(No Model.) 2 Sheets—Sheet 1.

G. WILKES.

ARMATURE COIL FOR DYNAMOS.

No. 507,297. Patented Oct. 24, 1893.

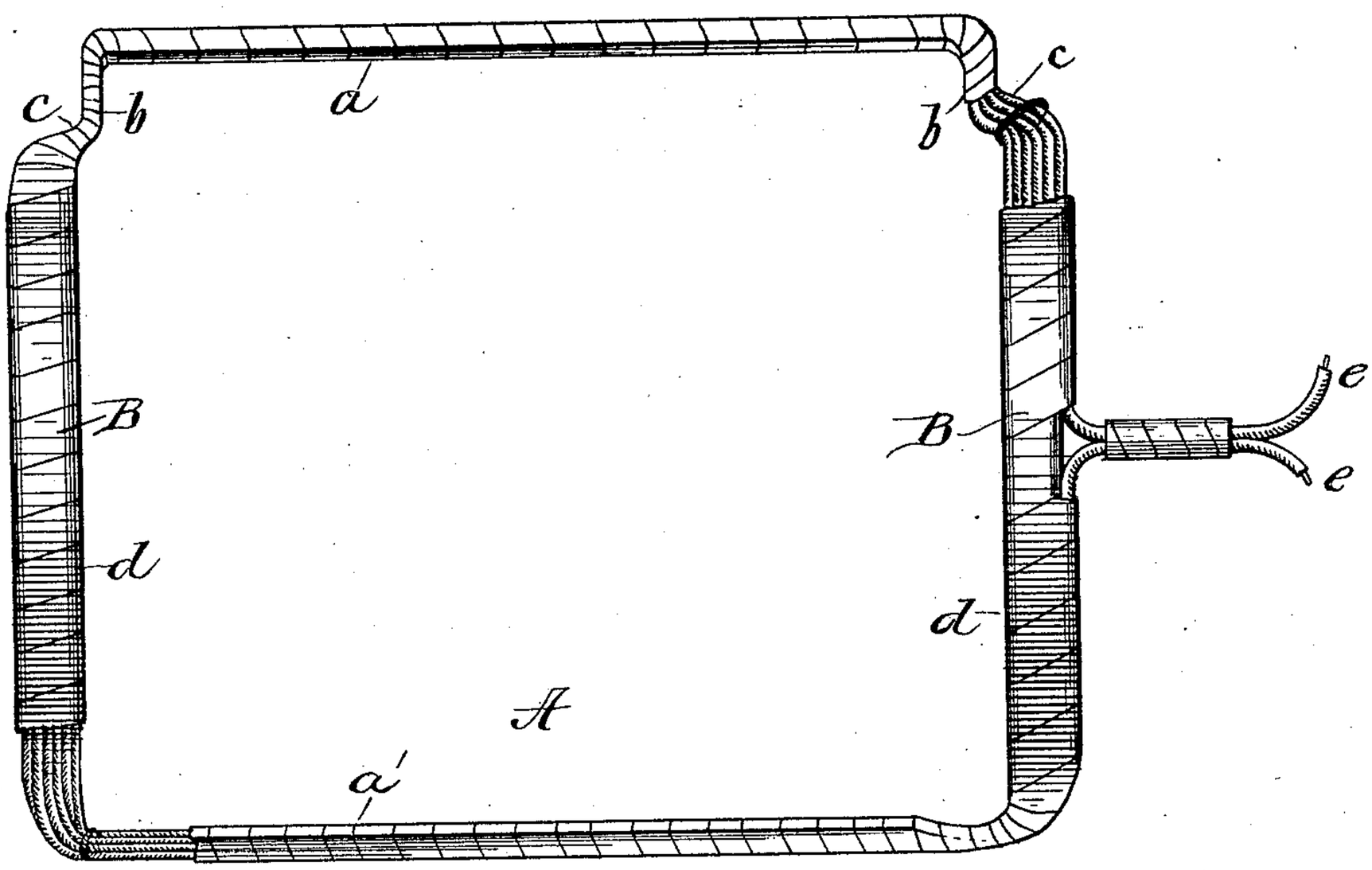

