No. 873,815. PATENTED DEC. 17, 1907.

J. B. WIARD.

SWITCHING DEVICE FOR ELECTRIC MOTORS.

APPLICATION FILED MAY 23, 1907.

Fig. 1.

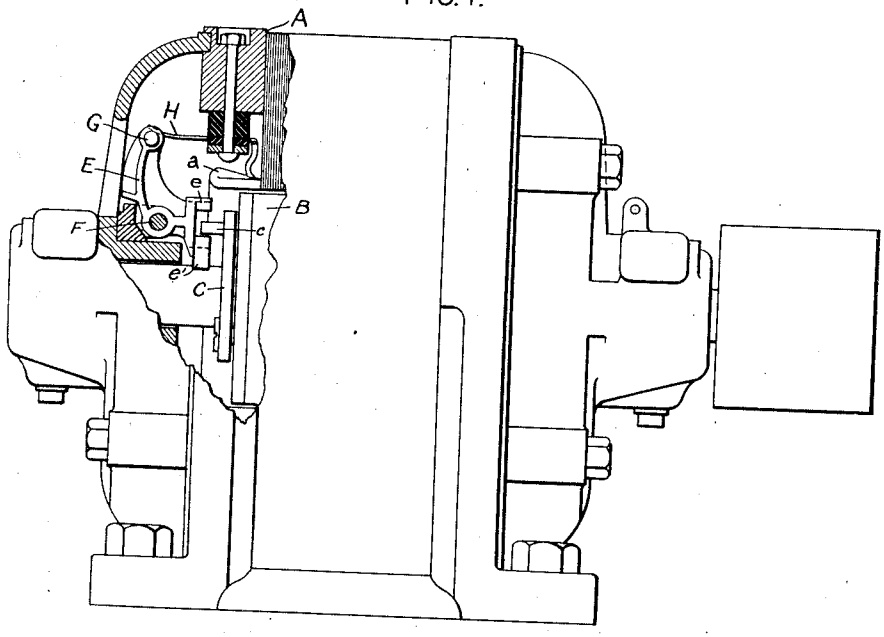


Fig. 2.

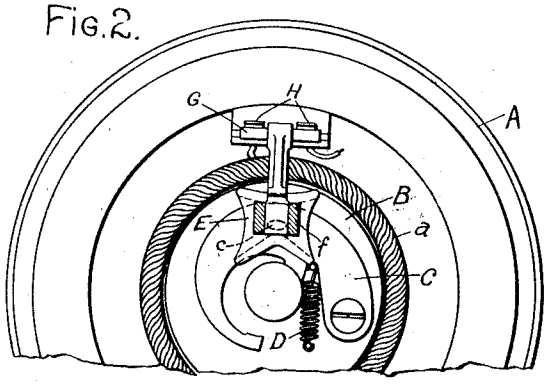


Fig. 3.

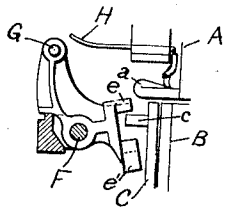
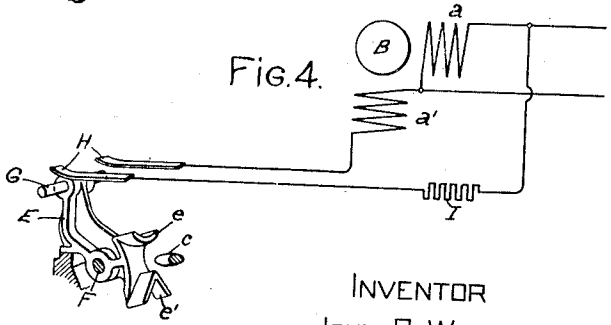


Fig. 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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SWITCHING DEVICE FOR ELECTRIC MOTORS.

No. 873,815. Specification of Letters Patent. Patented Dec. 17, 1907.

Application filed May 23, 1907. Serial No. 375,196.

To all whom it may concern:

Be it known that I, JOHN B. WIARD, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Switching Devices for Electric Motors, of which the following is a specification.

My invention relates to automatic switching devices for electric motors arranged to change the connections of the motor from starting to running conditions. Such devices centrifugally actuated have frequently been employed heretofore for electric motors, and particularly for single-phase induction motors which require special starting connections. In all such devices with which I am familiar centrifugal force has been employed directly to actuate the automatic switch.

My invention consists in employing centrifugal force simply to control the actuation of the switch and employing the momentum of the rotor for the actuating force.

By my invention the size of the centrifugal device is reduced to a minimum, and its construction may be the simplest possible, while the switch itself may be of simple construction without sliding contacts or complicated mechanical construction.

