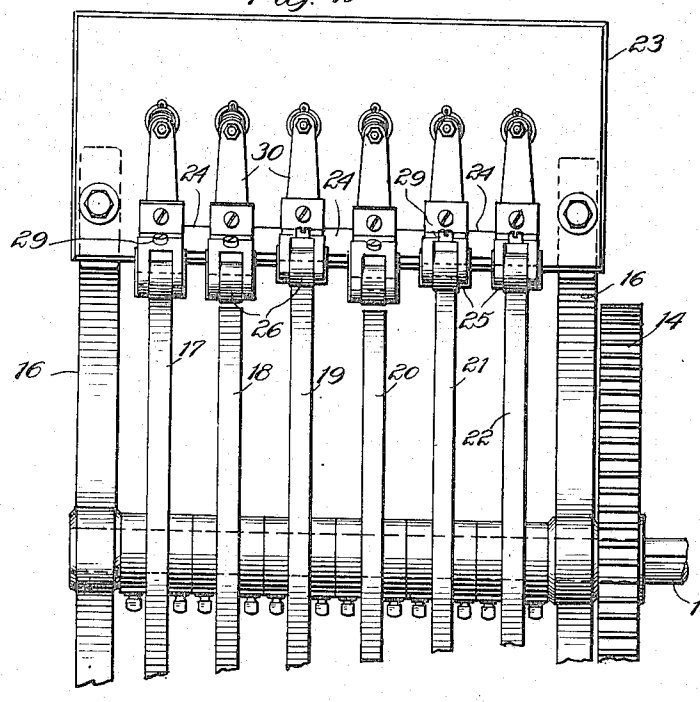
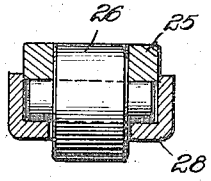


