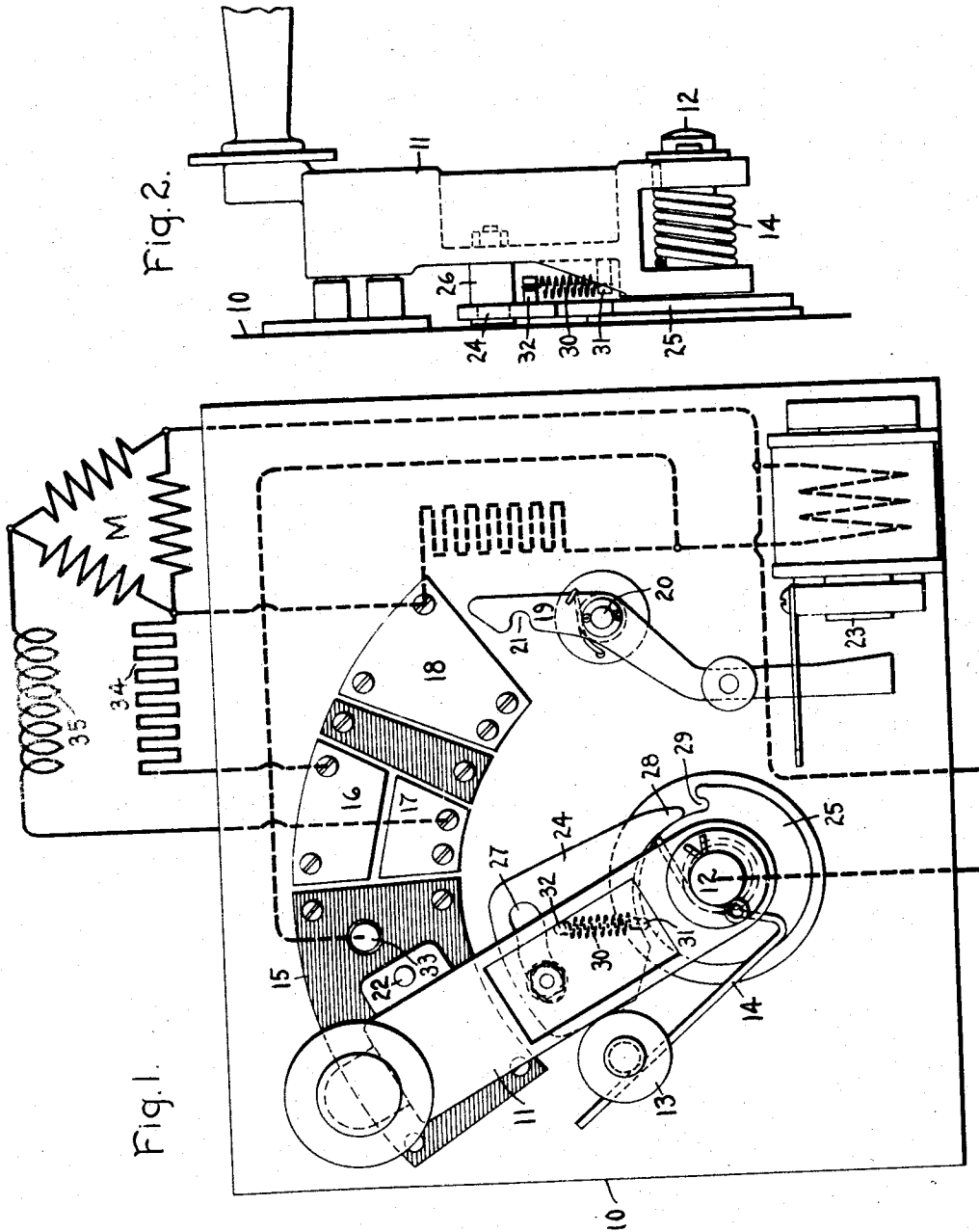


T. W. NOWELL.
MOTOR CONTROLLING DEVICE.
APPLICATION FILED MAY 19, 1911.

Patented Oct. 22, 1912.
2 SHEETS—SHEET 1.

