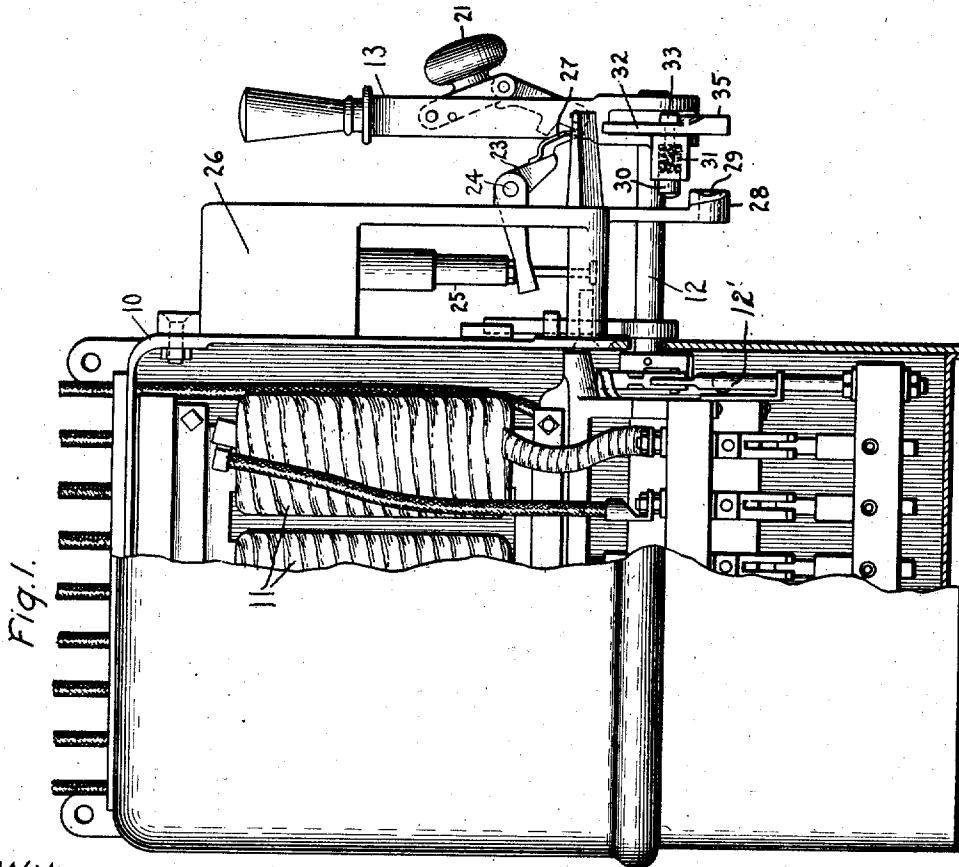
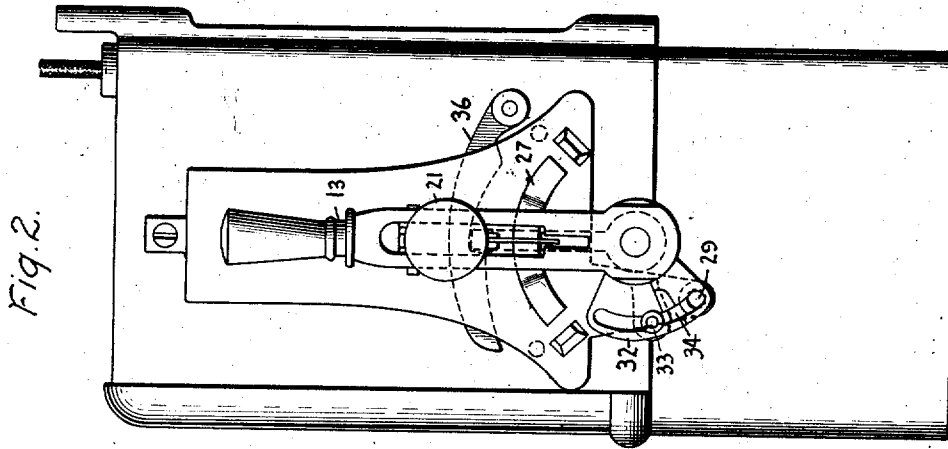


P. DUNNING.
MOTOR CONTROLLING DEVICE.
APPLICATION FILED OCT. 31, 1910.

1,019,439.

Patented Mar. 5, 1912.

