

(No Model.)

2 Sheets—Sheet 1.

H. GEISENHÖNER.
FORM FOR WINDING COILS FOR DYNAMO ELECTRIC MACHINES.
No. 586,995. Patented July 27, 1897.

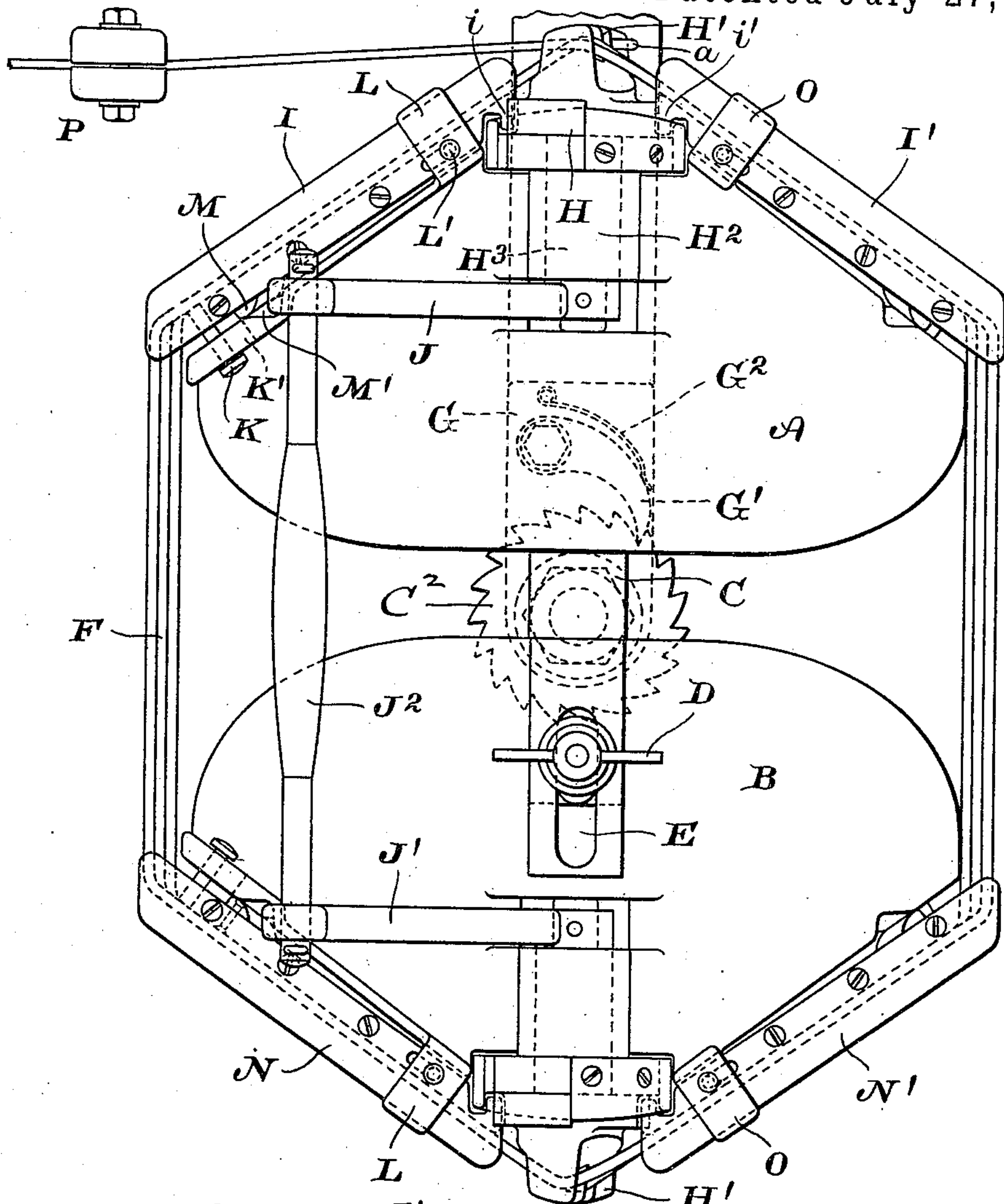


FIG. 1.

