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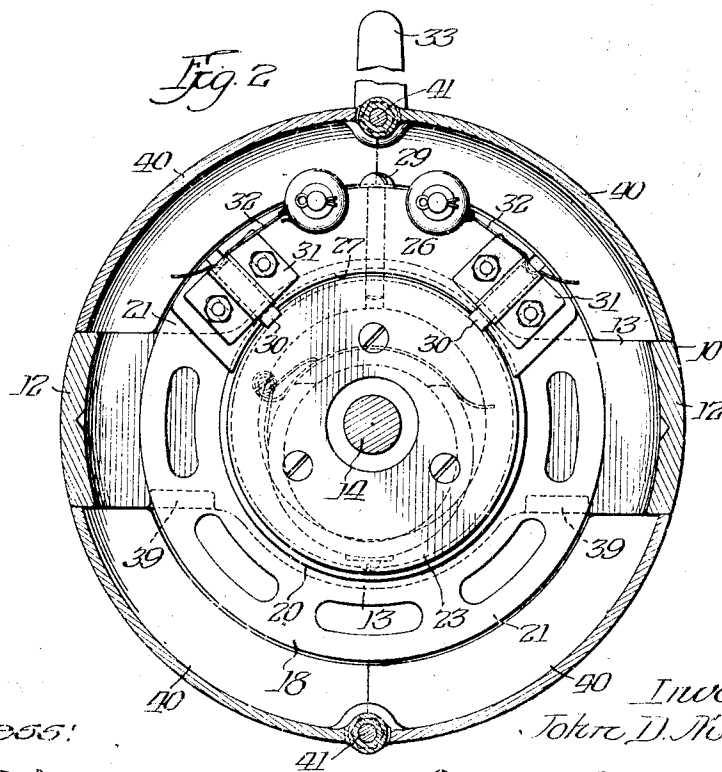
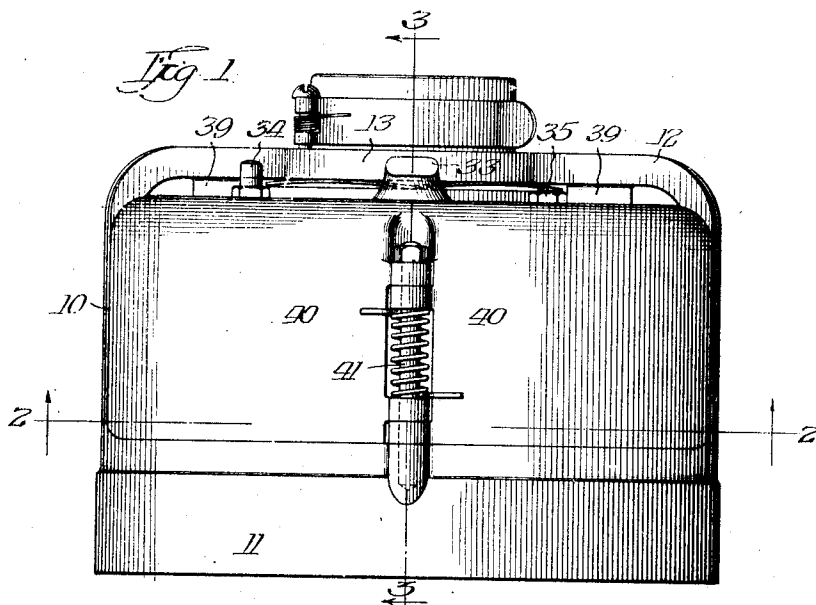
1,476,412

J. D. NIES

MOTOR CONSTRUCTION

Filed April 18, 1922

3 Sheets-Sheet 1



Witness:

Ed. C. Brown

Inventor:
John D. Nies

By Cromwell, Treist & Warden
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Dec. 4, 1923.