2 SHEETS—SHEET 1.



Witnesses:
Irving E. Steers
J. Ellis Allen

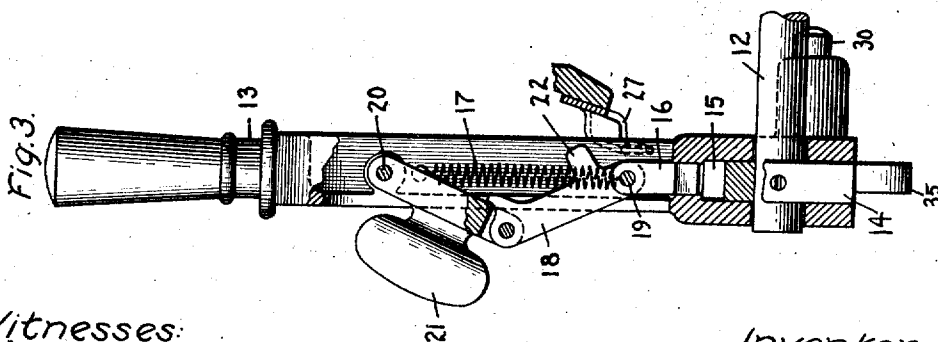
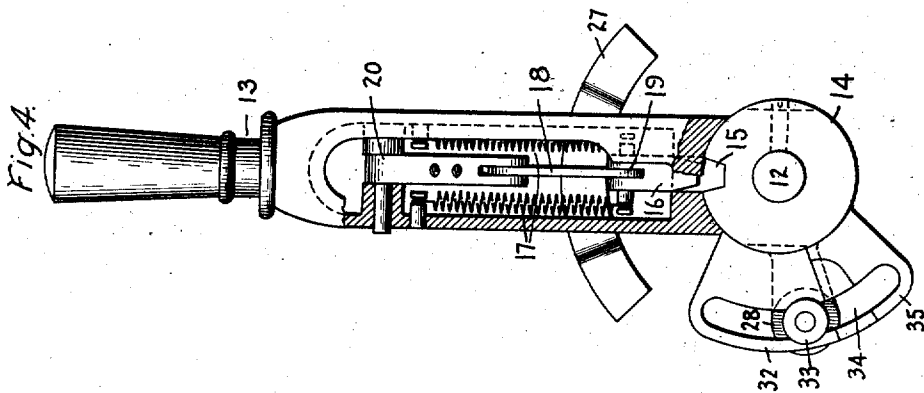
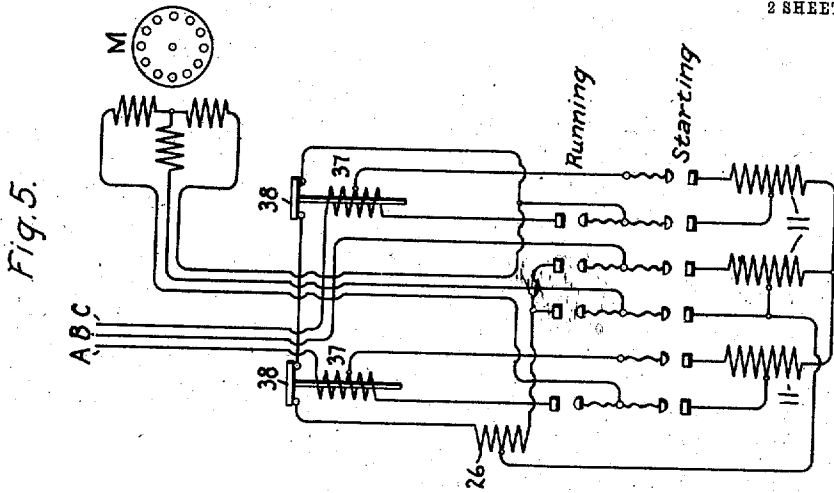
Inventor
Parker Dunning,
by *Alfred H. Davis*
His Attorney.

P. DUNNING.
MOTOR CONTROLLING DEVICE.
APPLICATION FILED OCT. 31, 1910.

1,019,439.

Patented Mar. 5, 1912.

2 SHEETS—SHEET 2.



Witnesses:
Irving E. Steers.
J. Ellis Ely

Inventor
Parker Dunning,
by *Albert H. Davis*
His Attorney

UNITED STATES PATENT OFFICE.

PARKER DUNNING, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

MOTOR-CONTROLLING DEVICE.

