

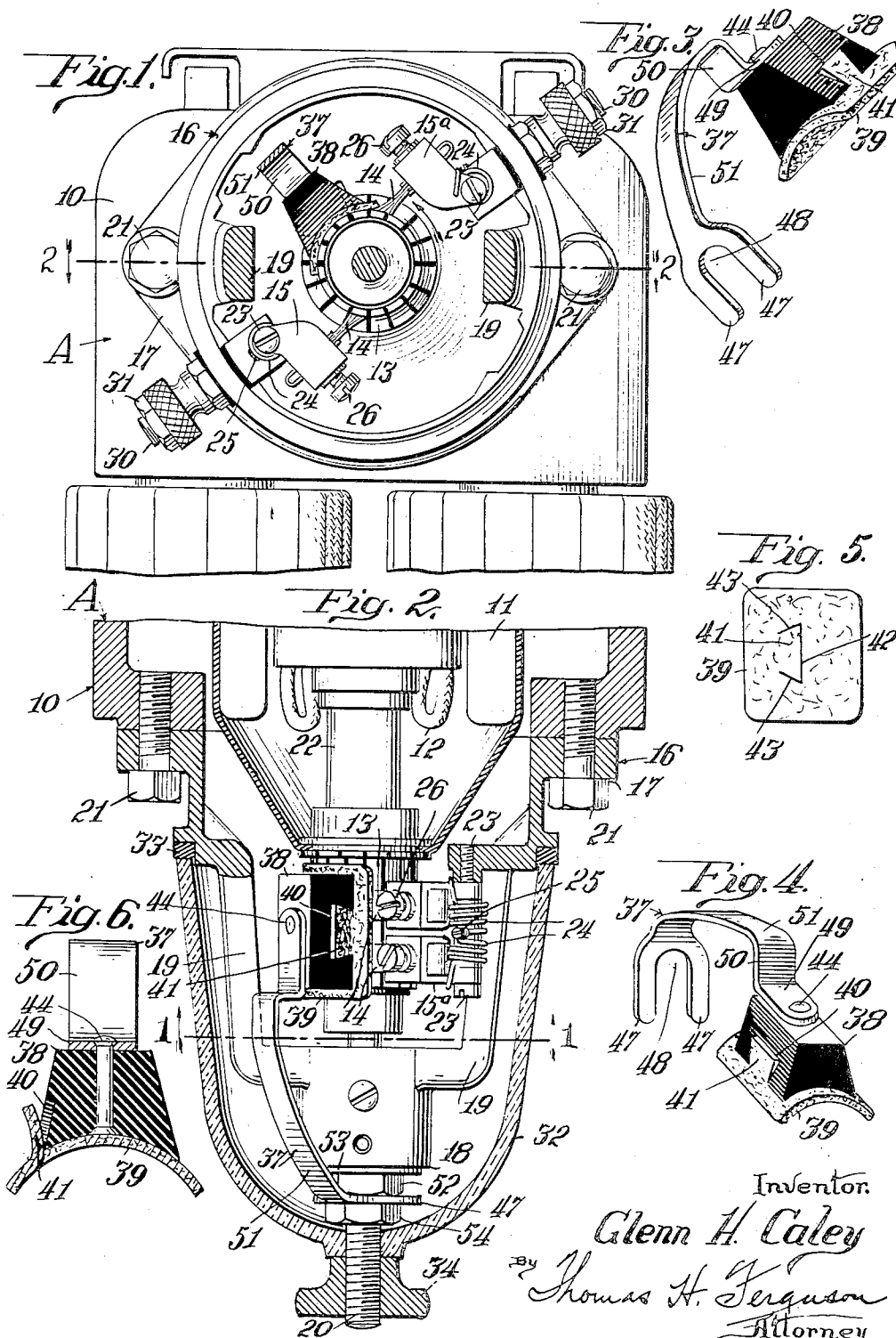
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G. H. CALEY

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COMMUTATOR CLEANER FOR ELECTRIC MOTORS

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COMMUTATOR CLEANER FOR ELECTRIC MOTORS

Glenn H. Caley, Middletown, N. Y., assignor to
Russell B. Arnold, Chicago, Ill.

