No. 771,269. PATENTED OCT. 4, 1904.

H. G. REIST.

CENTRIFUGAL SWITCH.

APPLICATION FILED MAR. 26, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

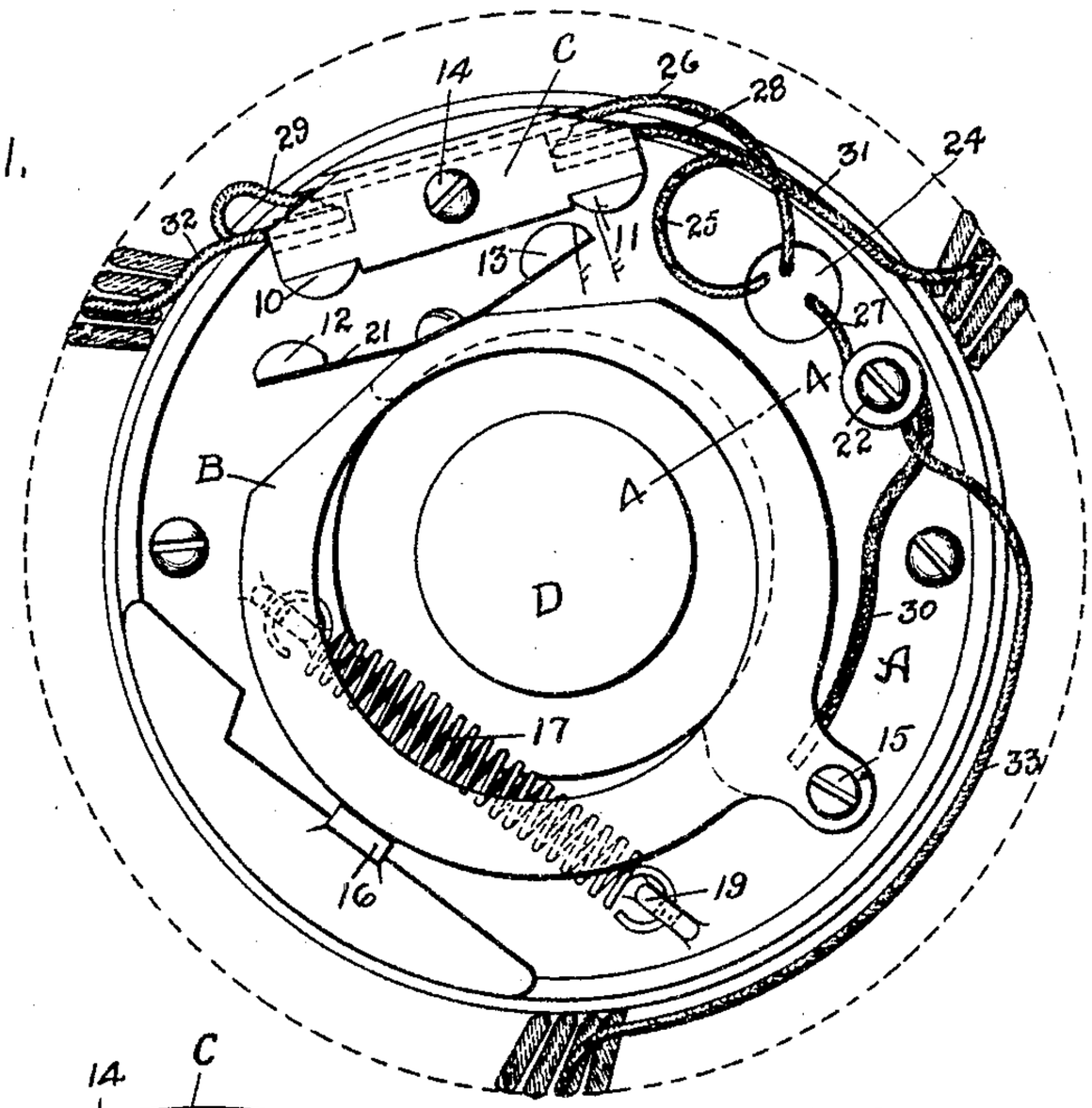



Fig. 2.