1,019,439.

Specification of Letters Patent.

Patented Mar. 5, 1912.

Application filed October 31, 1910. Serial No. 589,847.

To all whom it may concern:

Be it known that I, PARKER DUNNING, 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 the control of electric circuits and has for its object the provision of an improved circuit controlling device in which the opportunity for mis-handling is reduced to a minimum and which at the same time is simple in construction and efficient in operation.

My invention relates more particularly to controlling devices of the type used for controlling electric motor circuits, especially with reference to the starting of the motors and bringing them up to running speed.

My invention is particularly adapted to the starting of induction motors of the squirrel cage type in which the starting device, such for instance, as a transformer, is first connected in the motor circuit to increase the current and reduce the voltage and is afterward cut out and the motor connected directly to the supply circuit.

In my previous Patent No. 970,478, I have described and claimed a motor starting device which, while it is very satisfactory in practice, is not so well adapted to certain uses and conditions of operation as is the device of the present application. In the device of the said patent the motor is started by first throwing the handle to starting position and then to the running position, the handle being locked in the running position. Upon the occurrence of abnormal circuit conditions the handle returns to the off position. It has been found, however, that under certain conditions it is advisable to have the switch apparatus arranged so that it will return to the off position at any time, even during starting, if the abnormal circuit conditions occur.

One of the objects of my invention, therefore, is to provide a motor starting device equipped in this way.

Another object of my invention is to provide means whereby the handle which is locked in running position is released when the switch mechanism returns to off position.

Other objects and purposes of my invention will appear in the course of the follow-

ing specification, in which I have disclosed my invention embodied in concrete form for purposes of illustration.

In the drawings disclosing one embodiment of my invention, Figure 1 represents a side elevation of my device with the casing partly broken away to show the interior structure; Fig. 2 is an end view of the same; Fig. 3 shows a detail of the operating mechanism; Fig. 4 is an end view of the same; and Fig. 5 is a diagram of the circuit connections.

Referring to the drawings, 10 is the casing which incloses the compensator transformer coils 11 and the switch mechanism therefor. Within this casing the arrangement of parts is exactly the same as in my previous patent above referred to. I have shown this particular arrangement of starting device merely for purposes of illustration, although it is obvious that my invention is in no sense limited in its application to this particular device. The shaft 12, which corresponds to the operating shaft of the patent above referred to is adapted to operate the switch mechanism just as in the device of the patent by being turned first in a clockwise direction (looking at Fig. 2) and then in a counter clockwise direction. The switch mechanism is biased to the off position by the spring 12'.

In the device of the patent the operating handle is rigidly secured to the shaft and when the motor is normally running the handle is locked in running position so that in order to release the switch mechanism the handle must be released. In the present case, however, the handle 13 is loosely mounted on the shaft 12. The shaft is provided with a collar 14 which is rigidly secured to the shaft. This collar is provided with a slot 15 adapted to receive the locking dog 16 which slides up and down in guides in the handle. The springs 17 have one end secured to the dog, while the other end is fixed to the handle and normally pulls the dog out of the slot 15. A toggle mechanism 18 has one end pivoted to the dog at 19, while the other end is pivoted to the handle at 20. The upper link of the toggle mechanism is provided with a knob 21 for closing the toggle. The lug 22 is provided on the lower link of the toggle mechanism adapted to be engaged as hereinafter described to knock out the toggle. When the knob 21 is pressed inward toward the handle the dog

16 will enter the slot 15 and the shaft 12 and consequently the switch mechanism within the casing will move with the handle. In order to release the handle from the switch mechanism upon abnormal circuit conditions, I provide a trip lever 23 pivoted to the fixed portion of the frame at 24. One end of this lever is arranged to be engaged by the core 25 of the no-voltage coil 26 when it drops upon failure of voltage or upon overload. The other end of the lever is provided with an elongated strip 27 which is adapted to engage the lug 22 in any position of the handle so as to knock out the toggle. In order to secure the handle in running position, I provide a projection from the frame 28 provided with a hole 29 for the pin 30 which is mounted in an extension on the handle and slides in and out. This pin 30 is pressed outward so as to enter the hole 29 by the spring 31. When, therefore, the handle is moved to running position, the pin 30 enters the hole 29 and locks the handle in place. In order to release the handle, I provide a slotted segmental member 32 which forms a part of the collar 14. The pin 30 has a projecting shank 33 which passes through the slot 34 and has a head on its outer end. The member 32 is made thicker at 35 so as to produce the effect of a cam upon the head 33 to withdraw the pin 30 from the hole 29 against the tension of the spring 31 when the member 32 moves with reference to the pin. A pivoted latch 36 is likewise provided for making it necessary that the arm be moved rapidly from the starting to the running position. The arrangement of this latch is described in my previous patent above referred to.

