No. 838,423. PATENTED DEC. 11, 1906.

I. KITSEE.

METHOD OF PRODUCING ELECTRIC COILS.

APPLICATION FILED JUNE 15, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

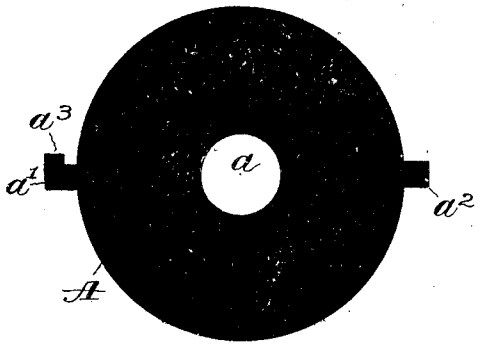


Fig. 2.

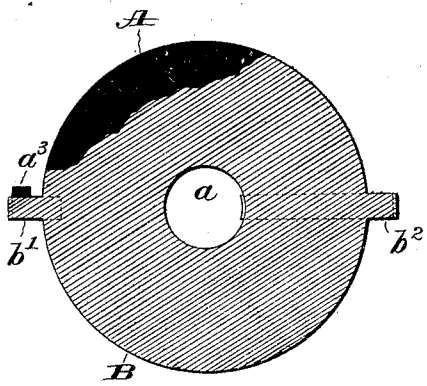


Fig. 3.

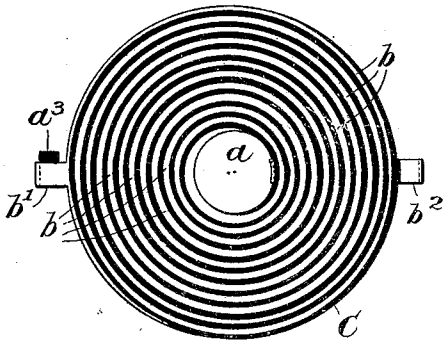
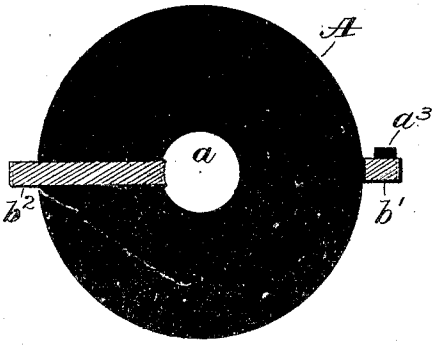


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

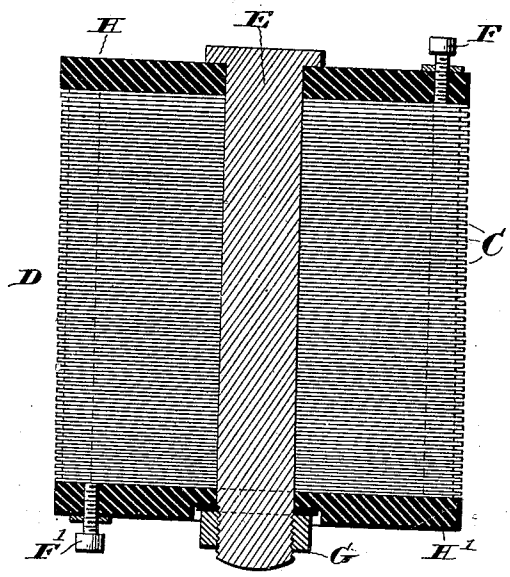
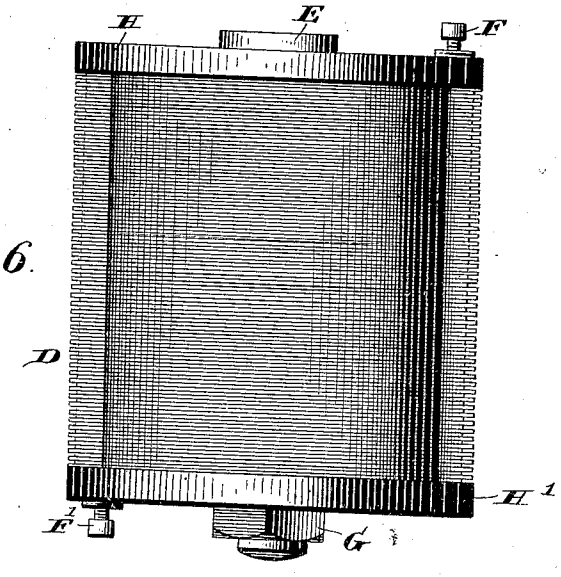


Fig. 6.



