No. 813,410. PATENTED FEB. 27, 1906.

C. A. ECK.

MOTOR CONTROL.

APPLICATION FILED MAY 16, 1905.

2 SHEETS—SHEET 1.

Fig. 1

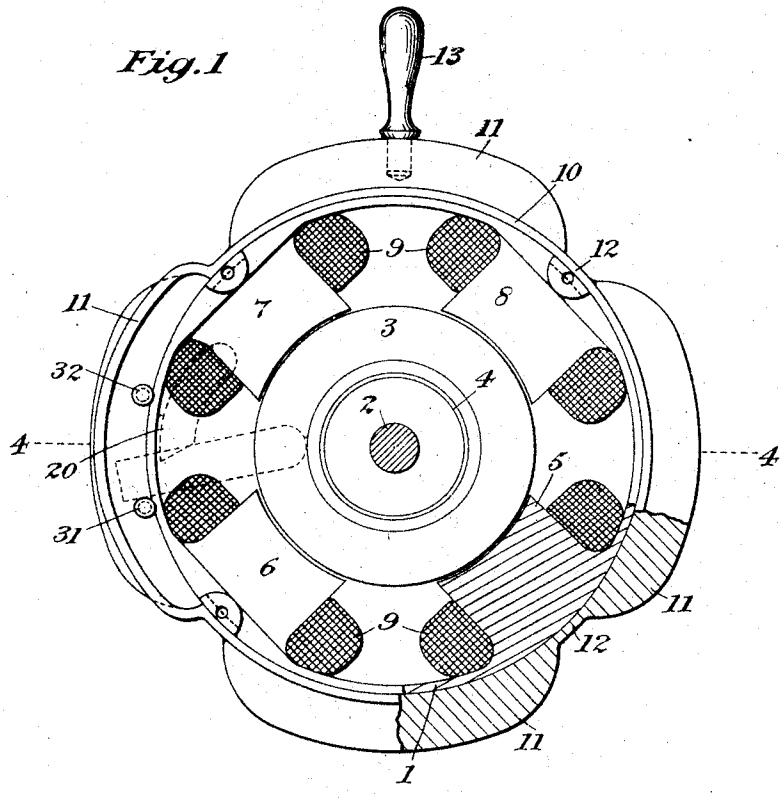


Fig. 2

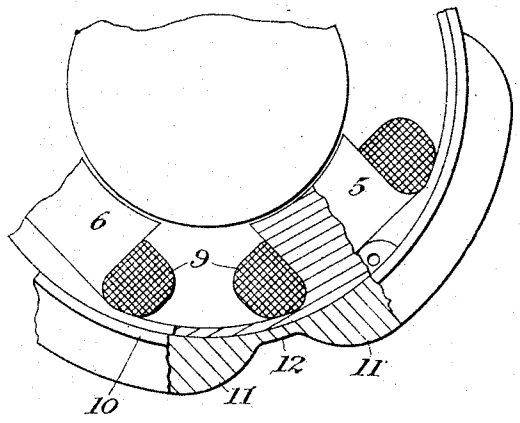
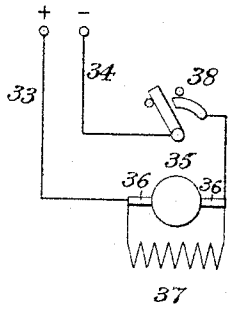


Fig. 3



Witnesses.
Chas. D. King.
Anna Kussmann.

Inventor:
Charles A. Eck
by Dewey & Spaulding
Attys.

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2 SHEETS—SHEET 2.

Fig. 4

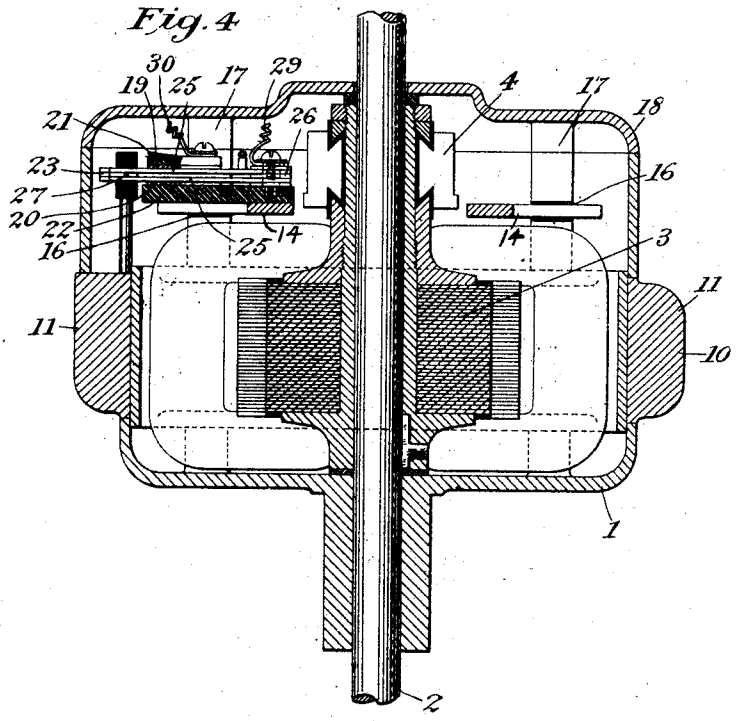
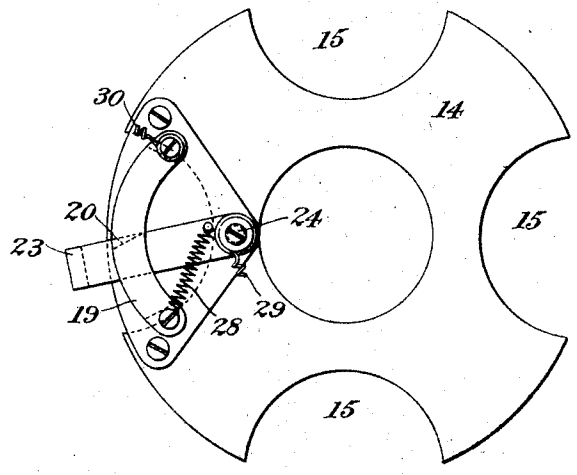