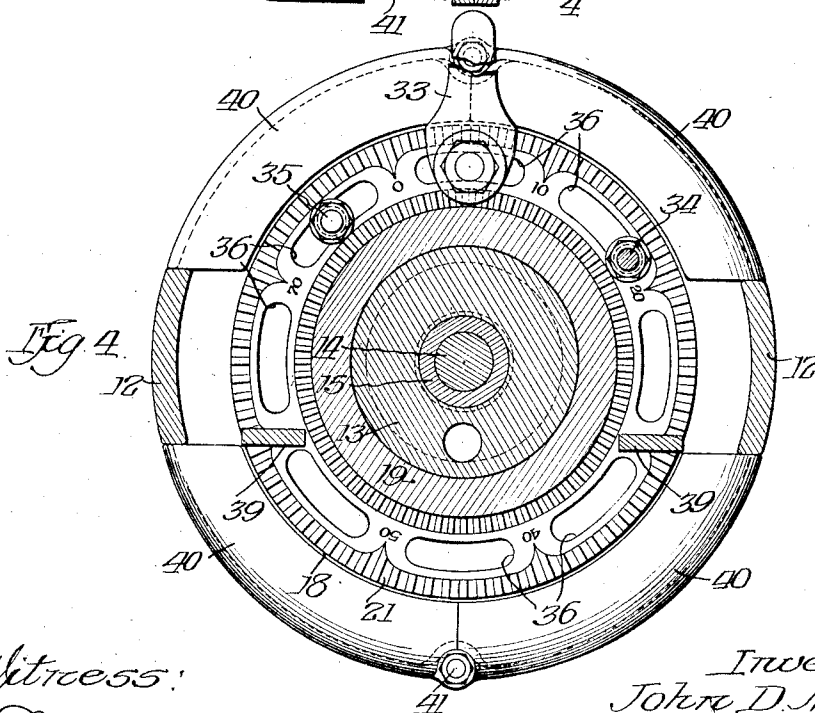
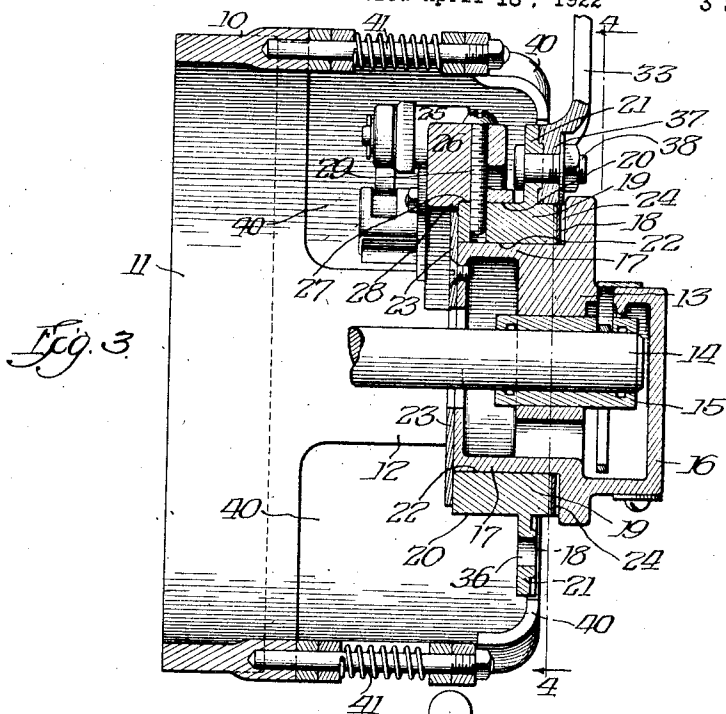
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MOTOR CONSTRUCTION

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3 Sheets-Sheet 2



Witness:

