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H. G. COX

METHOD OF FORMING FLAT COILS

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Fig. 1.

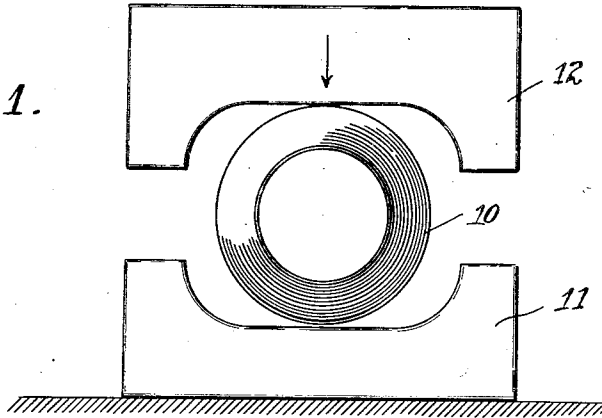


Fig. 2.

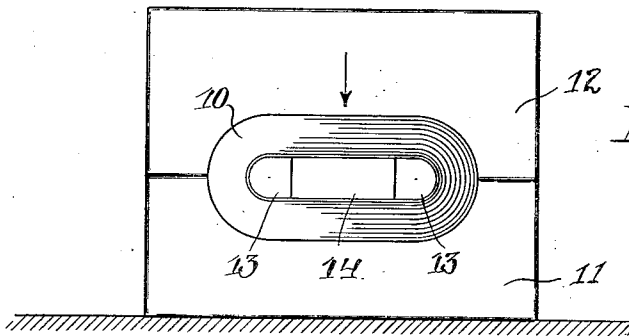
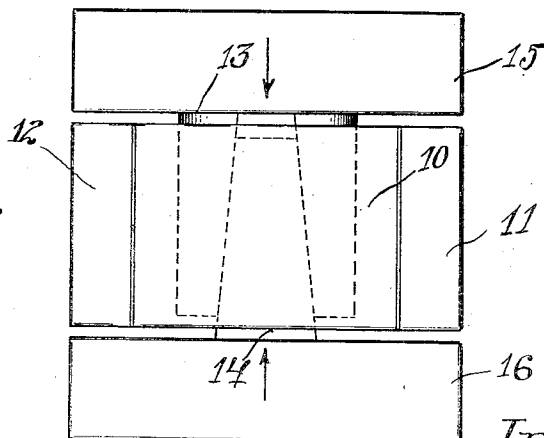


Fig. 3.



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UNITED STATES PATENT OFFICE.

HENRY G. COX, OF CHICAGO, ILLINOIS, ASSIGNOR TO INTERNATIONAL HARVESTER COMPANY, A CORPORATION OF NEW JERSEY.

METHOD OF FORMING FLAT COILS.

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To all whom it may concern:

Be it known that I, HENRY G. Cox, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods of Forming Flat Coils, of which the following is a full, clear, and exact specification.

This invention relates to forming coils, particularly flattened or oval coils for electrical purposes.

Round coils can be very easily and cheaply wound, but heretofore designers of electrical apparatus of all kinds have avoided the use of flattened or oval coils because of the difficulty and expense of winding. The usual method of forming such coils has been to use a mandrel of a shape corresponding to the inside of the finished coil, and wind the coil directly into the finished shape. This, however, gives the wire a great whipping action due to the up-and-down movement as the flat mandrel is turned. As a result of the whipping action of the flat mandrel, the tendency is for the wire to approximate a circle as it is wound about the mandrel and with a consequent tightening at the ends of the turns and looseness along the sides. This is particularly true where it is attempted to wind the coil at high speed, as is the case where round coils are made. As a result it has been necessary in making oval coils to wind them very carefully and very slowly by hand, and consequently at very great expense.

It is an object, therefore, of this invention to provide a flattened or oval coil which can be wound at high speed, and consequently low expense, and wherein the coils of wire will be of substantially uniform tightness, and wherein the coil itself will be uniformly compact throughout.

These and other objects, as will be hereinafter explained, are accomplished by my invention which comprises the process of forming flat wire coils consisting of winding the coil on a round mandrel and pressing it into a flattened or elliptical form.

