

K. KUHLMANN & H. MÜLLER.
INDUCTION MOTOR.
APPLICATION FILED MAR. 27, 1906.

1,019,491.

Patented Mar. 5, 1912.

Fig. 1.

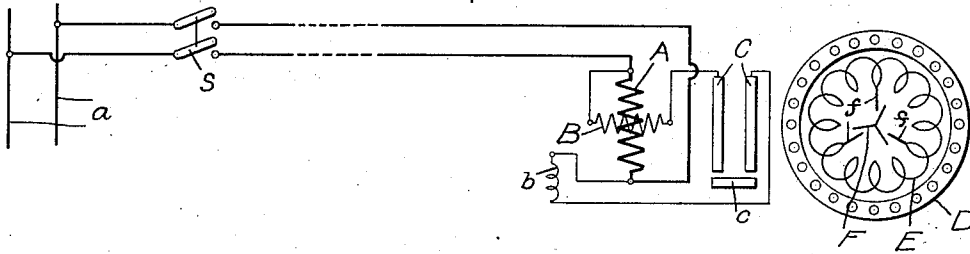


Fig. 2.

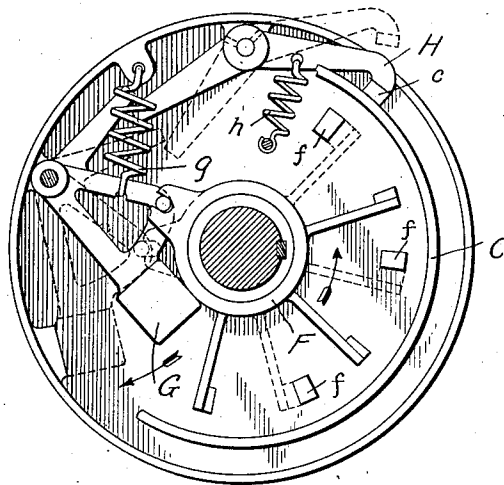
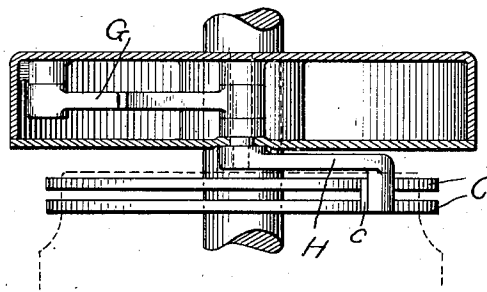


Fig. 3.



WITNESSES.

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UNITED STATES PATENT OFFICE.

KARL KUHLMANN, OF BERLIN-PANKOW, AND HEINRICH MÜLLER, OF BERLIN, GERMANY, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

INDUCTION-MOTOR.

1,019,491.

Specification of Letters Patent.

Patented Mar. 5, 1912.

Application filed March 27, 1906. Serial No. 308,269.

To all whom it may concern:

Be it known that we, KARL KUHLMANN, a subject of the Emperor of Germany, residing at Berlin-Pankow, Germany, and HEINRICH MÜLLER, a subject of the Emperor of Germany, residing at Berlin, Germany, have invented certain new and useful Improvements in Induction-Motors, of which the following is a specification.

Our invention relates to induction motors, and more especially to single-phase motors; and its object is to provide an improved form of starting device.

In order to prevent a heavy flow of current at starting, it is desirable to have a high resistance in the secondary circuit of an induction motor, which should be cut out when the motor is up to speed. For this purpose automatic centrifugally-actuated devices have been employed heretofore either to short-circuit a resistance in series with the secondary winding or to close the circuit of an auxiliary secondary winding. In order to make single-phase induction motors self-starting, it is necessary to arrange them with special connections at starting, either with a special starting winding or with phase-splitting devices, or both. The starting connections are broken and running connections established when the motor is up to speed. This has been accomplished heretofore both manually and automatically.

Our invention, in one aspect, consists in the combination with an alternating current motor having different connections of the primary member for starting and for running and having two secondary windings, one a starting winding and the other a running winding, automatic means serving to change the primary connections and also to short-circuit the secondary running winding.

Our invention also comprises a number of other features which will best be understood by reference to the accompanying drawings, in which—

Figure 1 shows diagrammatically the circuit connections of a single-phase induction motor arranged in accordance with our invention; and Figs. 2 and 3 show the construction of the automatic starting device.

In the drawings, A represents the main primary winding of the motor, adapted to be connected through the main switch S to

a source of alternating-current indicated by the conductors *a*.

B represents the auxiliary starting winding connected in parallel with the main winding and having in series with it the phase-shifting device *b*.

C represents stationary collector rings connected in series with the auxiliary winding B.

c represents a contact carried by the rotor and arranged at starting to bridge the collector rings C, so as to close the circuit of the starting winding B.