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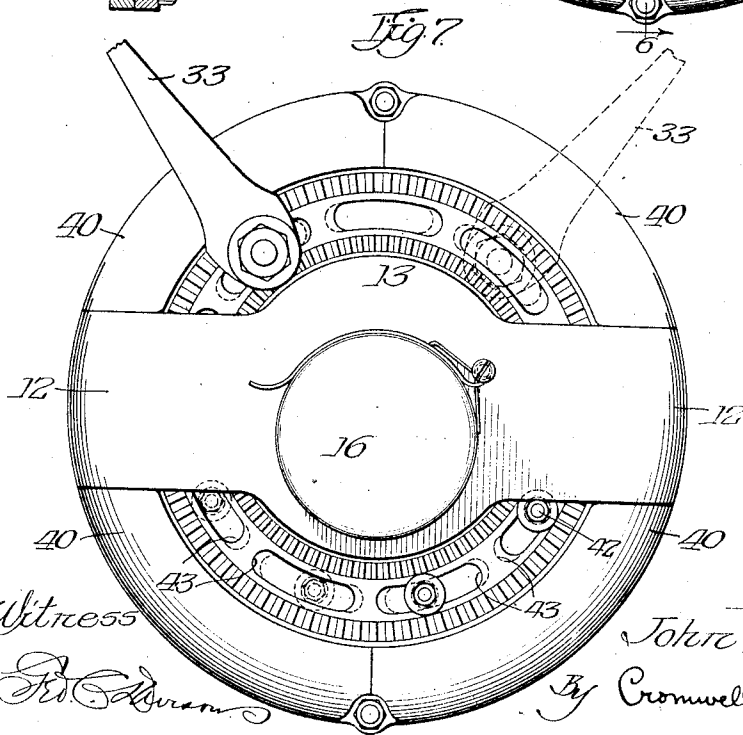
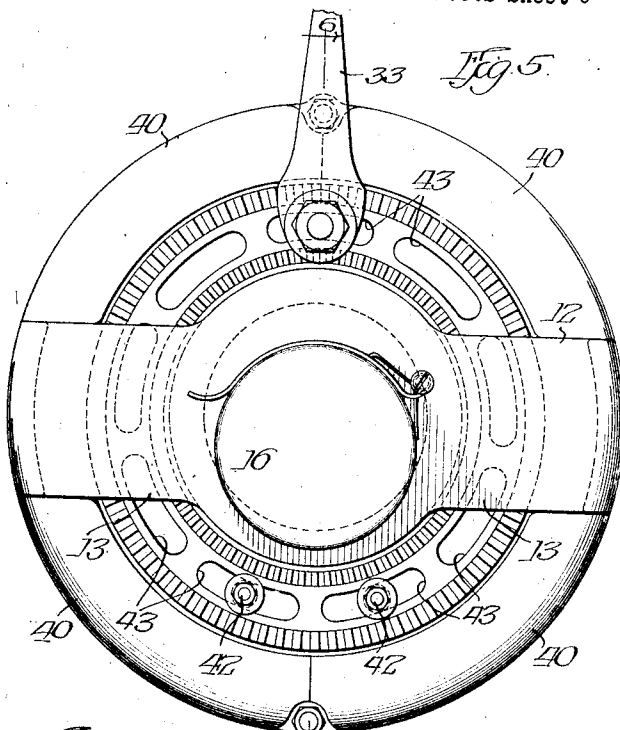
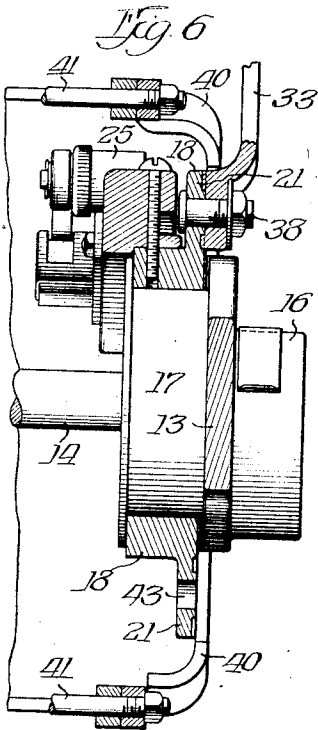
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1,476,412

MOTOR CONSTRUCTION

Filed April 18, 1922

3 Sheets-Sheet 3



Witness

Geo. C. Swann

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UNITED STATES PATENT OFFICE.

