

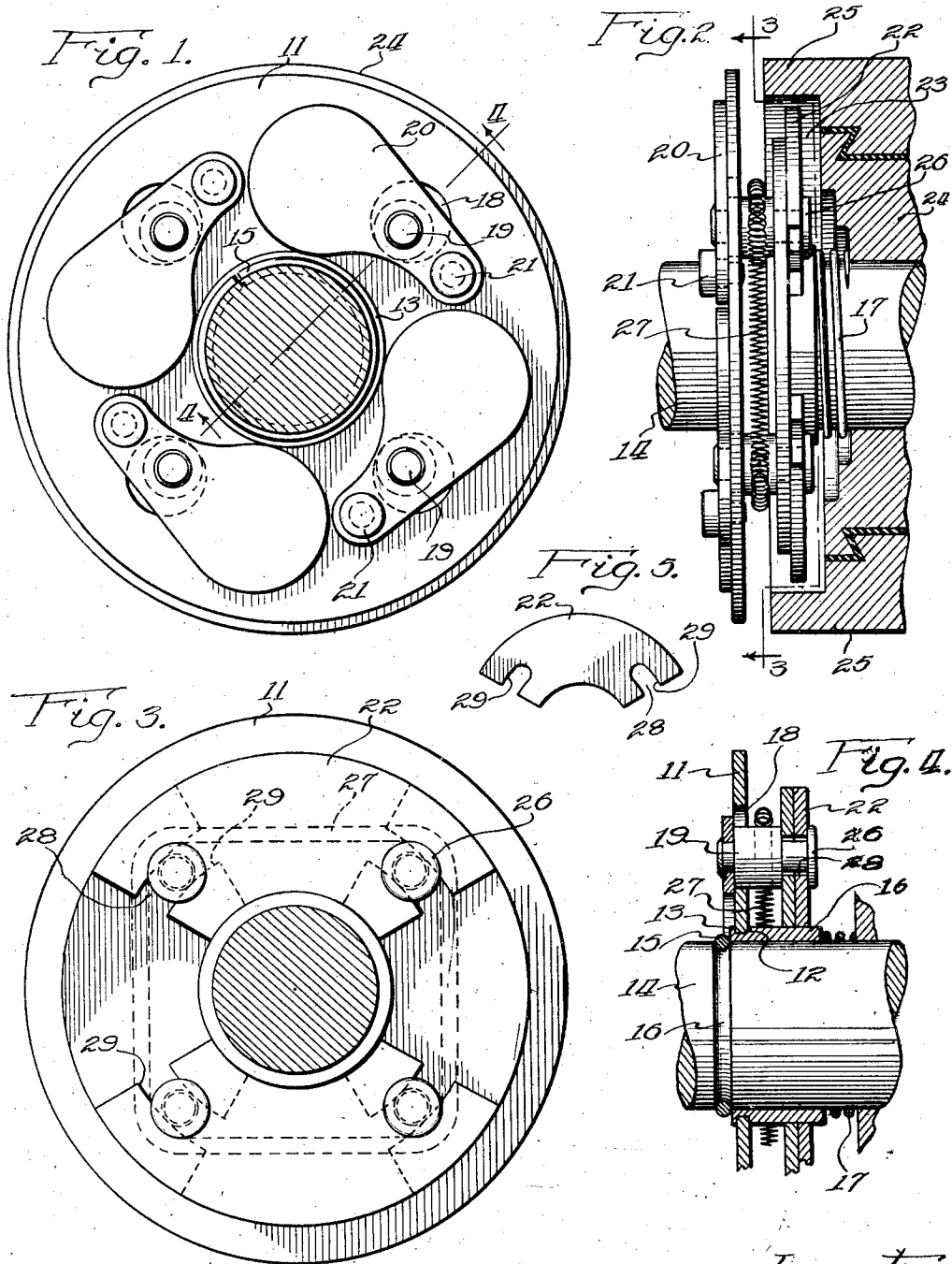
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R. O. GILBURG

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SHORT CIRCUITING SWITCH

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Witnesses
Arthur M. Franke.
Robert E. Harris.