The rotor or secondary member is shown provided with two windings,—one a squirrel-cage starting winding D of high resistance; the other an open-circuited coil running winding E of low resistance.

F represents a switch carried by the rotor and adapted to engage the contacts *f f* connected to the low-resistance winding E, so as to short-circuit this winding when the motor is up to speed.

The mechanical construction of the automatic device controlling both the contact *c* and the switch F is shown in Figs. 2 and 3. The contact *c* is carried by a pivoted lever H, which is normally held by a spring *h* in the position shown in Fig. 2, so as to press the contact *c* into engagement with the collector rings C, which may be supported upon and insulated from a bearing of the motor, as indicated in dotted lines in Fig. 3. The switch member F consists of a sleeve loosely mounted on the shaft and provided with projecting contact members adapted, when moved to the position shown in dotted lines, to engage the stationary contacts *f*, which are connected to points on the low-resistance winding, as shown in Fig. 1. The member F is engaged by a pin on the centrifugally-actuated member G. At starting this member is held by a spring *g* in the position shown in full lines, thereby holding the switch member F out of engagement with the contacts *f*. When the motor reaches a predetermined speed, the member G is thrown outward by centrifugal force, as indicated by the arrow into the position shown in dotted lines, thereby shifting switch member F into the dotted-line position so as to short-circuit the low-resistance secondary winding; and at the same time an arm of member G engages the pivoted lever

H, shifting it to the dotted-line position; thereby raising contact *c* from collector rings C and opening the circuit of the starting winding B. In this manner a single device serves both to make the necessary changes in the primary circuit from starting to running connections, and at the same time to decrease the effective resistance in the secondary when the motor is up to speed.

10 Since the centrifugal device does not engage the lever H until it begins to move outward, the contact *c* is held by its spring firmly on the collector rings until it is lifted quickly at the proper moment.

15 We do not desire to limit ourselves to the particular construction and arrangement of parts here shown, but aim in the appended claims to cover all modifications which are within the scope of our invention.

20 What we claim as new and desire to secure by Letters Patent of the United States, is:

1. In combination with an alternating current motor having different connections of the primary member for starting and running and having two secondary windings, one a starting winding and the other a running winding, automatic means serving to change the primary connections and also to short-circuit the secondary running winding.

2. In combination with an alternating current motor having different connections of the primary member for starting and for running and having two secondary windings, one a squirrel-cage starting winding of high resistance and the other a running winding of low resistance, automatic means serving to change the primary connections and also to short-circuit the secondary running winding.

3. In a single phase motor, a primary member having a main winding and a starting winding, a secondary member having a starting winding and a running winding, and automatic means serving to cut the primary starting winding out of circuit and also to short-circuit the secondary running winding.

4. In a single phase motor, a primary member having a main winding and a starting winding, a secondary member having a squirrel-cage starting winding of high resistance and a running winding of low resistance, and automatic means serving to cut the primary starting winding out of circuit and also to short-circuit the secondary running winding.

5. In combination with an alternating-current motor having different connections of the primary member for starting and for

running and having two secondary windings, one short-circuited and of high resistance and the other open-circuited and of low resistance, automatic means arranged both to change the primary connections and to close the circuit of the low-resistance secondary winding when the motor is up to speed.

6. In combination with an alternating current motor having different connections of the primary member for starting and for running and having two secondary windings, one short-circuited and of high resistance and the other open-circuited and of low resistance, centrifugally-actuated means arranged both to change the primary connections and to close the circuit of the low-resistance secondary winding when the motor is up to speed.

7. In an induction motor, a main primary winding, a starting winding, a high-resistance short-circuited secondary winding, a low-resistance open-circuited secondary winding, and a centrifugally-actuated device arranged to open the circuit of the starting winding and to close the circuit of the low-resistance secondary winding when the motor is up to speed.

8. In an induction motor, a stator and a rotor, a starting winding, stationary collector rings in circuit with said winding, a contact carried by the rotor adapted to bridge said rings, other contacts carried by the rotor adapted to vary the effective resistance of the rotor, and a centrifugal device carried by the rotor and controlling both contacts.

9. In an induction motor, a starting winding, stationary collector rings in circuit with said winding, a contact carried by the rotor adapted to bridge said rings, and a centrifugal device carried by the rotor and controlling said contact but separate therefrom.

10. In an induction motor, a starting winding, stationary collector rings in circuit with said winding, a contact movably carried by the rotor and adapted to bridge said rings, means for holding said contact in engagement with said rings at starting, and a centrifugal device arranged to be out of engagement with said contact at starting, but when moved by centrifugal force to engage and shift said contact.

In witness whereof, we have hereunto set our hands this 12th day of March, 1906.

KARL KUHLMANN.
HEINRICH MÜLLER.

Witnesses:

JULIUS RUMLAND,
KARL ROCKEBEN.