No. 644,311. Patented Feb. 27, 1900.

J. C. ANDERSON.

METHOD OF WINDING HELICES FOR ELECTRICAL PURPOSES.

(Application filed June 15, 1899.)

(No Model.)

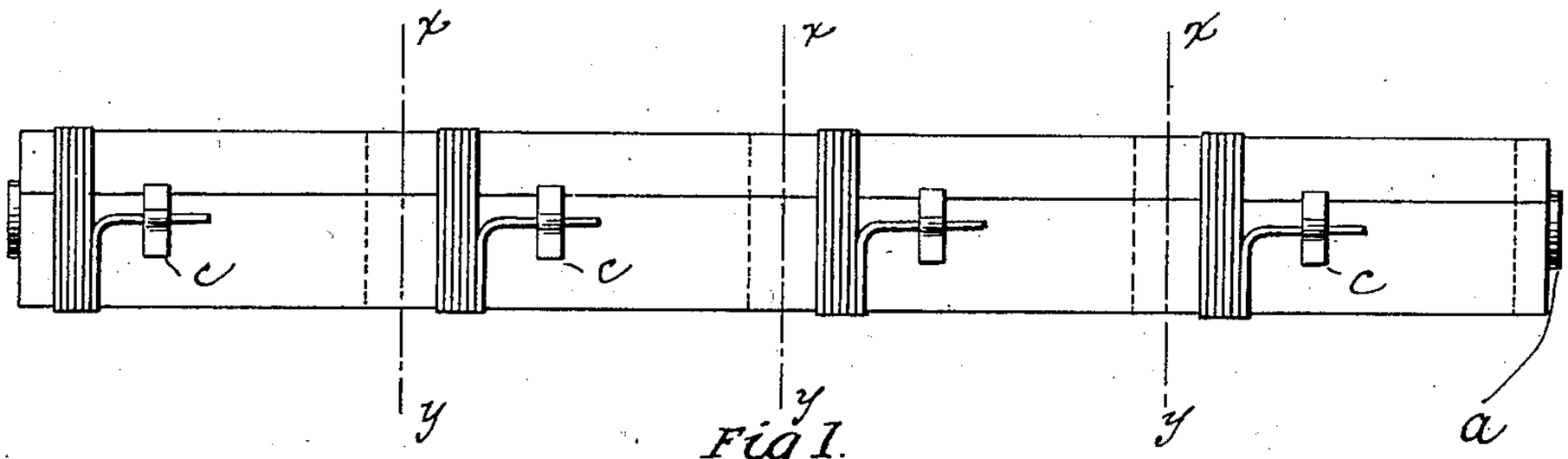

Fig. 1.

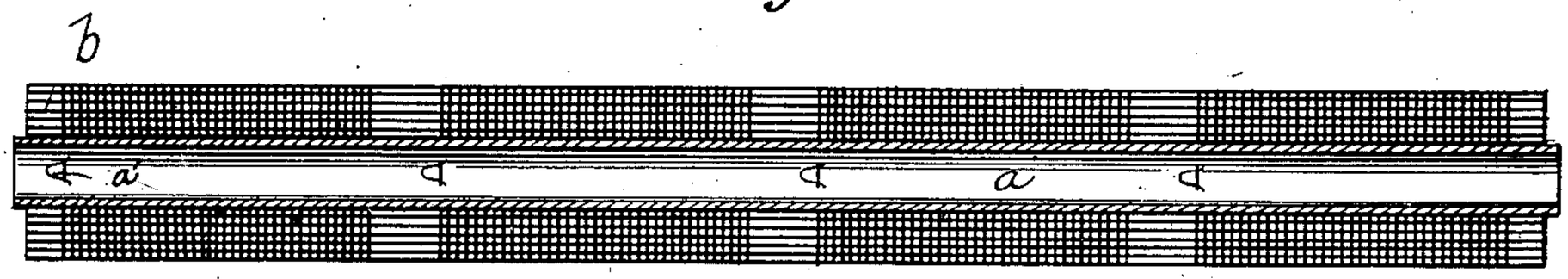

Fig. 2.

