Patented Nov. 13, 1934 1,980,363

UNITED STATES PATENT OFFICE

1,980,363

METHOD OF MAKING ELECTRICAL CONDUCTORS

Horace A. Staples, Plainfield, N. J., assignor to Phelps Dodge Copper Products Corporation, New York, N. Y., a corporation of New York

Application January 23, 1933, Serial No. 654,098

1 Claim. (Cl. 205—8)

My invention relates to a method of making light weight electrical conductors for the transmission of current at high voltages. In such conductors it is desirable to combine large outside diameter, in order to increase the critical corona voltage, with low copper content, in order to minimize the amount of copper required. It is also desirable that the tensile strength of such conductors be the maximum that can be obtained from the amount and character of the material employed.

I have previously invented a method of forming thin flat metal into shapes with the edges abutting and simultaneously stranding such shapes into cable form, thereby obtaining a core suitable for stranding a covering layer of solid wires thereon. U. S. application 551,422, filed by me July 17, 1931.

I have found that I cannot obtain the minimum weight with such a covering of solid wires, and that the above mentioned sections, while perfectly satisfactory for a core, cannot ordinarily be used for the covering layer of the cable, due to their extremely thin gage, and due to point discharge taking place under high voltage from the edges of the seam, and due to the facts that, while ordinarily numerous wires of comparatively small diameter are desired in order to make the exterior of the cable as smooth as possible, my previous method is best adapted to a comparatively few wires of comparatively large diameter because of space limitations in commercial stranding machines, and due to the advisability of subjecting the metal to more drawing in order to develop its maximum tensile strength.

In order to obtain a covering layer of weight intermediate between very thin sections and solid wire, and of tensile strength comparable to solid wire, and without perceptible seams, and of considerable number of wires of small diameter, I have set up my new method of forming sheet metal strips into shapes suitable for stranding.

In my new method I form the flat strip into a hollow shape and subject the formed hollow shape to whatever drawing operations may be necessary to develop the desired tensile strength, separately from the stranding operation. In my new method the hollow shape, after its formation from the flat strip, is handled through the drawing and stranding operations, in accordance with the ordinary practice of drawing and stranding solid wire.

I have found that the success of my method depends on the flat strip being of a particular thickness, as described hereinafter.

The foregoing and other features of my invention will now be described in connection with the accompanying drawing forming part of this specification in which I have represented a preferred way in carrying out my method after which I shall point out in the claim those features which I believe to be new and of my own invention.

In the drawing:—

Figure 1 shows the material from which my conductor is made, this being a flat rectangular strip of metal, of indefinitely long length, and of a particular thickness, as described hereinafter.

Figure 2 shows the first step in my method, which consists in forming the flat strip so that the edges meet. I usually form into a round shape, but I am not limited to this, and for special purposes, may form into a wedge shape, or any other section that may be desirable.

Figure 3 shows the succeeding operations up to the stranding operation; which consists in successively drawing the formed strip through dies until the reduction area of the metal has been sufficient to increase the tensile strength to the amount desired.

Figure 4 is a section through a multiple strand cable made after the preferred method.

Figure 5 is a side view of the stranded cable shown in section in Figure 4.

I have found that, in order to obtain successive drafts of the formed strip without the edges sliding by each other, it is necessary that the thickness "g" of the initial strip be not less than approximately $\frac{1}{16}$ of the diameter "d" obtained at the final draw; and that, if I use strip of such dimensions, the edges of the seam in my formed strip after the final draw, are so tightly closed together that there is no tendency to open or buckle during the stranding operation, and that my formed strip may be treated as though it were solid wire, and that the edges are so smoothly joined that there is no possibility of point discharge under high voltage.

In cables for intermediate voltages, where it is not necessary to obtain the absolute maximum of diameter for a given weight, or if location is such that wind pressures require maximum