1,041,859.



Witnesses:
F. W. E. Steers.
Marion K. Byng.

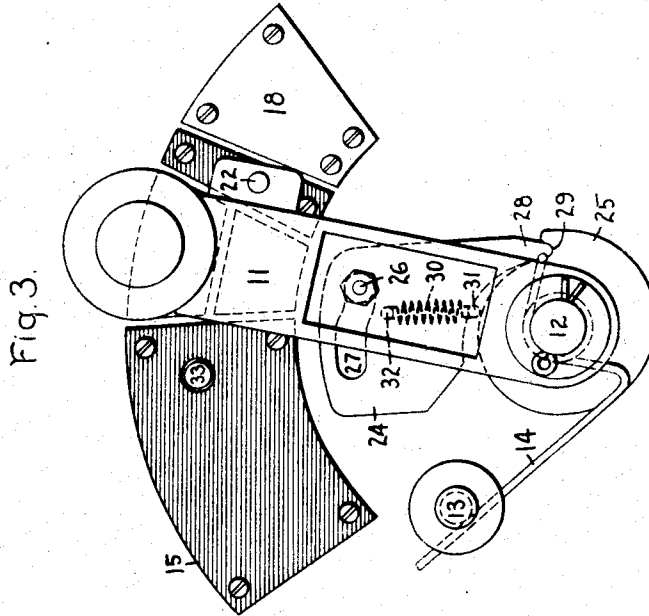
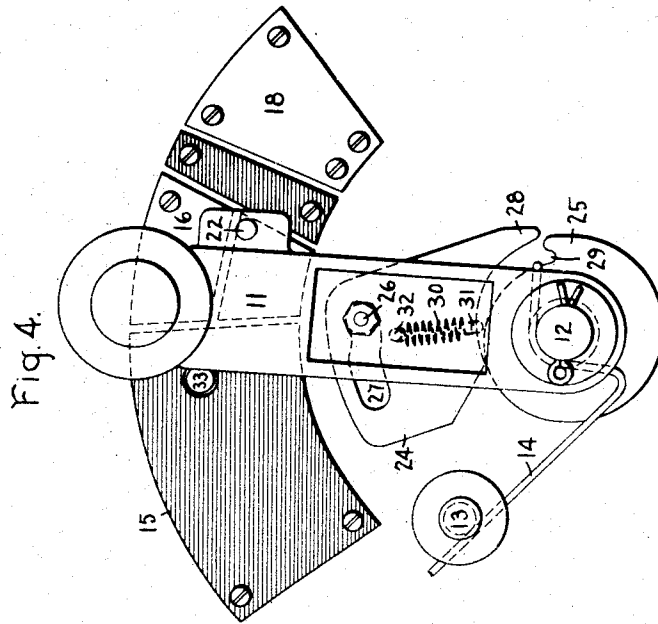
Inventor
Thomas W. Nowell,
by *Wm. D. Davis*
His Attorney.

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2 SHEETS—SHEET 2.



Witnesses:
Frederic E. Steers
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UNITED STATES PATENT OFFICE.

THOMAS W. NOWELL, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

MOTOR-CONTROLLING DEVICE.

1,041,859.

Specification of Letters Patent.

Patented Oct. 22, 1912.

Application filed May 19, 1911. Serial No. 628,163.

To all whom it may concern:

Be it known that I, THOMAS W. NOWELL, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Motor-Controlling Devices, of which the following is a specification.

This invention relates to controlling devices for electric circuits and has for its object the provision of an improved device of this character in which the speed at which the controlling operation is performed is positively limited in a simple and reliable manner.

One of the objects of my invention is to provide a controlling device with simple and positive means whereby the movement of the controlling member is automatically stopped for an instant at a predetermined point and may then be continued by the operator.

While my invention is applicable to various types of controlling devices, it is particularly well adapted for motor controlling devices of a character in which the controlling arm is moved from the initial or off position through the starting position to running position by a unidirectional movement. In the starting of motors with starting devices of this character, especially where the starting is performed in a single step, it is desirable that there be some means for preventing the operator from passing too quickly through the starting position so as to establish running connections before the motor has come up to speed.

