No. 887,442. PATENTED MAY 12, 1908.

L. L. TATUM.

CONTROLLER.

APPLICATION FILED JUNE 28, 1906.

2 SHEETS—SHEET 1.

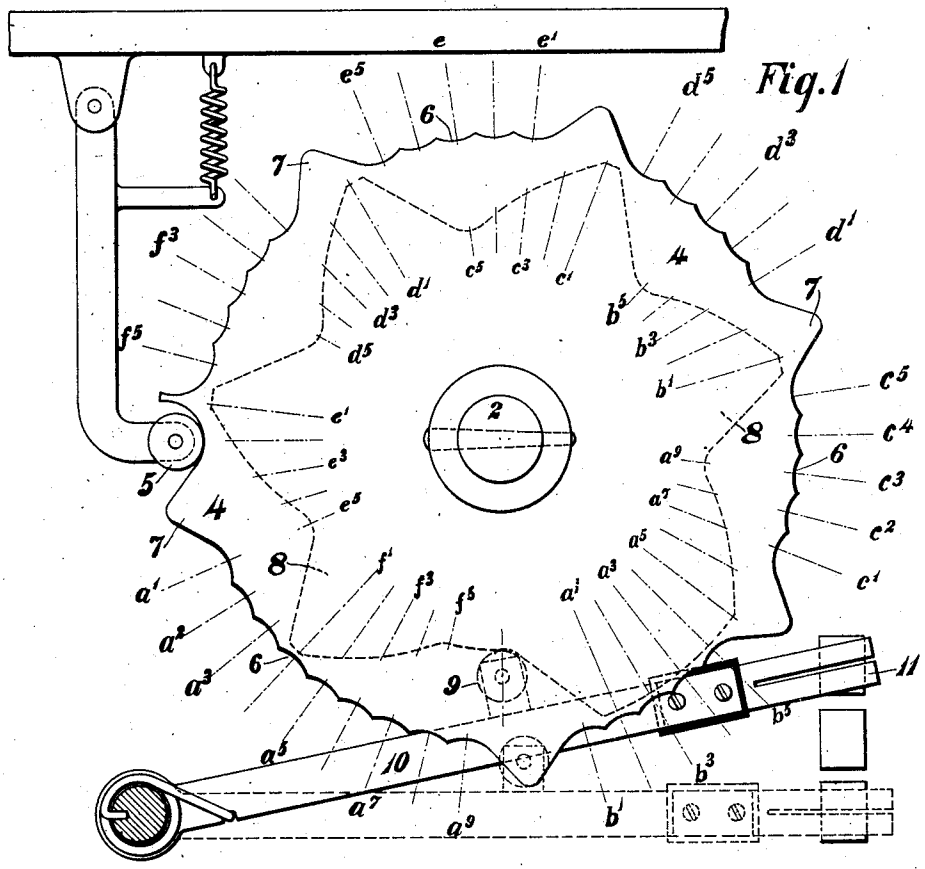


Fig. 1

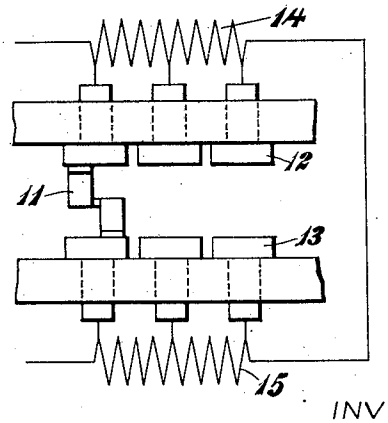


Fig. 2

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 3

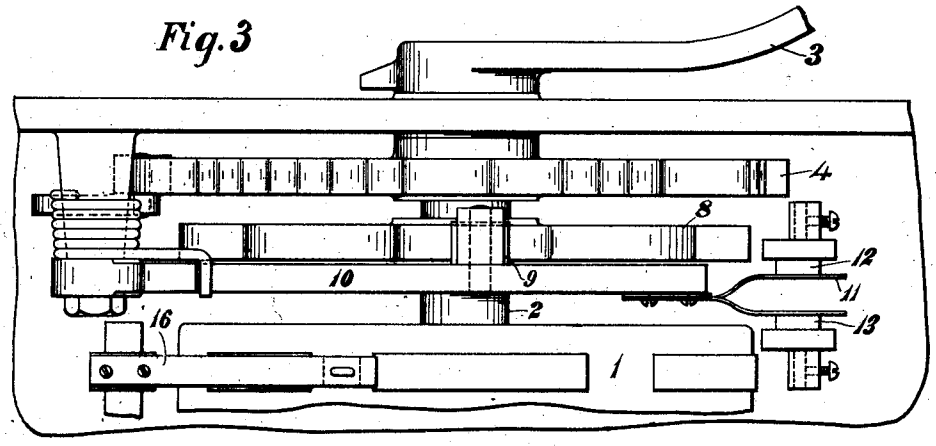
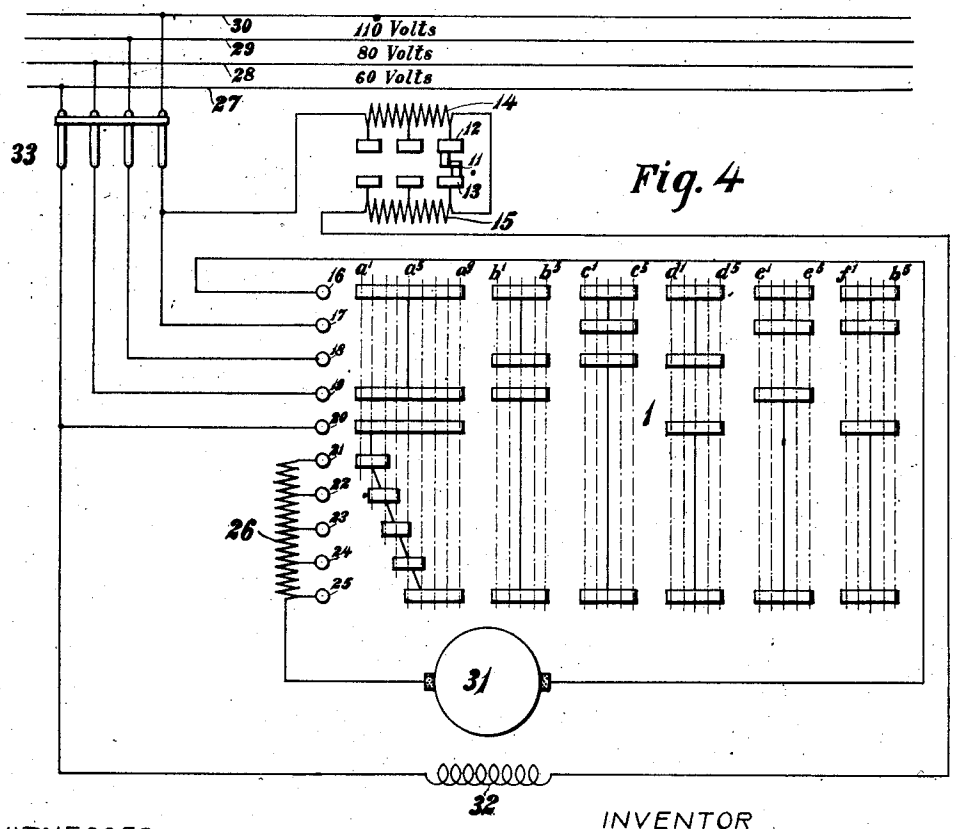


Fig. 4



WITNESSES

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UNITED STATES PATENT OFFICE.

LEWIS L. TATUM, OF NORWOOD, OHIO, ASSIGNOR TO ALLIS-CHALMERS COMPANY, A CORPORATION OF NEW JERSEY, AND THE BULLOCK ELECTRIC MANUFACTURING COMPANY, A CORPORATION OF OHIO.

CONTROLLER.

No. 887,442. Specification of Letters Patent Patented May 12, 1908.

Application filed June 28, 1906. Serial No. 323,783.

To all whom it may concern:

Be it known that I, LEWIS L. TATUM, citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Controllers, of which the following is a full, clear, and exact specification.

My invention relates to multiple-voltage controllers for electric motors.

The object of my invention is to so construct a multiple-voltage controller that the different mains may be connected to the armature as desired, that there may be a variable resistance for the field circuit, and if desired, also one for the armature circuit, and that these resistances may both be governed by the controller without requiring the controller drum to be of an undue length.

In one aspect my invention comprises a multiple-voltage controller consisting of a rotatable drum controlling the connection of the armature to the different mains of the system, and a lever movable by the drum for controlling the field resistance.

