Aug. 26, 1930. W. M. BISHOP 1,773,938

METHOD OF MANUFACTURING LOADED CONDUCTORS

Filed June 6, 1929

FIG. 1

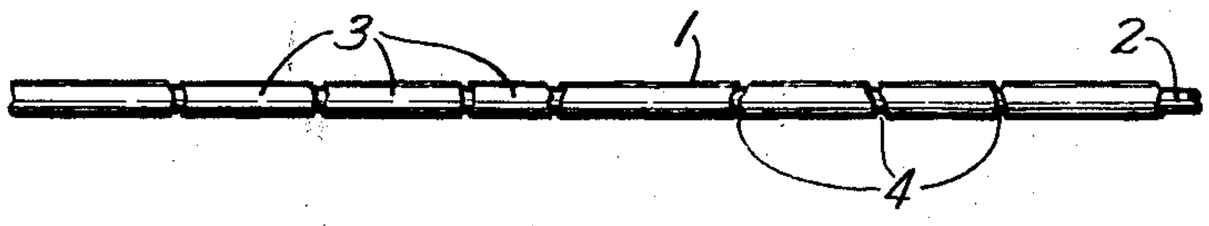
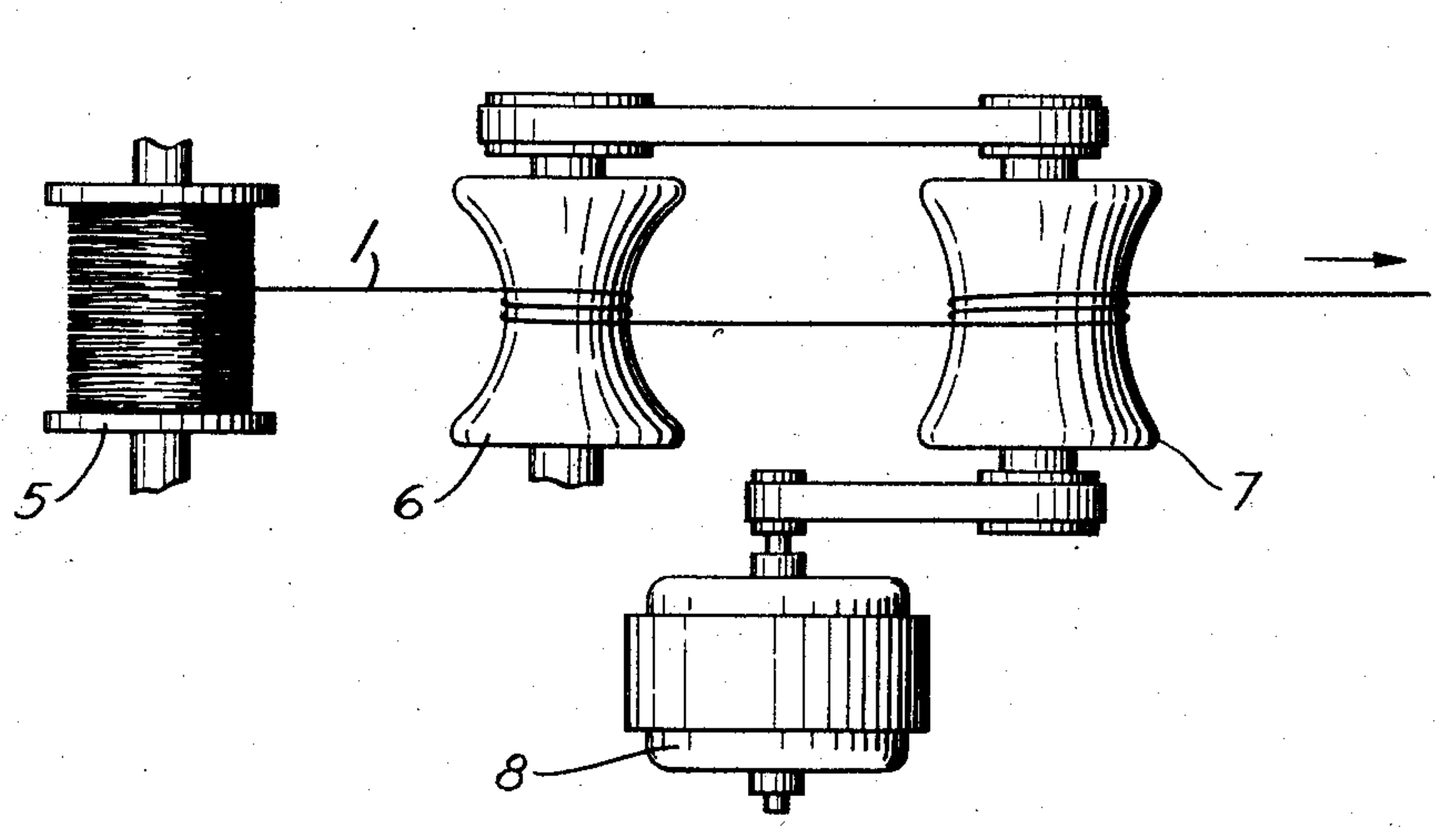