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The present invention relates to commutator cleaners for electric motors and the main object of the invention is to provide a cleaner of this type which shall be simple in construction, economical to manufacture and highly efficient in operation. Another object is to provide a cleaner which will always be in proper position with its cleaning element held tight against the commutator surface and properly centered upon it. Another object is to produce a new device with a minimum of parts and to associate them with the commutator in such a way that the device may be enclosed with the commutator within the usual motor casing. Another object is to arrange the parts so they are easily accessible and may be readily replaced when desired.

The various features and advantages of the invention will be best understood upon reference to the following description taken in connection with the accompanying drawing wherein a preferred embodiment of the invention is disclosed. The scope of the invention is particularly pointed out in the appended claims.

In said drawing, Fig. 1 is an end elevation of an electric motor provided with a commutator cleaner constructed and arranged in accordance with the present invention, some of the parts being shown in section taken on a plane indicated by the line 1—1 of Fig. 2; Fig. 2 is a partial sectional view of a portion of the same motor, the plane of section being indicated by the line 2—2 of Fig. 1; Figs. 3 and 4 are perspective views of the cleaner removed from the motor, the same being viewed in different directions in the two figures; Fig. 5 is a plan view of the cleaner pad before being placed in curved position upon its supporting block; and Fig. 6 is a transverse section through the block and pad illustrating a preferred way of securing the pad to the block, a tenon on the pad being shown in position to be pressed into a cooperating mortise in one side of the block. Throughout these views like characters refer to like parts.

It is well known that in the operation of electric motors, particularly in the railway signaling field, it is important to keep the commutators clean in order that the signals may not fail to function. Motors in such service are exposed to the hazards of the accumulations of dirt, frost, oil in congealed form, and other foreign matters that accumulate upon the surface of the commutator at different seasons of the year and under different conditions of service. By use of the commutator cleaner constructed and ar-

ranged in accordance with the present invention the surface of the commutator is kept clean.

Referring to the drawing in detail, A designates a typical switch motor of a type commonly employed in railway signaling. In this motor the armature axis is usually horizontally arranged and the motor itself includes the frame 10, the usual field windings 11, armature windings 12, commutator 13, brushes 14 and brush holders 15 and 15a. These motor parts are well known and need not be further described except as the description incident to the construction and operation of the cleaner may bring them into view.

In the present instance the main frame 10 carries an auxiliary frame 16 which has a base portion in the form of a ring 17 and an end bearing 18 connected thereto by a plurality of arms 19. The outer end of the bearing 18 terminates in a threaded stud 20. Suitable bolts 21 passing through the annular flange of the ring 17 into the adjacent portion of the main frame 10 serve to hold the frame parts together. These bolts may be screwed home after the armature has been properly assembled with its shaft 22 properly positioned in its bearings as will be obvious.

The brush holders 15 and 15a are suitably connected to the frame 16 by means of screws 23 which pass through suitable openings in the brush holders and into threaded engagement with threaded openings in the adjacent flange of the ring 16. Each of the brush holders is provided with a coiled spring 24 which serves to press the brushes 14 into engagement with the commutator 13. In the present instance each spring 24 is held in place by a screw 25. Other screws 26 are threaded through threaded openings in the body of each brush holder and are pressed into holding engagement with the associated brush 14. Thus the brushes are held in set position. The manner of supporting the brush holders is typical and may be varied according to circumstances.

No distinction has been made in the description between the two brush holders 15 and 15a but it should be noted that they are reversed, the one being, so to speak, a right hand holder and the other a left hand holder.

Electrical connection is established with the brush holders through the terminal screws 30 upon which are the knurled nuts 31. These screws are suitably supported upon and insulated from the supporting frame. The particular motor illustrated is also provided with a glass bell or cover 32 which has a central opening through which the stud 20 may be passed. The

open end of the bell has its periphery fitted against the adjacent portion of the ring 16 with a suitable washer 33 intervening. A thumb nut 34 screwed upon the stud 20 presses the bell mouth against the washer 33 and provides a tight closure to protect the inclosed commutator and associated parts.