In a more specific aspect my invention comprises a multiple-voltage controller consisting of a rotatable drum, contact fingers coöperating therewith and so arranged that as the drum is rotated the armature is connected across mains of different voltages and a resistance in the armature circuit is varied, a lever movable over fixed contacts to vary a resistance in the field circuit, and a star wheel on the shaft of the controller drum arranged to move said lever as the drum is rotated.

Other features of my invention will appear from the description and drawings and will be specifically set forth in the claims.

Figure 1 is a plan view of my controller with the top cover removed. Fig. 2 is an end view of the field resistance and the lever for varying it. Fig. 3 is a front elevation of the upper part of the controller with the front casing removed. Fig. 4 is a diagram showing the connections of a controller embodying my invention.

The controller drum is represented by 1 and is mounted on a shaft 2. This drum is rotatable by the usual handle 3. On the shaft 2 is a notch plate 4, with the periphery of which a spring-pressed pawl 5 coöperates to cause the drum to stop in the proper positions. This notch plate is arranged with sets of notches 6. There is but a small distance between successive notches in the same set, thus causing a comparatively small movement of the drum while passing between different points when the armature is connected to the same set of mains, but a greater distance and large horns 7 between successive sets of notches, thus requiring a much larger movement when the controller changes the connections of the armature from one set of mains to another.

Also mounted on the shaft 2 is a star wheel 8, on the periphery of which rides a roller 9, mounted on a lever 10. The lever 10 is supported in any desired manner, as from the controller cover, and is spring-pressed toward the controller drum. By reason of the engagement between the roller 9 and the star wheel 8, this lever 10 is moved in and out as the controller drum is rotated. The end of lever 10 is provided with a split contact finger 11 preferably insulated from the lever. This finger 11 passes between and engages the sets of contacts 12 and 13, and as it is moved by the rotation of the drum, cuts in or out the field resistance sections 14 and 15, which are connected with the contacts 12 and 13. The resistances 14 and 15 are varied alternately, because the two halves of finger 11 are offset from each other, as shown plainly in Fig. 2. Thus the field resistances 14 and 15 are cut in or out in four steps. This number of steps may be varied as desired by increasing the number of sections in resistances 14 and 15 and increasing the number of contacts 12 and 13 correspondingly.

The contact fingers 16 to 25 inclusive cooperate with the contacts on drum 1, the contacts 16 and 25 being connected to two terminals of the motor armature 31, the contacts 21 to 25 inclusive being connected to different points on the armature resistance 26 and the contacts 17 to 20 being connected respectively to the different mains 27 to 30 respectively. Between each pair of adjacent mains there is a different voltage, arranged as in the well known multiple-voltage system. The field 32 of the motor is connected between the outside mains 27 and 30 and in series with the resistances 14 and 15.

When the controller is in "off" position the parts are as shown in full lines in Fig. 1. When the controller is moved into its first operative position a^1, the lever 10 is moved

into the position shown in dotted lines in Fig. 1, and the field resistances 14 and 15 are entirely cut out, while the armature 31 is connected across the mains 27 and 28 with the full armature resistance 26 in series with it. As the drum is moved forward to position a^5, the armature resistance is cut out step by step, the field resistances during this time remaining unchanged because between positions a^1 and a^5 there is no eccentricity in the star wheel 8. As the controller is moved between positions a^5 and a^9, the field resistances 14 and 15 are gradually cut into the circuit, thus decreasing the field strength of the motor and increasing its speed. When the controller is moved into position b^1 the armature 31 is connected across mains 28 and 29, thus having a higher voltage impressed on it, and at the same time the field resistances are cut out of circuit. As the controller is moved forward to position b^5, the field resistances are gradually cut into circuit, thus again weakening the motor field. The same series of operations of simultaneously connecting the motor across mains of a higher voltage and simultaneously cutting out the field resistances and then gradually cutting in said field resistances, again takes place as the controller is moved to and through each of the other sets of positions c^1 to c^5, d^1 to d^5, e^1 to e^5 and f^1 to f^5. These positions are marked in Fig. 1 for both the notch-plate 4 and the star wheel 8, and in Fig. 4 for the drum.

