

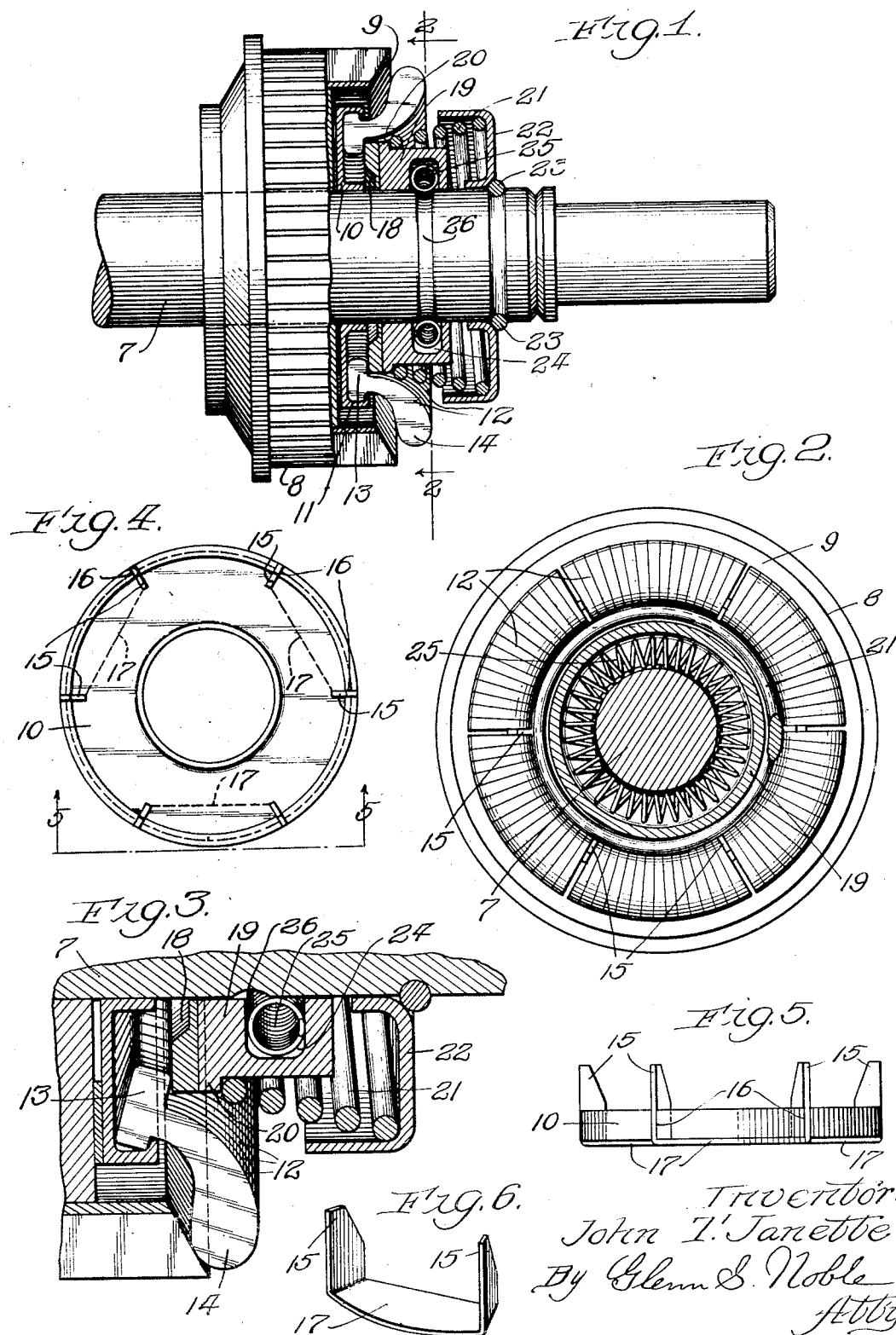
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ELECTRIC MOTOR

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ELECTRIC MOTOR

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7 Claims. (Cl. 172-279)

This invention relates to motors of the type which require short circuiting of their commutators under certain conditions, such as repulsion, induction motors, and is particularly directed to such short circuiting means. Centrifugal switches heretofore commonly used for this purpose have usually embodied centrifugal weights which are resisted by springs in such a manner that they have a more or less gradual movement to operate the short circuiting switch or members. This relatively slow or gradual movement is apt to permit arcing and consequent sticking of the short circuiting switch member.