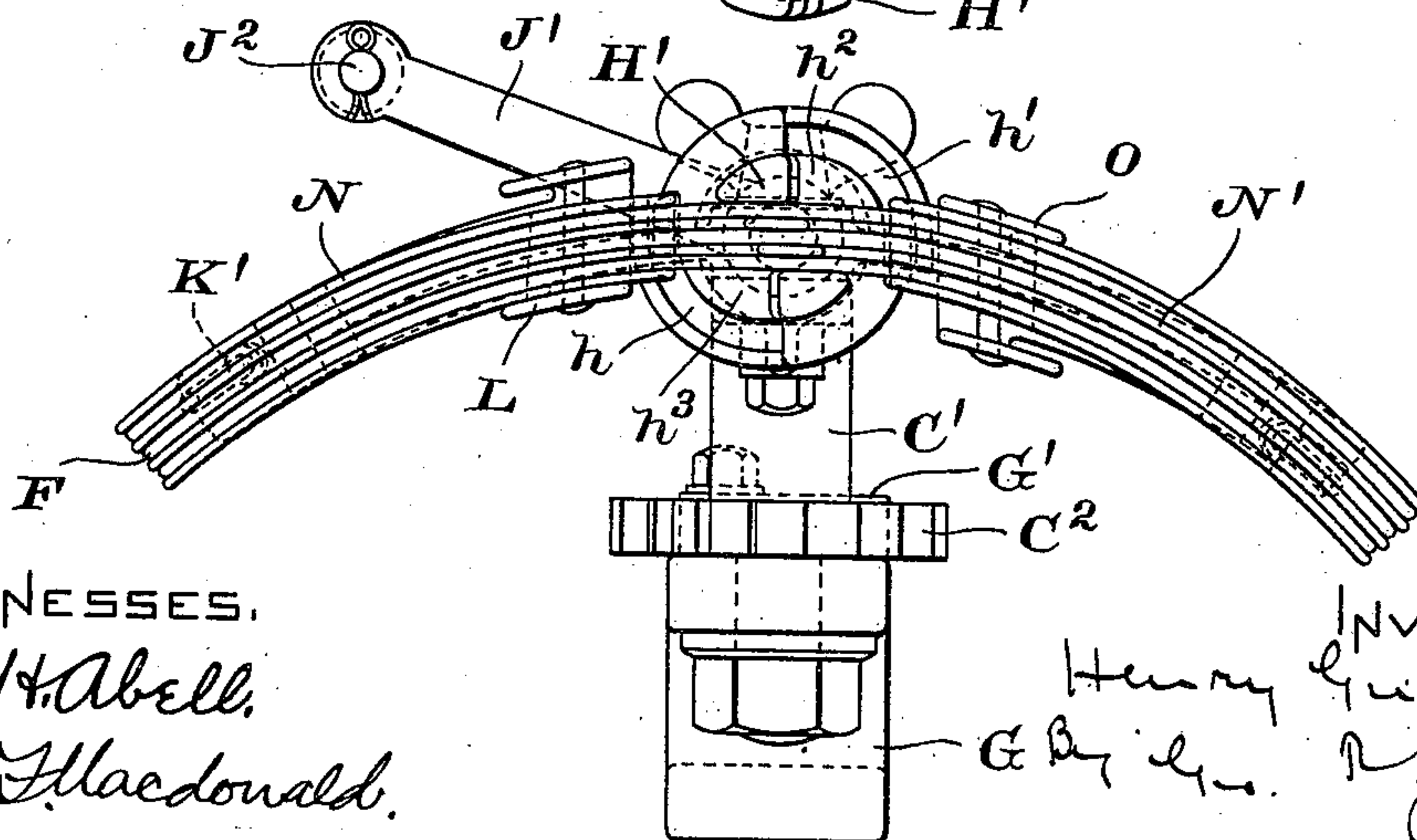


FIG. 2.

WITNESSES.

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A. MacDonald.

INVENTOR.

