Dec. 10, 1968 TERUMOTO YAMAGUCHI ET AL 3,414,970

METHOD OF PRODUCING FLAT OR SURFACE COMMUTATOR

Filed July 11, 1966

Fig. 1

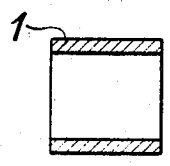


Fig. 2

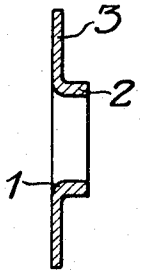


Fig. 3

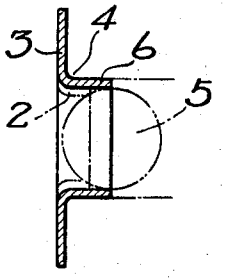


Fig. 4

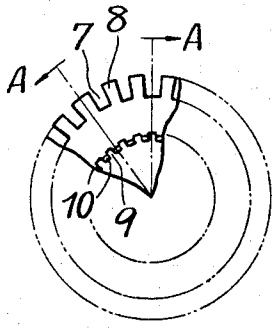


Fig. 5

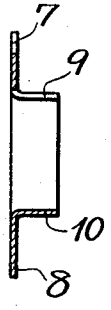
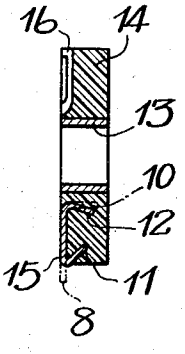


Fig. 6



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METHOD OF PRODUCING FLAT OR SURFACE COMMUTATOR

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1 Claim. (Cl. 29—597)

The present invention relates to a flat or surface commuator in an electric machine wherein the surfaces where the brushes make contact with each of commutator bars are contained in a plane which is perpendicular to the axis of rotation.

PRIOR ART

In the prior art the flat or surface commutator of the type described above has been manufactured by cold forging a hollow tubular blank so as to provide directly pawls extending toward the back surface of the commutator; or by forming a tubular blank whose axial section is of reversed U-shaped and providing pawls by dividing the tubular portion of said tubular portion by means of milling, broaching machining, etc. However, according to the above mentioned prior art methods, it is very difficult to manufacture a commutator of a small capacity whose thickness of pawl is rather thin and whose length of the pawls are rather longer.

Known is another method in which a plate blank is subjected to press at the center thereof so as to form a cylindrical projection whose one end is closed or blinded, then the outer periphery of the flat plate portion thereof is cut off so that a disk like flange whose center is that of said cylindrical projection may be formed and at the same time a group of projection are formed along the outer periphery thereof, said projections are bent toward the back surface of the disk so as to form pawls of the outer periphery; and the closed or blind portion of the cylindrical projection is cut off so as to separate the remainder thereof by broaching in the axial direction thereof in order to form pawls around the inner periphery. However, according to the last mentioned prior art method the economy of the material is very disadvantageous and it is difficult to produce a cylindrical projection whose one end is closed or blinded by press work especially when the pawls of the inner periphery are thin and long.

THE INVENTION

Bearing in mind the above stated disadvantages encountered in the prior art methods, the primary object of the present invention is to eliminate such disadvantages and to provide a method for manufacturing a commutator having rather thinner and longer pawls with a better economy of the raw material thereof from a tubular blank by forming a disk type flange wherein a portion thereof is made perpendicular to the axis thereof leaving a part thereof as it is and further by extending the tubular portion left unchanged in the axial direction thereof by passing therethrough a steel ball, etc.

The invention will be described with reference to the accompanying drawing illustrating the steps of a method according to the invention in the order to be mentioned, wherein;

FIG. 1 is a longitudinal view of a cylindrical or tubular blank;

FIG. 2 is a longitudinal sectional view of the first step semi-finished product which has been pressed from said cylindrical or tubular blank;

FIG. 3 is a longitudinal sectional view of the second step semi-finished product;

FIG. 4 is a front view of the third step semi-finished product;

FIG. 5 is a sectional view taken along the line A—A of FIG. 4; and

FIG. 6 is a longitudinal sectional view of a finished commutator.

In the figures, **1** is a cylindrical or tubular blank of a a suitable conductive material such as copper having a predetermined wall thickness and length. The substantial part of cylindrical or tubular blank **1** is formed by press work into a disk like flange **3**, as shown in FIG. 3, having a predetermined wall thickness and outer diameter and being perpendicular to the axial direction thereof, leaving a part of the cylindrical or tubllar portion **2** as it is. That is the first step semi-finished product, Thereafter, the cylindrical portion **2** of the first step portion **2** is, as illustrated in FIG. 3, fitted into a supporting table **4** having an inner diameter substantially equal to the outer diameter of the cylindrical or tubular portion and is applied with a steel ball **5** having an outer diameter sufficient to form a desired wall thickness of the tubular portion **2**. Thus the cylindrical or tubular portion **6** extending axially thereof and having a wall thickness thinner than that of the cylindrical or tubular portion **2** is produced and this is the second step semi-finished product. Then as shown in FIGS. 4 and 5, the second step semi-finished product is blanked so as to form a predetermined number of slots **7** having a predetermined depth and width around the outer periphery of the disk like flange **3**, providing a plurality of projections **8**. Next, by broaching a plurality of slots **9** whose number is equal to that of the slots **7** provided at the outer periphery and whose center lines are so arranged as to coincide with those of corresponding slots **7** of the outer periphery are provided, thus forming a corresponding number of projections **10**. The third step semi-finished product thus obtained is so processed, as illustrated in FIG. 6, as to bend each of the outer peripheral projections **8** toward the back surface of the semi-finished product, and further to the radial direction thereof, thus forming a pawl **11**. Each of the inner periphery projections **11** is slightly bent outwardly radially so as to form a pawl **12**. Such processed product is further processed so that a metallic bush **13** is located in this skelton structure and further an insulating material is molded around this semi-finished product whereby said pawls **11** and **12** are completely embedded therein. Further, slots **15** for connecting the windings of an armature are provided and also grooves **16** are provided along the center lines of the slots **7** and **9** so as to separate each commutator segment havtion in minor details, materials and proportions other portions thereof respectively.

The essential features of the invention has been described in this specification without restricting the invention in minor details, materials and proportions other than by the scope of the following claim.

What is claimed is:

1. A method for manufacturing a flat or surface commutator characterized by forming a portion of a cylindrical or tubular blank having a suitable or appropriate wall thickness and length into a disk like flange leaving the remaining portion of said blank as it is; extending the remaining portion of the cylindrical or tubular blank in the axial direction thereof by passing a steel ball through the inner portion thereof; then providing a plurality of slots around both said cylindrical or tubular portion and the outer periphery of said disk link flange, each of said slots in the tubular portion being aligned with and having a corresponding slot in the flange portion; bending thus formed projections so as to form pawls; molding an insulating material around the remaining portion so as to

embed said pawls; and separating each segment by providing a groove or recess along each of the center lines of said corresponding slots in the flange and tubular portions.

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U.S. Cl. X.R.

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