

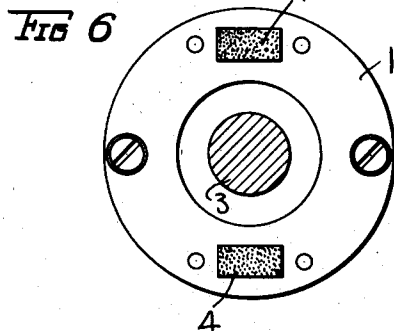
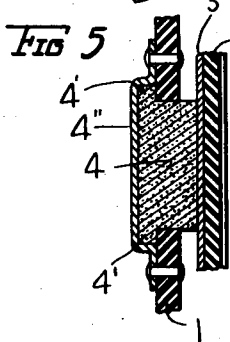
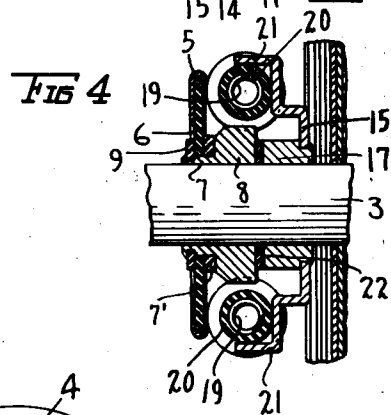
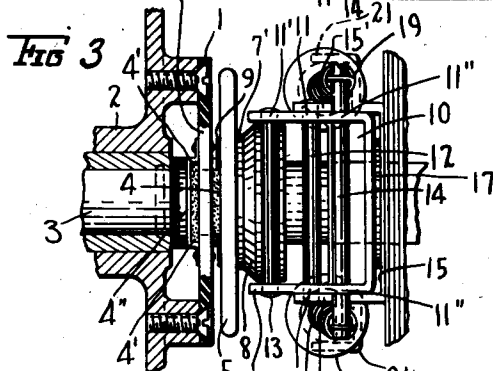
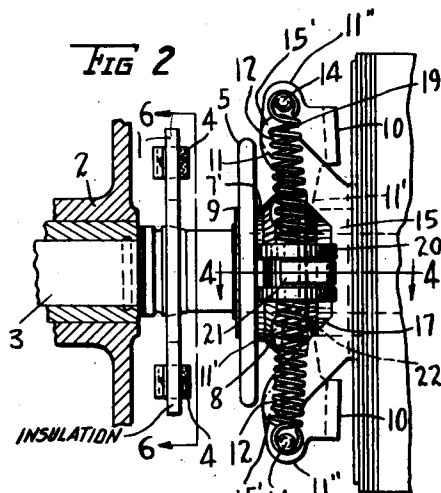
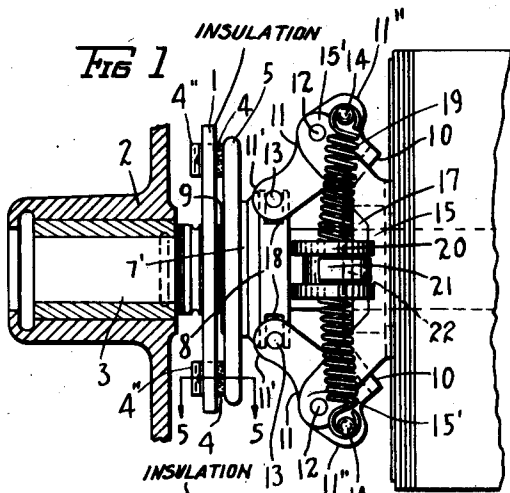
Jan. 12, 1932.

E. M. WRIGHT

1,840,996

CENTRIFUGAL SWITCH FOR ELECTRIC MOTORS

Filed Oct. 14, 1929



INVENTOR  
*Edwin M. Wright*  
BY *Staley & Melch*  
ATTORNEYS

# UNITED STATES PATENT OFFICE

EDWIN M. WRIGHT, OF SPRINGFIELD, OHIO, ASSIGNOR TO ROBBINS & MYERS, INC., OF SPRINGFIELD, OHIO, A CORPORATION OF OHIO

## CENTRIFUGAL SWITCH FOR ELECTRIC MOTORS

Application filed October 14, 1929. Serial No. 399,409.

This invention relates to a centrifugally operated switch for electric motors, it more particularly relating to a switch for cutting out the starting coil in an alternating current motor after the motor has acquired speed.

An object of the invention is the provision of simple, effective means to automatically open the starting coil circuit at a time when the armature has acquired a sufficient rotative speed.