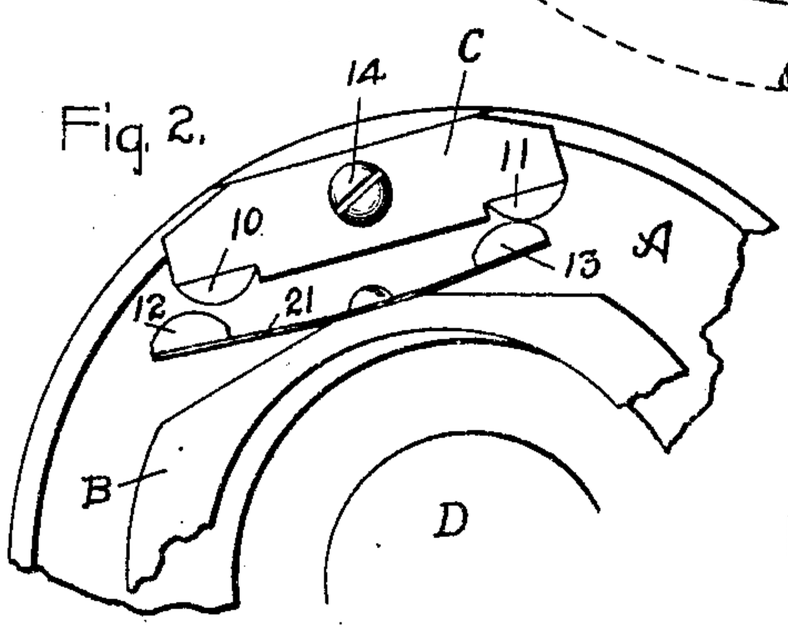



Fig. 3.

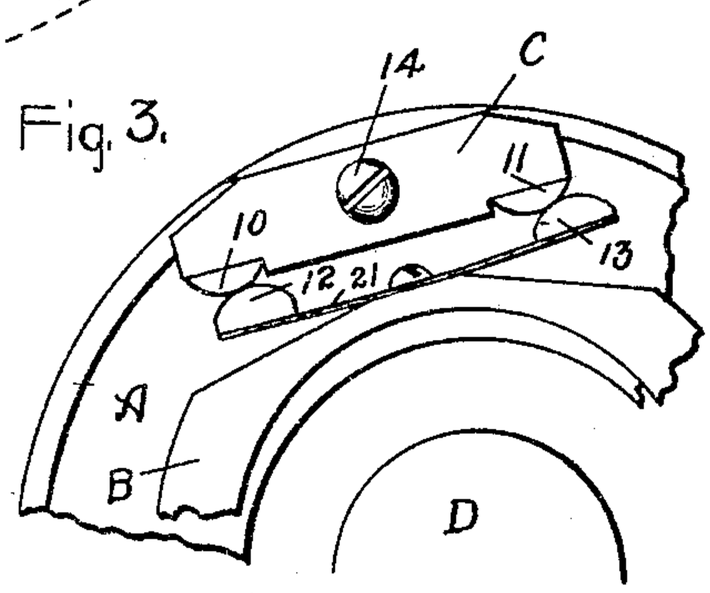



Fig. 4.

