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April 13, 1926. **1,580,953**

H. A. BREMER

CURVED SPIRALLY WOUND COIL AND METHOD OF PRODUCING THE SAME

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Fig. 1.

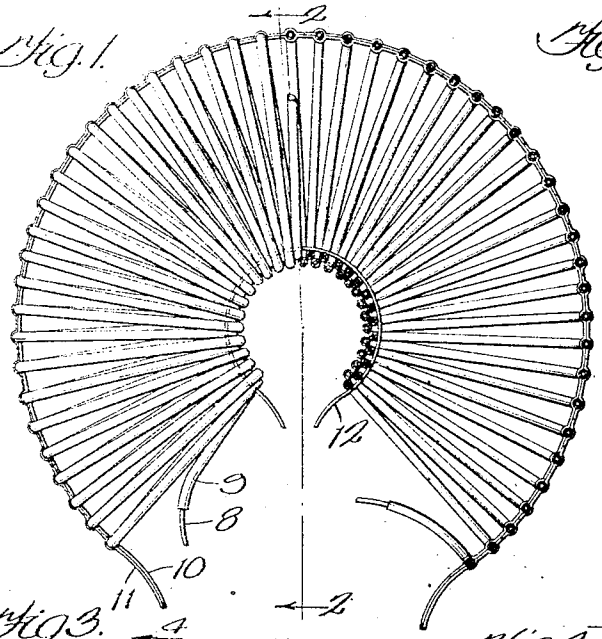


Fig. 2.

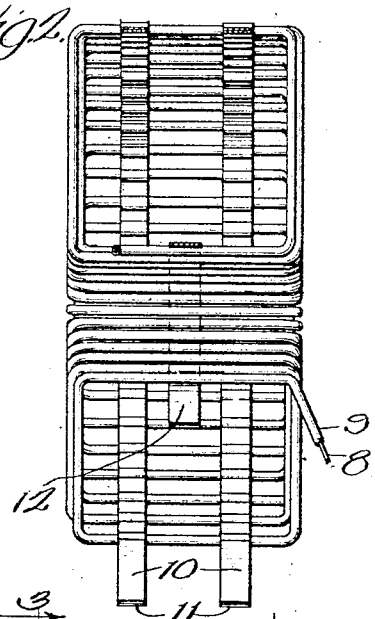


Fig. 3.

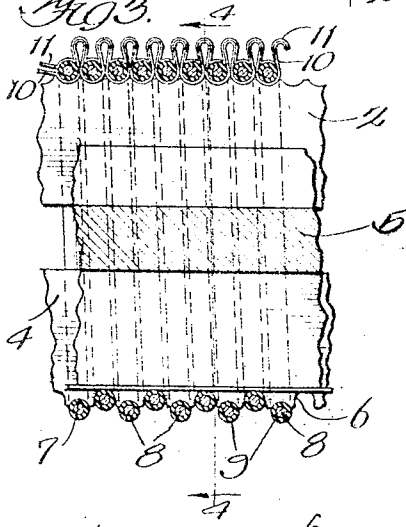


Fig. 4.

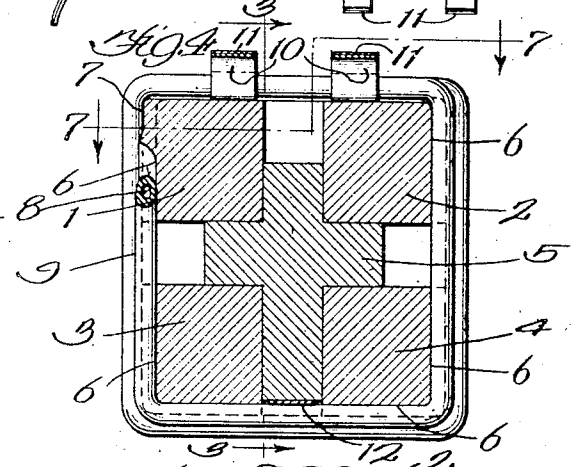


Fig. 5.

