F. WERNER.

ELECTRICAL MACHINE.

APPLICATION FILED APR. 17, 1915.

1,176,632.

Patented Mar. 21, 1916.

3 SHEETS—SHEET 1.

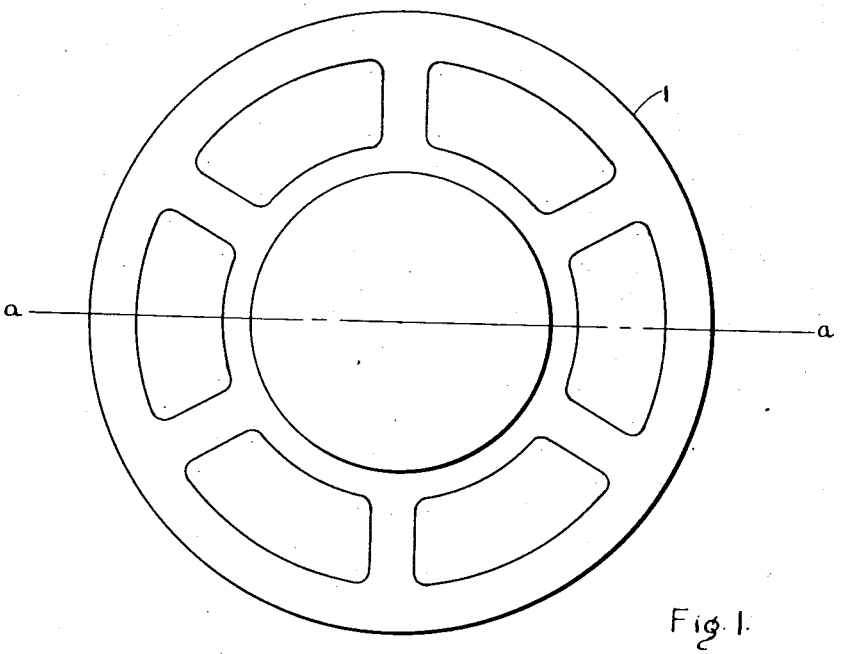

Fig. 1.

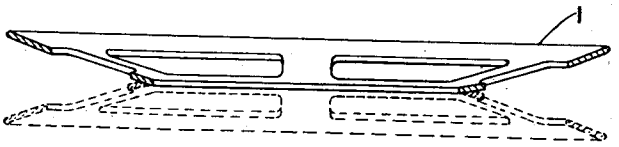

Fig. 2.

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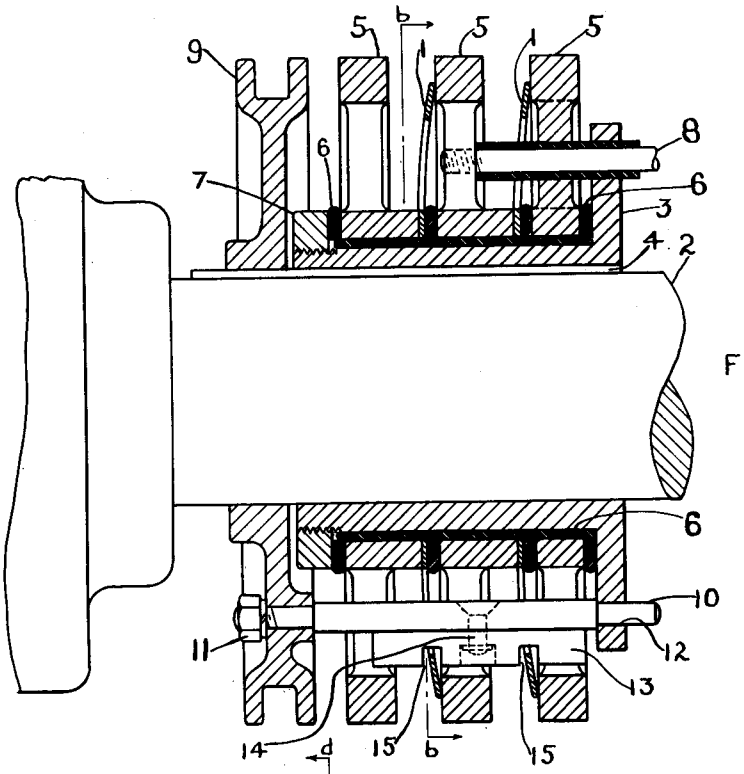

Fig. 3.

