No. 750,940. PATENTED FEB. 2, 1904.

C. A. BROWN.

ALTERNATING CURRENT MOTOR.

APPLICATION FILED JULY 13, 1903.

NO MODEL.

Fig. 1

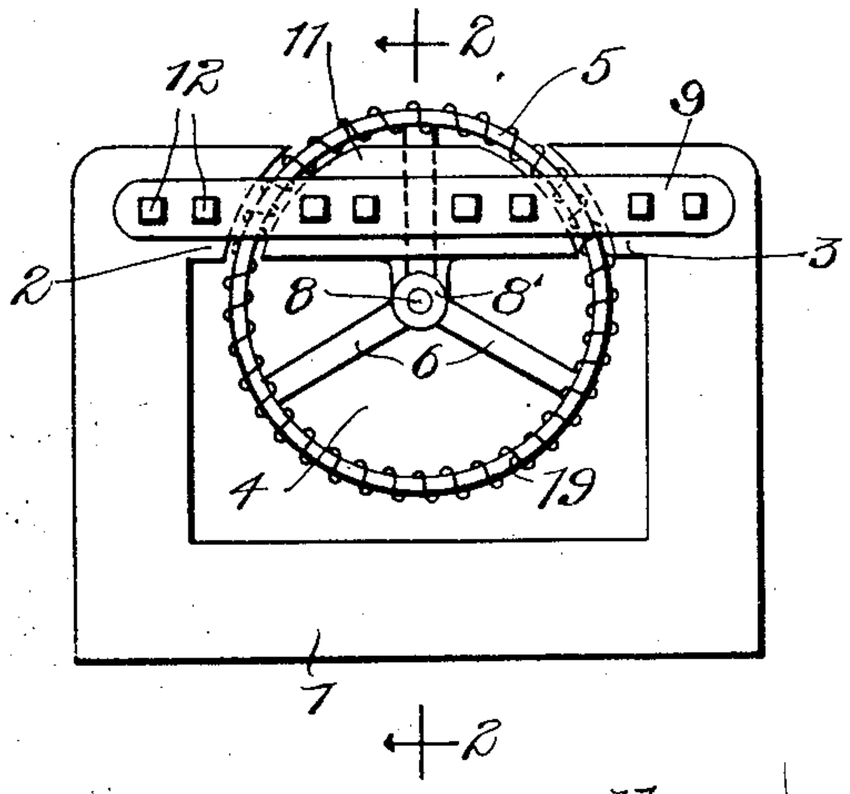
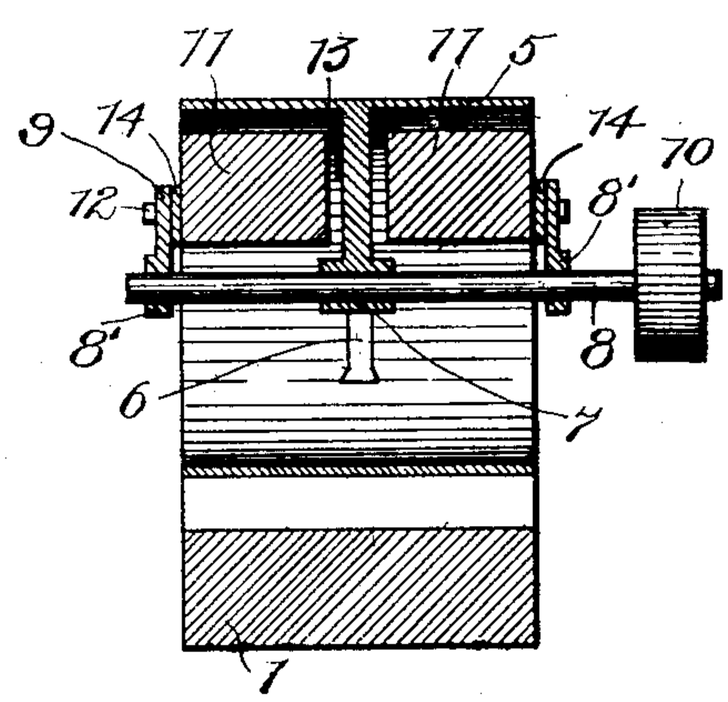