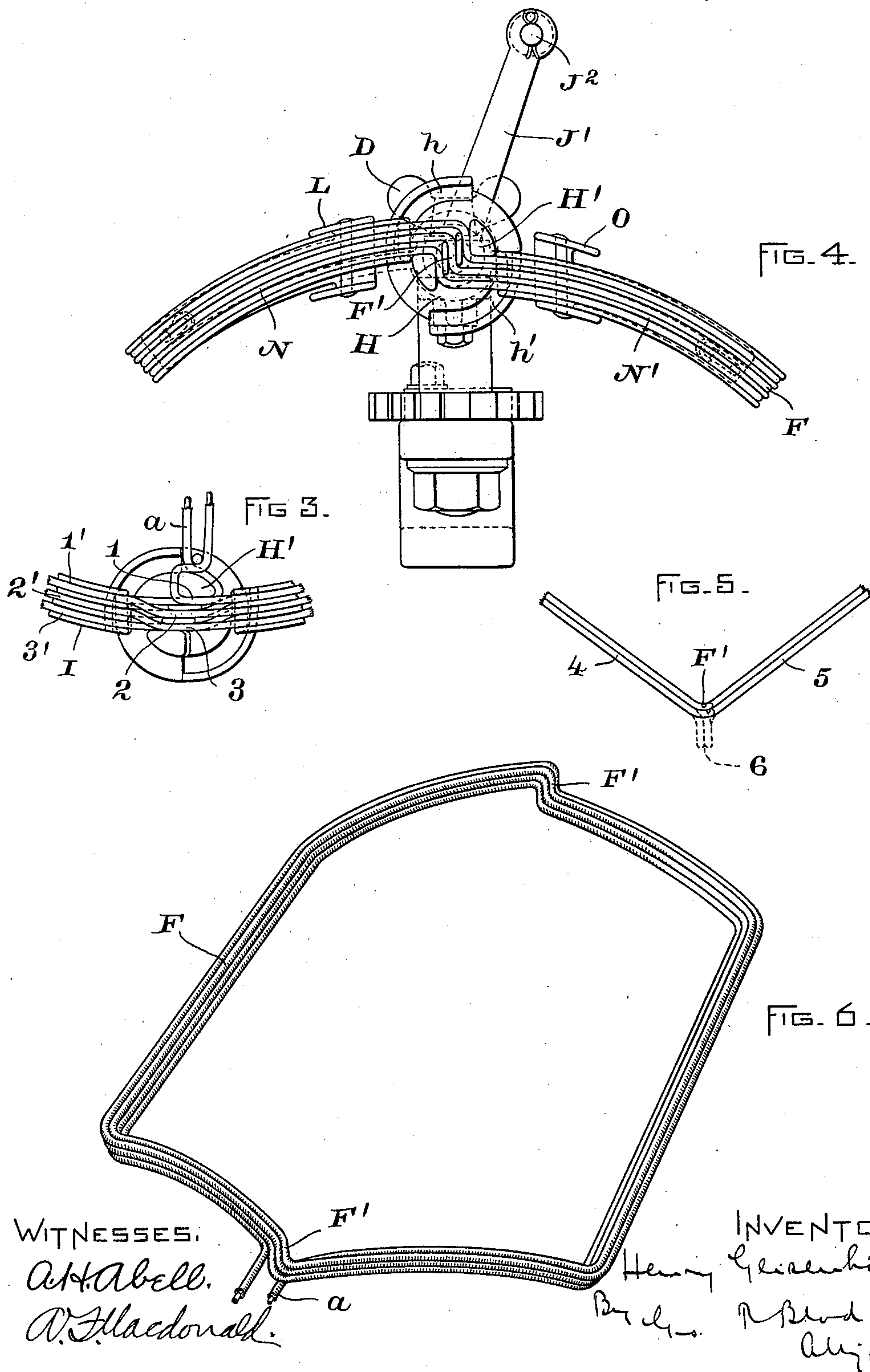
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FORM FOR WINDING COILS FOR DYNAMO ELECTRIC MACHINES.

No. 586,995.

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UNITED STATES PATENT OFFICE

HENRY GEISENHÖNER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO THE
GENERAL ELECTRIC COMPANY, OF NEW YORK.

FORM FOR WINDING COILS FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 586,995, dated July 27, 1897.

Application filed March 16, 1897. Serial No. 627,809. (No model.)

To all whom it may concern:

Be it known that I, HENRY GEISENHÖNER, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Forms for Winding Coils for Dynamo-Electric Machines, of which the following is a specification.

The present invention relates to forms upon which coils for dynamo-electric machines are wound, and has for one of its objects to provide a coil-winding form so arranged that the coils are given a shape while being wound that is substantially the same as that of the finished coil, and also to provide means whereby the coil can be given its final shape before being removed from the form.

The invention further has for its object to provide a coil-form so arranged that the coil can be given its final shape thereon and the whole operation performed by one winder instead of two, as is customary with other coil-forms with which I am familiar.

The invention also relates to certain novel features more fully described and claimed hereinafter.

In the accompanying drawings, attached to and made a part of this specification, Figure 1 is a front elevation of my improved winding-form. Fig. 2 is an inverted plan. Fig. 3 is a partial top plan view showing the relation of the wires on the form. Fig. 4 is a view showing how the offset between the end portions of the coil is made. Fig. 5 is a detail showing the end of my improved coil, and Fig. 6 is a perspective view of a completed coil as it is taken from the form.