In carrying out my invention I provide means whereby when the operator reaches the starting position, the controlling arm is positively stopped and in order that the starting arm may be continued to running position it is necessary to give the controlling arm a slight movement in a backward direction.

Other objects and purposes of my invention will appear in the course of the following specification in which I have shown my invention embodied in concrete form for purposes of illustration.

Referring to the drawings illustrating one form of my invention, Figure 1 is a plan view of my device, showing the circuit connections; Fig. 2 is a side elevation of the same; Fig. 3 is a view showing the

controlling arm in the starting position; and Fig. 4 shows the starting arm after it has been reversed far enough to permit the movement of the arm to running position.

Referring to the drawing, it will be seen that I have shown my invention in connection with the starting of a single phase motor by means of what is known as a split phase connection, but it is obvious that my invention is in no sense limited to the particular form of motor or connections for starting the same. In the drawing, therefore, 10 represents an insulating base of slate or soapstone having mounted thereon the controlling arm 11 pivoted at 12 and biased or spring pressed to the off position against the stop 13 by means of the spring 14. The contact on the controlling arm in the off position is in contact with the insulating segment 15. In the intermediate or starting position the contact arm will be simultaneously in engagement with the two conducting segments 16 and 17; while in the normal running position the contact arm will be in engagement with the conducting segment 18. In order to hold the controlling arm in running position I provide a spring pressed latch 19 pivoted at 20 and spring pressed so that the notch 21 in the end of the lever will engage with a pin 22 on the controlling arm when the latter is in running position. The opposite end of the lever projects outward so as to be engaged by the plunger 23 of the no-voltage magnet when it drops and thereby release the controlling arm and allow it to return to the off position. In this type of starting device it is desirable to prevent the operator from passing through the starting position too quickly. In other words, it is desirable that the operator be required to stop for an instant in the starting position so as to give the motor a short interval of time in which to speed up. One of the principal features of my invention, therefore, is the provision of means for accomplishing this result. To this end I provide in connection with the controlling arm a detent member 24 which is adapted to engage the stop 25 when the arm is moved to starting position. This detent is secured to the controlling arm by means of the pin 26 secured to the arm. This pin passes through a slot 27 in the detent so as to act as a pivot for the detent. The pin moves easily in the slot 27 from one

end of the slot to the other. The stop end of the detent is formed into a finger 28 which is adapted to enter the recess 29 in the stop 25. This stop is in the form of a cam disk against which the finger 28 bears. The spring 30 has one end secured to the controlling arm at 31 and its opposite end secured to the detent at 32 so as to hold it yielding into contact with the cam. The point 32 at which the spring 30 is secured to the detent is in such a position that it is on opposite sides of the pivot 26 when the latter is at opposite ends of the slot.

As shown in Fig. 1, the pivot 32 is to the right of the pivot pin, while in the position shown in Fig. 3 the pivotal point 32 is to the left of the pivot pin. In other words, the point 32 is between the lines drawn from the point 31 to the two positions occupied by the pivot pin at opposite ends of the slot. In the position shown in Fig. 1, therefore, the finger of the detent is held against the cam face of the stop, while in the position shown in Fig. 3 the spring tends to move the detent finger away from the cam face of the stop. It will be observed, however, that when the finger is against the stop the point of the finger is in the recess 29 so that the finger can not leave the face of the cam until the arm has backed the finger out of the recess.

