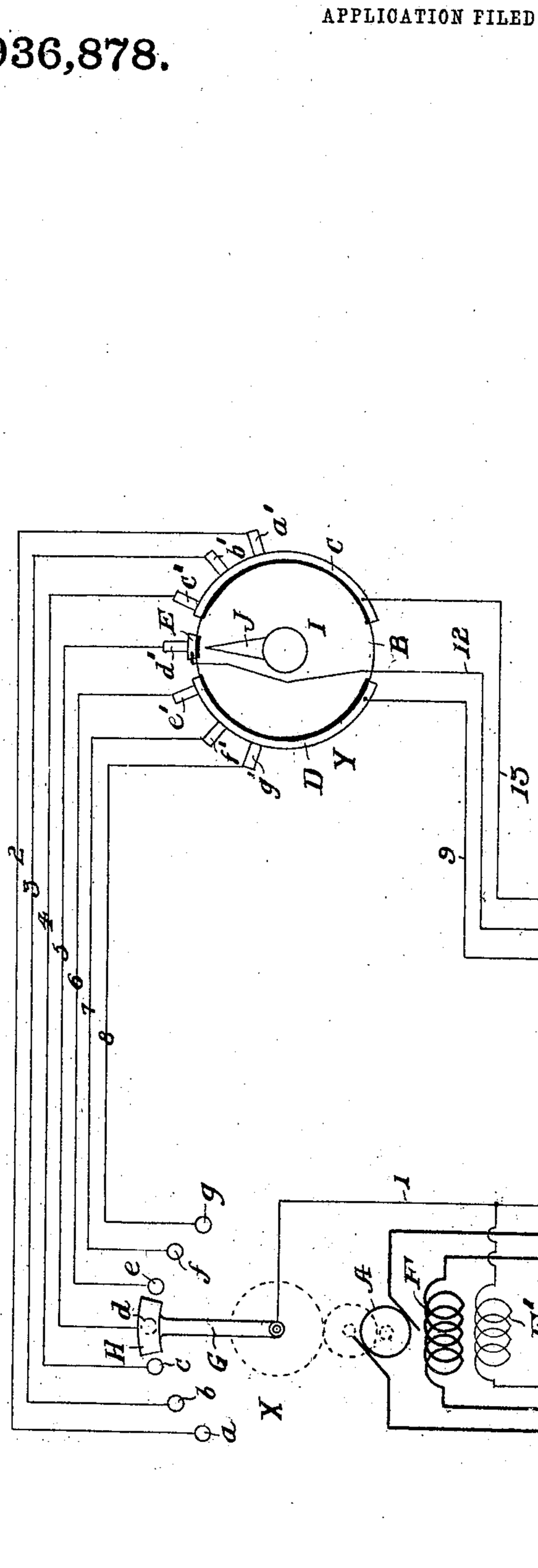
F. R. FISHBACK.

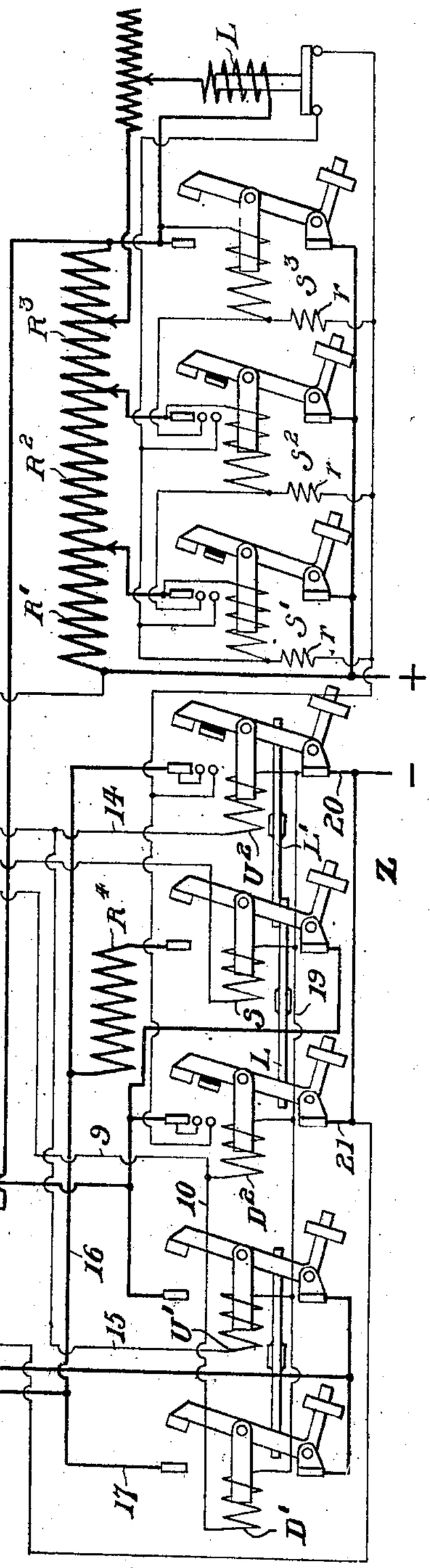
AUTOMATIC CONTROLLER.