In accordance with the present invention, I provide a centrifugal switch which will provide a quick make or have a snap action as distinguished from such relatively slow movement.

The objects of the present invention are to provide a motor having an improved short circuiting apparatus; to provide a centrifugal switch adapted to give quick make action; to provide a centrifugal switch having actuating means whereby the switch will be given a snap movement; and to provide such other advantages and improvements as will appear more fully from the following description.

In the accompanying drawing illustrating this invention;

Figure 1 is a side view of a portion of the motor showing the commutator and centrifugal switch, with parts broken away or shown in section;

Figure 2 is a sectional view taken on the line 2-2 of Figure 1;

Figure 3 is an enlarged detail showing the switch in closed position;

Figure 4 is a detail of the cup or shell for receiving the segments or contact members;

Figure 5 is a view of the parts shown in Figure 4; and

Figure 6 is a detail of one of the driving or spacing members for the segments.

Figure 1 shows a motor shaft 7 with a commutator 8 which may be of any usual or preferred construction, the commutator bars being insulated from the shaft and from each other in any well known manner. The end of the commutator is preferably beveled as shown at 9 where contact is made with the centrifugal switch. A cup or shell 10 is securely mounted on the shaft and has a channel shaped periphery 11 for receiving the inner engaging ends of the switch members or contacts 12. Each of these contacts comprises a substantially rectangular

head 13 having an outer portion which seats in the channel shaped groove 11, and a curved arm 14 which constitutes the weight portion as well as the contact for engagement with the commutator. A sufficient number of these contacts are placed in position to make a substantially continuous ring around the shaft.

In order to drive these contacts or keep them in proper spaced relation and to prevent their crowding at one side of the shaft, I provide driving members 15 which are secured to the cup or shell 10 and are interposed at intervals between the contacts 12. In order to secure these drivers in position the periphery of the cup 10 is provided at intervals with slots 16 to receive the drivers. In the arrangement shown, these drivers are made in pairs with connecting sectors 17, thereby making substantially U-shaped members as shown in Figure 6. The arms or driving portions 15 are inserted through the slots 16 and, when the parts are assembled, will be held securely in position.

A ring or washer 18 fits freely on the shaft 7 and engages with the inwardly projecting portions of the heads 13 as shown in Figures 1 and 3. This ring or washer is engaging by a sliding collar or sleeve 19 which is provided with a peripheral abutment or flange 20 and which is pressed inwardly by a coil spring 21 which fits over the collar and against such flange. The outer end of the spring presses against a flanged disc 22 which fits over the shaft and is held against longitudinal movement by any suitable means as for instance, a split ring 23.

The sleeve or collar 19 has an annular groove or recess 24 for receiving a coiled spring ring or annular resilient member 25 which normally rests in a slight annular groove or depression 26 in the shaft 7.

When the motor is at rest the parts are in the position shown in Figure 1 with the contact members 12 out of engagement with the commutator, being forced to this position by the action of the spring 21 through the sleeve 19 and washer 18 which presses the inner portions of the heads 13 against the back of the shell 10. As soon as the motor is started and the speed increases, the centrifugal weights or contact portions 14 of the contacts 12 tend to move outwardly against the resistance of the spring 21. This causes the sleeve 19 to slide along the shaft and to press against the spring ring 25 thereby tending to move this ring longitudinally and to force it out of the groove 26. This provides a substantial resistance to the

centrifugal force until the spring ring rides up to approximately the edge of the groove and as it passes out of the groove the resistance becomes little or nothing so that the contacts are suddenly released and fly out to engaging positions. It is highly desirable to so construct the motor that the commutator is short circuited at a definite or critical speed and by properly designing the spring ring and groove the closing of the switch may be regulated so that it will occur at the desired critical point.