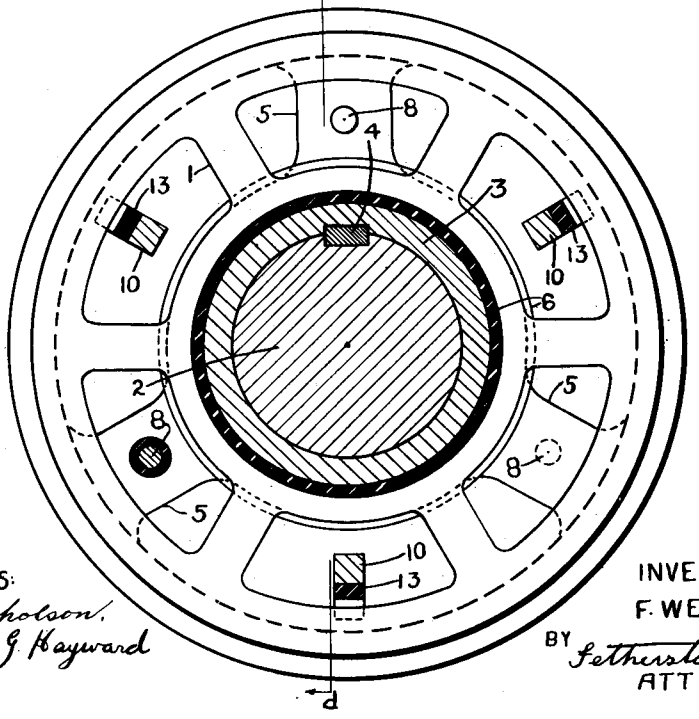

Fig. 4.

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3 SHEETS—SHEET 3.

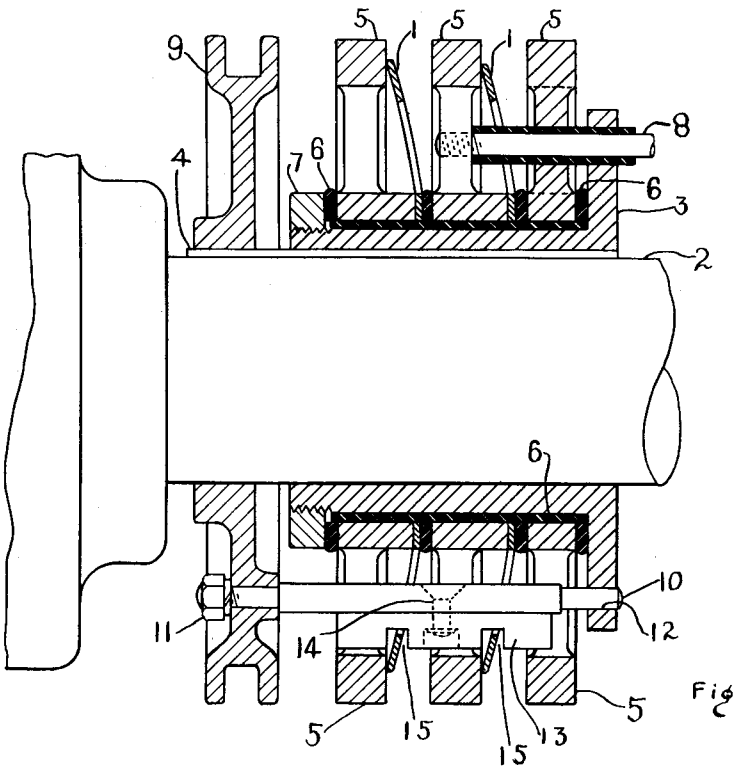

Fig. 5.

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UNITED STATES PATENT OFFICE.

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ELECTRICAL MACHINE.

1,176,632. Specification of Letters Patent. Patented Mar. 21, 1916.

Application filed April 17, 1915. Serial No. 22,058.

To all whom it may concern:

Be it known that I, FRITHJOF WERNER, of the city of Hamilton, in the county of Wentworth, Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Electrical Machines, of which the following is a specification.

My invention relates to improvements in electrical machines and more particularly to a device for short circuiting the collector rings of a collector type induction motor and the object of the present invention is to devise a switch for this purpose which will produce a more compact collector and short circuiting device and also reduce the overall length of the motor.

A further object is to produce a cheaper, combined collector and short circuiting device; and a further object is to devise means for obtaining a better contact surface in the short circuiting device.