APPLICATION FILED JAN. 23, 1909.

936,878.

Patented Oct. 12, 1909





WITNESSES:

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AUTOMATIC CONTROLLER.

936,878. Specification of Letters Patent. Patented Oct. 12, 1909.

Application filed January 23, 1906. Serial No. 473,840.

To all whom it may concern:

Be it known that I, FREDERICK R. FISHBACK, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented or discovered new and useful Improvements in Automatic Controllers, of which the following is a specification.

My invention relates to a system of automatic control for electric motors having particular application to cases where it is desired to stop an electric motor automatically when the load driven thereby has reached any one of a number of given points, the particular point at which the load is to be stopped being determined at the time of starting the motor.

My invention provides means for securing this result in a simple and reliable manner.

An example of the conditions which my improved system of control is particularly designed to meet occurs in the case of an elevator wherein the car may be started from a stationary point and be made to stop automatically at a number of different landings which may not be in full view of the person starting the elevator.

My invention will be more fully understood by reference to the accompanying drawing, which is a diagrammatic representation thereof.

A is the armature of the driving motor; F, its series field winding; and F′, its shunt field winding.

D′ and D^2, U′ and U^2 are switches which close in pairs to determine the direction of rotation of the armature of the motor.

S is a magnetically operated switch, which, when closed, completes a local or dynamic braking circuit including the resistance R^4 and the armature A of the motor.

S′, S^2, and S^3 are magnetically-operated switches which control the sections of resistance R′, R^2, and R^3, which are made use of in bringing the motor up to speed. The resistance controlling switches S′, S^2, and S^3 are under the control of a relay L, so arranged as to secure automatic successive closure of the resistance switches in a well known manner.

The construction and operation of the acceleration relay L form no part of this invention, but being well known, need not be described. Such a relay is shown in Letters Patent, No. 867,810, granted to A. C. Eastwood, October 8, 1907.

X is a cut-out switch having one end of the arm G connected by suitable gearing shown in dotted lines to the armature shaft of the motor A, or other part of the moving mechanism actuated by the motor, so that the arm shall assume definite positions corresponding to definite positions of the load. The arm G has a contact brush H arranged to engage the fixed contacts *a* to *g* as the arm is driven by the motor. The fixed contacts *a* to *g* are spaced apart relatively to the length of the brush so that the latter may span any two consecutive fixed contacts, or when centrally arranged on any fixed contact, will be out of contact with the adjacent fixed contact on either side thereof.

The contacts *a* to *g* are connected respectively by the wires 2 to 8 with the fixed contacts *a′* to *g′* of the dial switch Y, which has a central disk B carrying the arc-shaped segments C, D, and E arranged to engage the contacts *a′*—*g′*. The contact E is long enough to engage only one of the fixed contacts at a time. The switch Y has the handle I for moving the pointer J opposite any one of the contacts *a′* to *g′*.

The segment E is connected by the wire 12 to one end of the winding of the dynamic braking switch S; the segment D is connected by the wire 9 to the wire 10, which is connected to one end of the windings of the reversing switches D′ and D^2; and the segment C is connected by the wire 13 to the wires 15 and 14, which lead to one end of the reversing switches U′ and U^2, respectively. The remaining ends of these five windings are connected by the wire 19 to the negative wire 20. The arm G is connected by the wire 1 to the positive side of the line.

With the arm G of the cut-out switch X and the pointer J on the dial switch Y placed as shown, a circuit is completed as follows; from the positive side of the line, through the wire 1, the arm G, the contact *d*, the

wire 5, the contact d', the wire 12, the winding of the switch S, and the wire 19 to the negative side of the line at 20. Under this condition the dynamic braking switch S would close, the diagram, however, showing its position just before closure.