Fig. 6



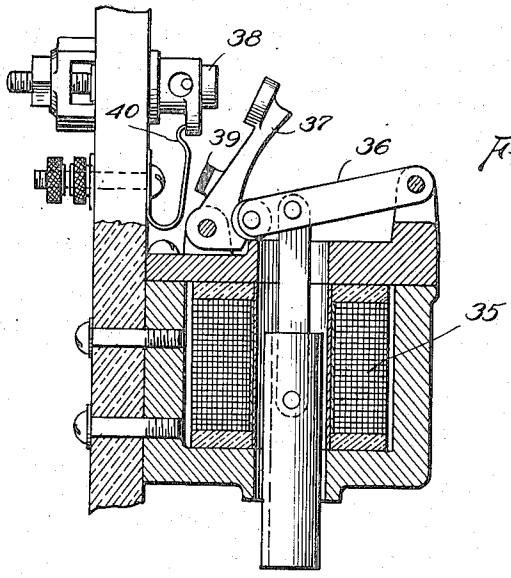


Fig. 7

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Fig. 8

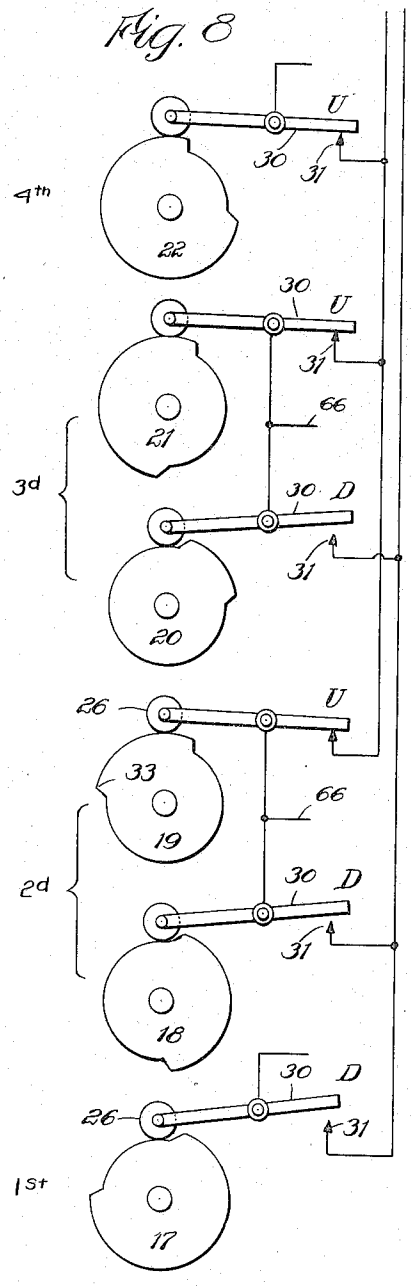
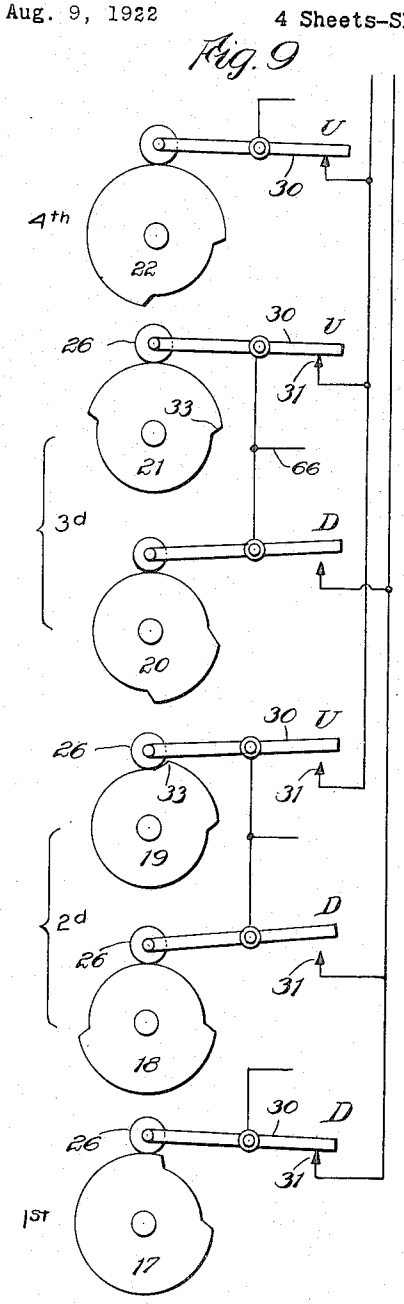


Fig. 9



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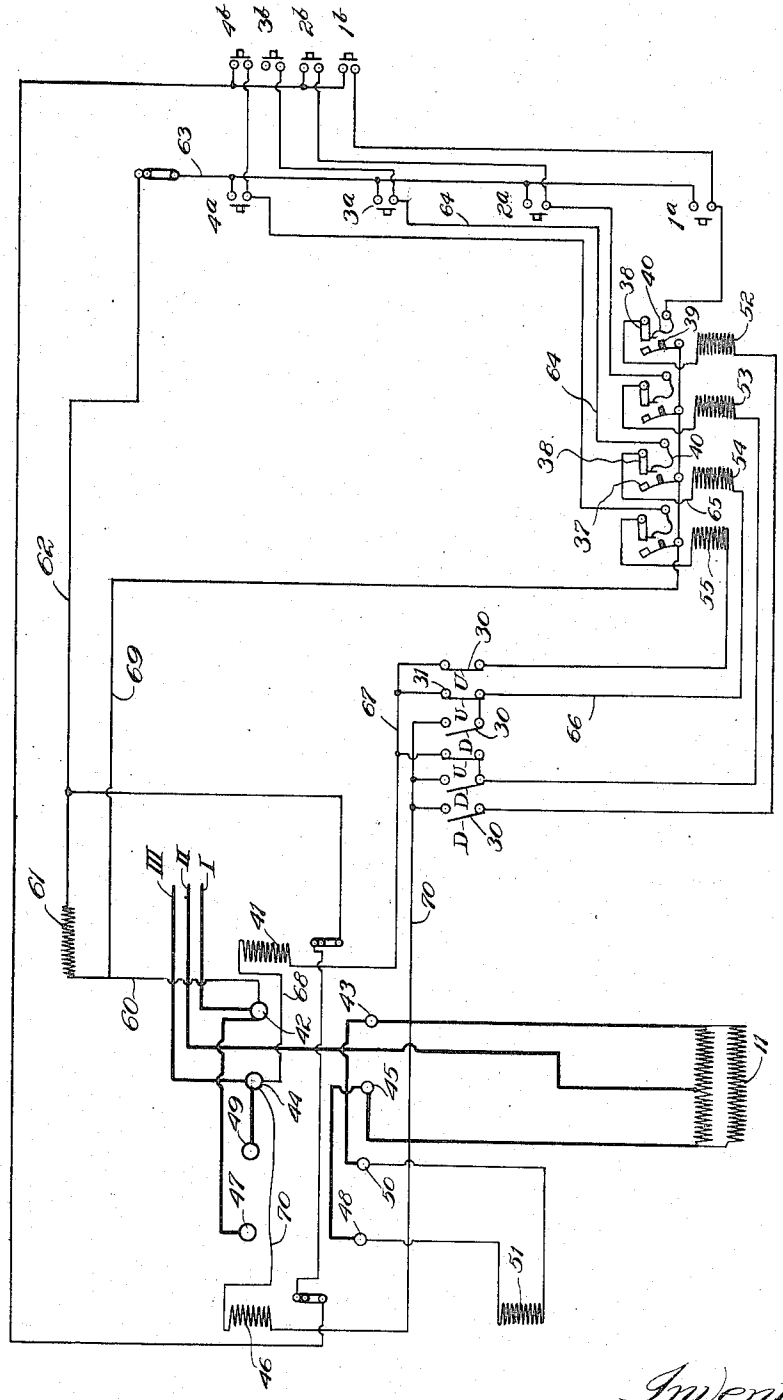


