No. 733,609. PATENTED JULY 14, 1903.

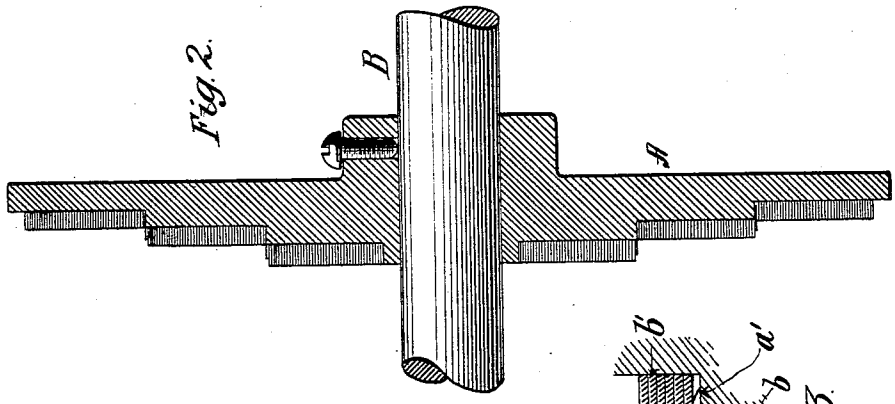
R. VARLEY.

PROCESS OF WINDING FLAT WIRE.

APPLICATION FILED MAY 15, 1903.

NO MODEL.

Fig. 2.



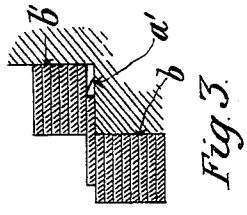


Fig. 3.

Fig. 1.

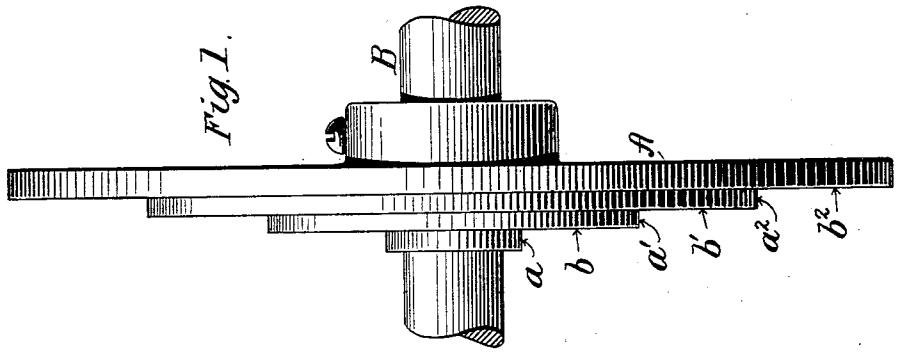
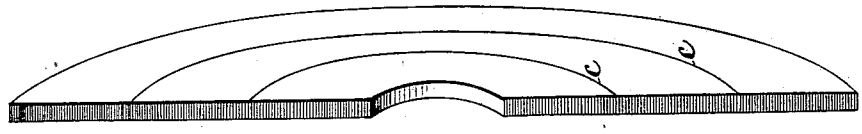


Fig. 4.



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No. 733,609. Patented July 14, 1903.

UNITED STATES PATENT OFFICE.

RICHARD VARLEY, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO VARLEY DUPLEX MAGNET COMPANY, A CORPORATION OF NEW JERSEY.

PROCESS OF WINDING FLAT WIRE.

SPECIFICATION forming part of Letters Patent No. 733,609, dated July 14, 1903.

Application filed May 15, 1903. Serial No. 157,224. (No specimens.)

To all whom it may concern:

Be it known that I, RICHARD VARLEY, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Processes of Winding Flat Wire, of which the following is a full, clear, and exact description.

This invention is a process of winding flat or ribbon-like material of narrow width, so as to obtain long unbroken lengths of the material in a single helix all of the convolutions of which are in the same plane at right angles to the winding-axis.

The invention relates more particularly to the winding of flat wire for electrical purposes. It is desirable to have the wire wound up in long lengths, so that when it is unwound and made up into special forms for electrical purposes, such as electromagnetic coils, it will not contain breaks, which have to be joined by solder or otherwise and which are objectionable in electrical apparatus.

In the winding of narrow flat wire, so that the convolutions are all in the same plane, forming a disk, it is not practicable to wind the wire between flanges, because if the distance between the flanges is equal to the width of wire the strand will bind in passing between the flanges, and if the space between the flanges is increased the coil will build up unevenly. A coil cannot be practicably wound without any side supports whatever, because when it reached a large diameter the jarring of the winding-spindle or other extraneous forces will break the coil down. Hence no considerable length of wire can be coiled up in this manner.

