

Nov. 24, 1953

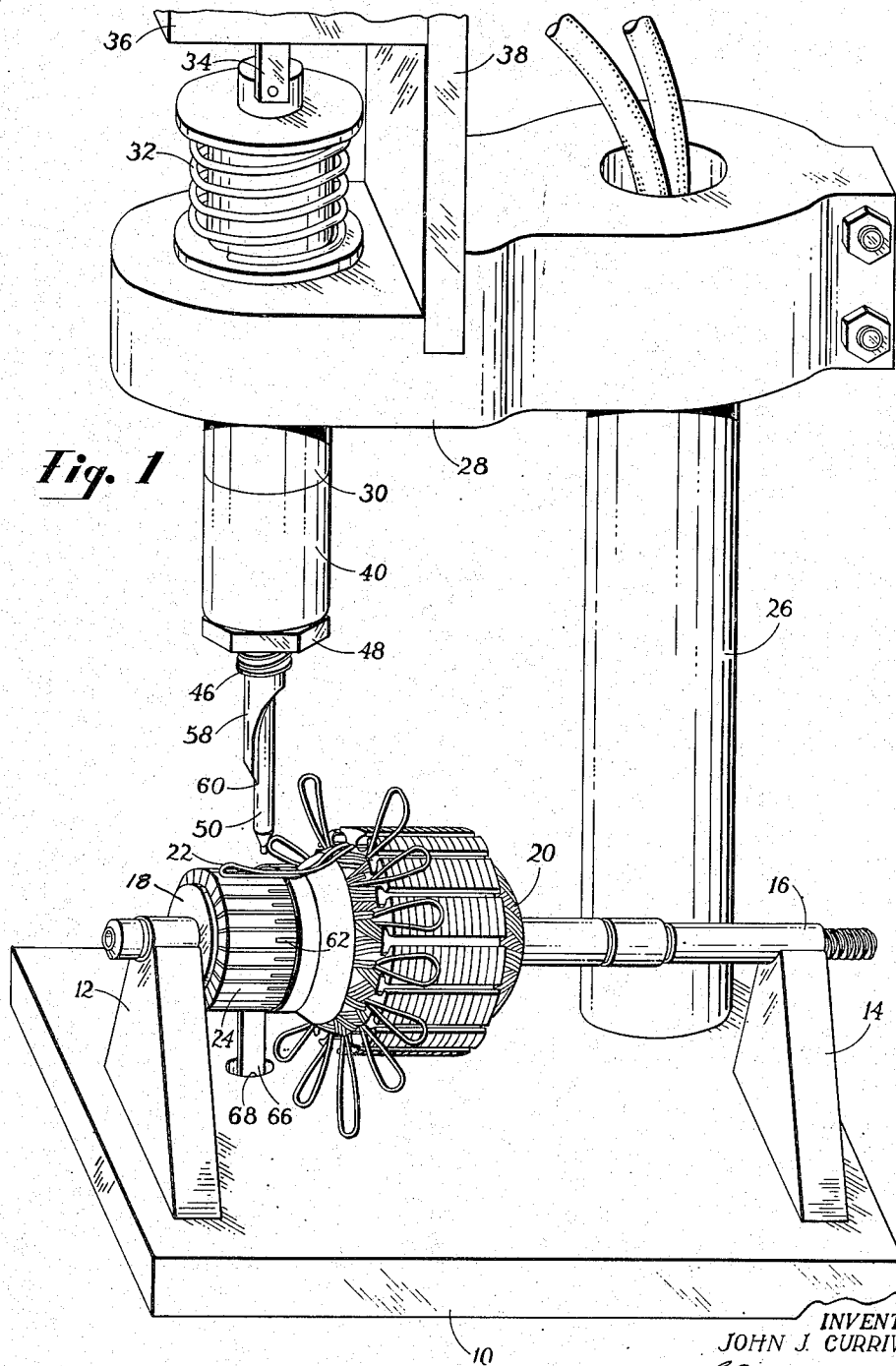
J. J. CURRIVAN

2,659,959

APPARATUS FOR STAKING LEADS TO COMMUTATORS

Filed Feb. 5, 1949

2 Sheets-Sheet 1



INVENTOR.
JOHN J. CURRIVAN
BY *Thomas C. Betts*
His ATTORNEY.