My invention will best be understood by reference to the accompanying drawings, in which

Figure 1 shows a side elevation, with the casing partly broken away, of an electric motor provided with an automatic switching device arranged in accordance with my invention; Fig. 2 shows an end elevation of the motor with the end-plate and bearing removed; Fig. 3 shows a view of the automatic switch in running position; and Fig. 4 is a diagram of the motor circuits with the starting switch shown in perspective.

In the drawings, A represents the stator carrying the primary coils *a*.

B represents the rotor on which is pivotally mounted a centrifugal weight C, which, when the motor is at rest, is held against the motor shaft, in the position shown in Figs. 1 and 2, by the spring D.

c is a pin or projection carried by the centrifugal weight.

E represents a member pivoted at F on the motor-bearing and having two projections *e* and *e'* extending into the plane of rotation of the pin *c*.

G represents a contact-piece carried by the member E and adapted to bridge the stationary contacts H when the member E is in the position which it occupies at starting. The contacts H are in series with the starting winding of the motor, as shown diagrammatically in Fig. 4, in which *a* represents the main winding, *a'* the starting winding, and I a non-inductive resistance or other suitable phase-controlling means to produce a phase-displacement between the currents in the coils *a* and *a'* at starting.

At starting, the centrifugal weight C and member E are in the positions shown in Fig. 1, so that the contacts H are bridged by the contact member G, and the circuit of the starting winding is closed. As the motor speeds up the centrifugal weight C is thrown outward to bring its tail-piece against the motor shaft, bringing the pin *c* into engagement with the convex inner side of the projection *e* and pushing the projection outward beyond the path of rotation of the pin at high speed, thereby rocking the member E into the position shown in Fig. 3. In this position the contact G is out of engagement with the contacts H and the starting circuit of the motor is open. The member E remains in this position until the motor is stopped. In slowing down, the centrifugal weight C is drawn inward by spring D, so that the pin *c* is brought into engagement with the convex outer surface of the projection *e'* and pushes it inward beyond the path of rotation of the pin at low speed, thereby returning member E to its starting position.

It will be seen that the centrifugal weight C merely controls the actuation of the switch by altering the path of rotation of the pin *c*. For moving the switch, the momentum of the rotor is employed, which causes the pin to strike a sharp blow on the projecting pieces *e* and *e'*. The size of the centrifugal weight may consequently be smaller than if centrifugal force alone were relied upon to move the switch. Furthermore, the switch is stationary, so that all sliding contacts are avoided.

To hold the member E in either position to which it is moved, spring washers *f* or other suitable friction devices may be employed, as shown in Fig. 2. Furthermore,

the member E may be so designed that its center of gravity is shifted from one side to the other of a vertical line passing through the center of its pivot.

I do not desire to limit myself 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 my invention.

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

1. In an electric motor, a centrifugally actuated member carried by the rotor, a device carried by the stator adapted to be engaged by said member in a predetermined position thereof and moved by the momentum of the rotor, and switch contacts actuated by said device controlling the starting connections of the motor.

2. In an electric motor, a member carried by the rotor and adapted to have its path of rotation altered by centrifugal force, a device carried by the stator adapted to be engaged by said member in one of its rotational paths, and switch contacts actuated by said device controlling the starting connections of the motor.

3. In an electric motor, a member carried by the rotor and adapted to have its path of rotation altered by centrifugal force, a device carried by the stator having two portions projecting respectively into the rotational paths of said member at starting and at speed, and switch contacts actuated by said device controlling the starting connections of the motor.

4. In an electric motor, a member carried by the rotor and movable with respect thereto by centrifugal force, a projection on said member extending at right angles to the direction in which said member is moved by centrifugal force, a device carried by the stator adapted to be engaged by said projection in a predetermined position of said member, and switch contacts actuated by said device controlling the starting connections of the motor.

5. In an electric motor, a member carried by the rotor and movable outwardly from the rotor axis by centrifugal force, an axially-extending projection on said member, a device adapted to be engaged by said projection in a predetermined position of said member, and switch contacts actuated by said device controlling the starting connections of the motor.

6. In an electric motor, a pivoted device carried by the stator having two projections displaced from each other radially with respect to the rotor, a member carried by the rotor movable radially by centrifugal force to engage said projections respectively at starting and at full speed, and switch contacts actuated by said device controlling the starting connections of the motor.

7. In an electric motor, a pivoted device carried by the stator having two projections displaced from each other radially with respect to the rotor, the outer projection having a convex inner surface, and the inner projection having a convex outer surface, a member carried by the rotor movable radially by centrifugal force to engage said projections respectively at starting and at full speed, and switch contacts actuated by said device controlling the starting connections of the motor.

In witness whereof, I have hereunto set my hand this twentieth day of May, 1907.

JOHN B. WIARD.

Witnesses:

JOHN A. McMANUS, Jr.,

HENRY O. WESTENDARP.