Inventor:
Roy O. Gilburg.
Hummel & Hummel
Attys:

UNITED STATES PATENT OFFICE

ROY O. GILBURG, OF WAUSAU, WISCONSIN, ASSIGNOR TO MARATHON ELECTRIC MFG. CO., OF WAUSAU, WISCONSIN, A CORPORATION OF WISCONSIN

SHORT-CIRCUITING SWITCH

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This invention relates to short circuiting switches for repulsion motors, for short circuiting the commutator bars of a motor when the armature thereof has obtained a predetermined speed of rotation; the purpose being to attain the starting advantages of a series motor when the rotation of the armature is commenced and to attain the advantages of the running conditions of a squirrel cage motor after the armature is rotating at high speed.

The main object of this invention is to provide improved means for short circuiting the bars of a commutator which is so constructed as to derive the mechanical advantages of the inclined plane or wedge in forcing the short circuiting means firmly against the commutator bars.

A further object is the provision of an improved form of expansible contact member, the elements of which move in unison and are positively guided during such movement by centrifugal actuating mechanism for causing simultaneous short circuiting of all the bars of the commutator.

In the accompanying drawings, I have illustrated a specific embodiment of my invention in which:—

Figure 1 is an outer end elevation of a short circuiting switch designed for small motors.

Fig. 2 is a side elevation of the same showing a fragmentary section of a rotor shaft and commutator upon which the switch is mounted.

Fig. 3 is a section taken on the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary section taken on the line 4—4 of Fig. 1, and

Fig. 5 is a detail of one of the contact elements.

In the form shown, a supporting disc 11 is rigidly mounted on the outer end of a collar 10 which is of reduced diameter. The disc 11 is confined between a shoulder 12 on the collar and the burred-over outer extremity 13 thereof as shown in Fig. 4. The collar 10 is mounted on the rotor shaft 14 adjacent to one end of the commutator and is held in position against a split ring 15 seated in

a peripheral groove 16 in the shaft, by a helical spring 17 which bears between the end of the collar 10 and the adjacent end of the commutator.

The supporting disc 11 is provided with spaced apertures 18 through which pins 19 extend. The intermediate portions of the pins 19 are larger in diameter than the end portions thereof and the apertures 18 are of sufficient size to allow free sidewise movement of the pins 19 within the required range.

A dog or lever 20 is rigidly secured at its intermediate portion to the outer end of each of the pins 19 and the dogs 20 are each pivotally attached by a rivet 21 to the disc 11 at one side of the respective aperture 18. The free ends of the dogs 20 are weighted and thus when the disc 11 rotates with the shaft 14 these ends tend to swing outwardly.

An expansible ring comprising arcuate contact sectors or segments 22 is mounted concentric with the collar 10 in spaced relation to the disc 11 on the inner side thereof in an end recess 23 formed in the end of the commutator 24. The commutator bars 25 are undercut and exposed at the inner periphery of the recess 23. In the form shown there are four contact segments 22 arranged in overlapped relation with diametrically opposite segments disposed substantially in the same plane. Each segment is provided at its extremities with cam slots 28 through which the inner end portions of the pins 19 extend. A head 26 on the inner extremity of each pin 19 serves to slidably secure the contact segments 22 together in the form of an expansible ring. A resilient member 27, preferably comprising a resilient endless spring band is extended around all of the pins 19 between the disc 11 and the expansible ring for normally urging the pins and the contact segments inwardly to contract the ring.

When the shaft 14 rotates at a predetermined rate of speed depending upon the tension of the spring 27 and the weight of the dogs 20, the latter swing outwardly. The swinging of the dogs 20 cause an outward movement of the pins 19 to which they are

secured. The pins 19 bear against the inclined edges 29 of the slots 28 in the contact segments, exerting a wedging action which causes the contact segments to be urged outwardly and the peripheries thereof to be firmly pressed against the commutator bars 25 at the inner periphery of the recess 23. The mechanical advantage derived from the wedging action of the pins and cam slots 24 serves to hold the expansible ring firmly against the bars 25, making an effective electrical connection therewith and completely short circuiting them.