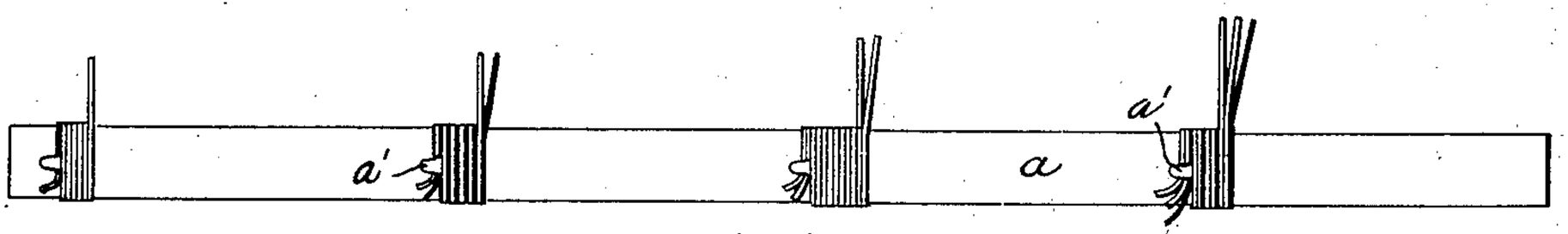

Fig. 3.

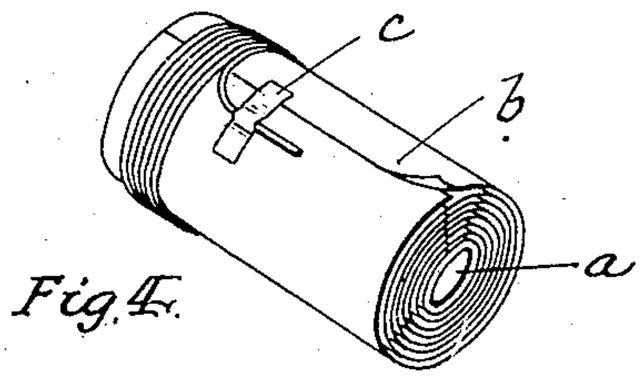

Fig. 4.

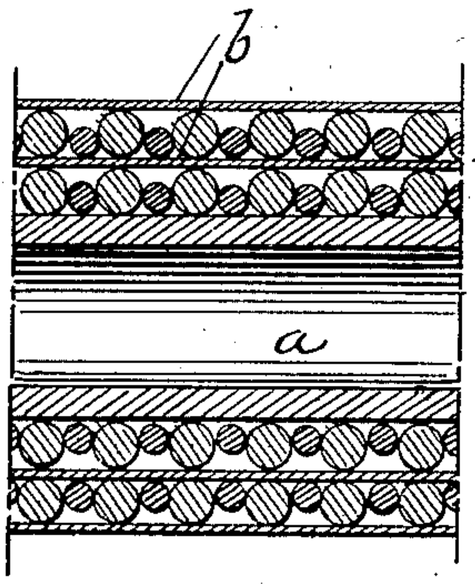

Fig. 5.

WITNESSES:

Frank L. Ober.

Geo. S. Kennedy.

INVENTOR

James C. Anderson

BY

Mrs. E. A. Rosenbaum

ATTORNEY

UNITED STATES PATENT OFFICE.

JAMES C. ANDERSON, OF JERSEY CITY, NEW JERSEY.

METHOD OF WINDING HELICES FOR ELECTRICAL PURPOSES.

SPECIFICATION forming part of Letters Patent No. 644,311, dated February 27, 1900.

Application filed June 15, 1899. Serial No. 720,667. (No model.)

To all whom it may concern:

Be it known that I, JAMES C. ANDERSON, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Methods of Winding Helices for Electrical Purposes, of which the following is a full, clear, and exact description.

This invention is a method of winding helices for electrical purposes, the intention being to lower the cost of such work and to produce a more uniform article with respect to resistance, size, shape, &c.

With these objects in view my invention consists, primarily, in winding a plurality of electrical helices or coils simultaneously upon a single tube, core, mandrel, or spool and then separating the coils or helices so wound into individual coils or helices.

The invention also consists in certain details of the winding with reference to the manner of securing or disposing of the ends of the coil.

The invention will be described in detail, with reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a number of helices wound according to my invention, showing their appearance before they are separated into individual coils. Fig. 2 is a longitudinal section of what is shown in Fig. 1. Fig. 3 is a side elevation of the tube or mandrel, showing how the helices are started. Fig. 4 is a perspective view of a finished individual helix; and Fig. 5 is an enlarged view in section of a helix wound by my method, showing the disposition of the wires and insulating material.