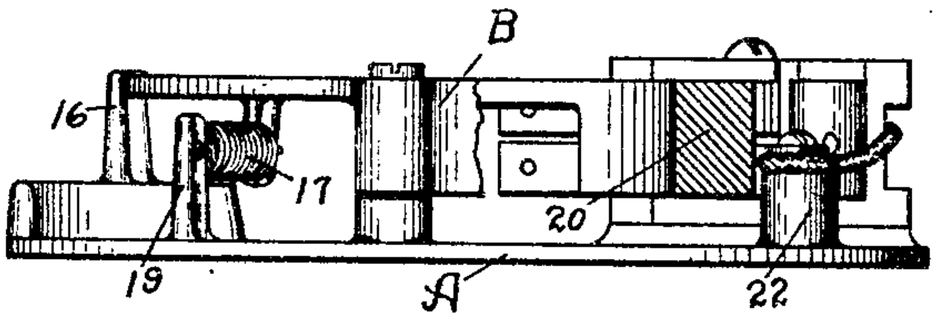
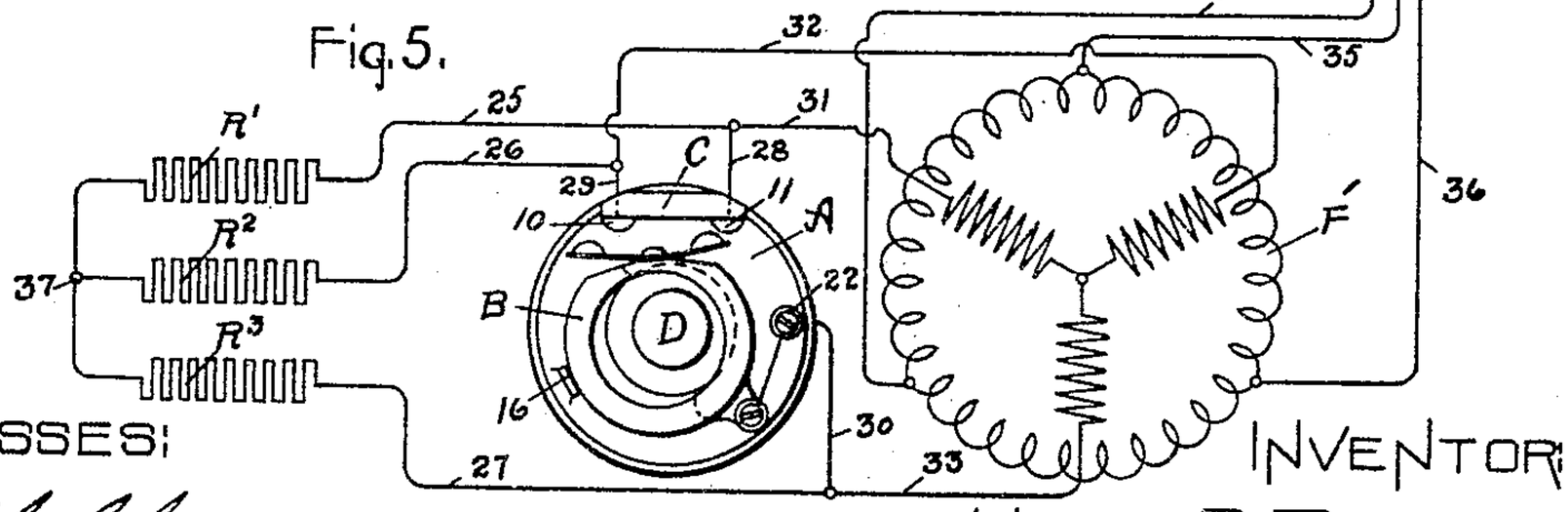



Fig. 5.




WITNESSES:

Robt. A. Schlosser

Helen Orford

INVENTOR:

Henry G. Reist.

by Allen A. Brown

Atty.

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H. G. REIST.

CENTRIFUGAL SWITCH.

APPLICATION FILED MAR. 26, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 6.