In order to start the motor, the operator moves the pointer J until it indicates the point corresponding to that at which he wishes the arm G to stop. Assume that he moves the pointer J so that it rests opposite the brush b', the contact segment E is then in contact with the brush b'. The segment C is in contact with the brush a', and the segment D is in contact with the remaining contacts c' to g'. In moving the segment E from the contact d', the circuit of the winding of the dynamic braking switch S is opened, causing this switch to open. The control circuit then passes from the positive side of the line through the wire 1, the arm G, the contact d, the wire 5, the contact d', the segment D, the wires 9 and 10 and one end of the windings of reversing switches D′ and D^2, the wire 19 to the negative side of the line. This circuit obviously closes the switches D′ and D^2, which complete the circuit through the motor as follows: from the positive side of the line, through the resistance sections R′, R^2, and R^3, the field F of the motor, the switch D′, the wires 17 and 18, the armature A of the motor, the switch D^2, and thence to the negative main through the wire 21. The motor should then start with all of the controlling resistance in its circuit. This resistance is subsequently automatically cut out by the switches S′, S^2, and S^3 under the control of the relay L, thus bringing the motor up to full speed. As the motor revolves, the arm G of the cut-out switch X also revolves; but in revolving the control circuit is maintained through the windings of the reversing switches D′ and D^2 when the brush H passes off from the contact d onto contact c, the control circuit then flowing through the wire 1, the arm G, the contact c, the wire 4, the contact c', and the segment D on the switch Y to the windings of the switches D′ and D^2 as before. When, however, the contact H makes connection with the contacts c and b, two circuits are established, one through the contact c, the wire 4, the contact c', etc. to the windings of the switches D′ and D^2 as above described. The other circuit is from the wire 1, through the arm G, the contact H, the contact b, the wire 3, the contact b', the segment E, the wire 12, and the winding of the switch S. This will tend to cause the switch S to close but the mechanical interlock L will not permit it to close until the switch D^2 has opened. As the contact arm G travels farther it will at the proper point of travel open circuit with the contact c, which causes the switches D′ and D^2 to instantly open, thus permitting the dynamic braking switch S theretofore under tension to instantly close. This quickly throws a braking current on the motor and brings it promptly to rest. Similar actions take place when other positions of stopping are selected by moving the disk B of the dial controller Y.

In case the disk B be rotated to the left from the position shown on the drawing, the circuits and the operation will be as described except that the control circuit will travel through the segment C, the wire 13, the wires 15 and 14, and the windings of the reversing switches U′ and U^2, causing them to close the motor circuit which has the same course as before only the current is reversed through the armature A, causing it to reverse its direction of rotation. The interlock L′, instead of the interlock L prevents the closing of the switch S until the arm G is in the proper position.

I claim—

1. The combination of an electric motor, a switch member driven thereby, a series of fixed contacts coöperating with the switch member, a setting switch having fixed contacts corresponding to the first-named fixed contacts, switches for reversing the motor, contacts on the setting switch for governing the reversing switches, a braking switch for connecting the motor armature in a closed braking circuit, and a contact on the setting switch for governing the braking switch.

2. The combination of an electric motor, reversing-switch mechanisms therefor, a braking switch for including the motor armature in a closed braking circuit, a setting switch having contacts for controlling the said switches, a switch driven by said motor, and contacts connected to the setting switch contacts and arranged to maintain a reversing-switch mechanism operative and the braking switch under a closing strain until the motor driven switch reaches a position corresponding to the stopping position of the setting switch.

3. The combination of an electric motor, a switch member driven thereby, a series of fixed contacts coöperating with the switch member, a setting switch having fixed contacts corresponding to the first-named fixed contacts, a braking switch for connecting the motor armature in a closed braking circuit, and a contact on the setting switch for governing the braking switch.

4. The combination of an electric motor, reversing switch mechanism therefor, a braking switch mechanism, a setting switch having one set of contacts connected to the said switch mechanism, and another set of contacts coöperating with the first set of

contacts, a set of fixed contacts connected to the second set of contacts of the setting switch, and a motor-driven contact arranged to successively engage certain of the last named fixed contacts, said motor-driven contact being long enough to engage one fixed contact before leaving another but short enough to engage one fixed contact without engaging the adjacent contact at either side thereof.

Signed at Cleveland, Ohio, this 18th day of January, A. D. 1909.

FREDERICK R. FISHBACK.

Witnesses:

H. M. DIEMER,

W. A. TENWINKLE.