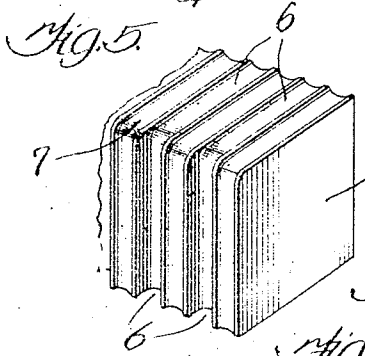


Fig. 6.

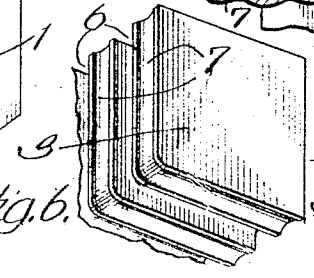
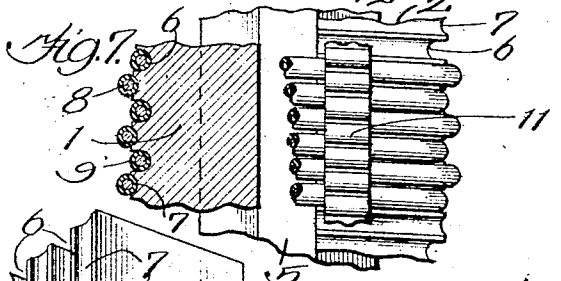


Fig. 7.



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Fig. 8.

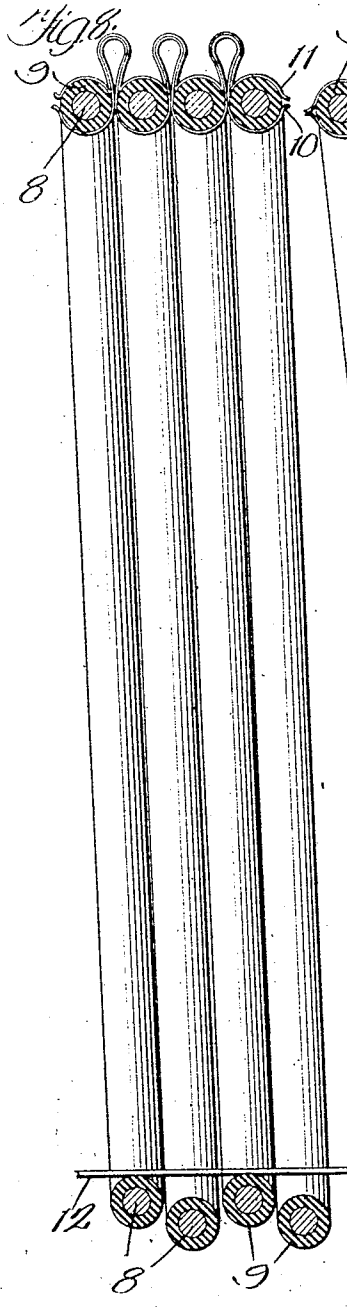


Fig. 9.