JOHN D. NIES, OF ST. CHARLES, ILLINOIS, ASSIGNOR TO KIMBLE ELECTRIC COMPANY,
OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

MOTOR CONSTRUCTION.

Application filed April 18, 1922. Serial No. 554,713.

To all whom it may concern:

Be it known that I, JOHN D. NIES, a citizen of the United States, residing at St. Charles, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Motor Construction, of which the following is a specification.

This invention relates in a general way to electric motors, being concerned particularly with improvements in the rocker structures associated therewith.

The principal purpose of the invention resides in the provision, in a machine of the character described, of a novel rocker assembly of improved construction embodying, primarily, means for limiting the angular movement of the rocker between any two points, means for permitting a recording of these points when once determined for use in future adjustment or reassemblage of the machine, means for attaching the brush assembly, means for attaching a rocker arm at any point about the periphery of the rocker, and means cooperating with the frame of the machine for forming a guard closure for the commutator, brushes and associated parts.

While the foregoing statement is indicative of the nature of the invention, other objects and advantages not herein specifically referred to will be appreciated upon a full comprehension of the novel features presented in the construction, arrangement and operation of the present rocker.

In order that the invention may be readily understood, two exemplifying embodiments of the same are set forth in the accompanying drawings and in the following detailed description based thereon. Obviously the invention is susceptible of embodiment in other and varied constructional forms without departure from the essence of the invention or the sacrifice of its material advantages; wherefore it is to be understood that the drawings and description are to be taken in an illustrative and not in an unnecessarily limiting sense.

In the drawings,

Fig. 1 is a top plan view of that end of a motor to which this invention is applicable;

Fig. 2 is a vertical transverse section on the line 2—2 of Fig. 1, illustrating the rocker assembly of this invention as viewed axially from within the motor frame—the commu-

tator being omitted for clearness in all of the views;

Fig. 3 is a vertical longitudinal section on the line 3—3 of Fig. 1;

Fig. 4 is a vertical transverse section on the line 4—4 of Fig. 3;

Fig. 5 is an end elevation illustrating a slightly modified embodiment of the rocker assembly;

Fig. 6 is a vertical longitudinal section on the line 6—6 of Fig. 5; and

Fig. 7 is a view similar to Fig. 5 showing the location and operation of the stops in that embodiment.

Referring now in detail to the drawings, and particularly to Figs. 1 to 4 thereof, it will be observed that the numeral 10 designates generally the end bearing bracket of a motor. This bracket is provided—as is usual in motor constructions—with an annular band portion 11 adapted for attachment to the main armature-housing frame, and with an integral yoke 12 in the horizontally disposed connecting portion 13 of which the adjacent end of the commutator shaft 14 is suitably journaled by the introduction of a bearing sleeve 15. That portion of the yoke 12 in proximity to the bearing sleeve 15 is radially enlarged and is extended in both directions axially of the shaft 14 to provide—exteriorly of the bracket—an oil well 16, and interiorly of the bracket—an integral hub 17 presenting, in concentric relation to the shaft 14, a cylindrical surface on which the rocker 18 of this invention is rotatably mounted.

The rocker 18 is preferably of annular form and comprises a collar portion 19 from the outer cylindrical surface 20 of which a continuous integral flange 21 projects radially. The inner cylindrical surface 22 of the collar portion 19 fits snugly about the hub 17. The rocker 18 is adapted to rotate freely on the hub 17 but is prevented from axial movement, in one direction, by the medial enlargement of the connecting portion 13, and, in the other direction, by a centrally apertured disk 23 carried by the inner face of the hub 17. A corrugated spring washer 24 is preferably inserted between the rocker and the portion 13 of the yoke of the bracket for the purpose of bearing frictionally against the rocker to retain the same in any position into which it is rotated.

