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METHOD OF FORMING TIMING MOTOR SHADING RINGS

Filed June 30, 1955

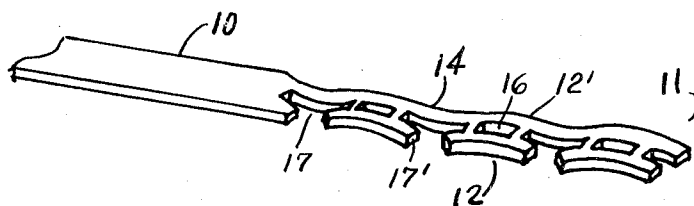


FIG. 1

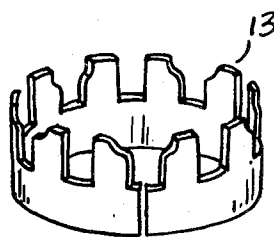


FIG. 2

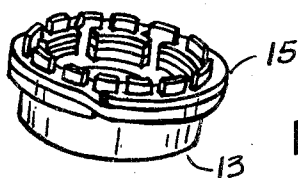


FIG. 3

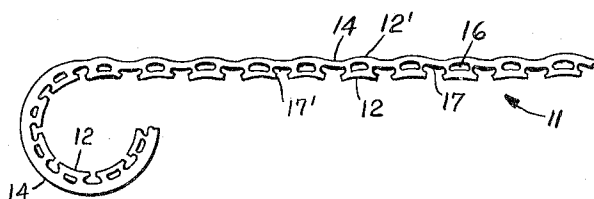


FIG. 4

1

2,968,088

METHOD OF FORMING TIMING MOTOR
SHADING RINGS

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2 Claims. (Cl. 29—155.57)

This invention pertains to a novel method of forming the shading rings for small single shaded pole synchronous motor such as are widely used in electric clocks.

The shading rings provide the quadrature flux that starts the motors. They are formed from copper, bronze or similar conductive materials. The pole pieces that they fit around are formed from soft sheet steel.

The general method of forming these shading rings has been to stamp several circular blanks having the proper cross section out of sheet material, and to stack these blanks on the pole pieces until the required thickness is obtained. In this process the circular center and square edges of the blank as well as cut out portion of the finished pattern are scrap. In an item such as a clock motor, which is produced in large quantities at a low per unit price, this scrap cost is large in relation to the total unit cost. The present invention in essence contemplates stamping thin strip material with the proper cross-section and then spirally winding the strip until the proper circular shape and thickness are obtained. The scrap is therefore confined to the cut out portions of the pattern which is a small fraction of the scrap loss in the prior art method.

Therefore an object of the present invention is to provide a method of forming timing motor shading rings that is substantially less costly than the prior art method.

Another object is to provide a method that eliminates the costly and troublesome operation of stacking the thin shading ring blanks.

And a further object is to provide a method of forming shading rings that is easily adaptable to automatized production methods. The forming of the rings from continuous strip stock rather than separate blanks makes the process ideal for mechanized production.

Other objects and advantages of the present method will be made apparent by the following detailed description and accompanying drawings, in which

Figure 1 is a view of a strip of conductive material, part of which is formed in accordance with the teachings of the present invention.

Figure 2 is a view of the pole piece on which the finished shading rings mount.

Figure 3 is a view of a completed shading ring mounted on its pole piece.

Figure 4 is a plan view of the formed strip of shading material according to the present invention.

Referring to Figure 1, the conductive material from which the ring is to be formed, generally copper or a bronze alloy, is received in long strip form 10. The width of the strip is preferably slightly greater than the width of the finished ring as taken at a radial cross-section. The thickness of the strip is largely dependent upon the forming process which is used to obtain the shape 11. This is preferably a progressive die process but long strips of the material might be formed by single die strokes. The formed section 11 basically consists of quadrangular elements which include arcuately contoured

2

sides 12 and 12' and which are punched to include apertures 16. The contoured sections are connected by elements 14 which, together with the quadrangular sections, form T-shaped notches 17. The shape of the formed section 11 at any given cross-section is very nearly that of the finished ring at an equivalent radial cross-section. The differences in the two are to allow for the intermediate bending. Such adjustments may easily be made by one familiar with the art of shaping ductile metals.

It is to be noted that the scrap material is only a small part of the original strip.