Reference is now had to the drawings in which—

Fig. 1 represents the side elevation of the forming dies with a round coil between as it comes from the coil winding machine;

Fig. 2 is a similar view of the same coil

with wedges inserted in the center and the coil forced into final form by the dies;

Fig. 3 is a plan view of the lower section of the die with a coil partially flattened and the wedges inserted.

I have chosen to illustrate my invention in connection with a coil 10, which is shown in Fig. 1 in the round form as it comes from the coil winding machine. The coil is here shown placed between the lower die 11 and the upper die 12, which should be of substantially the same length as the coil 10.

In my next step of forming the coil I preferably flatten the coil through pressure applied radially, i. e., in the direction of the arrow, at the same time inserting two rounded wedges 13 and a central wedge 14, as shown in Fig. 3. The wedges 13 and 14 are preferably partially forced in from opposite sides. The end plates 15 and 16 are then forced in at the sides of the coils, driving home the wedges, all of which are preferably of substantially the same length as the length of the coil 10 and the dies 11 and 12. The top die 12 is now pressed down and the coil is forced into final form, as shown in Fig. 2. The pressure of the end plates 15 and 16 should take place slightly in advance of the final pressure of the die 12 in order to insure that there will be no tendency on the part of the dies to squeeze the coils endwise. After the formed coil is removed from the dies, it is impregnated with a self-hardening compound, preferably an insulating substance, for the purpose of holding or retaining it in its formed shape.

While there is shown and described but one embodiment of this invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the method and order of the steps may be made which do not depart from the spirit and scope of my invention, as defined in the appended claims:

1. The process of forming flat wire coils consisting of winding the coil on a round mandrel, placing in a die, partially flattening the coil, inserting wedges into the coil opening, completing the flattening process and driving the wedges into the coil.

2. The process of forming flat wire coils consisting of winding the coil on a round mandrel, placing in a die with the axis of

the coil at right angles to the direction of movement of the dies, partially flattening the coil, inserting wedges into the coil opening, completing the flattening process and driving the wedges into the coil.

3. The process of forming flat wire coils consisting of winding the coil on a round mandrel, placing in a die, partially flattening the coil, inserting wedges into the coil opening of a thickness equal to the desired opening, completing the flattening process and driving the wedges into the coil.

4. The process of forming flat wire coils consisting of winding the coil on a round mandrel, placing in a die, partially flattening the coil, inserting wedges into the coil opening, simultaneously completing the flattening process and driving the wedges into the coil.

5. The process of forming flat wire coils consisting of winding the coil on a round mandrel, partially flattening the coil, inserting wedges from opposite sides into the coil and pressing the sides of the coil and driving said wedges.

6. The process of forming flat wire coils consisting of winding the coil on a round mandrel, partially flattening the coil, inserting wedges of a thickness equal to the desired opening from opposite sides into the coil and pressing the sides of the coil and driving said wedges.

7. The process of forming wire coils, which consists in winding the coil on a round mandrel, removing the mandrel, partially flattening the coil, inserting a member corresponding to the desired opening in the coil, and pressing the coil into final shape and impregnating with a hardening

insulating substance to retain it in formed shape.

8. The process of forming coils impregnated with a hardening material to retain the coils in formed shape consisting in winding the coil in cylindrical form, partially flattening the coil, inserting a member corresponding to a desired opening in the coil, forming the coil in final shape by lateral pressure in a die, and impregnating the coil with a hardening material to retain it in formed shape.

9. The process of forming flat coils consisting of winding the coil on a round mandrel, placing in a die with the axis of the coil at right angles to the direction of movement of the dies, partially flattening the coil, inserting wedges into the coil opening, completing the flattening process, driving the wedges into the coil, and impregnating the coil with a hardening material to retain it in formed shape.

10. A process of forming flat coils comprising the following steps: winding the coil in cylindrical form, partially flattening in a die, inserting a plurality of wedge members corresponding to the desired opening in the coil, pressing into final form in the die, and impregnating with a hardening insulating material.

11. A process of forming magneto coils which includes the steps of winding the coil in cylindrical form, pressing the coil into flattened form by external and internal pressure, and introducing an insulating material between the loops of the coil.

In testimony whereof I affix my signature.

HENRY G. COX.