Fig. 10

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Patented Nov. 25, 1924. 1,517,042

UNITED STATES PATENT OFFICE.

CARL J. ANDERSON, OF CHICAGO, ILLINOIS.

ELEVATOR CONTROL.

Application filed August 9, 1922. Serial No. 580,650.

To all whom it may concern:

Be it known that I, CARL J. ANDERSON, a citizen of the United States of America, and a resident of Chicago, county of Cook and State of Illinois, have invented certain new and useful Improvements in Elevator Controls, of which the following is a specification.

My invention relates to controllers for electrically operated elevators, and has for its object improvement in such devices.

In the accompanying drawings—

Fig. 1 is a side elevation of the controller;

Fig. 2 is a front elevation of the upper part of Fig. 1;

Fig. 3 is an enlarged elevation partly in section, of parts of the devices shown in Fig. 1;

Figs. 4, 5 and 6 are details;

Fig. 7 is an elevation, partly in section of one of the selecting relays;

Fig. 8 is a diagram showing the location of the cam wheels when the elevator is standing at the first floor;

Fig. 9 is a diagram showing the location of said wheels when the elevator is standing at the second floor; and

Fig. 10 is a diagram of the electrical connections.

The motor 11 (Fig. 10) is connected directly or indirectly to the shaft 12 (Fig. 1) on which is a pinion 13 meshing with a gear 14 secured on shaft 15 which is carried in frame 16. Also secured on shaft 15 are cam wheels 17, 18, 19, 20, 21 and 22. These wheels are adjustable and are set in a relationship to be described.

Supported on the upper part of the frame 16 is a slate 23, on which are secured brackets 24. Pivoted to brackets 24 are levers 25 which carry rollers 26 that ride upon the cam wheels 17 to 22. The bearings for the rollers 26 are elongated slots 27 formed in levers 25 and having their lower sides enclosed by plates 28 secured to the levers 25 by screws 29.

Secured to the levers 25 are insulated arms 30 which are arranged to engage carbon electrodes 31 suitably supported in slate 23. Springs 32 serve to push the arms 30 from the electrodes 31 when the rollers 26 pass from the high to the low parts of their respective cam wheels.

Referring specifically to Figs. 1 and 3, the spring 32 presses the roller 26 against the high part of the cam wheel 22. The position shown is that which exists when the wheel is moving in a contra-clockwise direction. Moving in this direction, the rolling of roller 26 on the face of the wheel 22 causes the roller to take the position with its spindle at the outer end of the slot 27. When the wheel moves in a clockwise direction, then the roller 26 moves to the inner end of said slot. The position of roller 26 with respect to slot 27 is determined by the direction which the cam wheel turns.

