METHOD OF MAKING COMMUTATOR SEGMENTS AND THE LIKE

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INVENTOR

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This invention relates to a new and improved method of making commutator segments and the like.

It is the object thereof to produce commutator segments, and the like, in quantities without deviation or change, in either size or shape thereof, from stock of standard cross section rather than of special cross section, as heretofore, and without waste of material in a standard machine.

My new and improved method of making commutator segments will be apparent from an inspection of the accompanying drawings, in connection with the description herein-after contained, and wherein a preferred embodiment of the invention is disclosed for the purpose of imparting an understanding of the same.

In the drawings, wherein like numerals of reference designate like parts in the several figures;

Figure 1 is a view of one of the dies used in my new and improved method and fragmentary views of some of the parts of a machine;

Figure 2 is a face view of a pair of dies in their open position with the end of a work bar therebetween;

Figure 3 is a view similar to Figure 1, illustrating the work piece after the first operation;

Figure 4 is an end view of the dies in their closed position and a partially completed work piece therebetween.

Figures 5, 6, and 7, are views of the die similar to Figures 1 and 3, after the work piece shown therein has been subjected to the succeeding operation;

Figure 8 is a perspective view of one of the punches;

Figure 9 is a perspective view of the work piece before cut from the bar;

Figure 10 is a perspective view of the work piece substantially as shown in Figure 3;

Figure 11 is a perspective view of the work piece substantially as shown in Figure 5; and

Figure 12 is a perspective view of a completed commutator segment.

Heretofore commutator segments have been made from a bar specially rolled so that its cross section is substantially the same as that of the finished segment. A portion is then cut away in a power press or the like to form a substantially L-shape segment, after which it is subjected to operation to remove the burr formed thereon. This method requires a specially rolled bar of stock, the cost of which is high, and all the material cut therefrom is scrap and disposed of as such.

Special tools are required for the press operations, and as it is difficult to secure bar stock of uniform hardness and density, the action thereon is not always uniform, so that there is frequency distortion of the stock by this process, and the product is neither uniform in size or shape.

As these commutator segments are assembled around a core, it is essential that they are all of the same size and shape, otherwise there is an imperfect assembly. As this is not practicable with the old method, many of the commutator segments are discarded, due to these distortions.

These, and other objections, to the method commonly used in making commutator segments are overcome in my invention, wherein a bar of stock of standard shape in cross section is used, which may be procured at a much lower cost than one of special shape; there are no press operations; no waste material, as every portion of the bar is utilized and the commutator segments when finished are all of uniform size and shape, none of which are discarded by reason of distortion thereof and all of which are assembled with the greatest ease and without loss of time.

In my invention I utilize dies which are mounted in a header or upsetting machine of a well known type. These dies are separated at the feed line to permit the bar of stock to pass therebetween and thereafter closed and moved laterally to the feed line to a position generally known as the upsetting line where the material is subjected to endwise pressure by one or more punches. This form of mechanism is well known in the art and constitutes no part of my present invention. The particular form of dies, as well as the punches, are, however, a feature of this invention.

In Figure 2, I have shown a pair of dies invented for use in this method, designated 10 and 11, in each of the side faces of which is a recess 13, which extends from front to rear of the die, and a recess 13 opening therein near the outer end of the die. The bottom 14 of both of these recesses is in a plane at
an angle to the adjacent side face, the deepest end being at the upper wall 15 of the recess 13, and the shallowest end at the wall 22 of the recess 12.

The work bar 16, from which the work piece 17 is obtained, is made from a bar, round in cross section, and flattened on each side, by passing through a pair of rolls or like.

In Figure 1 I have shown one of the dies with some of the adjacent parts of the header, these being severally designated, 18 the body of the header, 19 the die support member, 20 the cap or cover, and 21 the cutter block.

In practice, the bar 16 is fed through the cutter block 21 and the recess 12 near the upper end thereof, as shown in Figure 1. The parts in this position are substantially the same as shown in Figure 2, the dies having an open space therebetween. When the parts are as just described, the dies are moved laterally in a path at right angles to the bar 16 to what is known as the upsetting line.