The segments 22 move bodily outwardly, the curvature of the peripheries of the contact segments conforms with the curvature of the inner periphery of the recess 23 of the commutator and the pins 19 positively guide the segments in their outward movement so as to cause all of the segments to move simultaneously. This arrangement results in the simultaneous engagement of all of the commutator bars by the periphery of the expansible ring. As a result all of the commutator bars are short circuited at once, thus avoiding unbalanced electric strains in the windings and avoiding having the contacting surface on the commutator subjected to sudden impact by a small area of the expansible ring.

Although but one specific embodiment of this invention has been herein shown and described, it is to be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. A short circuiting switch for repulsion motors comprising a supporting member, an expansible contact member mounted on said supporting member and comprising a series of segments, and means on said supporting member operatively connected with said expansible contact member for camming the segments thereof radially to expanded position.

2. A short circuiting switch comprising a supporting member mounted on a rotor shaft, an expansible ring mounted on said disc comprising arcuate contact segments, connecting means extending through slots in adjacent segments for positively guiding the expansion and contraction of said ring, and actuating mechanism secured to said connecting means for expanding said ring when said rotor shaft rotates at a predetermined speed.

3. In a short circuiting switch for repulsion motors, a commutator having an undercut recess in one end, a supporting member mounted on the rotor shaft of said motor, an expansible ring comprising movable segments having arcuate peripheries supported by said supporting member, inclined surfaces on said segments, dogs pivoted on said

supporting member, having a weighted free extremity for causing an outwardly swinging movement thereof when said shaft is rotated, and means on said dogs operatively engaged with the inclined surfaces of said segments for wedging the same against the inner peripheries of said recess.

4. In a device of the class described, a rotor comprising a shaft and a commutator having an undercut recess in one end, commutator bars in said commutator exposed at the inner periphery of said recess, supporting means mounted on said shaft, an expansible member mounted on said supporting means comprising relatively movable segments, and actuating mechanism slidably connected with said segments for wedging the same outwardly in radial directions, and firmly against the commutator bars at the inner periphery of said recess.

5. In a device of the class described, a rotor comprising a shaft and a commutator having an undercut recess in one end, commutator bars in said commutator exposed at the inner periphery of said recess, supporting means mounted on said shaft, an expansible ring mounted on said supporting member positioned within said recess comprising arcuate segments, inclined surfaces on said segments, and actuating means on said supporting member comprising pins engaged with said inclined surfaces for wedging said segments outwardly in radial directions and engaging the periphery of said expansible ring firmly against the inner periphery of said recess to short circuit said commutator bars.

6. In a device of the class described, a rotor comprising a shaft and a commutator having an undercut recess in one end, commutator bars in said commutator exposed at the inner periphery of said recess, supporting means mounted on said shaft, an expansible ring mounted on said supporting member positioned within said recess comprising arcuate segments, the adjacent ends of said segments being overlapped and provided with registering inclined slots, levers pivoted on said supporting members, and a pin on each lever engaged in a pair of registering slots of said segments for simultaneously camming all of said sections outwardly in radial directions against the commutator bars at the inner periphery of said recess.

7. In a device of the class described, a rotor comprising a shaft and a commutator having an undercut recess in one end, commutator bars in said commutator exposed at the inner periphery of said recess, supporting means mounted on said shaft, an expansible member mounted on said supporting means comprising movable contact segments, and a centrifugal actuating mechanism mounted on said supporting members for urging said

contact segments outwardly in radial directions while positively guiding the movement thereof to cause the periphery of the expandible member to engage all the commutator bars simultaneously.

Signed at Wausau, this 25th day of June, 1928.

ROY O. GILBURG.