D. MILLER.

COIL FORMER.

APPLICATION FILED MAY 31, 1910.

1,032,925.

Patented July 16, 1912.

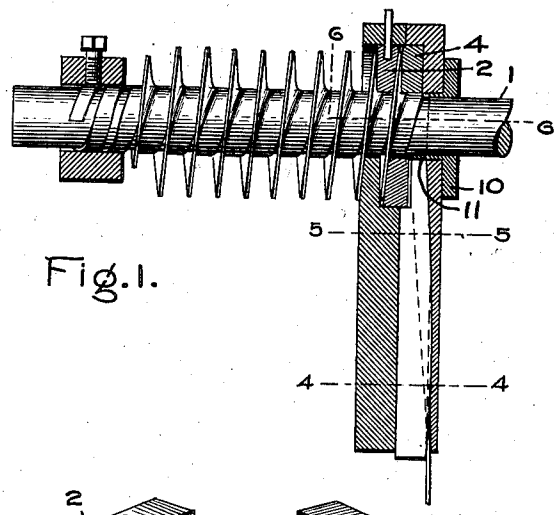


Fig.1.

Fig.2.

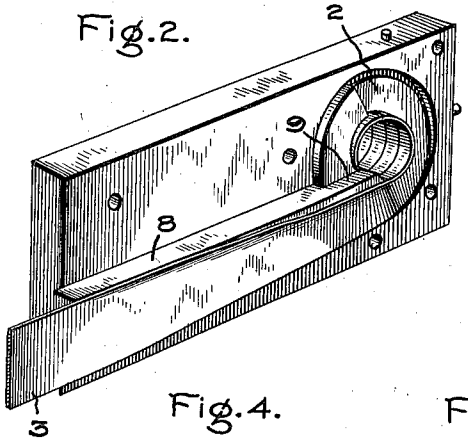


Fig.3.

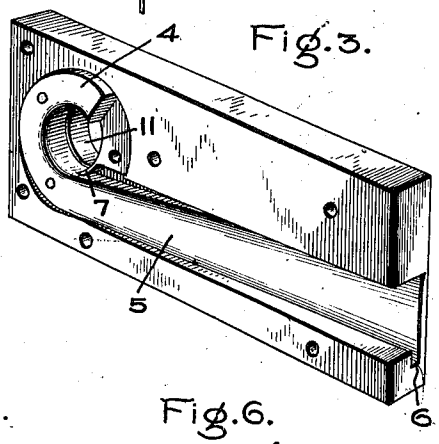


Fig.4.

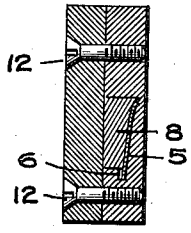


Fig.5.

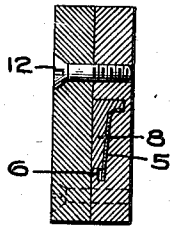


Fig.6.

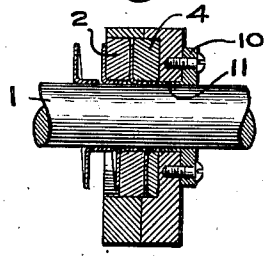


Fig.7.

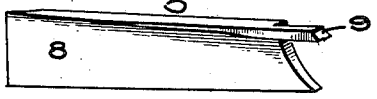
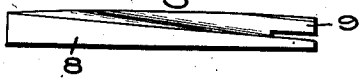


Fig.8.



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UNITED STATES PATENT OFFICE.

DAVID MILLER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

COIL-FORMER.

1,032,925. Specification of Letters Patent. Patented July 16, 1912.

Application filed May 31, 1910. Serial No. 564,025.

To all whom it may concern:

Be it known that I, DAVID MILLER, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Coil-Formers, of which the following is a specification.

The present invention relates to the art of metal working and more especially to the manufacture of edgewound coils from flat strips or ribbons of metal.

It is old in the art to make a coil by bending a strip about an axis at right angles to its plane so that the strip becomes disposed in a plain helix with substantially radial elements. These plain edgewound coils are used without practical difficulties in solenoids or other places where the individual convolutions may be supported and held in position transversely, but in those uses of the coil where the individual convolutions are required to be spaced apart without supporting means, as when used as radiator coils, much trouble has been experienced in securing them in the desired relation, and, as a consequence, it has been proposed to provide the convolutions of the coil with integral flanges at their inner edges, which flanges are adapted to be attached to the pipe or other support from which radiation is to be effected. Coils of the latter form, although recognized as highly desirable, have not, previous to my invention, gone into general use for the reason that it has been impracticable to manufacture them economically.