Fig. 2



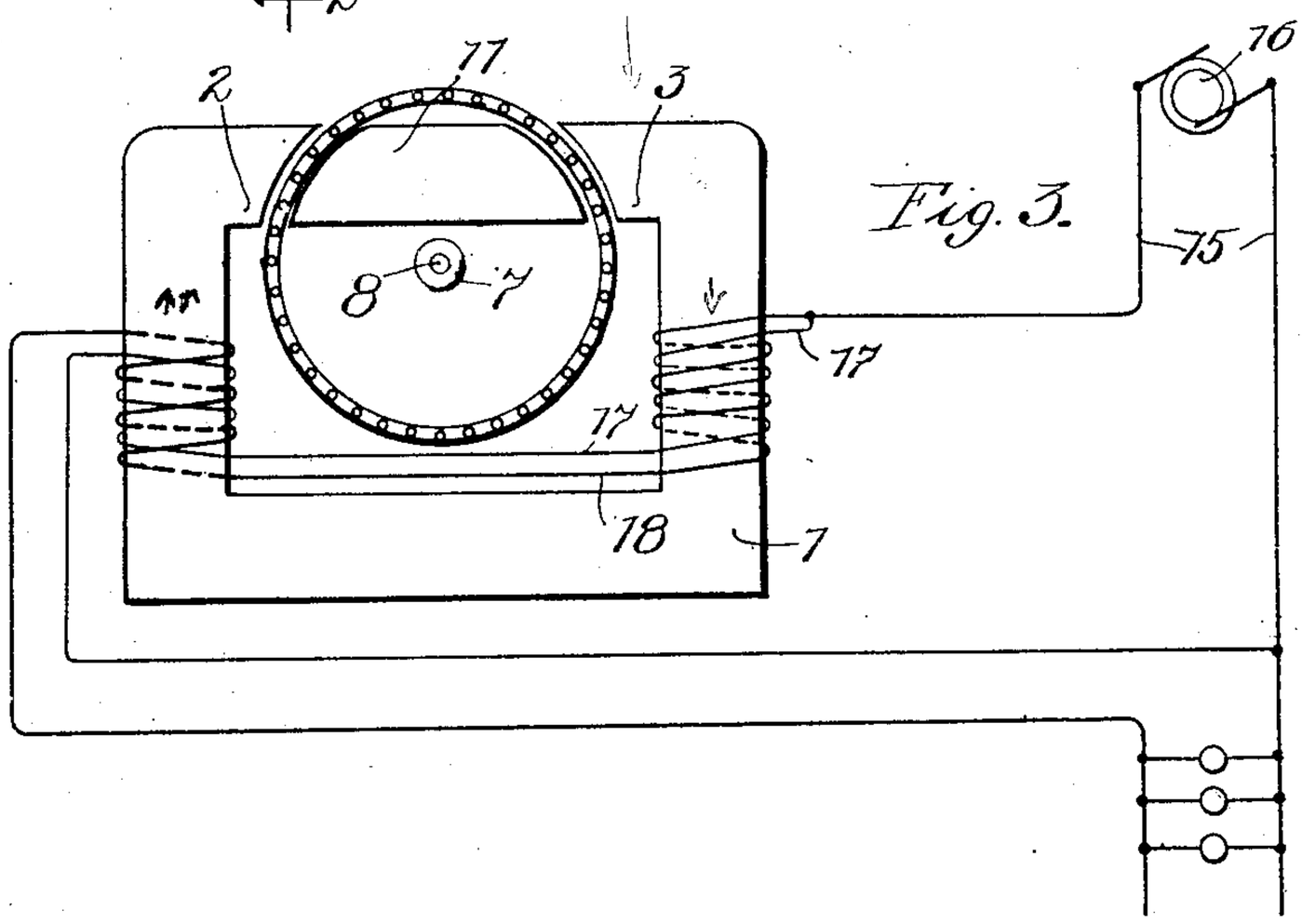


Fig. 3.