Nov. 24, 1953

J. J. CURRIVAN

2,659,959

APPARATUS FOR STAKING LEADS TO COMMUTATORS

Filed Feb. 5, 1949

2 Sheets-Sheet 2

Fig. 2

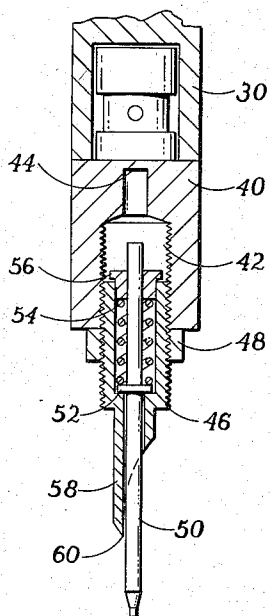


Fig. 3

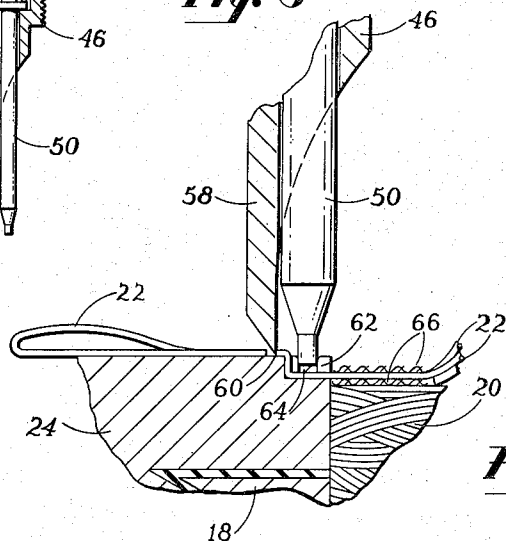
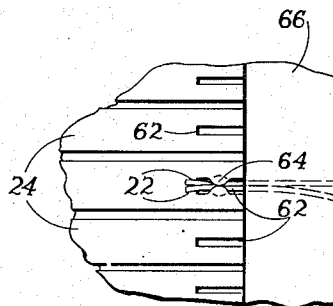


Fig. 4



INVENTOR.
JOHN J. CURRIVAN

BY *Thomas C. Betta*

His ATTORNEY.

UNITED STATES PATENT OFFICE

2,659,959

APPARATUS FOR STAKING LEADS TO
COMMUTATORSJohn J. Currivan, Stamford, Conn., assignor to
Electrolux Corporation, Old Greenwich, Conn.,
a corporation of Delaware

Application February 5, 1949, Serial No. 74,835

2 Claims. (Cl. 29—34)

1 My invention relates to an apparatus for staking armature winding leads to commutator bars and simultaneously cutting off the excess length of such leads.

As is well known in the manufacture of electric motors, generators and similar machines employing commutators, the winding machines which wind the armature coils automatically provide a series of loops of wire which, after the windings have been mounted on a shaft with a commutator, must be secured to the commutator bars. This may be done by providing a short slot in the end of each bar adjacent to the winding, placing a loop in the slot and peening over the edges of the slot in order to secure the loop in place. Thereafter, the excess length of the loop must be cut off. Heretofore, the peening and cutting operations have been performed separately and by hand.

In accordance with the present invention I have provided a power operated machine, having an upsetting punch and a cut-off knife so associated that both the staking and cutting operations are performed simultaneously and with a single stroke of the machine.

The above, as well as further objects and advantages of my invention will be apparent from the following description considered in connection with the accompanying drawings, which form a part of the specification and of which,

Fig. 1 is a perspective view of an apparatus in accordance with my invention;

Fig. 2 is a cross-sectional view of a portion of the apparatus shown in Fig. 1;

Fig. 3 is a cross-sectional view on an enlarged scale of a portion of the apparatus shown in Fig. 2 together with a portion of a commutator; and

Fig. 4 is an elevational view of a portion of a commutator after the leads have been staked to the commutator bars.

Referring more particularly to Fig. 1, reference character 10 designates a suitable base upon which is mounted a pair of supports 12 and 14. The upper ends of these supports are formed with semi-circular recesses for receiving an armature shaft 16. As is well known, this shaft has mounted thereon a commutator 18 and an armature winding 20. The winding is formed with a plurality of loops 22 coming out from one end thereof, the number of such loops corresponding to the number of bars 24 of the commutator.

Extending upwardly from the base 10 is a pedestal 26 which carries an arm 28. Recipro-

2 cally mounted in the arm is a plunger 30, a spring 32 being provided for urging the plunger upwardly. The upper end of the plunger is connected to a power operated member 34 which may constitute the armature of a solenoid or the piston of a power cylinder, either of which may be housed in the casing 36 mounted on the vertical member 38 carried by the arm 28.

Secured to the lower end of the plunger 30 is a member 40 provided with a threaded bore 42 extending inwardly from its lower end. Inwardly from the threaded bore is a recess having an end surface 44. A sleeve 46 is threaded into the bore 42 and a locknut 48 is provided for retaining the sleeve in adjusted position with respect to the member 40.

An upsetting punch 50 is reciprocally mounted within the sleeve 46. The punch is provided with a collar 52 which is received in an enlarged portion of the bore of the sleeve 46 and a coil spring 54 is compressed between this collar and a plug 56 which is threaded into the upper end of the enlarged portion of the bore. The lower end of the sleeve 46 is formed as a skirt portion 58 which extends downwardly along one side of the punch 50, the lower end of the skirt portion being ground to form a cutting edge 60.