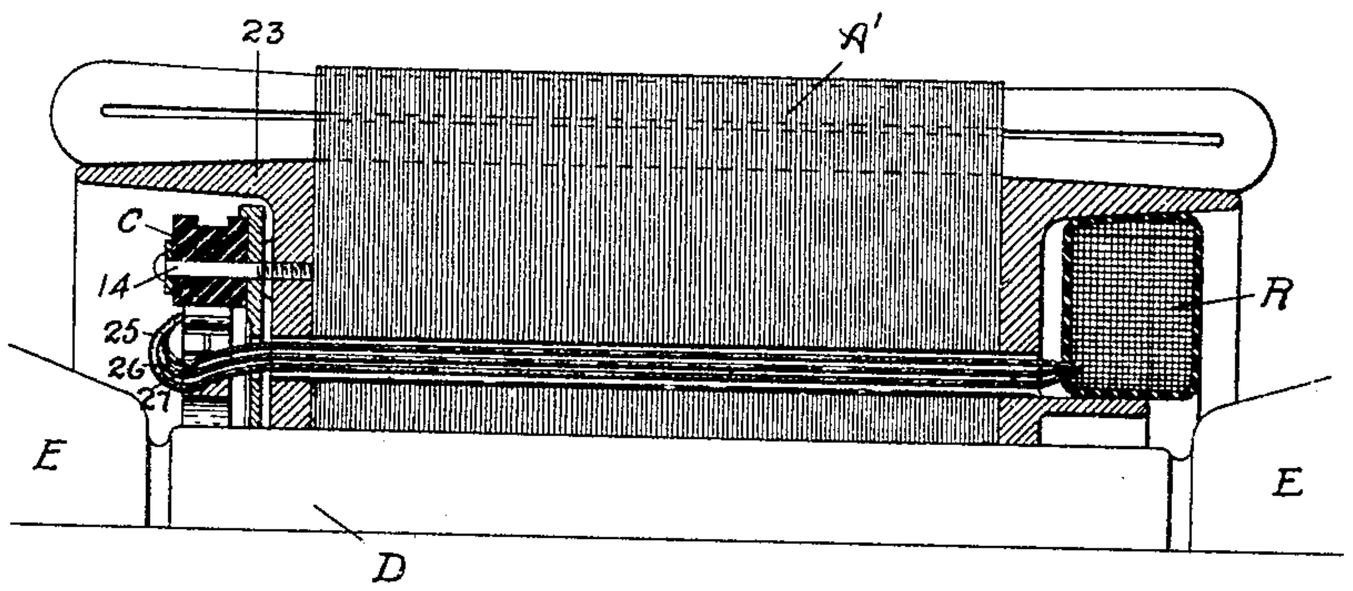



Fig. 7.

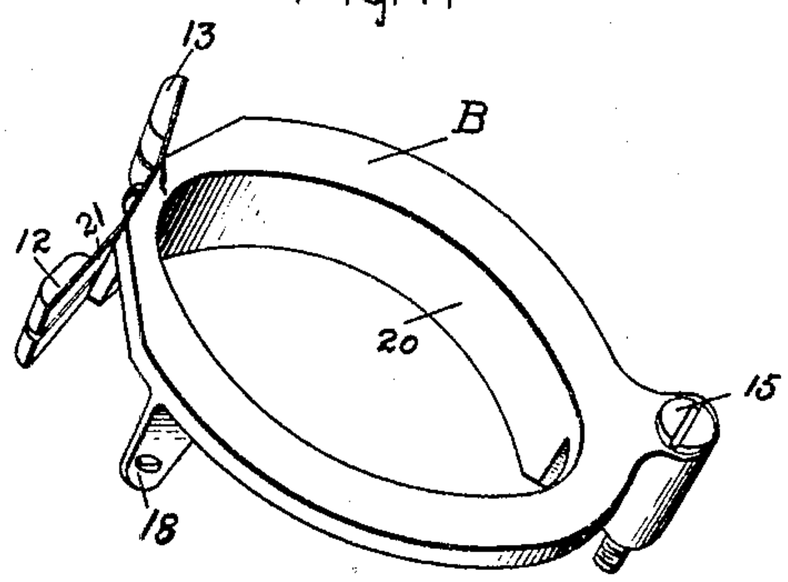
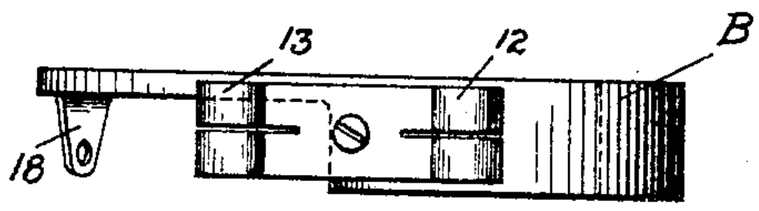



Fig. 8.




WITNESSES:
Art C. Chapman
Helen Alford

INVENTOR:
Henry G. Reist.
by Albert G. Davis
Atty.

No. 771,269. Patented October 4, 1904.

# UNITED STATES PATENT OFFICE.

HENRY G. REIST, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## CENTRIFUGAL SWITCH.

SPECIFICATION forming part of Letters Patent No. 771,269, dated October 4, 1904.

Application filed March 26, 1903. Serial No. 149,617. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY G. REIST, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Centrifugal Switches, of which the following is a specification.