Fig. 5



Witnesses:
Chas. D. King.
Anna Wiesmann

Inventor:
Charles A. Eck
by Dickerson & Spaulding
Attys.

UNITED STATES PATENT OFFICE.

CHARLES A. ECK, OF NEWARK, NEW JERSEY.

MOTOR CONTROL.

No. 813,410. Specification of Letters Patent. Patented Feb. 27, 1906.

Application filed May 16, 1905. Serial No. 260,613.

To all whom it may concern:

Be it known that I, CHARLES A. ECK, a citizen of the United States of America, and a resident of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Motor Control, of which the following is a specification.

The present invention relates generally to motor control, and has more particularly reference to means for varying the resistance of the magnetic circuit of the motor.

The object of the invention is to provide a simple and efficient means whereby a motor can be controlled—that is, whereby the speed and power can be regulated.

To this end the invention comprises, essentially, an adjustable yoke between the poles whose sectional area varies so that when the said yoke is adjusted to one position the magnetic lines of force will flow through that portion of the yoke having a large cross-sectional area and when adjusted to another position the magnetic lines of force will flow through that portion of the yoke whose cross-sectional area is smaller.

Other features of construction and combinations of parts will appear as the specification proceeds.

In the accompanying drawings there is disclosed a structure embodying the invention; but this construction is in no wise to be construed as a limitation of the invention to the specific form set forth, as the particular means used may be widely varied without departing from the invention.

In the said drawings, Figure 1 is an end elevation of a motor embodying the invention with the interior parts exposed and partly in section and showing the yoke adjusted to the position where the magnetic lines will flow through that portion having the larger cross-sectional area—that is, the starting position. Fig. 2 is a view similar to Fig. 1, but broken away and showing the position of the yoke when greater speed is desired and when the magnetic lines of force pass through that portion of the yoke which has the smaller cross-sectional area. Fig. 3 is a diagram of the electrical circuit. Fig. 4 is a sectional view taken on line 4 4 of Fig. 1. Fig. 5 is a detail view of a member stationary on the casing and carrying the switch for the motor.

Similar numerals of reference indicate corresponding parts in the different views.

1 indicates a casing for the motor of any suitable construction and preferably cylindrical in form, as shown. Suitably supported in this casing is an armature-shaft 2, carrying the armature 3 and the commutator 4. The motor shown here has a field consisting in the present instance of four pole-pieces 5, 6, 7, and 8, provided with field-coils 9.

Mounted upon the casing and adjustable thereon is a yoke, in this instance in the form of a ring 10 and composed of a series of portions 11 of a relatively large cross-sectional area and connected by a series of portions 12 of a relatively small cross-sectional area. It will be noticed that each portion 11 is somewhat longer than the distance between the poles, so that when properly positioned, as shown in Fig. 1, it will overlap from one pole to another. This ring 10 is provided with a suitable handle, as 13, so that it may be readily adjusted by the operator.

Suitably secured in the casing is a member, as 14, which is in the form of a plate with cut-out portions, as 15, and adapted to be inserted from the end of the motor and when turned around will be properly held in the grooves 16 of the ribs 17 on the casing. The removable cover 18 is then placed over this and secured to the framework by means of screws or otherwise.

Mounted upon the member 14 are two contact-plates 19 and 20, properly insulated by means of the fiber 21 and 22 and between which two contact-plates the switch-lever 23 is adapted to play. This switch-lever is pivoted at 24 and fits snugly between the two contact-plates, so that when moved between the said two contact-plates it will remain there by reason of the fact that it is composed of two parallel bars 25, spaced apart by means of washers 26 and 27, leaving the main portion of the switch-lever resilient. This switch-lever is normally held out of engagement with the two contact-plates by means of the spring 28 and has connected to it the wire 29, while one of the contact-plates has connected to it the other wire 30. Mounted upon the adjustable yoke-ring are two stops 31 and 32.