Other and more specific objects of my invention are to improve the construction of the centrifugally operated weights and their associated parts, including the manner of connecting the weights with the slidable switch member; securing the springs which are associated with the weights against distortion under the action of centrifugal force; preventing contact between the weights and springs; providing for cushioning the movable parts; and improving the construction of the stationary and movable contact members to insure good contact.

Other objects and advantages will appear from the following description and claims.

In the accompanying drawings:

Fig. 1 is a side elevation shown partly in section with the switch closed.

Fig. 2 is a similar view showing the switch open.

Fig. 3 is a partial top plan view of the mechanism as shown in Fig. 1.

Fig. 4 is a longitudinal section on the line 4—4 of Fig. 2.

Fig. 5 is an enlarged horizontal section on the line 5—5 of Fig. 1.

Fig. 6 is a transverse section on the line 6—6 of Fig. 2.

Referring to the drawings, 1 is a flat disk of insulating material secured in any manner to the frame 2 of the motor and concentrically disposed with reference to the motor shaft 3. Supported in the disk is a plurality of contact members 4, which are, in the present instance, brushes composed of graphitic carbon. These brushes are inserted in the disk in suitable openings diametrically opposed to one another and are maintained therein by reason of the end projections 4'

and by the formed metallic strips 4'' which are riveted to the disk 1. Each of the brushes is connected to one end of the starting coil (not shown), which coil is energized for starting purposes by connection to the line circuit, a bridging member in the nature of a flat, circular, copper ring 5 being adapted to connect the brushes and completing the starting coil circuit.

The bridging member 5 is a part of a mechanism in which centrifugally-operated weights act to open the starting circuit when sufficient rotative speed is acquired. The member 5 is carried on a flat disk 6 of insulating material which is loosely and rotatably mounted on a reduced-diameter extended portion 7 of a sleeve 8, slidably carried on the shaft 3, being held in position by a washer 9 on the portion 7, the end of which is swaged over to retain the washer and by the shoulder formed by the reduced portion of the sleeve, a washer 7' of suitable material being interposed between the disk and shoulder, as seen in Fig. 4.

The longitudinal sliding movement of the sleeve 8 is brought about by the action of the fly-ball mechanism secured to the shaft, in which 10 represents a pair of oppositely-disposed weights of a plate-like formation. Each weight is provided with a pair of parallel out-turned arms 11, one at each end thereof, which are connected by rods 12, 13 and 14. The ends of the rod 12 are extended beyond the arms and are journaled in the extremities of parallel out-turned arms 15' of a double-armed U-shaped bracket 15 secured to a collar 17 which in turn is fastened to the shaft 3 to provide pivots for the weights 10. Connection with the sleeve 8 is obtained by the insertion of the rods 13 in tangential slots 18 in the sleeve 8, the rods 13 being secured in the ends 11' of the weight arms 11, so that by the action of centrifugal force, the outward movement of the weights, as indicated in Fig. 2 acts to slidably move the sleeve 8 along the shaft, according to the speed of the armature shaft.

The outward movement of the weights is resisted by coiled springs 19 which are hooked over the extended ends of the rod 14. Re-

ferring to Fig. 1 it will be seen that the tension of the springs acts to force the bridging member 5 to bear against the brushes 4, when the motor is at rest. When current is applied, the shaft revolves; the member 5, however, remains stationary by reason of the rotatable mounting thereof on the sleeve 8, until such time as the speed is sufficiently great to cause the weights to move outwardly, resulting in the withdrawal of the member 5 from contact with the brushes 4, which opens the starting coil circuit.

During the operation of the motor, the bridge 5 revolves with the moving parts, influenced by the friction of its mounting. When the motor is stopping, the slackening in speed of the armature causes the bridge 5 to approach the brushes, and when contact is made the inertia of the bridge causes it to momentarily maintain rotation against the friction of the brushes and thus provide for a desirable wiping effect.

The springs 19 are confined at their centers to prevent an additional tension due to the centrifugal action of the bodies of the springs, which would by causing distortion of the spring in the direction of centrifugal force, have the effect of preventing adequate outward swing of the weights. For this purpose, a flanged hollow bushing 20 of a material such as rubber is slipped over each spring, and is placed within the hook of an outwardly bent arm 21 projecting from opposite sides of the U-shaped bracket 15. Further, when the motor is at full speed, as shown in Fig. 2, the bridge 5 bears against the flanges of the bushing 20, which not only provides a means to prevent damage from shock, but also insures that the bridge will rotate at the speed of the shaft and continue to rotate after leaving the bushings to provide wiping contact with the brushes when the motor comes to a stop. To further reduce shock, a washer 22 of resilient material is placed at the end of the collar 17 to form a resilient abutment for the sleeve 8.