The object of my invention is to provide means for manufacturing economically edgewound coils having integral flanges.

In carrying out my invention, I employ a forming die which is adapted to receive relatively wide and thin metal strips or ribbons and simultaneously form therein a longitudinal fold and a radial helix as the strip passes to the mandrel about which it is wound.

For a more complete understanding of my invention, reference may be had to the accompanying drawing forming a part of this specification, in which—

Figure 1 is a plan of the mandrel and a section of the coil forming die with a flanged coil shown in process of formation; Fig. 2 is a perspective view of the left-hand section of the die; Fig. 3 is a similar view of the right-hand section; Figs. 4, 5, and 6 are sections taken on lines 4—4, 5—5 and 6—6 of Fig. 1; Fig. 7 is a perspective view; and Fig. 8 a bottom plan of the folding wedge.

The drawings do not show any device for driving the mandrel 1, but it is to be understood that any machine tool, such as a lathe, may be employed for that purpose. The die shown in the drawing may be carried by the tool carriage of the lathe and requires no special feed or guide, since the thread of the coil formed operates to force the die longitudinally of the mandrel automatically. The left-hand section of the die has in its forward end a steel helix 2 with its turns spaced to permit the formed coil to pass between them and operating to support the strip of metal 3 sidewise, and the right-hand section of the die has a similar steel helix 4 extending somewhat over 180 degrees, and leading from or tangential to the lower portion is a channel having a folding surface 5, which at the rear end of the die is substantially flat and gradually merged into a right angle as it joins the lower portion of the helix 4. In order to prevent buckling of the strip as it is passed over the depressed folding surface 5, a guide groove 6 is formed at the lower edge of the surface, and at the upper edge and adjacent the inner periphery of the helix 4 a tongue 7 is formed which holds the flange of the strip from splaying outwardly and also forms an abutment for the right-hand edge of the flange. In order that the strip may be forced into intimate contact with the folding surface 5, a folding wedge 8, as shown in Figs. 7 and 8, is provided with a surface complementary to the folding surface 5, so that when the parts are assembled there will be a passage-way between the folding wedge 8 and the folding surface 5 of substantially uniform transverse dimensions. The front end of the wedge is provided with a projection 9 adapted to extend up against the tongue 7 and to operate to hold the turned over portion on the strip until it reaches the mandrel. The right-hand section of the die is also provided with a bushing 10 serving as a centering bearing for the mandrel and having a crown flange 11 extending a short distance into the die with its inner

edge formed helically to serve as an abutment for the edge of the coil flange, as shown in Fig. 6.

The matter of starting the operation of forming an edgewound coil in any case presents many practical difficulties, and the difficulties in starting a flanged edgewound coil is much greater than in the case of a plain coil, for the reason that the friction between the strip and die is much greater and the tendency to rupture the strip is so great that a slight percentage of increase in friction at the entrance to the die will operate to break the strip as it is drawn in. It is for this purpose that the folding wedge 8 is made comparatively loose, and also in order that the strip may be passed through the die and connected to the mandrel, as shown at the left of Fig. 1, before any tension is put upon it, it is necessary that the wedge be detachable. After the strip has been attached to the mandrel, the key is forced home and the right and left sections of the die clamped together by screws 12 or other means.

I do not desire to restrict myself to the particular construction or arrangement of parts here shown and described, since it is apparent that they may be changed and modified without departing from my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. A die for making flanged edgewound coils having fixed surfaces to fold the coil strip longitudinally, and means for guiding and supporting on all sides the bent strip during the coiling.

2. A fixed die for making flanged edgewound coils having a guide helix, and a folding passage-way leading thereto.

3. The combination of a mandrel, and a die adjacent thereto having fixed surfaces for longitudinally folding a strip of metal and simultaneously forming a radial helix in one portion thereof and a flat helix in the other portion.

4. A sectional die for making flanged edgewound coils, each section having a fixed folding surface and a forming helix.

5. A die for making flanged edgewound coils comprising two sections, one of which has a guide helix and the other of which has a guide helix and a depressed folding surface, a wedge having a complementary folding surface, and means for holding the two sections and wedge in fixed relation.

6. A die for making flanged edgewound coils having a channel formed with a folding surface and a guide groove, a wedge having a complementary folding surface, and means for holding said wedge in said channel.

In witness whereof, I have hereunto set my hand this 28th day of May, 1910.

DAVID MILLER.

Witnesses:
BENJAMIN B. HULL,
CARL A. SALMONSEN.