Fig 1

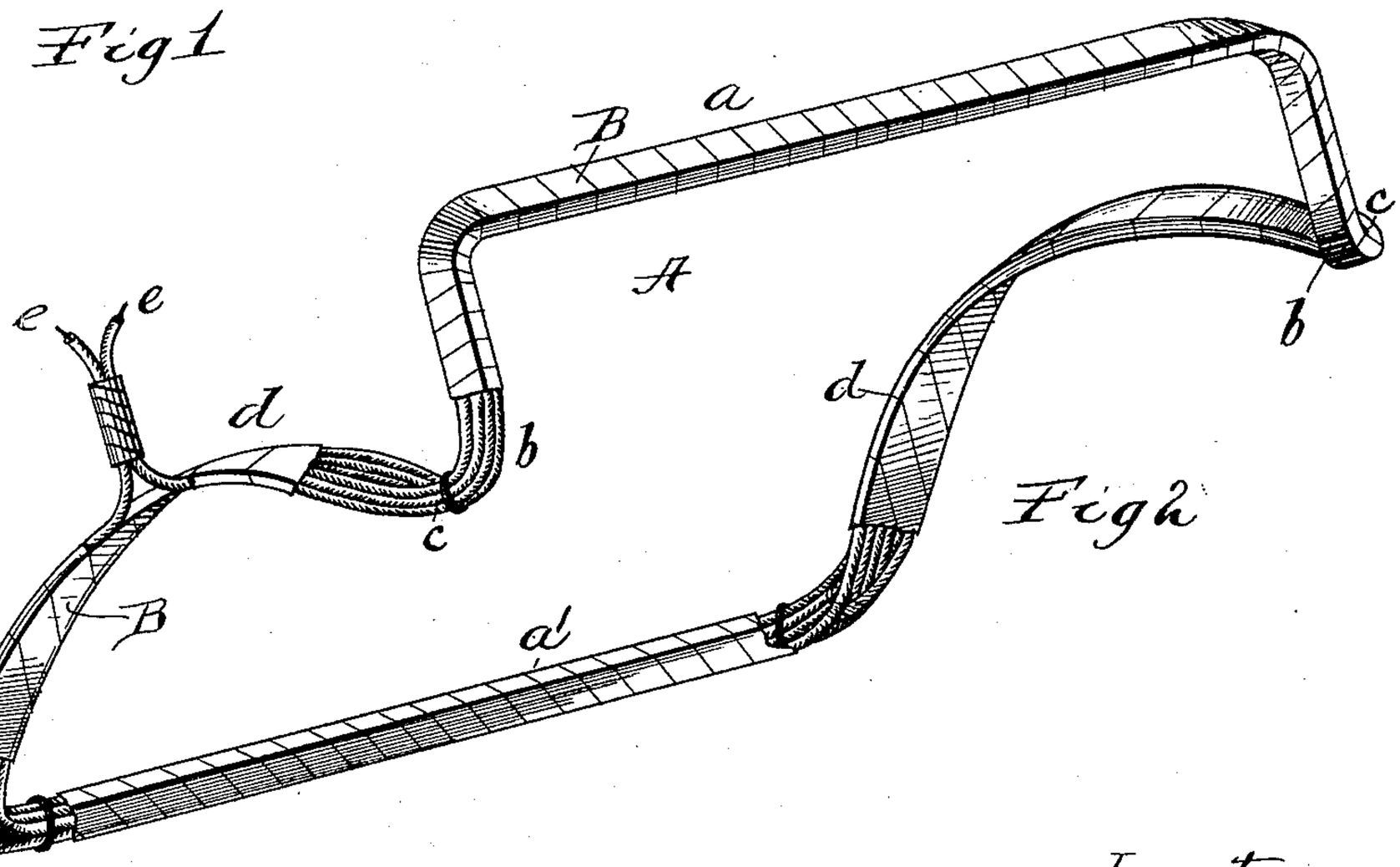

Fig 2

Witnesses:
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Jno. A. Christianson.