My invention relates to electric switches, and has reference particularly to centrifugal switches designed for use on alternating-current motors.

It is well known that in operating certain types of alternating-current motors it is desirable to provide different circuit connections for starting and running. For this purpose some form of switching mechanism is usually employed by which the desired circuit changes may be made either manually or automatically.

One object of my invention is to provide a switch which will operate automatically to change over from one set of circuit connections to the other.

Other objects are, first, to provide a switch which is compact and will therefore occupy little space when in position on the armature, and, second, to provide a wiping connection between the contacts such that the points at which arcing may occur will not be in contact when the switch reaches its full "on" position.

Other objects and advantages will appear from the detailed description hereinafter given.

In the accompanying drawings, in which I have disclosed one embodiment of my invention, I have shown a motor having a closed-circuited secondary member with resistance in circuit therewith at starting which is automatically short-circuited when the motor is speeded up to the desired point.

In said drawings, Figure 1 is an end view of an armature with the switch constituting one embodiment of my invention in position thereon with the contacts in "off" position. Fig. 2 is a similar view of a portion of said switch, showing the contacts when they first engage. Fig. 3 is a similar view showing the contacts in their full on position. Fig. 4 is a side elevation of the switch, showing a portion of the pivoted ring in section on the line 4 4. Fig. 5 is a diagram illustrating the various connections between the switch and other parts. Fig. 6 is a section of an armature, illustrating the relative positions of the switch and the resistance-coil. Fig. 7 is a perspective view of the pivoted ring; and Fig. 8 is a side elevation of said ring, illustrating particularly the yielding contacts thereon.

The switch consists, essentially, of a base A, upon which are mounted fixed contacts 10 11, and a pivoted ring B, which carries movable contacts 12 and 13. The fixed contacts 10 and 11, which are insulated from each other and the base A, are mounted on an insulating-block C, which is attached to said base by a screw 14. The ring B is pivoted at the point 15 and is normally held in engagement with the stop 16 by the action of the spring 17, which engages at one end a perforated lug 18 on said ring and at the other a similar lug 19 on the base A. The portion of the ring opposite the spring is made much thicker than the main portion of the ring to provide a weighted portion which will be responsive to the centrifugal action developed by the rotation of the armature. This weighted portion is designated 20. Adjacent to one end of this weighted portion is a conducting-spring 21, to which the contacts 12 and 13 are connected. These contacts, as illustrated in Figs. 7 and 8, as well as the ends of the spring, are slitted to insure a more perfect contact upon engagement with the fixed contacts 10 and 11. Upon the opposite side of the base from the stop 16 is a stop 22, with which the ring is adapted to engage when the armature is running at full speed.

The switch is adapted to be applied to the end of the armature in some such manner as illustrated in Fig. 6, where it is attached by suitable screws to the web 23 of the armature A′, whose shaft D passes through the opening in the switch-base A. This shaft is provided with suitable bearings E E. Upon the opposite end of the armature and supported within one of the projecting flanges of the armature-body is mounted a resistance-

coil R, consisting of three parts R′ R² R³, connected, as illustrated in Fig. 5, with its terminals leading through the aperture 24 of the base A to the switch-contacts. As illustrated in Fig. 5, these contacts 25, 26, and 27 are connected, respectively, through the wires 28, 29, and 30 with the contacts 11, 10, and the ring B. These wires 28, 29, and 30 also connect through the wires 31, 32, and 33 with the armature-coils. The field F′ of the armature is provided with leads 34, 35, and 36, which connect it with the supply means M′, M², and M³. The resistances R′, R², and R³, which make up the coil R, are connected together at the point 37. From this diagram it will be seen that when the switch is in its off position, which is that illustrated, the resistances R′, R², and R³ will be connected in circuit with the armature-coils; but as soon as the armature is driven at full speed, or the speed for which the switch is set, said ring B, with its yielding contacts 12 and 13, will be thrown from the position of Fig. 1 to that of Fig. 3, thus short-circuiting the resistance. This movement takes place suddenly, due to the proportion and arrangement of the parts, so that all parts of the resistance are short-circuited practically instantaneously, although contact is first made between the contacts 11 and 13. An inspection of Figs. 2 and 3 will show that the points of the contacts 10, 11, 12, and 13, at which arcing would occur, are well out of contact when the switch is in its full on position and that smooth contacting portions have been brought together by a wiping action. Thus in the case of contacts 11 and 13, which first contact at the points F F, said points are far from engagement with any surface when the switch has reached the position of Fig. 3. In the case of the contacts 10 and 12 this difference in position is similar, but not so great.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a dynamo-electric machine, a revolving armature, a resistance formed in a coil encircling the armature-shaft and supported at one end of said armature, and an automatic switching device for said resistance supported at the other end of said armature.