A commutator brush assembly 25 is adapted for attachment to the collar portion 19 of the rocker through the employment of an insulator mounting block 26 characterized by a concave supporting surface 27 conforming with the curvature of the cylindrical surface 20 of the rocker. The arcuate mounting block 26, which is clearly shown in Figs. 2 and 3, is provided with a shoulder 28 for correctly locating the block axially with relation to the rocker, and is secured to the rocker by means of a single machine screw 29 which passes through a radially disposed aperture in the center of the block and screws into a screw-threaded aperture in the rocker. The mounting block is adapted to carry one or more spaced brushes 30 with their brush holders 31 and spring regulators 32. It will be noted that the brush holders 31 are adapted for adjustment toward or away from the commutator shaft as circumstances make such an adjustment advisable. While only one mounting block 26 is here shown it will be appreciated that a plurality of blocks of this general type and form of attachment may be spaced at intervals about the block-supporting surface of the rocker.

A rocker arm 33 and two limiting stops 34 and 35 are adapted for attachment to the flange 21 of the rocker. For this purpose the outer face of the flange 21 is radially grooved at regular intervals, and is provided with a plurality of arcuate slots 36; the grooves being numbered at intervals of ten for instance to provide a circular scale.

The rocker arm 33 consists of a handle which is flattened and grooved at its centrally apertured attaching end 37 to conform to the grooving in the outer face of the flange 21. The rocker arm may be detachably secured to the flange 21 of the rocker at any point in alignment with a portion of one of the slots 36 by the employment of a bolt 38 adapted to pass through both the slot and the aperture in the end of the handle, the interfitting grooves in the contacting surfaces of the rocker and handle serving to maintain the radial position of the rocker arm under lateral stress. The rocker arm is secured in a vertical position to the rocker when that angular position of the rocker has been reached wherein the brushes carried by the same are in the neutral position of their effective range of movement in either direction. The adjustable nature of the connection between the rocker arm and rocker is of considerable importance in that slight variations in the location of this neutral position exist in almost all motor assemblies due to unavoidable variations in field and brush locations. The effective range of throw of the brushes in either direction to give the full forward or reverse speed of the motor is through an

angle in either direction from the neutral position of from approximately forty five degrees to seventy five degrees, depending upon the type of motor and other factors. The adjustable means for limiting the throw of the brushes in either direction after the most efficient limits for each particular motor assembly have been determined by experiment are embodied in the previously mentioned limiting stops 34 and 35.

The limiting stops 34 and 35 consist of two bolts—a long one and a short one—which are adjustably secured to the flange 21 of the rocker by passing through certain of the arcuate slots 36 therein. Both of the stops project from the outer face of the flange 21. It will be noted in the embodiment of this invention set forth in Figs. 1 to 4 that the outer face of the flange 21 is spaced inwardly a short distance from the inner face of the horizontal connecting portion 13 of the bearing bracket yoke. Accordingly, in the rotation of the rocker the long stop 34 is adapted to abut against the upper edge of the yoke portion 13 to limit the rotation in one direction, and the short stop 35—which clears the inner face of the portion 13—is adapted to abut against one of two lugs 39 which project inwardly from the lower edge of the yoke portion 13 in the path of the short stop to limit the rotation in the opposite direction. In motors used for running in both directions one of the stops may be employed to limit the rocker movement in the reverse direction, and the other to limit the rocker movement in the forward direction; and in motors used for running in only one direction, one of the stops may be employed to limit the rocker movement at the neutral position, and the other to limit the rocker movement in the forward direction. The employment of long and short stop bolts is advisable in rocker constructions having an even number of slots in order to permit a limitation of the rocker movement at any point within the effective range of throw of the brushes.