Inventor:
Gilbert Wilkes
By Coburn & Thacher
Atty's.

(No Model.) 2 Sheets—Sheet 2.

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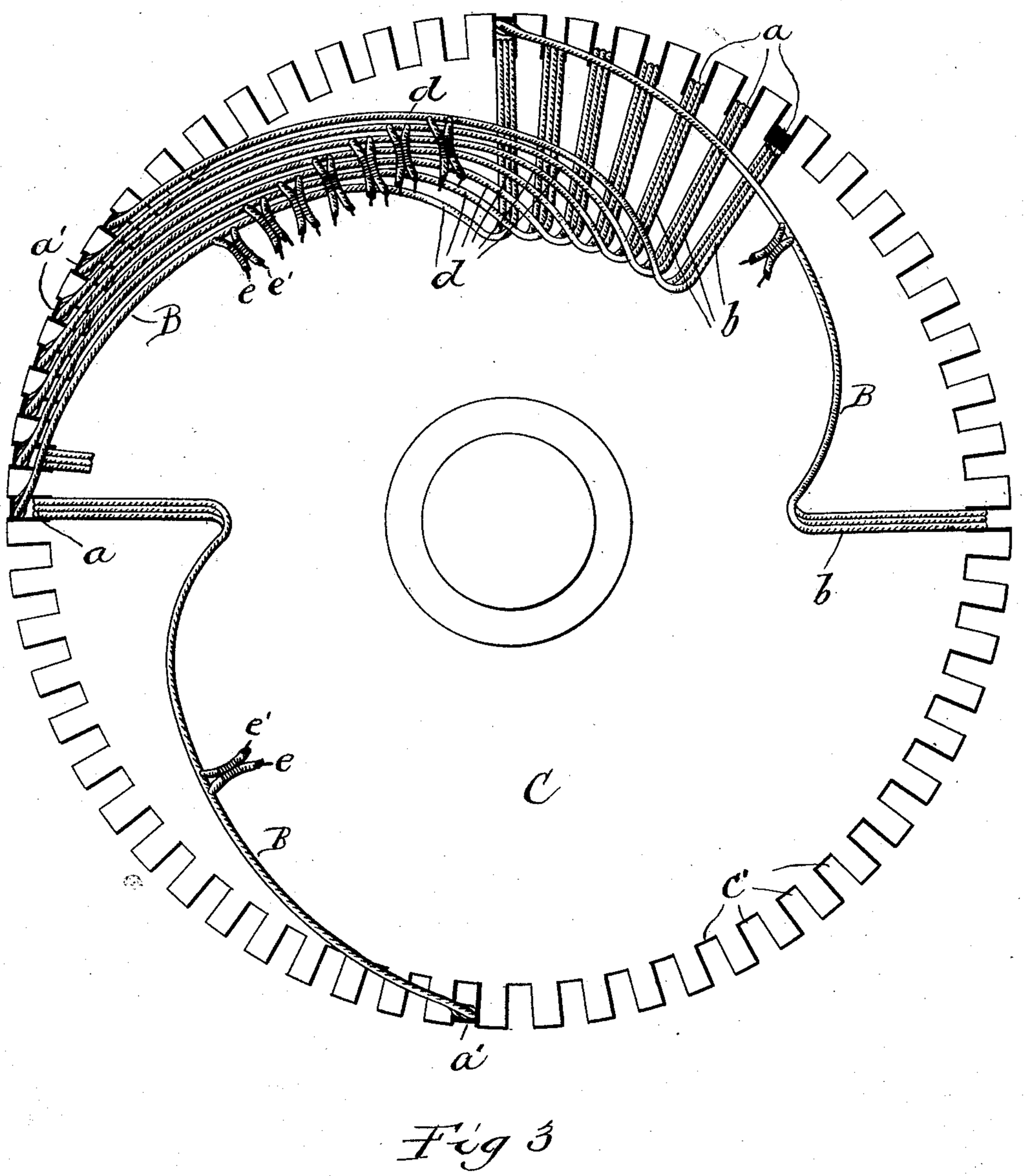