The mode of operation of my device thus far described is as follows: To start the motor the knob 21 is first pushed inward toward the handle so as to set the toggle mechanism and lock the handle to the operating shaft. The handle is then first turned in a clock-wise direction to connect the transformer or compensator between the motor and the line and is then quickly turned in a counterclockwise direction to connect the motor directly to the line. When this latter position is reached the handle is held in running position by the pin 30. If during starting, however, an abnormal condition, such as an overload, appears on the line the toggle will be tripped and the switch mechanism and the shaft 12 will be returned to the off position, the handle remaining in the operator's hand and being unaffected. If while the motor is running abnormal conditions appear, the toggle will be tripped and the switch mechanism returned to the off position. In this case, however, the handle is locked in the running position, but as the switch mechanism returns to off position, the cam-shaped

portion 35 of the member 32 engages the head 33 of the pin 30 and withdraws it from the hole 29. The handle is, therefore, released and may be moved to the off position to be locked to the switch mechanism.

In Fig. 5, I have shown a diagram of the circuit connections of my device. In this diagram, A, B and C represent the three phase supply circuit which I have shown for purposes of illustration. M represents the induction motor which I have shown of the squirrel cage type and 11 represents the autotransformer or compensator. When the controlling mechanism is in the starting position the lower pairs of contacts marked "starting" will be in contact and the motor will be connected to the line through the transformer so as to increase the current and lower the voltage at the motor. When the controller is thrown to running position the upper pairs of contacts marked "running" will be in engagement and the motor will be connected direct to the line. No-voltage magnet 26 is provided with a tap connected to the starting side so that during starting the no-voltage coil will be effective at the decreased voltage. The overload coils 37 are likewise provided with an intermediate tap connected with the starting side so as to be effective during starting, as well as while the motor is normally running. The no-voltage and overload coils are tapped so that substantially one-half of the turns are in circuit during starting, since the starting voltage is about one-half the normal running voltage, while the starting current is approximately twice the running current. The overload coils are arranged to open the circuit of the no-voltage coil at the contacts 38 and the no-voltage coil in turn trips the switch mechanism.

While I have described my invention as embodied in concrete mechanism and as operating in a specific manner in accordance with the patent statutes, it should be understood that I do not limit my invention to the structure and arrangement herein shown and described, since various modifications of my invention 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. In a motor starting device, in combination, switch mechanism biased to an off position between two operative positions, an operating handle for said mechanism, means for locking the handle to the mechanism, and means responsive to abnormal circuit conditions for releasing the mechanism from the handle and allowing it to return to off position.

2. In a motor starting device, in combination,

tion, switch mechanism biased to off position, an operating handle arranged to be locked to said mechanism, means for holding the handle in running position, means responsive to abnormal circuit conditions for releasing the mechanism from the handle to allow it to return to the off position, and means for releasing the handle when said mechanism is moved to off position.

10 3. In a motor starting device, in combination, switch mechanism biased to off position, an operating handle arranged to be locked to said mechanism, means for holding the handle in running position, and means responsive to abnormal circuit conditions for releasing the mechanism from the handle and releasing the handle.

20 4. In a motor starting device, in combination, switch mechanism biased to off position, an operating handle movable independently of said mechanism, a toggle for locking the handle to said mechanism, a locking device for holding the handle in running position, means responsive to ab-

normal circuit conditions for tripping the toggle to allow the mechanism to return to off position, and means for unlocking the handle when said mechanism is moved to off position.

5. In a starting device, in combination, switch mechanism biased to an off position between two operative positions, an operating handle movable independently of said mechanism, means for locking the handle to said mechanism, a locking device for holding the handle in running position, means responsive to abnormal circuit conditions for releasing the locking means to allow the mechanism to return to off position, and means for releasing the handle when said mechanism is moved to off position.

In witness whereof, I have hereunto set my hand this 29th day of October, 1910.

PARKER DUNNING.

Witnesses:

HELEN ORFORD,
THOMAS W. NOONAN.