It will be noted that the flange 21 of the rocker provides, in effect, an end closure for the mechanism contained within the open bearing bracket 10. In order to house completely this mechanism at the remaining open upper and lower apertures in the bracket, inwardly spring pressed doors 40, which are pivotally mounted on studs 41 carried by the band portion 11 of the bracket at the top and bottom thereof, cooperate with the sides of the yoke 12 and band portion 11 and with the periphery of the flange 21 of the rocker to form, with the rocker and the bearing bracket, a complete housing. By this construction and arrangement, the rocker arm—which, in the usual forms of housed rocker construction heretofore

commonly employed must project through an elongated slot in the casing—extends clear of the casing without in any manner interfering with an efficient housing of the mechanism contained therein.

The purpose of the scale provided on the outer face of the rocker flange 21 is to permit a recording of the points where the rocker arm and limiting stops should be located on that particular motor when these points have once been determined by test in order that such data may be available in future adjustment or reassemblage of the motor without again determining by experiment the proper points of location for the rocker arm and stops.

The modified embodiment of the invention illustrated in Figs. 5 to 7 differs from the embodiment hereinbefore described in that the long and short stops are dispensed with and only short stops 42 used. In order to permit of this and still provide limits to the rotation of the rocker at any two points within the effective range of throw of the brushes, an odd number of slots 43—preferably nine—are provided in the flange 21 of the rocker. The only material changes in the construction of this second embodiment of the invention over the first are at once evident from a comparison of Figs. 6 and 3. It will be seen in Fig. 6 that the outer face of the flange 21 is substantially flush with the inner face of the connecting yoke 13 of the bearing bracket, and that both of the stops 42 are adapted to abut against the edges of the portion 13 but on opposite sides of its central bearing portion. The provision of an odd number of slots permits a stop to be located in one of the slots where it will abut against the yoke and limit the rotation of the rocker at any point within the effective range of throw of the brushes, since, if that particular point occurs when the spacing web between two slots in the rocker is approaching or is in direct alignment with an edge of the yoke and a stop bolt cannot accordingly be located therein, the stop bolt can instead be located in the available slot positioned diametrically across the rocker from the web referred to. In Fig. 7 is shown the arrangement of the rocker arm and the stops when the rocker is in its full reverse position. The dotted line locations of the rocker arm and the stops indicate the same rocker in its full forward position.

While this invention has been referred to throughout the specification as applicable for association primarily with an electric motor, it is to be understood that the invention is equally as applicable for association with an electric dynamo.

I claim:

1. In a machine of the character de-

scribed, the combination with a frame and a commutator shaft, of a rocker rotatable about the axis of the shaft, a commutator brush assembly associated with the rocker, an arm detachably connected to the rocker, and means associated with the rocker to limit its rotation in one direction at any point within the effective range of movement of the brush about the shaft.

2. In a machine of the character described, the combination with a frame and a commutator shaft, of a rocker rotatable about the axis of the shaft, a commutator brush assembly associated with the rocker, an arm detachably connected to the rocker at any one of a plurality of points, and means associated with the rocker to limit its rotation in one direction at any point within the effective range of movement of the brush about the shaft.

3. In a machine of the character described, the combination with a frame and a commutator shaft, of a rocker rotatable about the axis of the shaft, a commutator brush assembly associated with the rocker, an arm connected to the rocker, and means associated with the rocker to limit its rotation in one direction at any point within the effective range of movement of the brush about the shaft, said means being releasable and movable angularly to effect a variation in the limit of rotation.

4. In a machine of the character described, the combination with a frame and a commutator shaft, of a rocker rotatable about the axis of the shaft, a commutator brush assembly associated with the rocker, an arm connected to the rocker, and means associated with the rocker and co-acting with the frame to limit the rotation of the rocker in both directions at any points within the effective range of movement of the brush about the shaft, said means being detachable and movable angularly to effect variations in the limits of rotation.

5. In a machine of the character described, the combination with a frame and a commutator shaft, of a rocker rotatable about the axis of the shaft and provided with a curved surface, a commutator brush assembly having a mounting block curved on its base for attachment against the curved surface of the rocker, and means engageable with the mounting block for attaching the same to the rocker.