The cleaner is in itself very simple in construction. It comprises, in the embodiment shown, a resilient leaf-like metal strip 37 in association with an insulating block 38 and the cleaning pad 39. The pad has a dimension in the direction of the axis of rotation of the commutator which closely approaches the width of the commutator. This pad is made of flexible resilient material such as felt and it is relied upon to wipe off the accumulations upon the surface of the commutator as the latter engages it when rotating. Obviously, the material out of which the pad is made may be varied and it is also clear that the dimensions themselves may be changed to suit particular conditions.

The block 38 is composed of insulating material and is preferably a truncated pyramid in form. The under surface of the block is concave and cylindrical to conform to the curvature of the commutator. When the pad 39 is in place it fits up snugly against the curved bottom of the block 38 and this curvature is such that the lower portion of the pad then nicely fits against the curved surface of the commutator.

There are many ways in which the pad may be secured to the block 38. In the present instance the edge of the block 38 which, when the motor is operating, lies toward the oncoming commutator bars is provided with a notch or mortise 40. Preferably this mortise is dovetailed in shape. The part of the pad which fits into this mortise is the tongue or tenon 41. This tenon may be variously formed. In the instance illustrated the piece of material out of which the pad 39 is made is provided with a slit or cut 42 associated with two angular cuts 43, as clearly shown in Fig. 5. These cuts preferably extend all the way through the material, as indicated by the separated pad and tenon shown in Fig. 6. When the tenon is drawn up in this way it may be easily slipped into place in the mortise 40. The movement of the commutator is in the direction indicated by the arrow in Fig. 1. In other words, it is in a direction such that the commutator bars first encounter the pad at the edge adjacent to the tenon 41. The resulting forces are thus such as to hold the pad in place. Any tendency to drag the pad away is opposed by the inclined edges of the dovetailed tenon engaging the like edges of the mortise. In other words, the force applied tends to wedge the tenon more securely in the mortise. Obviously, too, the pad might be otherwise secured to the block. Thus, it might be glued to it.

The strip 37 is secured at its inner end to the top face of the block 38 by a pin or rivet 44. The opposite or outer end of the strip 37 is bifurcated and terminates in two arms 47 which are spaced so as to give an intermediate space or slot 48. It will be noted that the plane of the arms 47 is substantially at right angles to the general direction of the main portion of the strip 37. The end 49, where the pin 44 is located, is flat and engages the flat top of the block 38. Adjacent to the flat portion 49 is an angular portion 50 which turns abruptly away from the plane of the portion 49 with what is practically a right-angled turn. The strip 37, adjacent to the

abruptly turned portion 50, again takes a longitudinal direction in the portion 51 which also is slightly curved, as clearly shown.

It will be noted that when the cleaner shown in perspective in Figures 3 and 4 is placed on the motor, the arms 47 at the bifurcated end will pass down upon opposite sides of the stud 20. In other words, the stud 20 will enter the space 48. In assembling the parts, a nut 52 is threaded upon the stud 20 and screwed down so as to apply pressure against the end of the bearing 18. A washer 53 may be employed between the nut 52 and the end of the bearing. By using more than one washer 53 it is possible to change the position of the arms 47 lengthwise of the stud 20, the greater the number of washers the greater the distance of the bifurcated arms 47 from the commutator. The same result may be had by replacing the nut 52 by one or more nuts providing a different resultant thickness. When the arms 47 are once properly positioned along the stud by the proper number of nuts or washers as just stated, then, with the arms 47 straddling the stud 20, it is only necessary to apply another nut 54 to the stud 20 and screw it home tight against the arms 47 of the strip. When this is done the position of the pad 39 in the direction of the axis of the commutator and armature will be determined. Furthermore, the material of the strip 37 is in itself, although a spring material, of sufficient pliability so that the strip may be bent a little so as to vary this adjustment in the direction of said axis even without changing the setting of the arms 47 by the use of nuts and washers as just described.

Because of the resiliency of the metal of the strip 37 there will be, when the bifurcated end is held in place upon the stud 20, a certain amount of pressure applied to the block 38 and the pad 39 beneath it. This pressure may be varied by the setting of the stud within the space 48. If the setting be such that the stud is near the inner end of the space then, obviously, other things being equal, the pressure would be greater than it would be were the position of the stud nearer the open end of the slot 48. As before, quite independently of this setting of the bifurcated end of the strip, it is also possible to bend the strip 37 so as to increase or decrease the pressure of the pad upon the commutator.