2. In a dynamo-electric machine, a revolving armature-body having projecting flanges at its ends, a resistance formed in a coil and supported within one of said projecting flanges, and an automatic switching device for said resistance supported at the other end of said armature-body.

3. In a switching mechanism, a revolving member, contacts mounted thereon, an unbalanced ring carried by said member and movable relatively to said member by centrifugal force in its plane of rotation, means for restraining its movement, and contacts carried by said ring adapted to engage the contacts mounted on said member.

4. In a switching mechanism, a revolving member, contacts mounted thereon, a pivoted ring carried by said member and movable on its pivot by centrifugal force, means for restraining its movement, and contacts carried by said ring adapted to engage the contacts mounted on said member.

5. In a switching mechanism, a base, contacts mounted thereon, a member pivoted to said base and provided with a weighted portion at one side of said pivot, a spring at the opposite side of said pivot for holding said member in one extreme position, stops for limiting the movement of said member, and yielding contacts mounted on said member adjacent to the base-contacts and adapted to move into engagement therewith.

6. In a switching mechanism, a circular base provided with a central aperture, contacts mounted on said base, a ring pivoted to said base and provided with a weighted portion located at one side of said pivot, a spring at the opposite side of said pivot for holding the ring in one extreme position, stops for limiting the movement of said ring, and yielding contacts mounted on said ring adjacent to the base-contacts and adapted to move into engagement therewith.

7. In a switching mechanism, a circular base provided with a central aperture, contacts mounted on said base, a ring pivoted to said base so as to move in a plane parallel thereto, said ring being provided with a weighted portion at one side of its pivot, a spring connecting said ring and base at the other side of the pivot so as to hold the ring in one extreme position, stops for limiting the movement of said ring, a leaf-spring secured at its center to said ring at a point substantially opposite the pivot, and contacts secured to the ends of said spring and adapted to engage the fixed contacts.

8. In a switching mechanism, an annular base adapted to be mounted to revolve about a shaft, contacts fixed to said base, a weighted ring pivoted to said base so as to move in a plane parallel thereto, stops for limiting the movement of said weighted ring, a spring for holding said ring normally in engagement with one of said stops, a leaf-spring secured at its middle point to said weighted ring at a point substantially opposite the pivot, and contacts secured to the ends of said spring and adapted to engage the fixed contacts, the movable and fixed contacts being so shaped as to engage with a wiping action.

9. In a switching mechanism, a base, two fixed contacts thereon, a movable member, a spring secured thereto at an intermediate point of its length, and a contact secured to each end of said spring, all of the contacts lying in a common plane and each of the movable contacts adapted to engage with one of the fixed contacts.

10. The combination of an armature, suit-

able resistance mounted thereon and connected with the windings thereof, automatic switch mechanism for short-circuiting said resistance comprising a movable member encircling more or less of the armature-axle, contacts secured to said member, and other contacts adjacent thereto with which the former contacts are adapted to engage.

11. The combination of an armature provided with a three-phase winding, suitable resistance mounted thereon, a centrifugal switch secured to one end of said armature comprising a movable ring encircling the armature-shaft, a pair of contacts electrically and mechanically connected therewith, a pair of fixed contacts insulated from each other and the ring, electrical connections between said ring-contacts one phase-winding and one resistance, similar connections between each of the fixed contacts and a corresponding winding, and resistance whereby when the ring is moved as a result of the speeding up of the armature the resistance will be automatically short-circuited.

In witness whereof I have hereunto set my hand this 23d day of March, 1903.

HENRY G. REIST.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.