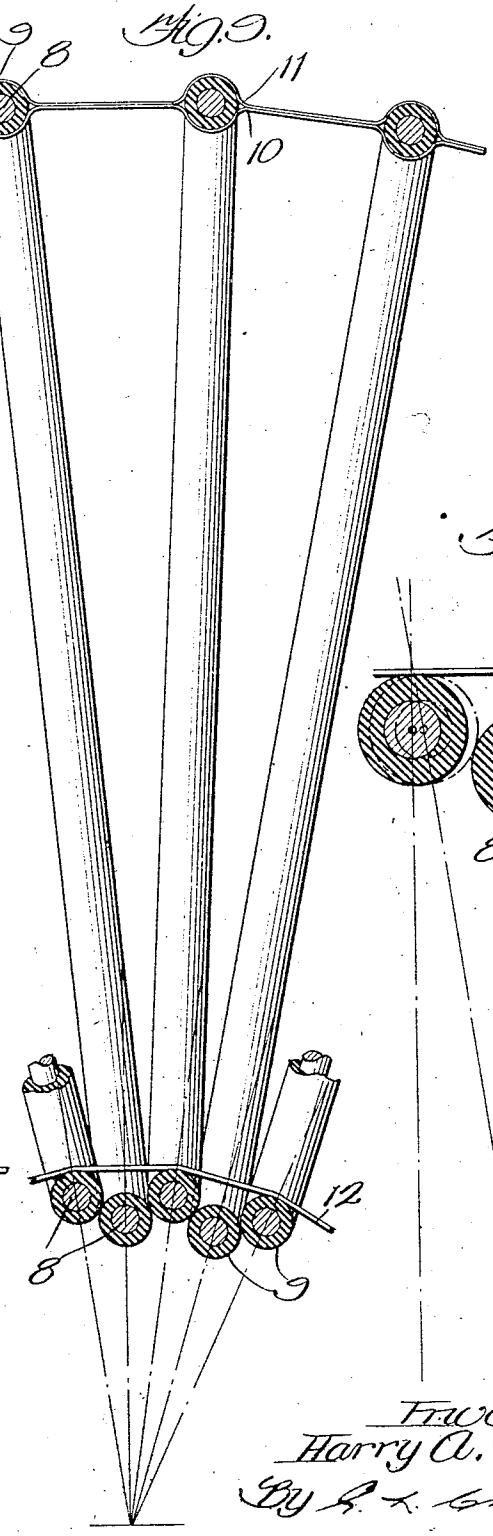
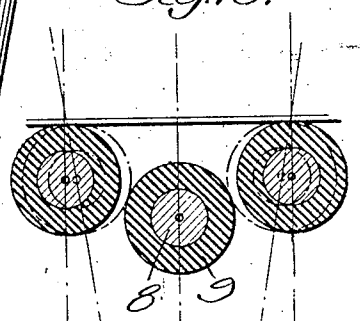


Fig. 10.



Inventor:
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Patented Apr. 13, 1926. 1,580,953

UNITED STATES PATENT OFFICE.

HARRY A. BREMER, OF CHICAGO, ILLINOIS, ASSIGNOR TO BREMER-TULLY MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CURVED SPIRALLY-WOUND COIL AND METHOD OF PRODUCING THE SAME.

Application filed February 16, 1925. Serial No. 9,680.

To all whom it may concern:

Be it known that I, HARRY A. BREMER, a citizen of the United States, residing at Chicago, in the county of Cook and the State of Illinois, have invented a certain new and useful Improvement in Curved Spirally-Wound Coils and Methods of Producing the Same, of which the following is a full, clear, concise, and exact description.

My invention relates to curved spirally wound or toroidal coils and a method of producing the same.

Such coils when made of wire are commonly employed in the electrical art, though the invention is not to be limited to the nature of the thread employed in producing the coils.

The method of my invention consists in spirally winding the thread into a coil requiring bending into the desired shape, assembling slack folds of ligature at their ends with convolutions of the coil outside of the coil side that is to become the inner side of the coil in its final shape and of aggregate length limiting the extent to which the coil may be bent, and curving the coil.

The product of my invention, in one aspect, is a coil of spirally wound thread in combination with ligature portions connected with and stretched between convolutions of the coil and located outside of the inner side of the coil.

In another aspect of my invention the innermost portions of adjacent convolutions of the coil contact and are in staggered relation in the plane of the coil whereby the amount of wire within a given winding space may be increased without unduly increasing the dimensions of the coil.