The simplest conception of my invention is the simultaneous winding of a plurality of wires into as many helices upon a single core or center pin and afterward separating them into individual coils. This simple idea may be carried out by using a core of any desired character and winding the several conductors which are to form the respective helices upon the said core simultaneously, causing each helix to be wound at a different zone or belt of the core, and then separating the coils thus wound by severing the core at the points between the adjacent helices; but inasmuch as I purpose in practice to use special methods of insulation not usual in the art I will describe my invention in connection with such methods.

a represents a tube, preferably of paper and of sufficient rigidity to support the helices. This tube may, however, be of any suitable insulating material. It is used as a spindle or core upon which to wind a plurality of helices simultaneously, and for this purpose it may be mounted upon a winding-machine, where the winding may be done automatically, or it may be placed in a machine and manipulated partially by hand, or in so far as the invention is concerned it may be manipulated or disposed in any manner so long as the simultaneous winding operation is performed. Each of the helices may consist of one or more electrical conductors, and these conductors may be of ordinary insulated wire, or one or more of them may be of insulated wire, while the others may be of bare wire, the convolutions of which will alternate with the insulated wire and so insulate the convolutions of the coil, or any number of bare wires may be wound in conjunction with a thread of silk or other insulating material whose convolutions alternate with those of the bare wire. The last-mentioned plan is the one preferred specially for fine-wire coils, because a greater length of wire may be wound into a given space, thus increasing the efficiency of a coil for magnetic purposes, and the cost of insulating the wire before it is wound into the helix is avoided, and also for other reasons which need not be mentioned herein. For the sake of easy description we will assume all the helices to be composed of bare wire alternately wound with a silk thread. To start a helix, a tongue *a'* is formed in the side of the tube *a* by cutting slantingly through its wall. The two ends of the thread and wire are then passed under the tongue and bent back, as shown in Fig. 3, to hold the inner end of the helix, the wire and thread being thus exposed on the interior of the tube. This operation is repeated for each of the helices which are to be simultaneously wound onto the tube, the second cut being made somewhat beyond the point where the first helix ends and the third cut at a point beyond where the second helix ends, and so on throughout the length of the tube. The wire

and thread from each point of attachment will lead off separately to the spools supplying the material. The tube is then rotated and either the wire and thread fed along the face of the tube to form a layer thereon or the tube itself is fed with respect to the wire and thread for this purpose. In either case the formation of the layer continues until within a short distance, say a quarter of an inch, from the beginning points of the several coils, when the rotation is stopped long enough to wrap a sheet of paper *b* of such width as to cover all of the layers and of such length as to entirely surround the tube and slightly overlap. The tube is then again rotated and the second layer formed by reversing the travel of the wire and thread or of the tube, as the case may be. The second and succeeding layers will be wound over the first, and at the completion of each layer the wrapping of insulating material will be inserted. When the coils are finished, a few extra turns are wound on each over the last layer of paper for connecting purposes and the loose ends secured to the side of the helix by a short strip of gummed paper *c*. The structure thus finished consists of a number of helices mechanically connected together by the central tube and the successive layers of paper, and to separate them into individual helices it is only necessary to sever the paper along the lines *x y* by means of a saw or knife, and thus produce the article illustrated in Fig. 4. The inner ends of the individual helix may be reached and pulled out for connecting by means of a small hook, such as a crochet-hook, passed into the tube and caught over the wires which are exposed under the tongue *a'*. When the coil has been shellacked, it is ready to be placed upon a spool or directly upon its iron magnetic core.

My invention is not limited to the exact method described of building up the coils. The insertion of the paper, for instance, might be accomplished without stopping the rotation of the tube. Likewise the paper might be inserted in separate sheets for each helix and the stability and strength of the inner tube relied upon to hold the helices together until the winding is completed, after which the tube only would have to be severed. The operation of severing the helices may be performed either by the manufacturer or user. The layer of paper besides furnishing insulation also promotes uniformity in the construction of the coils, since it furnishes an even surface upon which to wind the layer. This fact also insures a uniform amount of wire and a better coil for electrical purposes. The ends of the helices where they are caught under the tongues may be left long and brought out to a convenient point and there connected in any desired manner with each other, as in series-parallel or differential relation to meet the conditions under which they are to be used, this of course referring to the use of a number of the helices on the single tube, the act of severing them into individual coils being omitted.

Having described my invention, I claim—

1. The method of winding helices for electrical purposes, consisting in simultaneously winding a plurality of helices upon separated zones of a single core, and inserting sheets of insulating material between the superposed layers of the helices, each sheet being common to all the helices.

2. The method of winding helices for electrical purposes, consisting in simultaneously winding a plurality of helices upon separated zones of a single core, inserting sheets of insulating material between the superposed layers of the helices, each sheet being common to all the helices, and then separating the helices by transversely severing said sheets and core between the adjacent helices.

3. The method of winding helices for electrical purposes, consisting in simultaneously winding one layer of each helix upon separated zones of a single core, then simultaneously wrapping all of said layers with insulating material, then simultaneously winding the second layers of the helices upon the insulating-wrapper over the first layers, then simultaneously wrapping all of the second layers with insulating material and so on until the desired length of helix has been formed, and finally separating the helices, substantially as described.

In witness whereof I subscribe my signature in presence of two witnesses.

JAMES C. ANDERSON.

Witnesses:
WM. A. ROSENBAUM,
FRANK S. OBER.