It will now be seen that when the parts are in the position shown in Fig. 1 the motor will be in the starting position and the magnetic lines of force passing through the portion 11 having the large cross-sectional area, the mo-

tor will run at its slowest speed. If the handle 13 is now grasped and turned to the right of the figure, the stop 31 will continue to move the switch-lever between the two contact-plates, so as to keep the motor in circuit and will at the same time gradually bring the portion 12 of the yoke-ring having the small cross-sectional area into the position shown in Fig. 2, thereby gradually increasing the speed of the motor by causing the magnetic lines of force to travel through a constantly-decreasing cross-sectional area of yoke. If the handle 13 is turned in the opposite direction, then the stop 32 will gradually move the switch-lever out of contact between the two plates, and when that point is reached then the spring 28 will snap it back on a quick action, thereby reducing sparking.

In Fig. 3 the electrical circuit is shown. In this figure the line-wires are indicated by 33 and 34, the motor by 35, the two brushes by 36, and the field by 37. Interposed in one of the line-wires is the switch 38.

What is claimed is—

1. The combination with a motor having poles and an armature, of a yoke having portions of varying cross-sectional area, and means for adjusting the yoke so as to cause the magnetic lines to flow through that portion of the yoke having the large cross-sectional area or through that portion of the yoke having the small cross-sectional area at will.

2. The combination with a motor having poles and an armature, of an adjustable yoke having a portion of a large cross-sectional area of a length somewhat longer than the distance between the poles and having a portion of a smaller cross-sectional area whereby the speed of the motor can be varied by causing the lines of force to run through either of the two portions.

3. The combination with a motor having poles and an armature, of an adjustable yoke-ring having a series of portions of a large cross-sectional area, each somewhat longer than the distance between the poles, and having portions of a smaller cross-sectional area connecting the portions of the large cross-sectional area.

4. The combination with a motor having a casing, poles and an armature, of a contact-plate stationary with the motor, a switch-lever adapted to be moved into contact with said plate, a yoke-ring circumferentially adjustable on the casing and having alternating portions of large and small cross-sectional area, and means on said yoke-ring for moving the switch-lever into contact with the plate.

5. The combination with a motor having a casing, poles and an armature, of a contact-plate stationary with the motor, a switch-lever adapted to be moved into contact with said plate, a yoke-ring circumferentially adjustable on the casing and having alternating portions of large and small cross-sectional area, means on the yoke-ring for moving the switch-lever into contact with the plate when turned in one direction and out of contact with the contact-plate when turned in the opposite direction, and a spring for pulling the switch-lever away from the contact-plate on a quick action.

6. In a motor, the combination with two contact-plates, a switch-lever adapted to be moved into position between the two and fitting snugly so as to maintain the said lever in the position to which it has been moved, an adjustable yoke-ring on the casing of the motor, means carried by said ring for moving the switch-lever in between the two contact-plates and back again out of engagement between the said two plates, and a spring for returning the switch-lever to its original position after it is moved out of contact between the two plates.

7. The combination with a motor having poles and an armature, of circumferentially-adjustable means for varying the cross-sectional area of the field at a point between the poles.

8. The combination with a motor having poles and an armature, of an adjustable yoke-ring having a series of portions of large cross-sectional area and having portions of a smaller cross-sectional area connecting the portions of the large cross-sectional area, whereby the magnetic lines can be caused to flow through that portion of the yoke having the large cross-sectional area or through that portion of the yoke having the smaller cross-sectional area at will.

9. The combination with a motor having poles and an armature, of adjustable means for varying the cross-sectional area of the field at a point between the poles, and a switch adapted to be operated by the adjustment of the adjustable means.

10. The combination with a motor having poles and an armature, of circumferentially-adjustable means for varying the cross-sectional area of the field at a point between the poles, and a switch adapted to be operated by the adjustment of the circumferentially-adjustable means.

11. The combination with a motor having poles and an armature, of adjustable means for varying the cross-sectional area of the field at a point between the poles, a switch adapted to be moved by the adjustable means and so arranged that when it is thrown in the motor will run at its slowest speed and will remain closed while the said adjustable means is moved to increase the speed of the motor.

12. The combination with a motor having poles and an armature, of circumferentially-adjustable means for varying the cross-sectional area of the field at a point between the poles, a switch adapted to be moved by the circumferentially-adjustable means and so arranged that when it is thrown in the motor will run at its slowest speed and will remain closed while the said adjustable means is moved to increase the speed of the motor.

Signed at Belleville, New Jersey, this 2d day of May, 1905.

CHARLES A. ECK.

Witnesses:
FREDK. R. LATTUSE,
AXEL V. BEEKEN.