My invention will be more fully explained in connection with the accompanying drawings in which Fig. 1 is a face view of a toroidal coil made in accordance with the preferred embodiment of my invention, some of the convolutions being shown in section; Fig. 2 is a sectional view on line 2—2 of Fig. 1; Fig. 3 illustrates a portion of a collapsible mandrel and a part of a coil wound thereon, this figure illustrating some of the steps in the method of my invention; Fig. 4 is an end view of the parts shown in Fig. 3; Fig. 5 is a perspective view illustrating one of the elements of the collapsible mandrel; Fig. 6 is a perspective view illustrating another element of the collapsible mandrel; Fig. 7 is a sectional view on line 7—7 of Fig. 4; Fig. 8 is a diagrammatic view illustrating steps in the method of my invention; Fig. 9 is another diagrammatic view illustrating the concluding step in the method of my invention; and Fig. 10 is still another diagrammatic view illustrating a detail of formation of the coil.

The mandrel illustrated comprises four straight rectangular blocks 1, 2, 3 and 4, which are held in expanded relation by means of a cross 5 in the corners of which these blocks are seated. The blocks may be provided with grooves 6, 7, le ining a spiral pathway for the wire. The wire illustrated includes the metallic core or wire proper 8 covered by insulation 9. The wire is initially spirally turned upon the straight mandrel into a straight coil, whereafter the cross 5 is withdrawn to permit the mandrel to collapse preparatory to withdrawing the coil therefrom. Ligatures 10 are placed upon the top side of the mandrel sections 1 and 2, these ligatures being preferably tape like in form and cemented to the inulation 9 by means of collodion or other suitable adhesive. Similar ligatures 11 are placed upon the top sides of the portions of the convolutions that are upon the mandrel sections 1 and 2, these ligatures being similarly assembled with the insulation that is disposed about the wire. These ligatures 10 and 11 are thus respectively upon the inner and outer sides of the coil wire that is sandwiched between the ligatures. Initially the ligatures are sinuous in form, the assembly of the ligatures with the adjacent wire convolutions being effected between the folds of the ligatures. After the coil is withdrawn from the mandrel the coil is curved with the ligatures outside of the inner side of the bent coil, these ligatures being preferably at the extreme outer side of the coil. The convolutions are of a length, when stretched, coinciding with the length of the curve of the finally shaped coil where the ligatures are disposed so that the extent to which the coil is curved is limited. The folds in the sinuous ligaments are desirably of equal extent so that the adjacent convolutions are equally spaced apart when the coil is curved to the extent permitted by the ligature portions that then become stretched between the adjacent wire convolutions with

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which these ligature portions are connected. The result is a coil of toroidal form with the convolutions thereof evenly spaced apart.

In order that as many convolutions of wire in a single spiral as possible may be contained in the winding space afforded, the wire receiving groves in the mandrel are so disposed that the innermost portions of adjacent convolutions of the coil, when the coil is finally curved, contact and are in staggered relation in the plane of the coil as illustrated most clearly in Figs. 8, 9 and 10. Another ligature 12 is preferably laid upon the lower end of the cross 5 as illustrated in Fig. 4, and is similarly treated with collodion so that it may adhere to the convolutions of the wire at the inner side of the coil to maintain the inner side of the coil in shape.

Changes may be made without departing from my invention.

Having thus described my invention, I claim:—

1. The method of making curved coils of wire which consists in spirally winding the wire into a coil requiring bending into the desired shape; assembling a sinuous ligature with and with its folds between convolutions of the coil and along one side of the coil and of a length, when stretched, coinciding with the length of the curve of the spirally shaped coil where the ligature is disposed: and curving the coil with the ligature outside of the inner side of the bent coil.

2. The method of making curved coils of wire which consists in spirally winding the wire into a coil requiring bending into the desired shape; assembling slack folds of ligature with and between convolutions of the coil at places outside of the coil side that is to become the inner side of the coil in its final shape and of aggregate length limiting the extent to which the coil may be bent; and curving the coil.

In witness whereof, I hereunto subscribe my name.

HARRY A. BREMER.