The winding-form is made in two parts A and B. These are curved so as to give the coils a shape corresponding to that of an armature or field-magnet. The upper part A is provided with a downwardly-extending lug C, to which the lower part B is secured by a bolt and wing-nut D. The parts A and B are adjustable vertically with respect to each other to permit of more than one size of coil being wound on the form. The slot E allows for a certain amount of adjustment and also permits the two parts to be brought together to permit the removal of the coil F. Formed integral with the back of the lug C is a stud

C', which is mounted in a suitable bearing in the stand G. Rigidly secured to the stud C' is a ratchet C², and engaging therewith is a pawl G', pivotally secured to the stand G and held in engagement with the ratchet by a spring G². By this construction the form as a whole can be rotated forward as the wire is wound, but is held against backward rotation.

The upper end of A is provided with two inclined surfaces making an angle with each other, upon which are mounted grooved pieces I and I'. These are pivotally secured at their outer ends by screws K, working in slots K'. Guides L are provided for the inner ends of the pieces, and extending between the sides of each guide and through a slot in the grooved piece is a pin L'. On the under side of the grooved pieces are lugs M, working in notches M' in the piece A. This permits the sides of the coil to move inward at the time the offset in the end is formed. In the present instance the pieces I I' are shown as having three grooves, but the number varies with the number of turns desired in each coil. The grooved pieces are curved, as shown in Figs. 2 and 3, to conform to the curvature of the ends of the coils.

Mounted in a bearing H² in the upper part A is a shaft H³, and rigidly secured thereto is a cam H, having spiral cam-grooves h h', and engaging therewith are hooks i i', formed on the under side of pieces I I'. The arrangement of the cam grooves and hooks is such that when the cam is rotated from left to right the pieces I I' are moved inwardly and the lugs M slide into the notches M'.

Formed integral with the cam and extending upwardly is a bending device H', having three slots containing the wires of the coil F, and cut-away portions h² h³, which are occupied by the wires of the coil after the bending device has been rotated, as shown in Fig. 3.

The lower part B of the form is provided with grooved pieces N N' and a bending device. These are made and mounted in the same manner as those on the part A, so that further description is unnecessary.

Rigidly secured to the shafts of the cam H are arms J J', and connecting the arms is a

handle J², employed in moving the cams and bending devices of the parts A and B.

In Fig. 2 the relation of the parts on the under side of the form is shown. It will be seen that the grooves in the pieces N and N' coincide with the slots in the bending device H', and that the inner end of piece N is resting on the lower side of guide L and the inner end of piece N' on the upper side of guide O. This arrangement is the same as that of the pieces I and I'.

In Fig. 4 the cam H and bending device H' are shown as having been rotated to the right by means of handle J². The position of the inner ends of the pieces N and N' has also been changed, that of N now resting on the upper side of guide L and that of N' on the lower side of guide O. At the same time the pieces N and N' have been drawn bodily toward the center by the hooks engaging with the cam-grooves h and h'. This compensates for the length of wire used in the offset F', between the end portions of the coil. At the time the pieces I I' and N N' are being drawn together by the cams H the lugs M are moving inward on the L-shaped slots M' until their lower edges coincide with the edges of the pieces A and B.

By providing a suitable tension device P for the wire and means for holding the form against such tension, one winder can readily wind the coils by advancing the forms step by step. In winding a coil the first end a is secured to the bending device H', as shown in Fig. 3, and the wire is then passed through slot 1 and groove 1' in the piece I. The wire continues around the form in the first slot to the point of starting; then it crosses to slot 2 in the bending device H' and continues in groove 2' until it has made a complete turn; then it crosses to slot 3 at the bending device H' and makes the third complete turn in grooves 3', the wires occupying the bottom of the slots and grooves. In winding the second layer the wire continues in slot 3 and groove 3' for one complete turn, then crosses at the bending device H' to slot 2, and continues in groove 2' for a second turn, and finally crosses at bending device H' to slot 1 and continues in groove 1' for a complete turn, and the end is passed around a pin in the bending device H' to secure it.

The coil as now wound has two layers with three turns in each layer; but it is evident that the number of turns in each layer and the number of layers can be varied to suit different conditions by simply varying the grooves, pieces, and bending devices.