The mode of operation of my device is as follows: With the parts in the position shown in Fig. 1, the controlling arm lever is spring pressed to the off position and the detent 24 is pressed against the stop or buffer 13 forcing the detent into the position shown in Fig. 1. In this position the spring 30 is pulling the detent into engagement with the cam face of the stop 25. As the arm is moved to the right to start the motor the contact arm engages the contact 33 which energizes the no voltage magnet so as to move the plunger 23 out of engagement with the arm of the latch 19. When the arm is moved to the position shown in Fig. 3, the starting connections are made. These connections are shown, for purposes of illustration, as being of the split phase type in which the resistance 34 and the reactance 35 are connected in parallel across one of the windings of the motor M. These connections give to the motor a starting torque. It is necessary, however, that the arm be held in this position at least for an instant in order that the motor may be started. In this position it will be observed that the finger 28 of the detent enters the recess 29 of the stop and positively prevents any further movement. As the arm moves toward the starting position the detent is in the position shown in Fig. 1. When, however, the starting finger engages the stop, the pivot pin 26 moves forward in the slot 27 until it reaches the position shown in

Fig. 3. As the pin 32 passes to the opposite side of the pivot, the tension on the detent is reversed so that with the parts in the position shown in Fig. 3, the bias or tendency of the spring is to move the finger away from the cam face of the stop. This movement, however, is restrained by the fact that the finger is in the recess 29. The operator therefore reaches the starting position in which the resistance and reactance windings are in circuit and stops. In order to get farther, however, he moves the handle back a short distance sufficient to take the finger 28 out of the recess 29. As soon as this is done the spring throws the finger into the position shown in Fig. 4. The operator is now able to continue the movement to running position, in which the arm is held by the latch 19. On failure of voltage the plunger 23 of the no-voltage magnet will be released and trip the latch 19, thereby returning the arm to the off position. As the arm strikes the buffer 13 the detent is again shifted on its pivot to the position shown in Fig. 1. The net result is that the operator can not possibly pass through the starting position without stopping and reversing slightly, which movement will take a small amount of time sufficient to enable the motor to get started.

While I have described my invention in connection with the controlling of a particular type of motor and as operating in a specific manner in accordance with the patent statutes, it should be understood that I do not limit my invention thereto, since various modifications thereof will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the annexed claims.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. A controlling device for electric circuits comprising a controlling arm, a co-operating stop and detent mechanism associated with said arm biased to lock the arm when the latter is moved to a predetermined position and means whereby the detent is biased away from the stop by the pressure of the detent against the stop and is released therefrom by a backward movement.

2. A controlling device for electric circuits comprising a controlling arm, a detent mounted thereon and biased to locking position, a recessed stop arranged to receive said detent at a predetermined point in its travel when the detent is in locking position, and means whereby the bias on said detent is reversed by the pressure of the detent in the recess so as to cause the detent to move out of the path of the stop when released from the recess.

3. A controlling device for electric circuits comprising a controlling arm, a re-

cessed stop, a detent on said arm having a locking position in which it enters the recess at a predetermined point of its travel and a releasing position in which it is out of the path of the stop, and means whereby the detent is held in locking position while the arm is being moved to said predetermined point and is biased toward releasing position by engagement with the stop so that the detent will move to releasing position when moved out of the recess.

4. A controlling device for electric circuits comprising a controlling arm, a recessed stop, a detent mounted on the arm and biased to enter the recess at a predetermined point in the travel of the arm to stop the same, and means whereby the bias on the detent is reversed by the pressure of the detent against the stop so that the detent will move out of the path of the stop when released from the recess.

5. A controlling device for electric circuits comprising a controlling arm, a pivot pin on said arm, a detent movable on said pivot to change the pivotal point thereof, a spring having one end secured to the arm and the opposite end secured to the detent

at a point between the pivotal points so that the spring will act upon opposite sides of the pivot in opposite pivotal positions of the detent, and a stop for engaging the detent in a predetermined position of said arm.

6. A controlling device for electric circuits comprising a controlling arm, a pivot pin mounted on said arm, a detent movable on said pivot to change the pivotal point thereof, a spring having one end secured to the arm and the opposite end secured to the detent at a point between lines drawn from the securing point on the arm to the opposite pivotal points, a stop for engaging the detent at a predetermined point in the travel of said arm to hold it while the pivot is moved to its opposite pivotal point, and a stop at the initial position of the arm for engaging the detent and moving it to the other pivotal point.

In witness whereof, I have hereunto set my hand this 17th day of May, 1911.

THOMAS W. NOWELL.

Witnesses:

HELEN ORFORD,
BENJAMIN B. HULL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."