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UNITED STATES PATENT OFFICE.

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METHOD OF PRODUCING ELECTRIC COILS.

No. 838,423. Specification of Letters Patent. Patented Dec. 11, 1906.

Original application filed May 3, 1905, Serial No. 258,700. Divided and this application filed June 15, 1906. Serial No. 321,890.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Producing Electric Coils; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in the method of producing electric coils, and is a division of my pending application, filed May 3, 1905, Serial No. 258,700.

Electric coils for instruments of precision are mostly wound with a very fine gage of wire—such, for instance, as No. 36 or No. 40—and the insulation of such wire occupies a greater space than the wire itself, which, as is well understood, greatly decreases the efficiency of the coil proper. Besides, the insulation of such wire, as the same must be of high resistance, is very costly, and it is therefore the aim of the present invention to provide a process whereby coils may be produced on a cheaper basis, and yet provide a more efficient construction of coil.

In lieu of producing the windings of a coil by insulated wires as is practiced at the present time recourse is had to a method in which a non-conducting support is provided for a conducting-plate or disk and wherein said conducting-plate or disk is so shaped as to form a series of continuous convolutions, the features of the invention being hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the drawings, Figure 1 is a plan view of the support formed of non-conducting material. Fig. 2 is a similar view of the support illustrated in Fig. 1, but showing the step in which the conducting material is applied to the support. Fig. 3 is also a plan view of the support and the conducting material thereon after the latter has been shaped or cut to form a series of spirals or convolutions. Fig. 4 is an inverted plan view of the support and illustrating the arrangement of the conducting material to provide terminal connections for contiguous disks when forming the coil proper. Fig. 5 is a vertical transverse sectional view of a completed coil, and Fig. 6 is a side elevation thereof.

Referring in detail to the drawings, the letter A designates a support, which is formed of non-conducting material, preferably mica, and said support is in the form of a disk, mica being employed by reason of the same being of high resistance even when in the thinnest layers and its ability to withstand high temperature as well as moisture. The disk A is provided with a central aperture or perforation a and at its edges is likewise provided with two ears a' and a^2. On the ear a' is provided a projection a^3, through the medium of which the ears are distinguished.

B designates a metallic covering for the non-conducting support A, which covering is firmly attached to the support A, as by cementing, and this covering may consist of any of the desired metals, but the same should be of a thickness sufficient to carry the required current. For those coils designed to carry only a small quantity of current simply tinfoil or foil of other metal may answer the purpose.

In Fig. 3 the covering B is shown as formed in a series of convolutions b. The shaping of the covering to form these convolutions may be accomplished by the simple process of cutting, which process is well understood, and as it is possible with the proper implement to cut lines smaller than one five-hundredth of an inch it is obvious that any reasonable number of convolutions may be made within a given space. The metal connected with the inner terminal or beginning of the convolutions is carried to the reverse face, as clearly shown in Fig. 4, and there forms the terminal b^2, while the metal connected with the outer terminal or end of the convolutions is carried to the reverse face and there forms the terminal b'. After the metal has been cut in the desired spiral convolutions and the metallic terminals b' and b^2 have been formed the metallic parts, with the exception of the metal covering the ears a' and a^2, are covered with an insulating material—such, for instance, as shellac. This can be done by applying a solution containing shellac or other rosin by means of a brush. It will therefore be seen that when the disk is entirely finished each convolution b is separated from the other by a non-con-

ducting material of a value greater than the value of the usual insulation of fine wires, shellac and similar substances and mica being of greater resistance than cotton or silk with which fine wires are usually covered.

