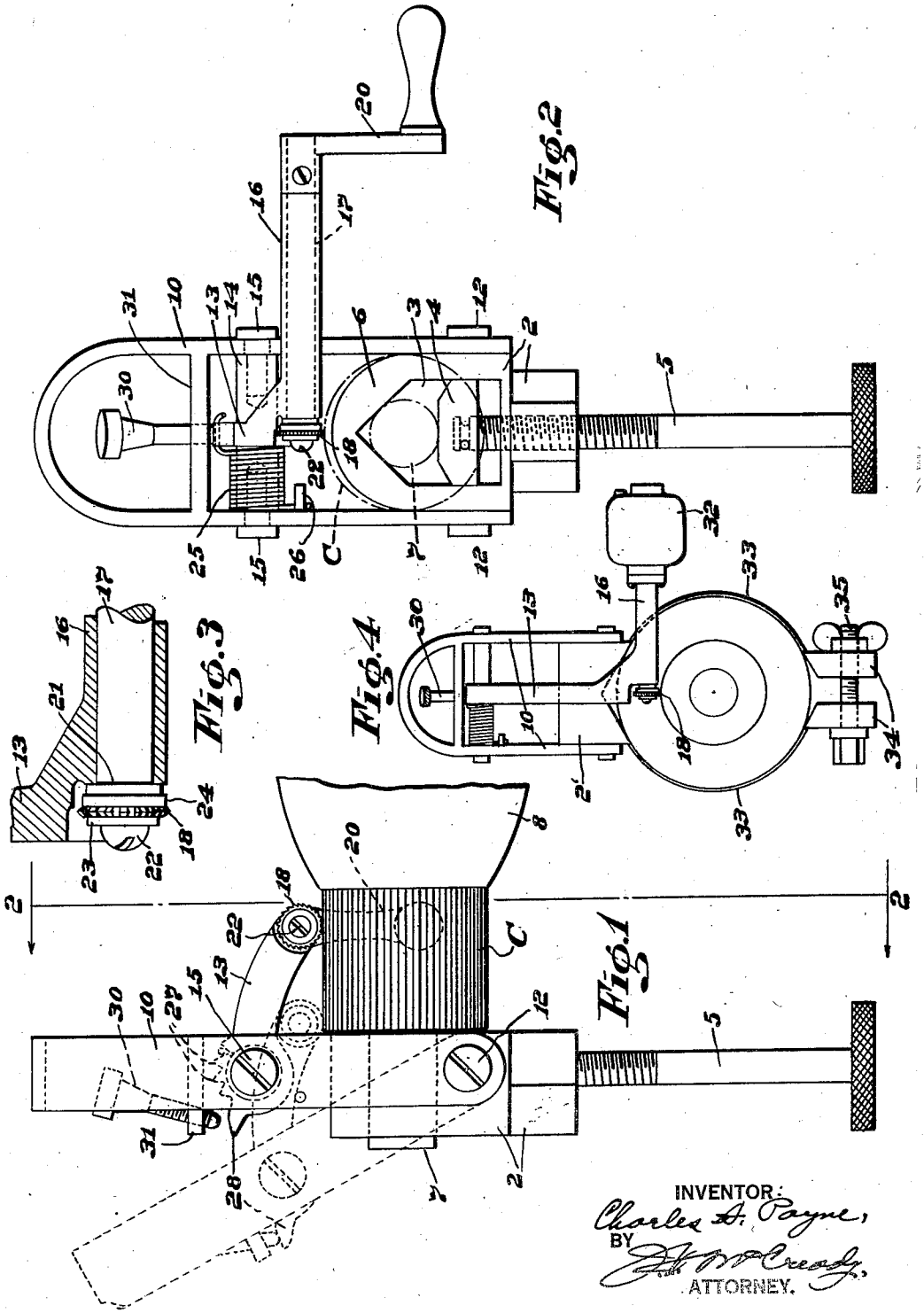
Aug. 22, 1939. C. A. PAYNE 2,170,389

APPARATUS FOR USE IN REPAIRING COMMUTATORS

Filed Feb. 19, 1938



Patented Aug. 22, 1939

2,170,389

UNITED STATES PATENT OFFICE

2,170,389

APPARATUS FOR USE IN REPAIRING COMMUTATORS

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Application February 19, 1938, Serial No. 191,446

6 Claims. (Cl. 90—12)

In connection with the overhauling and repairing of direct current and universal motors and generators, it is usually necessary to re-surface the commutator. In the case of small motors and generators, such as those used in automobiles and in a great variety of small tools, this re-surfacing operation is readily accomplished either in a lathe or with the aid of special equipment commonly used by garage men. After the turning down of the commutator has been accomplished, however, it is necessary, in order to produce a good job, to undercut the separators or mica plates interposed between the commutator segments. That is, the edges of these plates should be cut down somewhat below the peripheral surface of the commutator. The equipment now available for this purpose is expensive, and the present invention aims to devise an inexpensive apparatus with which this operation can be performed quickly and accurately.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawing, and the novel features will be particularly pointed out in the appended claims.