Assuming the cam wheel to be moving in a contra-clockwise direction, a little further movement will bring the roller 26 to the corner 33 of the cam face 34, and the action of the spring 32 will be to move the lever 25 and arm 30 so as to break the electrical connection at 31. But upon the roller 26 passing the corner 33, the action of the spring 32 in pressing the roller against cam face 34 will cause the roller to shift suddenly from the outer to the inner end of the slot 27, with the result that a quick break is obtained at the electrode 31 when there is only a slow movement of the cam wheel 22. This break stops the elevator, and unless there is a break which is quicker than the cam movement, there is no certain stop at a desired point.

The motor 11 is used to operate an elevator, and the connections of the parts just described are for controlling the motor. As shown in Fig. 2, the device is for a building for which the elevator is automatically stopped at any one of four floors. The elevator is started from any position by merely pressing a button, and the floor at which it stops is determined by which of several buttons is pressed. As the elevator comes to the bottom floor only by moving downward, and comes to the top floor only by moving upward, only one cam wheel is needed for each of these floors. But the elevator to be controlled comes to intermediate floors in both up and down directions, and two control wheels are used for each intermediate floor. The wheel 17 controls the stoppage of the elevator at the bottom floor. The wheel 18 controls the stoppage of the elevator when moving downward to the second floor, and the wheel 19 controls it when moving upward to the same place. The wheels 20 and 21 similarly control for the third floor, and wheel 22 for the top floor.

There is a selecting magnet for each floor, one of which is illustrated in Fig. 7. This

is a solenoid 35 which operates a lever 36 to move an arm 37 so as to close a circuit at the carbon electrode 38. Fig. 7 shows these parts in normal position. When a current flows thru the solenoid, the arm 37 is pressed against the carbon 38, which yields longitudinally, and just after this contact is made a piece of insulation 39 strikes a spring 40 to break the electrical connection which previously exists between 40 and 38.

The general electrical arrangement is shown in Fig. 10, in which I, II and III represent the lines leading to a source of electrical power, and 11 represents a squirrel cage motor for driving the elevator. The magnet 41 serves to connect contact 42 to contact 43, and contact 44 to contact 45 for starting the motor 11 in the proper direction to move the elevator upward. The magnet 46 serves in a similar manner to connect 47 to 48 and 49 to 50 for moving the elevator downward. The magnets 41 and 46 may be solenoids like 35 and may move levers like 37 for making the desired connections. 51 is a break magnet which need not be here considered as it forms no part of the present invention.

The selecting magnets for the different floors are shown at 52, 53, 54 and 55. The push buttons in the hall of the building are represented by 1^a, 2^a, 3^a, and 4^a. The corresponding buttons in the car are represented by 1^b, 2^b, 3^b and 4^b. The levers 30 in this figure (Fig. 10) are represented as being in the position in which they are when the elevator car is standing at the bottom floor.

Fig. 8 represents the cam wheels and their levers in the positions in which they are when the elevator is standing at the ground floor, Fig. 9 represents the same parts when the elevator is standing at the second floor. These two figures also represent the proportions of the cam surfaces in a device for four floors, and on the assumption that the cam wheels make a trifle less than one complete revolution while the elevator is moving thru its whole travel from top to bottom. This represents each cam wheel as making nearly one-quarter of a revolution during the passage of the elevator from one floor to the next one. If the building had five floors instead of four, then the cam wheels would be divided into fifths instead of quarters. Cam wheels divided into fifths will be suitable for any number of floors less than six.

The wheels 17 to 22, inclusive, control only the stoppage of the elevator, and not the starting. The wheel 17 controls only the stoppage of the elevator when moving downward to the bottom floor, and to illustrate this its lever 30 has "D" marked adjacent thereto. The wheel 18 controls the movement downward to the second floor and has "D" adjacent to its lever 30. The wheel 19 controls the stoppage at the second floor when the elevator is moving upward, and has "U" marked adjacent to its lever 30. In the same way the other levers or arms 30 are marked "D" or "U" according to the direction which they control, and these same characters are carried over to Fig. 10. When the elevator is standing at the first or ground floor, as in Figs. 8 and 10, all of the "D" levers are open at their contacts 31, and all of the "U" levers are closed at their contacts 31. This is because the elevator cannot move downward when it is standing at its bottom position.