During this travel of the dies from the feed line to the upsetting line the work piece 17 is cut from the bar 16, and as the dies are brought together to the position substantially as shown in Figure 4, a sidewise pressure is exerted upon the work piece. As the space between the opposite walls of the recess 12, near the lower portion thereof, is less than the thickness of the work piece, the pressure thereon pinches its lower edge, so that its thickness is less than formerly, and that portion of the bar adjacent to the recess 13, in its attempt to escape the pressure, flows upwardly into the recess so that it assumes the shape substantially the same as shown in Figure 3.

It will be noted in Figure 1 that the distance from the top and bottom of the bar is less than that between the top and bottom of the recess 12. The open space thus left under the work piece (Figure 1) is sufficient to accommodate the flow of the metal at this point to assume the cross sectional shape required in the finished segment.

In Figure 3 the work piece is shown after this flow of metal has taken place and the bottom edge of the work piece is at the wall 22 of the recess 12. The dies are thereafter held in their close relation until the completion of the segment. When thus positioned, the first punch 23 in the reciprocating holder 24 moves toward and engages the outer end of the work piece, as shown in Figure 3, and causes the metal thereof to further flow into the recess 13 until it assumes the shape substantially as shown in Figures 5 and 11.

In Figure 6 the second punch 25 in the holder 26 has engaged the outer end of the work piece and causes further flow of the metal thereof so that it assumes the shape substantially as shown in Figure 6. The third punch 27, in the holder 28, is then brought in contact with the outer end of the work piece and the metal thereof flows until it completely fills both of the recesses 12 and 13, except that portion thereof occupied by the punch 27 and producing the finished segment 29, as shown in Figures 7 and 12.

After the punch 27 is withdrawn, the dies are returned to the feed line, that is, the position substantially as shown in Figure 1 and the bar 16 as it again moves forward ejects the finished segment from between the dies, which are now separated, as shown in Figure 2 and the pressure upon the side walls thereof relieved. As there is but a single space in the recess in the dies into which the metal may flow, obviously the segments will all be exactly the same size and shape without variation, deviation or distortion.

The underside of the punches 23 and 25 are preferably cut away, as at 30, so as to permit the air within the recess to escape therefrom. This is not required, however, with the finished punch, because all the air pockets around the work piece have been practically eliminated or else reduced to such a degree as to be of minor importance.

The segments are thus produced in a standard form of machine, of stock of standard size and shape, and without manual labor, but produced entirely automatically.

What I claim as new and desire to secure by Letters Patent, is:

1. A method of producing an article of manufacture, consisting in applying pressure to the sides of a bar whereby one portion of the bar is caused to flow and lie at an angle to the remainder of the bar and then upsetting the bar by applying pressure to the angular portion in a direction axially of the said remainder of the bar.

2. A method of producing an article of manufacture, consisting in subjecting opposed sides of a bar to pressure from sources inclined relative to the sides of the bar whereby a portion of the bar is caused to flow and lie at an angle to the remainder of the bar and then applying pressure to the angular portion axially of the said bar to upset the same.

3. A method of producing an article of manufacture, consisting in applying pressure to the opposed sides of a bar so as to impart to the bar a cross-section of wedge-shape throughout the entire length of the same whereby a portion of the bar is caused to lie at an angle to the remainder of the bar by such pressure, and then upsetting the angular portion of the bar by applying pressure to the angular portion in a direction axially of the remainder of the said bar.

4. A method of producing an article of manufactur
manufacture, consisting in subjecting opposed sides of a bar to pressure from sources inclined relative to the sides of the bar and to each other whereby a portion of the bar is caused to flow and lie at an angle to the remainder of the bar and then applying pressure to the angular portion axially of the bar to upset the same.

5. A method of producing an article of manufacture, consisting in applying pressure to the sides of a bar whereby one portion of the bar is caused to flow and lie at an angle to the remainder of the bar and then upsetting the bar by applying pressure to the end of the bar adjacent to the angular portion in a direction axially of the length of the bar.

6. A method of producing an article of manufacture consisting of first squeezing a metal bar between dies having diverging faces and an offset recess adjacent to the faces, thereby causing a portion of the bar to flow laterally to the length thereof and into the recess, and then applying pressure to the end of the bar to reshape the portion thereof that has flowed in a lateral direction.

In testimony whereof, I have hereunto affixed my signature.

RICHARD LESTER WILCOX.