The above described device operates as follows:

30 An armature, as is shown in Fig. 1, is placed on the supports 12 and 14. Previously, the winding 20 has been wound on the shaft 16 and the leads 22 extend outwardly from one end of the winding. Likewise, a commutator 18 has been suitably secured to the shaft and the inner end of each bar 24 of the armature has been provided with a short slot 62.

The forward support 12 is so positioned that, when the outer end of the commutator is held against it, the slots 62 are underneath the punch 50. The operator takes one of the loops 22 and places it so that an intermediate portion thereof extends through a slot 62. The armature is then turned by hand until this slot is directly underneath the punch 50, whereupon the power device within the casing 36 is operated, as by means of a foot treadle, so as to move the plunger 30 and member 40 downwardly. As soon as the lower end of the punch strikes the commutator, the punch stops but the plunger 30 and member 40 continue to move downwardly, thus compressing the spring 54. The presence of the punch spanning the slot 62 assures that the loop 22 remains in the slot during the subsequent staking and cutting operations. When the sur-

face 44 strikes the upper end of the punch, there is imparted a sharp hammer-like blow or impact to the latter which causes its lower end to upset the metal at the edges of the slot 62, thus peening the metal over the wire of the loop 22 which is within the slot, as is shown at 64 in Fig. 4. At substantially the same time the cutting edge 60 of the skirt portion 58 severs the excess length of the loop beyond the point where the loop has been staked to the commutator bar, as is shown in Fig. 3. Thereafter, the next loop is placed in a slot 62 and the commutator rotated sufficiently so as to bring this slot underneath the punch.

Inasmuch as the relative motion between the sleeve 46 and the punch 50 is terminated by the end of the punch being struck by the surface 44 on the member 40, the length of the stroke of the punch relative to the member 46 may be varied by adjusting the latter member with respect to the member 40. Such adjustment may be accomplished by loosening the locknut 48 and turning the sleeve 46 into or out of the bore 42. Such adjustment is desirable in order that proper initial relationship may be obtained between the cutting edge 60 and the end of the punch when the latter is in its fully retracted position. Also, it is of course necessary to occasionally grind down the lower end of the skirt 58 in order to resharpen the cutting edge 60, and this shortening of the skirt may be compensated by turning the sleeve 46 outwardly from the member 40 so that the vertical distance between the lower end of the punch and the cutting edge will remain constant.

The fact that the punch 50 is reciprocable with respect to the sleeve 46 and member 40 not only results in the advantage of the punch receiving a sharp hammer-like blow, but it also makes it possible to have the lower end of the punch in close proximity to the commutator when the punch is in extended position, while still providing a stroke of sufficient length for the plunger 30 and member 40. In order that the operator may line up the punch properly with the slot it is essential that the punch be fairly close to the slot. However, if the stroke of the plunger 30 and member 40 were limited to such a short distance, there would not be sufficient impact to properly upset the metal of the commutator bar. By making the punch slidable in the sleeve 46, both close proximity to the slot and a stroke of sufficient length are obtained.

As the successive loops are staked to the commutator bars a piece of insulating tape 66, fed through a hole 68 in the base 10 from a roll suitably supported therebeneath, may be wrapped around the leads between the point where they

are staked to the commutator and the point where they come out of the winding. The purpose of this tape is to retain the leads in position during the subsequent impregnating step and to aid in preventing the leads from being bowed outwardly by the action of centrifugal force when the armature is rotated at high speed in the motor or generator of which it becomes a part.

While I have described one more or less specific embodiment of my invention this has been done for purposes of illustration only and the scope of my invention is not to be limited thereby, but is to be determined from the appended claims.

What I claim is:

1. A tool for staking leads to commutator bars comprising a body member adapted to be mounted for reciprocation, an elongated punch having a punch surface at one end, means mounting the punch for reciprocating movement in said body member, means urging said punch outwardly of said body member to a limited extent, a cutter immovably mounted on and relative to said body member and having a cutting edge adjacent one side only of said punch with its edge effective in the same direction as said punch, and means on said body member for engaging the other end of said punch when the punch is retracted by engagement with a commutator to positively strike said other end and deliver a blow to said punch, the length of said punch relative to the distance between said cutting edge and the last mentioned means being such that said punch surface cannot be retracted inwardly of said cutting edge.
2. The structure of claim 1 having cooperating means for maintaining said body member and said punch mounting means in assembled relation in a manner to afford axial adjustment of said punch mounting means relative to said body member.

JOHN J. CURRIVAN.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
184,579	Briggs	Nov. 21, 1876
345,655	Wood	July 13, 1886
348,441	White	Aug. 31, 1886
771,669	Schneegass	Oct. 4, 1904
1,809,168	Junkers	June 9, 1931
1,971,649	Furman	Aug. 28, 1934
2,056,534	Poole	Oct. 6, 1936
2,074,366	Collins et al.	Mar. 23, 1937
2,372,029	Stair	Mar. 30, 1945
2,385,619	Fausset et al.	Sept. 25, 1945
2,451,488	Huntington	Oct. 19, 1948