Witnesses:
Arthur H. Boettcher.
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Inventor
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No. 750,940. Patented February 2, 1904.

UNITED STATES PATENT OFFICE.

CHARLES A. BROWN, OF CHICAGO, ILLINOIS.

ALTERNATING-CURRENT MOTOR.

SPECIFICATION forming part of Letters Patent No. 750,940, dated February 2, 1904.

Application filed July 13, 1903. Serial No. 165,302. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. BROWN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Alternating-Current Motors, (Case No. 12,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to alternating-current motors, and has for its object the provision of an improved device of this class wherein the energizing-currents may produce a single magnetic field which acts upon the armature to cause rotation thereof. Heretofore in motors of this class field-windings have been provided which are displaced with respect to each other and serve to produce lines of flux which intersect and form a shifting resultant line of maximum magnetic effect in space or in the armature.

In my invention the actuation of the armature is produced by the effect of a single magnetomotive force and the field-windings are preferably disposed so that they serve to produce a single field in the field-core and a single field through the armature.

A single winding may be employed to produce a single field and torque, or several windings may be employed whose magnetic effects may be combined to form a single resultant field and torque capable of actuating the armature. Where several windings are employed, they may be so associated as to act cumulatively at one pole and opposedly at another pole of the single field, whereby poles of unequal strength are produced. The single field may also be produced by providing only one pole with one or more windings.

The distinction between the device of my invention herein shown and devices of this class heretofore known and used is that in prior devices where several energizing-circuits are used each energizing-circuit acts to cause a state of stress in the space occupied by the armature and the state of stress caused by each of the energizing-circuits is displaced in position with reference to that produced by the other energizing-circuits. In the device of my invention, however, the state of stress in the armature which is the cause of rotation is produced by the magnetic flux due to a single energizing-winding or to the conjoint effect of the currents in the windings where more than one is used, and this stress operates upon the armature in a single or common area—that is, the magnetic effects due to the energizing-winding or correlated windings are not effective in different areas upon the armature.

In one embodiment of my invention one of the windings may be superposed upon the other, so that they may have a common magnetizing effect upon the same portion of the magnetic core about which they are disposed. The same effect may obviously be secured in other ways, the purpose being to direct the magnetic flux due to the currents in the windings through substantially the same magnetic path to create a single field.

By means of my invention I am enabled to do away with all supplemental phase-changing coils and other accessories necessary in the operation of motors of the prior art, and I can thus produce a motor which is simple and efficient, requiring little attention and care.

I will explain my invention more fully with reference to the accompanying drawings, in which—

Figure 1 is an end elevation view of one form of construction embodying my invention. Fig. 2 is a vertical sectional view through line 2 2 in Fig. 1. Fig. 3 is a diagrammatic view showing a circuit arrangement of the windings associated with the motor.

Like characters of reference refer to like parts throughout the figures.

A field-core 1 is of U shape and has inwardly-extending field-poles 2 and 3. An armature 4 in the shape of a cylindrical shell 5 is adapted