With the controller arranged as shown the armature resistance is not used save when the controller is connected to the lowest voltage, but it is obvious that if desired this armature resistance may be used at any or every set of positions. The field circuit of the motor is never broken by the controller but is arranged to be broken when the switch 33 is opened, this switch 33 entirely disconnecting the controller and the motor. In the controller shown the field resistances are cut in and out completely at each set of positions, but obviously either the cutting in or out may be only partial at any set of positions if such a construction is desired.

It is obvious that many modifications and substitutions may be made in the particular arrangement which I have here shown and described, without departing from the broad spirit and scope of my invention, and in the following claims I aim to cover broadly the new combinations invented by me.

What I claim as new is:—

1. A multiple-voltage controller, comprising a rotatable drum for connecting the armature of a motor between different sets of mains, and a lever pivoted eccentrically of said drum and arranged to be moved upon rotation of said drum for varying the field resistance of said motor.

2. A multiple-voltage controller, comprising a rotatable drum arranged to connect the armature of a motor between different sets of mains and to vary a resistance in the armature circuit, and a lever pivoted eccentrically of said drum and arranged to be moved upon rotation of said drum to vary the resistance in the field circuit of the motor.

3. In a multiple-voltage controller, a rotatable drum arranged to connect a motor armature across different sets of mains, and a lever pivoted eccentrically of said drum and arranged to be moved upon rotation of said drum for varying the ampere turns of the motor field magnet.

4. A multiple-voltage controller, comprising a rotatable drum arranged to connect a motor armature across different sets of mains, a star wheel on the shaft of said drum, and a lever movable by said star wheel to vary the resistance in the field circuit of the motor.

5. In combination, a rotatable drum arranged to vary a resistance in one circuit, and a lever pivoted eccentrically of said drum and arranged as said drum is rotated in one direction from off position to be reciprocated to vary the resistance in another circuit.

6. In combination, a motor, a controller therefor comprising a rotatable drum arranged to vary the voltage impressed on the motor armature circuit, and a lever pivoted eccentrically of said drum and arranged upon rotation of said drum to be moved to vary the resistance in the motor field circuit.

7. A multiple-voltage controller, comprising a rotatable drum, contact fingers with which the said drum coöperates to connect the armature of a motor across different sets of mains, a star wheel on the shaft of said drum, and a lever movable by said star wheel to vary the resistance in the field circuit of the motor.

8. A multiple-voltage controller, comprising a rotatable drum arranged to connect a motor armature across different sets of mains, and a lever pivoted eccentrically of said drum and arranged to be moved upon rotation of said drum to vary the resistance in the field circuit of said motor, and so arranged that this resistance is cut out as the controller is moved to connect the motor armature to mains of a higher voltage and is cut in as the controller is moved forward without varying the connections of the armature.

9. In combination, a motor, a rotatable drum arranged to connect the motor armature across mains of different voltages, a star wheel on the shaft of said drum, and a lever movable by said star wheel to vary the resistance in the field circuit of the motor and arranged to cut said resistance out when the controller is moved forward to connect the armature to mains of a higher voltage and to

gradually cut said resistance in again as the controller is moved forward without varying the armature connections.

10. A controller, comprising a rotatable drum for varying the connections of a motor armature, and an arm for varying a resistance in the field circuit of said motor and arranged to be reciprocated as the drum is rotated in one direction from "off" position.

11. A multiple-voltage controller, comprising a rotatable drum for connecting a motor armature between different sets of mains, and an arm for varying a resistance in the field circuit of said motor and arranged to be reciprocated as said drum is rotated.

12. In a multiple-voltage controller, a rotatable drum arranged to connect a motor armature across different sets of mains, an arm for varying the ampere turns of the field magnet of said motor, and means for reciprocating said lever as the drum is rotated.

13. In a multiple-voltage controller, a rotatable drum arranged to connect a motor armature across different sets of mains, an arm for varying the ampere turns of the field magnet of said motor, and means for reciprocating said lever repeatedly as the drum is rotated.

14. In a multiple-voltage controller, the combination of a rotatable shaft, contacts carried thereby, fixed contacts with which the contacts carried by the shaft coöperate to connect a motor armature between different sets of mains, an auxiliary member movable otherwise than around the axis of the shaft to vary the resistance in the field circuit of the motor, and a common operating handle for said shaft and said auxiliary member.

In testimony whereof I affix my signature, in the presence of two witnesses.

LEWIS L. TATUM.

Witnesses:
GEO. B. SCHLEY.
FRED J. KINSEY.