When the speed of the motor is reduced the centrifugal action of the segments 12 is overcome by the spring 21 which causes the sleeve 19 to move back to its initial position and the contacts to be swung out to open position as shown in Figure 1. At the same time the spring ring 25 is moved back into the groove 26 preparatory for the next action. While the opening of the switch is comparatively rapid, it is not important to have a snap action at this time as will be readily understood by those familiar with motors of this type.

While I have shown a preferred form of construction which has proven to have been successful in actual operation, it may be necessary or desirable to change the particular form or arrangement of the parts in order to adapt the invention to various styles of motors and therefore I do not wish to be limited to the particular arrangement shown and described except as specified in the following claims in which I claim.

1. In a device of the character set forth, the combination with a commutator, of a shell arranged adjacent thereto and having a channel shaped groove in the periphery, a plurality of contacts, each contact having a head pivoted in said groove and having an outwardly extending arm terminating adjacent to the ends of the commutator bars, a sleeve tending to hold the heads in the shell, a spring pressing against said sleeve, and means coacting with the sleeve to control the movement thereof, comprising a garter spring mounted in said sleeve and movable longitudinally therewith, said spring engaging at times with a reduced portion of the shaft.

2. In a repulsion, induction motor, the combination with the motor shaft of a commutator mounted thereon, a disc mounted on the shaft and having an inwardly opening peripheral groove, a plurality of tapered contacts, each contact having a head fitting in the groove and having an outwardly projecting arm, a sleeve on the shaft coacting with the heads, a spring engaging with said sleeve, an abutment for the spring, an annular recess in said sleeve, said shaft having a groove therein and a resilient ring mounted in the groove and positioned in the recess to coact with the sleeve to cause a snap-like movement of the contacts when moving to closed position.

3. In a centrifugal switch, the combination of a rotatable shell having an annular bearing

therein, a plurality of contacts pivotally mounted in the bearing and U-shaped members having their arms projecting through slots in the shell and engaging with the contacts.

4. The combination with a commutator, of a supporting member having a groove therein, a spring ring adapted to seat in said groove, means for moving the spring out of the groove, a plurality of weights pivoted adjacent to the commutator and adapted to swing outwardly to make a contact therewith, and means coacting with the weights and the spring ring whereby the weights will move outwardly with a snap action into engagement with the commutator for short circuiting the same.

5. In a motor, the combination of a shaft having a peripheral groove therein, a spring ring adapted to seat in the groove, a spring pressed sleeve having an annular recess for receiving the ring, a commutator, a plurality of contacts pivoted adjacent to the commutator which are held normally out of engagement by means of the sleeve but which are adapted to move into engagement with the commutator under centrifugal force, the arrangement being such that the sleeve will be resisted by the spring ring until the ring passes out of the groove, thereby permitting a quick closing movement of the contacts.

6. In a device of the character set forth, the combination of a shaft, a commutator mounted on the shaft, a disc secured to the shaft and having a channel shaped periphery, a plurality of contacts with heads engaging with said channel and projecting inwardly, drivers secured to the channel and coacting with the contacts, a washer engaging with the inner ends of the heads, a sleeve engaging with the washer, a spring tending to press the sleeve toward the disc, an abutment for the opposite end of the spring, an annular recess in the sleeve, a groove in the shaft opposed to the recess, and a resilient ring mounted in the groove and adapted to be displaced therefrom by the movement of the sleeve when the contacts move outwardly under centrifugal force.

7. In a motor, the combination of a shaft having one portion of smaller diameter than another portion, a garter spring adapted to be normally positioned on the smaller portion of the shaft, a sleeve coacting with said spring to move the same longitudinally of the shaft, a spring tending to press the sleeve in one direction, a commutator, a plurality of contacts pivoted adjacent to the commutator and held normally out of engagement by means of the sleeve but which are adapted to move into engagement with the commutator under centrifugal force, the arrangement being such that the movement of the sleeve will be resisted by the garter spring until it passes on to the portion of the shaft of larger diameter, as described.

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