It will also be apparent that by loosening up the nut 54 the strip 37 may be rotated about the axis of rotation of the armature and thus the pad may be annularly displaced so as to occupy any desired position, within the range of movement possible, upon the commutator. Once thus located, it is only necessary to again screw down the nut 54.

In carrying out my invention it will be clear that some changes may be made in the details of the parts without departing from the spirit and scope of the invention. I therefore do not wish to be limited to the details shown but aim to cover by the terms of the appended claims all those alterations and modifications which rightly come within the spirit and scope of my invention.

I claim:

1. The combination with the frame and commutator of an electric motor, of a cleaning pad for engaging said commutator, means for yieldingly pressing said pad radially toward the axis of rotation of said commutator, and securing means for connecting said pressing means to said

frame, said securing means being operative to engage said pressing means to give different radial adjustments of said pressing means thereby to vary the pressure of said pad on said commu-
 5 tator, and further operative to permit rotation of said pressing means about said axis of rotation thereby to permit adjustment of said pad circumferentially of said commutator.

2. The combination with the frame and com-
 10 mutator of an electric motor, of a cleaning pad for engaging said commutator, an insulating block engaging the outer surface of said pad, and a resilient leaf-like metal strip secured at one end to said block and extending generally in
 15 the direction of the commutator axis, a threaded stud projecting from said frame outward in said axis, the outer end of said strip being bifurcated to embrace said stud, and means for clamping the outer end of said strip upon said
 20 stud in different radial positions relative to said axis and in different angular positions about said axis, whereby the resilient action of said strip on said block and pad may be varied and the circumferential position of said pad on said com-
 25 mutator may be varied.

3. The combination with the frame and com-
 mutator of an electric motor, of a cleaning pad for engaging said commutator, an insulating
 30 block engaging the outer surface of said pad, and a resilient leaf-like metal strip secured at one end to said block and extending generally in the direction of the commutator axis, a threaded stud projecting from said frame out-
 35 ward in said axis, the outer end of said strip being bifurcated to embrace said stud, and means for clamping the outer end of said strip upon said stud in different radial positions relative to said
 40 axis, in different angular positions about said axis and in different longitudinal positions on said stud, whereby the resilient action of said strip on said block and pad may be varied, the circumferential position of said pad on said com-
 45 mutator may be varied, and the transverse position of said pad on said commutator relative to a central plane at right angles to said commu-
 tator axis may be varied.

4. The combination with the frame of an electric motor, its commutator, a commutator cover, a threaded stud for receiving said cover and a

nut for holding said cover in place, of a cleaning pad for engaging said commutator, a resilient leaf-like metal strip supportingly secured to said pad and having its outer end apertured for the reception of said stud, and abutting means on
 5 said stud to operatively engage opposite sides of the outer end of said strip to secure the same in different adjusted positions, said abutting means being independent in operation of said cover and cover holding nut.

5. The combination with the frame and com-
 mutator of an electric motor, of a cleaning pad for engaging said commutator, a resilient leaf-
 10 like metal strip for supporting said pad from said frame, and means for securing said strip to said frame at a point in substantial alinement with the axis of rotation of said commutator, said means including clamping members which
 15 engage opposite sides of said strip to hold the same in different rotational positions and also at different distances from said commutator, and the connection of said strip to said pad being
 20 outward of the commutator surface relative to said axis of rotation, thereby to direct the variable pressures of said strip radially inward to-
 25 ward said axis of rotation.

6. The combination with the frame and com-
 mutator of an electric motor, of a cleaning pad for engaging said commutator, a resilient leaf-
 30 like metal strip for supporting said pad from said frame, and means for securing said strip to said frame at a point in substantial alinement with the axis of rotation of said commutator, said means including clamping members which
 35 engage opposite sides of said strip to hold the same in different rotational positions and also at different distances from said commutator, and the connection of said strip to said pad being
 40 outward of the commutator surface relative to said axis of rotation, thereby to direct the variable pressures of said strip radially inward to-
 45 ward said axis of rotation, and said strip being pliable enough to be set by bending so as to have different over-all lengths in the direction of said axis of rotation, thereby additionally
 providing for adjustment of said pad upon said commutator transversely of its plane of rota-
 tion.

GLENN H. CALEY.