The formed strip 11 is converted to the finished ring 15 (Figure 3) by winding it through several turns in a spiral fashion. It is possible to accomplish this winding either completely manually or through use of an aiding jig; but preferably the winding operation is performed by a machine. The winding may be done directly on the pole piece 13 (Figure 2) or it may be done externally and later assembled to the pole piece. In either event the continuous strip form of the material easily lends itself to mechanized methods.

One of the features which makes it possible to edge-wind the strip 11 in the configuration shown in Figure 3, and fragmentarily shown in Figure 4, at the left hand portion thereof, is that the strip is made in the form shown in Figures 1 and 4. Attention has been called above to the fact that a portion of the strip 11 is arcuately contoured on the exterior side 12' and the interior side 12 and punched to form arcuate apertures 16 in the middle thereof. The shape of the contoured portion of the strip, including the apertures, as shown in Figures 1 and 4, is essentially that of a true segment of the annulus corresponding to the completed annulus of the product illustrated in Figure 3. The preferred form of the annulus of the completed product is circular. The arcuate exterior portion 12' of the contoured portion of the strip, the generally radial sides of the apertures 16, and the interior arcuate portion 12 of this contoured portion of the strip brace each other to form a stable section of the annulus which does not change its shape appreciably during the edge-winding operation. Between the contoured portions, and generally corresponding to the T-shaped notches 17, there are portions 14 of the strip which connect the contoured portions to each other and which are somewhat reversely curved marginally with respect to the contoured portions. These portions of the strip 11 are destined to become just as definitely a part of the completed annulus on the same lines of curvature as represented by the contoured portions, but the sections 14 are not braced as are the contoured portions, thus permitting the strip 11 to assume the annular configuration, as shown in Figure 3, with a minimum amount of bending of the strip 11. The legs 17' of the T-shaped notches 17 are slightly splayed so that the notches do not close when the strip is edge-wound. As stated above, the shape of the formed strip 11 at any given cross section is very nearly that of the finished ring in an equivalent radial cross section. This is illustrated by Figure 4, wherein it is shown that the contoured portions in the straight strip 11 are essentially the same shape as when the contoured portions are wound in the annular form, as illustrated in the left hand portion of Figure 4.

Having thus described our invention we desire to secure the following features by Letters Patent and therefore claim:

1. A method of forming an annular shading ring for accommodating the pole piece of a synchronous timing motor which comprises the steps of forming an elongated strip of shading material, removing material at predetermined intervals along said elongated strip to form T-shaped notches for receiving said pole piece, said T-

3

shaped notches extending inwardly of said strip from one margin thereof, shaping the side margins of each portion of said strip located between said T-shaped notches to a predetermined configuration, and finally bending said strip edge-wise adjacent said T-shaped notches to provide an annular shading ring, said predetermined configuration of said portions of said strip between said T-shaped notches conforming essentially to the configuration of the annulus formed by said edge-wise bending, and said edge-wise bending not appreciably changing the shape of said portions of said elongated strip between said T-shaped notches.

2. In the method of forming an edge-wise, helically wound, annular shading ring, especially for use in synchronous timing motors, having apertures extending parallel to the axis of and through the annulus, the steps comprising forming an elongated strip of shading material having apertures spaced along its length, removing material at predetermined intervals along said strip intermediate the apertures to form T-shaped notches extending inwardly of said strip from one margin thereof, shaping the side margins of each portion of the strip adjacent

4

the apertures and located between the T-shaped notches to conform to a predetermined configuration, and finally winding the strip edge-wise and helically to a substantially circular annulus by bending the portions of the strip adjacent the T-shaped notches, said predetermined configuration of the side margins of the strip adjacent the apertures essentially conforming to a segment of said circular annulus formed by said edge-wise winding of said strip.

References Cited in the file of this patent

UNITED STATES PATENTS

1,920,154	Carlson	July 25, 1933
1,920,354	Carpenter	Aug. 1, 1933
1,934,903	Apple	Nov. 14, 1933
2,353,305	Haydon	July 11, 1944
2,484,288	Hamm	Oct. 11, 1949
2,683,922	Zion	July 20, 1954
2,697,865	Norton	Dec. 28, 1954
2,742,279	Small	Apr. 17, 1956
2,908,965	Platt	Oct. 20, 1959