When the elevator has been moved to and is standing at the second floor, both levers for that floor are open at their contacts 31 because the elevator is at that place and does not require to be moved there. In rising from the first to the second floor, all of the cam wheels turn thru about one-quarter of a revolution in a clockwise direction. This movement of wheel 17 raises its roller 26 from the lower to the upper cam surface, and closes the connection at its contact 31. The same movement of wheel 19 permits its roller 26 to drop and open its contact 31. At the other wheels no change in electrical connection is made by this movement.

Referring to Fig. 10 it will be assumed that with the elevator standing at the first floor, some person pushes button 3^a. A current will then flow from the line I to contact 42, and then 60 resistance 61—62—63—3^a—64—40 and 38 of the selecting magnet 54—65—54—66 to the U-lever for the third floor and its contact 31—67—41—68—44—line III.

This current thru the magnet 41 connects contacts 42 and 43, and also 44 and 45 so as to connect motor 11 to lines I and III and start said motor to raise the elevator. At the same time magnet 54 breaks the circuit at its spring 40 but remakes it by lever 37 engaging contact 38. This makes shunt around resistance 61 from 60 thru 69 to 38.

The connections just described are held during the rise of the elevator. By the time it reaches the second floor, the cam wheels have made about one-quarter of a revolution and are in the position shown in Fig. 9. By the time the elevator reaches the third floor, the wheels will have advanced another quarter of a revolution, the D-lever of the second floor will be closed to its contact 31, and the U-lever at the third floor will be open. The other levers will be at the positions shown in Fig. 9.

In the description of Figs. 1 and 3 given in the early part of this specification, the cam wheel was assumed to be moving in a contra-clockwise direction, and the roller 26 was described as being at the outer end

of slot 27 and moving suddenly inward where it reached the corner 33. This represented a downward movement of the elevator. In the upward movement just described, the cam wheels move in the clockwise direction and the rollers will be at the inner ends of their respective slots 27. When the wheel 19 has moved so that its other corner 33 has come to the position shown in Fig. 9, then the corresponding roller 26 will move suddenly to the outer end of its slot 27 so as to cause a quick break at 31. But as the circuit described was made for the third floor and not for the second floor, nothing happens as a result of this break. But when the elevator reaches the third floor, and the corner 33 of wheel 21 comes under the corresponding roller 26, then the quick break at contact 31 breaks the circuit for magnet 41, and this in turn breaks the circuit for the motor 11 and stops the elevator. Owing to the manner in which the roller is shifted in its slot by the spring 32 forcing it against the cam face 34, the speed of the break is greater than the speed of the cam wheel which controls the break.

If, with the elevator standing at the third floor, some person pushes the button for either the first or second floor, then the circuit would be completed thru a D-lever of the corresponding floor, and would continue thru line 70, magnet 46 and line 71 to line III. This would close contact 47 to 48 and contact 49 to 50. This completes the circuit in the reverse direction thru the motor 11, and consequently drives it in the reverse direction.

What I claim is:

1. In a device of the class described, the combination with a cam, and means for driving it, of a pivoted lever having a fork on its end and slots in the tines of the fork, a roller located between the tines of the fork and having trunnions projecting into said slots, a spring pressing said lever so as to cause said roller to bear on the face of the cam, and an electrical connection opened and closed by the movement of the lever due to the movement of the cam under the roller said parts being so arranged that upon an incline of the cam arriving at the roller the tension of the spring and the incline will force the trunnions backward in the slots to permit a quick opening of the electrical connection by the spring action.

2. In a device of the class described, the combination with a cam, and means for moving it, of a pivoted lever having an opening for the reception of a roller and open sided slots adjacent to said opening, a roller located in said opening and having trunnions projecting into said slots, a plate secured to said lever and serving to cover said slots so as to confine said trunnions, and a spring acting on said lever to press the roller against the cam.

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