By the construction described, the weights have an effective leverage upon the sliding sleeve and also by reason of the cross bars which fit in the tangential grooves of the sleeve a wide area of contact between the weights and sleeve is secured. Further, by reason of the arrangement of the springs with relation to the weights contact between the weights and springs which is likely to distort the springs is avoided and by reason of the resilient sleeves placed on the springs in connection with the retaining device for the same the springs are held from distortion under the action of centrifugal force and an effective buffer provided for the movable switch member. Further, by the construction of the stationary contact member by which it is equipped with carbon brushes that make contact with the copper ring of the mov-

able switch member, a carbon to copper contact is secured which gives very efficient results.

Having thus described my invention, I claim:

1. In a motor and its shaft provided with a switch member slidably mounted upon said shaft having grooved portions, the combination of a pair of oppositely-arranged centrifugally-operated spring-controlled weights pivotally mounted on said shaft, a pair of spaced parallel arms rigidly connected with each of said weights, and a cross-bar carried by the free ends of each pair of said arms, the central portion of each of said cross-bars being located in a grooved portion of said switch member.

2. In a motor and its shaft provided with a switch member slidably mounted on said shaft having grooved portions, the combination of a pair of oppositely-arranged centrifugally-operated spring-controlled weights pivotally mounted on said shaft, a pair of spaced parallel arms rigidly connected with each of said weights, with each weight projecting in one direction from the pivotal point thereof and its arms in another direction, and a cross-bar carried by the free ends of each pair of said arms, the central portion of each of said cross bars being located in a grooved portion of said switch member.

3. In a motor and its shaft provided with a switch member slidably mounted upon said shaft, the combination of a pair of oppositely-arranged centrifugally-operated weights pivotally mounted on said shaft, means for connecting said weights with said switch member, a pair of coiled springs connecting said weights to resist the outward swinging movement thereof, and means for each spring to prevent lateral distortion of said springs under action of centrifugal force.

4. In a motor and its shaft provided with a switch member slidably mounted upon said shaft, the combination of a pair of oppositely-arranged centrifugally-operated weights pivotally mounted on said shaft, means for connecting said weights with said switch member, a pair of coiled springs connecting said weights to resist the outward swinging movement thereof, said springs being located at the outer sides of said weights so as to be out of contact therewith except at the points of connection, and means for each spring to prevent lateral distortion of said springs under action of centrifugal force.

5. In a motor and its shaft provided with a switch member slidably mounted upon said shaft, the combination of a pair of oppositely-arranged centrifugally-operated weights pivotally mounted on said shaft, means for connecting said weights with said switch member, a pair of coiled springs connecting said weights to resist the outward

70

75

80

85

90

95

100

105

110

115

120

125

130

swinging movement thereof, and means for each spring to prevent lateral distortion of said springs under action of centrifugal force, each of said means consisting of a  
5 grooved sleeve surrounding an intermediate portion of said spring and a relatively stationary member located in the groove of the sleeve.

6. In a motor and its shaft provided with  
10 a switch member slidably mounted upon said shaft, the combination of a pair of oppositely-arranged centrifugally-operated weights pivotally mounted on said shaft,  
15 means for connecting said weights with said switch member, a pair of coiled springs connecting said weights to resist the outward swinging movement thereof, and means for  
20 each spring to prevent lateral distortion of said springs under action of centrifugal force, said means being of resilient material and located in the path of the switch member to act as buffers therefor.

7. In a motor and its shaft provided with  
25 a switch member slidably mounted upon said shaft, said switch member consisting of a sleeve slidably mounted upon said shaft and a contact disk rotatably mounted upon the sleeve; the combination of a pair of oppositely-arranged pivotally mounted weights carried by said shaft having an operative connection with said sleeve, a pair of coil  
30 springs connecting said weights to resist the outward swing thereof, sleeves of resilient material carried by said springs and arranged in the path of said disk, and stationary  
35 means cooperating with the sleeves to prevent displacement thereof on said springs.

40 In testimony whereof, I have hereunto set my hand this 11th day of October, 1929.

EDWIN M. WRIGHT.

45

50

55

60

65