My invention consists of the parts constructed and arranged as hereinafter more particularly described and illustrated in the accompanying drawings in which:—

Figure 1 shows a plan view of a dish spring switch constructed according to my invention. Fig. 2 shows a sectional elevation of Fig. 1 on the line *a—a*, the switch being shown in its two positions. Fig. 3 is a sectional elevation of Fig. 4 on the line *d—d*, showing the collector in the short circuited position in the case of a 3-phase machine. Fig. 4 is a sectional plan of Fig. 3 on the line *b—b*. Fig. 5 is a sectional elevation of Fig. 4 on the line *d—d*, showing the collector in the open position.

Like characters of reference indicate corresponding parts in the different views.

1 is a dish spring switch.

2 is the rotor shaft.

3 is a bushing keyed to the shaft 2 by means of the key 4.

5 are the collector rings carried by the bushing 3 and insulated therefrom and from each other by the insulating material 6.

1 are dish spring switches held between the collector rings as shown in Figs. 3 and 5.

7 is a nut threaded on to the bushing 3 and adapted to hold the switches and collector rings in place.

8 are insulated rods for connecting the collector rings to the rotor leads.

9 is a shifting collar having sliding engagement on the shaft 2 and being held from rotating relatively to the shaft 2 by means of the key 4.

10 are shifting rods having a reduced portion at each end, one end of the rods 10 is held firmly in the shifting collar 9 by means of the nut 11 the other end has sliding engagement in the bushing 3 as shown at 12. These rods carry the hard fiber shifting blocks 13 securely fastened thereto by the sunk rivets 14.

15 are slots in the blocks 13 which are adapted to engage the dish spring switches 1.

The dish spring switch is punched, or otherwise cut out from a thin hard rolled metal plate of which Fig. 1 shows a plan view, it is then dished up and the outer edges rounded off to the shape shown in full lines in Fig. 2. It will readily be seen that this dish spring switch will have two positions of natural equilibrium, viz: that shown in full lines and that shown in dotted lines in Fig. 2.

The operation of my device is as follows: Since it is necessary when starting the motor to have a resistance in series with the rotor, before starting the motor the collar 9 is moved to the left. This puts the collector into the open circuited position as shown in Fig. 5. When the motor is started the current passes along the insulated rods 8, to the collector rings 5 then through the brushes (not shown in the drawings) to the resistance. As the motor speeds up the resistance is gradually cut out until at full load speed the resistance is completely cut out. The collar 9 is then moved to the right which puts the dish spring switches into their second position of natural equilibrium in which they bear against the collector rings 5 as shown in Fig. 3 in which it will be seen that the collector is completely short circuited since the collector rings are all put into conducting communication with each other.

It will thus be seen that I have devised a very simple and effective means by which the collector rings may be short circuited and one which is very compact and greatly reduces the length of the motor. Further the contact obtained by my switch is most perfect since I provide a contact surface all the way around each collector ring.

Many modifications may be made in my invention without departing from the spirit

of the same or the scope of the claims and the form shown is to be taken as illustrative and not in a limiting sense.

What I claim as my invention is:—

1. In the collector of an electric machine, collector rings, dish springs suitably mounted between adjacent collector rings, said springs being adapted to assume two positions of positive and natural equilibrium, in which positions they respectively short circuit and open the collector circuit and means for controlling the movement of the dish springs.

2. In a collector type induction motor, collector rings, a plurality of dish springs suitably mounted between adjacent collector rings so as to be in conducting communication with one ring but to be insulated from the other ring, the dish springs being adapted to assume either of two positions of positive and natural equilibrium in which positions they respectively short circuit and open the collector ring circuit and means for controlling the movement of the dish springs.

3. In a collector type induction motor, collector rings, a plurality of dish springs, each having a central aperture therein, and being rigidly mounted on the collector shaft between adjacent collector rings, each spring being so secured that it is in conducting communication with one collector ring and insulated from the adjacent ring, the dish springs being adapted to assume either of two positions of positive and natural equilibrium in which positions they respectively short-circuit and open the collector ring circuit, and means for controlling the movement of the dish springs.

4. In a collector type induction motor the combination of collector rings, dish springs suitably mounted between the rings and means adapted to move the springs into such positions as to respectively short circuit or open the collector ring circuit.

5. In a collector type induction motor collector rings a dish spring, having a central aperture therein and rigidly mounted on the collector shaft between the collector rings so as to be in conducting communication with one ring but to be insulated from the other ring, the dish spring being adapted to assume either of two positions of positive and natural equilibrium in which positions it respectively short circuits or opens the collector ring circuit and means for controlling the movement of the dish spring.

FRITHJOF WERNER.

Witnesses:
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