The form of the coil as now wound is substantially the same as that of the finished article, with the exception that the offset F' has not been formed, which in a winding composed of counterpart coils is necessary to provide for the overlapping of the ends of the coils. To form the offset, the handle J² is moved to the position shown in Fig. 4. This simultaneously draws the grooved pieces N

N' and I I' toward each other by reason of the hooks thereon engaging with the spiral grooves on the cams. At the same time the vertical side portions of the coil are drawn nearer together, and the extra length of wire thus obtained is utilized in the offset F', which connects the end portions of the coil.

To remove the coil, the wing-nut D is released, permitting the parts A and B to approach each other, and the coil is lifted from the form.

Referring to Fig. 5, the difference between a coil constructed according to my invention and others with which I am familiar will be explained. An end portion of a coil made in accordance with the invention is illustrated in full lines, and in dotted lines is shown the construction of the ordinary coil. The end portions 4 5 of the coil make an angle with each other and occupy similar planes, but located one above the other, and are connected by an offset F'. The dotted portion of the coil represents the construction of the usual offset between the ends of the coil, and it will readily be seen that the total length of the coil is increased on each end by a length approximately equal to the distance between the offset shown in full lines and point 6 on the dotted-line coil.

I have found that in constructing a coil in accordance with my invention there is a saving of approximately eighteen inches over a similar coil, but constructed with end portions and offsets formed like that shown in dotted lines in Fig. 5.

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

1. In a winding-form, the combination of means for giving the coil a shape while winding that is substantially the same as that of the finished article, and means for finally shaping the coil before removing it from the form.

2. In a winding-form, the combination of means for giving the coil a shape while winding similar to the finished article except for the offset in the ends, and means for forming an offset in the ends of the coil.

3. In a winding-form, the combination of means for giving the coil a shape while winding that is substantially the same as that of the finished article, means for simultaneously forming the offsets in the ends of the coils, and a device for operating the said means.

4. In a winding-form made in two parts, the combination of means for giving the coil a shape while winding which is substantially the same as that of the finished article, with means for adjusting the relation of the two parts of the form so that different sizes of coil can be wound thereon.

5. In a winding-form, the combination of grooved pieces in which the wire forming the coil is placed, arranged so as to give the coil a shape substantially the same as that of the finished article, supports for the pieces adjustable with respect to each other, and a

bending device for forming the offsets in the ends of the coil.

6. In a winding-form, the combination of a support divided into upper and lower parts, 5 movable grooved pieces mounted on the parts in which the wire forming the coil is wound, means for simultaneously moving the grooved pieces of each part toward one another, and means for forming the offsets in the coil.

7. In a winding-form, the combination of upper and lower parts adjustable with respect to each other, a clamp for securing the parts, a support in which the form is rotatably mounted, and means permitting a rotation of 15 the form in one direction, but preventing it in the opposite.

8. In a winding-form, the combination of upper and lower parts adjustable with respect to each other, grooved pieces secured to inclined surfaces on both parts, cams for drawing the grooved pieces together, bending devices for forming the offsets in the ends of the coil, and means for actuating the cams and bending devices simultaneously. 20

9. In a winding-form, the combination of grooved pieces in which the wire forming the coil is wound, a pivot for the outer end of each piece, grooves formed in the main body portion of the form in which the pivots are adapted to work, guides for the pieces, and 30 cams for drawing the pieces inward.

10. In a winding-form, the combination of grooved pieces in which the wire forming the coil is wound situated on each side of a bending device, pivots for the outer ends of the 35

grooved pieces, a bending device having slots coinciding with the grooves in the pieces, and guides for the pieces permitting them to move on their pivots when the bending device is actuated.

11. The combination in a winding-form divided into halves, of two inclined surfaces on each half making an angle with each other, grooved pieces pivotally secured to each half, a lug on the under side of each grooved piece 40 working in slots, cams for drawing the grooved pieces together, a bending device for forming the offset in the ends of the coil, a ratchet and pawl arranged to permit rotary movement of the form in one direction but preventing it in the opposite, and means for releasing the halves of the form so that the coil can be removed. 50

12. In a winding-form, the combination of grooved pieces in which the wire forming the coil is wound, cams rigidly secured to shafts, bearings for the shafts formed in the main or body portion of the form, hooks on the under side of the grooved pieces working in spiral grooves on the cams, a bending device rigidly 60 secured to the cam having slots coinciding with the grooves in the pieces, arms secured to the shafts, and a handle for operating the arms simultaneously.

In witness whereof I have hereunto set my hand this 12th day of March, 1897. 65

HENRY GEISENHÖNER.

Witnesses:

B. B. HULL,

M. H. EMERSON.