FIG. 2



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UNITED STATES PATENT OFFICE

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METHOD OF MANUFACTURING LOADED CONDUCTORS

Application filed June 6, 1929. Serial No. 368,843.

This invention relates to continuous loading of electrical conductors with magnetic loading material.

It has been proposed heretofore to apply magnetic loading material to conductors by electrolytic deposition of the magnetic material directly upon the conductor or by spraying it thereupon in molten form to form a thin sheet or a plurality of sheets separated by an insulating layer. When the magnetic material is thus deposited upon the conductor it is continuous from end to end and owing to the tendency of high frequencies to flow in the outer layers of the conductor the effective high frequency resistance is increased.

A problem connected with the electrolytic or spray method of deposition of magnetic materials on conductors has been to provide efficient and practicable means of preventing this increase in effective resistance, which is more important at telephone and carrier frequencies than at telegraph frequencies. It is at these higher frequencies that the electrolytic and spray methods offer their greatest advantages from the standpoint of providing a sufficiently thin layer or layers of magnetic material. This problem is solved in accordance with the present invention by stretching the conductor, after application of the magnetic material thereto, a sufficient amount to break up the layer of magnetic material longitudinally, it having been observed that with copper conductors, for example, a small amount of stretching does not cause the copper to break but does cause the magnetic loading material of the usual compositions to break transversely at frequent intervals. The stretching may be accomplished by direct longitudinal tension, pulling the material over a wheel of small diameter, by pulling the loaded conductor through a die, or by a combination of these or equivalent methods.

A further advantage of this stretching is that the diameter of the copper conductor is reduced to a greater extent than the diameter of the loading material which gives the loading material a certain degree of looseness desirable for developing and maintaining satisfactory magnetic properties during the subsequent heat treatment.

A further advantage is that the longitudinal component of flux, which is present with spirally applied loading, is absent.

The invention is not limited to use with copper conductors but may be employed with conductors of a metal such as copper alloys, copper-aluminum alloys or other suitable highly conductive conductors which will stretch sufficiently without breaking. The method is not limited to conductors bearing a single layer of loading but may be employed with those having a plurality of layers.

In practice it has been found possible to break up the magnetic material into relatively short uniform lengths of the order of a centimeter or less, although less frequent breaks may be found satisfactory. The distance between breaks and hence the length of the separate pieces of loading may be very irregular under some circumstances. This, however, is entirely immaterial, in most cases, provided the largest distance between breaks is no longer than a few decimeters or possibly a meter or two. The method is applicable not only to a single layer of electrolytically deposited or sprayed material but to a plurality of layers.

A conductor manufactured in accordance with the invention is shown in Fig. 1; and a mechanism suitable for stretching the conductor is shown in Fig. 2.

In Fig. 1 the conductor 1 comprises a central copper portion 2, and the loading 3 is indicated with cracks or breaks 4.

In Fig. 2 a supply of the loaded conductor 1 is taken from the reel 5 and run in succession over the friction capstans 6 and 7. If capstan 7 is rotated by power device 8 about 5% faster than capstan 6, more or less, this conductor will be stretched sufficiently to break up the magnetic loading material in the desired fashion. This is conventionally indicated in a diagrammatic manner by making the drive pulley of capstan 6 larger than the connected driving pulley of capstan 7. Many other means for accomplishing the stretching of the conductor will occur to those skilled in the art.

What is claimed is:

1. A method which comprises applying magnetic loading material to an electric conductor in a continuous sheath, for example, by electrolytic methods or spraying, characterized in that the conductor is thereafter deformed sufficiently and in a manner to cause frequent transverse breaks in the magnetic material.

2. A method in accordance with claim 1 in which the deformation is accomplished by stretching the conductor.

In witness whereof, I hereunto subscribe my name, this 3rd day of June, 1929.

WALTER M. BISHOP.