In the drawing,

Figure 1 is a side elevation of an apparatus constructed in accordance with the invention, and showing it in its operative position on an armature;

Fig. 2 is an end elevation of the apparatus shown in Fig. 1, its relationship to the latter figure being evident from the line 2—2, Fig. 1;

Fig. 3 is a fragmentary, sectional view of the parts adjacent to the cutter, and showing the cutter on a larger scale; and

Fig. 4 is a view similar to Fig. 2 showing a modification.

The construction shown in the drawing comprises a base 2 provided with an hexagonal portion to facilitate the mounting of it in a vise. Formed through this base is an aperture 3 and working in this aperture is a plunger 4 adapted to be moved up and down by means of a screw 5, the upper end of the screw being secured rotatably in, but against axial movement relatively to, the plunger 4. The upper surface of this plunger cooperates with a V-shaped upper surface in the part 6 integral with the base to form a clamp designed to receive the shaft 7 of the motor armature 8, and to secure this armature in position for the undercutting operation.

Pivotally mounted on the base 2 is a reticulated arm or frame 10. It straddles the base and is secured to it by pivot screws 12—12 so that it can swing in a plane passing through the axis of the shaft 7. A second arm 13 is pivoted on the arm or frame 10, the former arm preferably having a hub portion 14 formed integral with it and located between the side pieces of the member 10, these two parts being secured together by pivot screws 15—15. This second arm 13 also has a relatively long extension 16 formed integral with it which serves as a bearing for a shaft 17 on one end of which the rotary cutter 18 is secured. A hand crank 20 is secured to the opposite end of the shaft and serves as the means for driving the cutter 18 in the form of the device designed to be operated by hand. Preferably the shaft 17 is provided with a thrust collar 21 fast on the shaft and the cutter 18 is secured to the shaft by means of a screw 22 and washer 23. Between the collar 21 and the cutter 18, and loosely mounted on the shaft, is a second collar 24 designed to bear on the surface of the commutator immediately beside the cutter. This collar is somewhat smaller in diameter than the cutter and therefore limits the depth of the cut which can be made by the cutter 18.

It will be observed that the arms 10 and 13 are mounted to swing in the same plane in which the cutter 18 is supported, and that this plane passes through the axis of the armature shaft 7. Also, that the nature of the construction is such that the cutter is held definitely in this plane. This arrangement, therefore, supports the cutter for movement along the surface of the commutator C, Fig. 1, where it can follow an element of this cylindrical surface and thus can be traversed backward and forward along the edge of a mica separator. The cutter used in working on any individual motor will be of a width approximately equal to that of the separator. By revolving the cutter in the proper direction while it is so traversed, it can be made to cut the edge of the separator down to a depth below the adjacent surface of the commutator controlled by the gage roll 24. Usually this depth in a small motor is approximately equal to the thickness of the separator.

For the purpose of holding the cutter pressed against the edge of the separator on which it is working, a coiled spring 25 is interposed between the two swinging arms 10 and 13, this spring preferably being coiled around the hub 14, Fig. 2, and one end being anchored to the pin 26, while the other end is located in one of a series of notches 27, Fig. 1, formed in the edge of a flange or fin integral with the parts 13 and 14. At the rearward end of this series of notches a lug 28, Fig. 1, is provided where it can engage the lower end of a stop screw 30 which is threaded through a hole in the web 31 which connects the opposite side pieces of the arm 10. This stop arrangement is useful in adjusting the initial position of the cutter relatively to the commutator, and the spring 25 tends to hold the lug 28 constantly in engagement with the lower end of the screw 30.