The object of my invention is to provide a process by which any desired length of wire can be practicably coiled up into a single disk of considerable diameter.

To this end the improved process consists in winding a coil in successive sections, each section having its own base or core and a supporting side flange on one side, the successive sections having internal diameters substantially equal to the external diameter of the preceding section. The radial width of each section is as great as can be made without breaking down the section. At the end of each section the plane of the helix is shifted to a position parallel to that of the last section wound, so as to bring the new section onto a solid footing or core, where its tension will not affect or disturb any of the sections previously wound. When all the sections have been wound, they are simultaneously removed from the winding device and telescoped over each other to bring them all into the same plane, and thus form one large disk containing a great length of wire.

In carrying out my process I use a winding device of peculiar construction.

In the accompanying drawings, Figure 1 is an edge view of a disk upon which the winding is done. Fig. 2 is a central section of the disk, showing the winding in place thereon. Fig. 3 is an enlarged detail showing the manner of transferring the strand from the end of one section to the beginning of the next, and Fig. 4 is a sectional perspective of the finished winding.

As an aid to the winding operation I use a disk A, which is mounted rigidly upon the winding axis or shaft B. This disk is, in fact, a multiple disk, since it has a series of annular concentric shoulders a a' a^2, &c., successively offset from flat surfaces b b' b^2, &c. Each annular shoulder forms a base or footing for each section of the winding, as will now appear. In beginning the winding the end of the strand is fastened in any suitable manner to the shoulder of smallest diameter a and the shaft started. The coil builds up in the plane of the shoulder a and the strand is meanwhile held close to the face b, so that the coil will grow evenly and with the edge of each convolution resting against and supported by the face b. If the strand is guided by hand, the operator can at the same time press his finger or a flat instrument of suitable character against the outer face of the coil to force it over against the face b to insure an even winding. The diameter or depth of the face b is about the limit of the size of coil that can be built up on the shoulder a without danger of breaking down or producing an uneven winding. As soon as the level of shoulder a' is reached the leading strand is deflected laterally to bring it into the plane of shoulder a', the displace-

ment of the strand being gradual and indicated in Fig. 3. The second section is then built up on the shoulder a', the said shoulder furnishing a new and solid footing for it and the surface b' aiding in the formation of the section in the same manner as before. When the second section reaches the diameter of the shoulder a^2, the strand is again shifted laterally to bring it into the plane of said shoulder to give the third section a solid footing, whereupon the third section is wound to the outer diameter of the face b^2. The disk can be provided with other annular shoulders and the winding operation continued almost indefinitely. In this way a very long length of flat wire can be continuously coiled up. When the disk has been filled, it is removed from the shaft and turned face downward upon a flat surface, whereupon the sections all fall from the disk and into the same plane with each other by telescoping one over the other, the finished product being one large disk, as shown in sectional perspective in Fig. 4, the lines c c being more or less imaginary and locating the limits of the sections. Disks of wire thus made can be clamped between boards and shipped or handled without displacing the convolutions.

The distance between the shoulders of the winding-disk can be made as small or great as conditions may require. The method of removing the sections from the disk is not important and any other way than that described can be resorted to.

Having described my invention, I claim—

1. The process of winding flat wire, which consists in winding the wire into a plurality of successive sections in each of which the convolutions are all in the same plane at right angles to the winding-axis, each section having an internal diameter substantially equal to the external diameter of the preceding section, and supporting each section independently of the others during the winding operation.

2. The process of winding flat wire, which consists in winding wire into a plurality of successive sections in each of which the convolutions are all in the same plane at right angles to the winding-axis, but each section being in a different plane, each section having an internal diameter substantially equal to the external diameter of the preceding section, substantially as described.

3. The process of winding flat wire, which consists in winding wire into a plurality of successive sections in each of which the convolutions are all in the same plane at right angles to the winding-axis, but each section being in a different plane, each section being given an internal diameter substantially equal to the external diameter of the preceding section, and then telescoping one section over another to bring all sections into the same plane.

4. The process of winding flat wire, which consists in successively winding a plurality of sections, the convolutions of each section being all in the same plane, while the respective sections are in different planes parallel to each other and supporting each section at its center and on one side only during its winding.

5. The process of winding flat wire, which consists in winding one section upon a suitable base or core, so that its convolutions will all be in the same plane at right angles to the winding-axis, then directing the strand laterally onto a second base or core substantially equal in diameter to the outer diameter of the first section, winding a second section of the second base or core parallel to the first section and with its convolutions all in the same plane, and again transferring the strand to a third base or core whose diameter is substantially equal to the outer diameter of the section previously wound and winding as before, and so on, building up sections of winding throughout all of which the strand is continuous.

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

RICHARD VARLEY.

Witnesses:
M. M. CROSWELL,
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