6. In a machine of the character described, the combination with a frame and a commutator shaft, of a rocker rotatable about the axis of the shaft and provided with a convex surface substantially concentric with the said axis, a commutator brush assembly having a mounting block concave on its base for attachment against the convex surface of the rocker, and means en-

gageable with the mounting block intermediate its ends for attaching the same to the rocker.

7. In a machine of the character described, the combination with a frame and a commutator shaft, of a rocker rotatable about the axis of the shaft and provided with a convex surface substantially concentric with the said axis, a commutator brush assembly having a mounting block concave on its base for attachment against the convex surface of the rocker, and means engageable with the mounting block intermediate its ends for attaching the same to the rocker, said means consisting of a connecting member which projects from the convex surface of the rocker and engages with the block.

8. In a machine of the character described, the combination with a frame and a commutator shaft, of a rocker rotatable about the axis of the shaft and provided with a convex surface substantially concentric with the said axis, a commutator brush assembly having a mounting block concave on its base for attachment against the convex surface of the rocker, and means engageable with the mounting block intermediate its ends for attaching the same to the rocker, said means consisting of a single machine screw which projects from the convex surface of the rocker through the block into engagement with the same.

9. In a machine of the character described, the combination with a frame and a commutator shaft, of a rocker rotatable about the axis of the shaft and provided with a portion having a surface substantially at right angles to the said axis, an arm detachably engageable with said portion at any one of a plurality of points angularly thereof, and a scale on said surface for permitting a recording of the point at which the arm is attached to the rocker.

10. In a machine of the character described, the combination with a frame and a commutator shaft, of a rocker rotatable about the axis of the shaft and provided with a portion having a surface substantially at right angles to the said axis, limiting stops detachably engageable with said portion at any one of a plurality of points angularly thereof, and a scale on said surface for permitting a recording of the points at which the stops are attached to the rocker.

11. In a machine of the character described, the combination with a frame and a commutator shaft, of a rocker rotatable about the axis of the shaft and provided with a portion having a plurality of slots therein, an arm, and attaching means passing through one of the slots and engageable with the arm to locate adjustably the latter angularly of the rocker.

12. In a machine of the character described, the combination with a frame and

a commutator shaft, of a rocker rotatable about the axis of the shaft and provided with a portion having a plurality of slots therein, a stop co-acting with the frame to limit the rotation of the rocker in one direction, and attaching means passing through one of the slots to locate adjustably the stop angularly of the rocker.

13. In a machine of the character described, the combination with a frame and a commutator shaft, of a rocker rotatable about the axis of the shaft and provided with a portion having a plurality of elongated arcuate slots therein, stops co-acting with the frame to limit the rotation of the rocker in either direction, and attaching means passing through one or more of the slots to locate adjustably the stops angularly of the rocker.

14. In a machine of the character described, the combination with a tubular housing open at one end and a commutator shaft, of a rocker rotatable about the axis of the shaft and provided in substantially the plane of the open end of the housing with a web portion which extends radially in all directions to the encompassing edge of the housing whereby to constitute an end closure for the mechanism within the housing.

15. In a machine of the character described, the combination with a frame having an annular portion and a diametrically disposed bearing bracket portion extending from the annular portion in axially spaced relation thereto, and a commutator shaft, of movable closure means associated with the frame in the circumferential openings existing in the space between the diametrically disposed portion of the bracket portion and the annular portion of the frame whereby to constitute with the frame and the closure means a tubular housing open at one end, and a rocker rotatable about the axis of the shaft and provided in substantially the plane of the open end of the housing with a web portion which extends radially in all directions to the encompassing edge of the housing whereby to constitute an end closure for the housing.

16. In a machine of the character described, the combination with an open frame and a commutator shaft, of a rocker rotatable about the axis of the shaft and provided with a portion extending radially in all directions to constitute an end closure for the mechanism contained within the frame, and doors carried by the frame and disposed in the openings in the peripheral contour thereof to constitute complementarily with the frame a peripheral closure for the mechanism contained within the frame.

In testimony whereof I have hereunto signed my name.

JOHN D. NIES.