Having formed the individual sections of the coil in the manner above described, to produce the coil proper it is only necessary to assemble a number of the disks in their completed form (shown in Fig. 3 and designated as an entirety by the letter C) and connect the same either in series or multiple arc, and in Fig. 5 is illustrated the arrangement of the sections for this purpose. In this figure D designates the coil as an entirety including the separate disks C, said disks being connected in series—that is, the terminal b' of one disk being in contact with the terminal b^2 of the contiguous disk, E designating the core of the coil, and H and H′ the end pieces thereof. The conducting terminals for the metallic parts of the disks are designated by the letters F and F′, and the entire structure is held assembled through the medium of a nut G, the latter engaging the screw-threaded end of the core E, and thus enabling greater or less pressure to be exerted on the disks. For coils adapted to carry only a current of comparatively low electromotive force, such as one hundred or two hundred volts, the shellac insulation covering the conducting parts is sufficient for all practical purposes; but for coils which are used for a comparatively high electromotive force, such as one thousand volts, it is desirable that an insulating-disk, preferably of mica, shall be placed between the disks C in order to increase the resistance between the same.

It has been stated above that all parts, excepting the conducting parts on the ears a' and a^2, preferably should be provided with an insulating-covering; but when the different disks constituting the entire structure of the coil are to be connected in series care must be taken that only the outer terminal of one disk is electrically connected with the inner terminal of the adjacent disk, or vice versa. In assembling it is best to first place one disk on the core, if the latter is used, with the face of the disk outward, the second or adjacent disk being positioned with its metallic covering facing the reverse side of the first disk, and this continued until all the disks are in assembled relation.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. The method of producing electric coils, which consists in mounting a body of conducting material upon a non-conducting support, imparting to the conducting material a spiral formation to provide a continuous conductor, insulating the convolutions of said conductor, and assembling a series of the supports so that the terminals of the spiral conductors are connected to form a continuous circuit.

2. The method of producing electric coils, which consists in mounting a body of conducting material upon a non-conducting support, imparting to the conducting material a spiral formation to provide a continuous conductor the convolutions of which are insulated from each other by a space, and assembling a series of the supports so that the terminals of the spiral conductors are connected to form a continuous circuit.

3. The method of producing electric coils, which consists in covering a non-conducting support with a body of conducting material, scoring the conducting material to provide a continuous conductor of spiral formation the convolutions of which are insulated from each other by a space, and assembling a series of the supports so that the terminals of the spiral conductors are connected to form a continuous circuit.

4. The method of producing electric coils, which consists in covering a non-conducting support with a body of conducting material, scoring the conducting material to provide a continuous conductor of spiral formation the convolutions of which are insulated from each other by a space, covering the convolutions of said conductor with an insulating material, and assembling a series of the supports so that the terminals of the spiral conductors are connected to form a continuous circuit.

5. In the production of electric coils, the process of forming a section thereof, which consists in mounting a body of conducting material upon a non-conducting support, and imparting to the conducting material a spiral formation to provide a continuous conductor the convolutions of which are insulated by a space.

6. In the production of electric coils, the process of forming a section thereof, which consists in mounting a body of conducting material upon a non-conducting support, and removing a portion of said conducting material to form a spiral conductor the convolutions of which are insulated from each other.

7. In the production of electric coils, the process of forming a section thereof, which consists in mounting a body of conducting material upon a non-conducting support, and scoring said conducting material to provide a continuous conductor of spiral form the convolutions of which are insulated from each other.

8. In the production of electric coils, the process of forming a section thereof, which

consists in mounting a body of conducting material upon a non-conducting support, removing a portion of said conducting material to form a spiral conductor the convolutions of which are insulated by a space, and covering the convolutions of said conductor with an insulating material.

In testimony whereof I affix my signature in the presence of two witnesses.

ISIDOR KITSEE.

Witnesses:
HELEN C. ELLIS,
MARY C. SMITH.