to rotate between the poles 2 and 3 in the path of the magnetic flux between said poles. The cylindrical shell 5 is supported on spokes 6 6, extending from a hub 7. A shaft 8, to which the hub is secured, is mounted in bearings 8′ 8′, supported from cross-pieces 9 9, extending between and bolted to the sides of the poles 2 and 3. These cross-pieces 9 9 are preferably of non-magnetic material. The shaft may extend a distance at one side of the motor to receive a driving-pulley 10. To complete the magnetic circuit through the U-shaped core 1, I provide additional core-pieces 11 11, these additional core-pieces forming extensions of the poles 2 and 3 and disposed upon the interior of the cylindrical shell. These core-pieces 11 11 may be supported from the cross-pieces 9 by means of bolts 12 12 and extend toward each other into the cylindrical shell, a small space 13 intervening between their ends, however, to allow passage therebetween of the spokes 6. The magnetic flux passing between the poles 2 and 3 acts upon the cylindrical shell to cause rotation of the armature, and to prevent the direction of actuation of this force from passing through the armature center to establish a so-called "dead-center" I cause the armature center to be displaced by raising or lowering the bearings 8′, so that the armature-hub 7 clears both the core-pieces 11. I preferably lower the bearings 8′, however, to lower the armature into the bend of the U-shaped core. By this position the armature is almost entirely protected and also a more compact motor secured. The magnetic forces acting upon the armature-shell thus act on a line which does not pass through the armature center. To allow sufficient clearance for the armature-shell, thin distance-pieces 14 14 may be interposed between the cross-pieces 9 and the core parts.

In Fig. 3 I have shown an arrangement of the energizing-windings which connect with an alternating-current circuit 15, fed from a source 16, a shunt-winding 17, and a series winding 18 encircling both limbs of the core. It will be observed that the windings are so disposed upon the core that the series winding and the shunt-winding coöperate at one pole and are opposed, in effect, at the other pole. The two magnetomotive forces produced by the currents in the two windings combine and produce a single field in the iron core and a single field through the cylindrical shell, thus causing the armature to rotate. The armature may be provided with a short-circuited winding 19, as illustrated in Fig. 1, or it may be of the short-circuited squirrel-cage type, as indicated in Fig. 3.

Although I have shown an arrangement of energizing-windings, I do not wish to be limited to the precise arrangements shown, as such energizing-windings may be arranged in a variety of ways without departing from the scope or spirit of the invention.

I claim as new, however, and desire to secure by Letters Patent—

1. In an alternating-current motor, the combination with two energizing-circuits serving to carry currents adapted to produce magnetic flux following substantially the same magnetic path, of an armature in inductive relation to said circuits, and a short-circuited winding on said armature, substantially as described.

2. In an alternating-current motor, the combination with an armature provided with a short-circuited winding, of a field-core associated therewith, and energizing-windings on said core in inductive relation with said armature, said energizing-windings being disposed upon said core so that they coöperate at one pole and are opposed in effect at the other pole of the core, substantially as described.

3. In an alternating-current motor, the combination with a U-shaped core, of an armature in the shape of a cylindrical shell disposed between the poles of said core in the bend thereof, a short-circuited winding on said core, a continuation of said core upon the inside of said shell for completing the magnetic circuit through said core, said shell being adapted to rotate between said core parts to intercept the magnetic flux flowing therethrough, and means for creating a single magnetic field through said core parts and the part of the shell between said core parts whereby the armature is caused to rotate, substantially as described.

4. In an alternating-current motor, the combination with a U-shaped core, of an armature in the shape of a cylindrical shell disposed between the poles of said core, a continuation of said core upon the inside of said shell for completing the magnetic circuit through said core, said shell being adapted to rotate between said core parts to intercept the magnetic flux flowing therethrough, the axis of rotation of said armature being vertically displaced from the path of said magnetic field, and means for creating a single magnetic field through said core parts and the part of the shell between said core parts whereby said armature is caused to rotate, substantially as described.

5. In an alternating-current motor, the combination with a field-core, of an armature disposed in the path of the magnetic flux between the poles of said core, a short-circuited winding upon said armature, and energizing-windings for said field-core for causing a single

field through said core and said armature whereby said armature is rotated, substantially as described.

6. In an alternating-current motor, the combination with a field-core, of an armature disposed in the path of the magnetic flux between the poles of said core, a short-circuited winding for said armature, and energizing-windings for said field-core for causing a single field through said core and said armature, the axis of rotation of said armature being displaced from the path of the magnetic flux between the poles of said core, substantially as described.

In witness whereof I hereunto subscribe my name this 11th day of July, A. D. 1903.

CHARLES A. BROWN.

Witnesses:

JOHN STAHR,

HARVEY L. HANSON.