In using the apparatus the base 3 is clamped in a vise and the end of the motor shaft adjacent

to the commutator is clamped in the base, as illustrated in Fig. 1. At the beginning of the cutting operation on any separator, the part 10 is swung backwardly to the left, as shown in dotted lines in Fig. 1, so that the cutter 18 can start its operation at the outer end of the commutator. By turning the screw 30 up or down, the cutter can be moved into the correct relationship to the commutator for the start of the cutting operation. When this adjustment has once been made it is not disturbed until the work on that particular commutator has been completed. From the initial position shown in dotted lines in said figure, the arm 10 is moved toward the right, while revolving the cutter 18. It cuts away the exposed surface of the separator rapidly, and its point of operation is transferred along the separator simply by moving the arm 10 forward. When the undercutting operation on one separator has been completed, the workman moves the arm 10 and the cutter 18 backwardly until the cutter clears the commutator. He then turns the armature in the clamp 4—6 far enough to bring the next adjacent separator into line with the cutter. The undercutting operation above described is then repeated, and these operations are continued until all of the separators have been undercut to the desired degree. The entire operation may be performed rapidly with relatively little effort and with a high degree of accuracy because the depth of cut is definitely predetermined by the relationship between the diameter of the cutter and that of the gaging roll or collar 24.

If the nature of the equipment with which the commutator is turned down is such that the pulley and the bearing at the opposite end of the motor from the commutator need not be removed, then such removal is not required by the apparatus provided by this invention. At the conclusion of the operation the screw 5 is backed up sufficiently to release the shaft 7, after which the entire device is pulled off the shaft.

The labor involved in using this device can be further reduced by mounting a small electric motor on the bracket 16 to drive the shaft 17. Such a construction is shown in Fig. 4 in which the motor is illustrated at 32. Or, provision may be made for driving the cutter shaft from some convenient source of power through a flexible shaft, or in any other convenient manner. In some cases, also, it may be found desirable to clamp the apparatus directly to the core of the armature 8. This result also may be accomplished in the manner illustrated in Fig. 4. There the base 2' on which the arm 10 is pivoted has two flexible elements 33—33 secured rigidly to it at their upper ends and these parts are provided at their lower ends with blocks 34—34 through which a clamping bolt 35 extends. By properly adjusting the parts on the motor and tightening up the bolt 35, the undercutting apparatus may be mounted on the core so that the cutter 18 can be operated in essentially the same manner above described in connection with Figs. 1, 2 and 3. In this arrangement the armature presumably would be clamped in a vise and the bolt 35 would not be tightened sufficiently to prevent the relative movement of the armature and the undercutting apparatus necessary to shift the point of operation of the cutter from one separator to another. In addition to actually cutting away the edges of the separators, this apparatus also is useful in cleaning out the grooves between the commutator segments, even when no substantial cutting away of the mica separators thus is required.

While I have herein shown and described a preferred embodiment of my invention, it will be evident that the invention is susceptible of embodiment in other forms without departing from the spirit or scope thereof. Also, since it is immaterial whether the commutator operated upon is that of a motor of a generator, both will be hereinafter included generically in the term "motor."

Having thus described my invention, what I desire to claim as new is:

1. In an apparatus for operating on motor commutators, the combination of a base, means for releasably securing a motor armature to said base, a rotary cutter for operating on the mica separators between the segments of the commutator, an arm pivoted on said base, and a second arm pivoted on the first arm to swing in the same plane with it, said second arm supporting said cutter.

2. An apparatus according to preceding claim 1, in combination with a spring connecting said arms and tending to swing one arm relatively to the other to press said cutter against the commutator, and a stop screw carried by one arm and against which said spring tends to hold the other arm, said screw being adjustable to change the angular relationship of said arms.

3. An apparatus according to preceding claim 1, in which said second arm supports a rotary shaft on which said cutter is mounted, and a roll loosely mounted on said shaft beside said cutter is arranged to run on the surface of the commutator and is slightly smaller in diameter than the cutter, whereby it serves as a gage to limit the depth of operation of the cutter.

4. An apparatus according to preceding claim 1, in which said second arm carries a shaft on which said cutter is mounted, and a small motor is mounted on said arm to drive said shaft.

5. In an apparatus for operating on motor commutators, the combination of a base, means for releasably securing a motor armature to said base, an arm pivoted on said base, a second arm pivoted to the first arm to swing in the same plane with it, a cutter mounted on said second arm in position to operate on the upper edges of the mica separators between the segments of the commutator, and a spring associated with said second arm and serving to press said cutter against the edges of said separators.

6. In an apparatus for operating on motor commutators, the combination of a base, means for releasably securing a motor armature to said base, an arm pivoted on said base, a second arm pivoted to the first arm to swing in the same plane with it, a cutter mounted on the free end of said second arm whereby it is supported in position to operate lengthwise on the upper edges of the separators between the segments of the commutator, a spring connecting said arms and serving to press said cutter against the mica separators during such operation, and a stop screw carried by one arm and adapted to engage the other to adjust the angular relationship between said arms.

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