Fig 3

Witnesses
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UNITED STATES PATENT OFFICE.

GILBERT WILKES, OF DETROIT, MICHIGAN, ASSIGNOR TO HUGH McMILLAN, OF SAME PLACE.

ARMATURE-COIL FOR DYNAMOS.

SPECIFICATION forming part of Letters Patent No. 507,297, dated October 24, 1893.

Application filed June 20, 1893. Serial No. 478,233. (No model.)

To all whom it may concern:

Be it known that I, GILBERT WILKES, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented a certain new and useful Improvement in Armature-Coils for Dynamos, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a front elevation of an armature coil embodying my invention; Fig. 2, a perspective view of the same, and Fig. 3, an end elevation of an armature with a number of my improved coils applied.

My invention relates to the separate coils or windings, which are prepared as completed articles ready for application to the armature drum or core.

The invention consists in a certain special form of the completed coil produced by the peculiar winding of the wire to make the latter. The coil is intended for use on a slotted armature, having an even or odd number of slots and connected either according to the Gramme method or in any of the several methods of single series connections, by means of which but two paths for the current are supplied in the armature conductors, no matter how many poles there may be. In short, this form of coil may be used on any slotted armature on which it is possible to mount symmetrical coils. The system of connection, however, is no part of the present invention and is mentioned only in illustration of the possible uses of the coil.

In the drawings, Figs. 1 and 2, a completed coil, A, is shown, wound in a form to constitute an embodiment of my invention. This coil is constructed with two straight bars or sections, *a* and *a'*, which are parallel to each other, but the former of which is somewhat shorter than the latter, as seen in Fig. 1. These straight bars are adapted to be laid in the slots of a slotted armature. They are rectangular in shape, as seen in Fig. 2 of the drawings. At each end of the bar, *a*, the coil is bent at right angles, forming two short, straight projections or arms, *b*, parallel to each other, and the same in shape as the bar, *a*, in cross section. These short arms are adapted to extend inward radially at each end of the armature drum or core. There is then a sharp bend, *c*, outward, at the ends of these portions of the coil, and thence a long curved section, *d*, extending to and joining the respective ends of the longer straight bar, *a'*. As they leave these bends, *c*, the wires are brought into a parallel position with each other, thus forming a wide web instead of a rectangular bar, as seen in Fig. 1. The curve of these web sections is outward from the axis of the armature when the coil is applied thereto, and the plane or widest dimension of the web is parallel to the axis of the armature, or in other words, these web sections at the ends of the coil would, if straightened out, lie in planes horizontal to the axis. Of course, it will be understood that the wires are suitably bent to join the ends of the web sections to the respective extremities of the bar, *a'*. The usual connection ends of the wire are led out at the outer edge of one of these webs, as seen at *e*, *e*, in the drawings.

This coil is adapted for application to a slotted armature, as seen in Fig. 3, in which C represents the armature core provided with the usual circumferential slots, *c'*. The straight bars, *a*, *a'*, of the coil are adapted to be laid into these armature slots, and I prefer an arrangement of the coils on the armature in which one of the said bars shall lie in the lower and the other in the upper half of two slots distant from each other a space approximately equal to the circumference of the armature divided by the number of poles, though I do not wish to be understood as limiting myself to this particular application. This is the arrangement seen in Fig. 3 of the drawings, which represents an armature for a four-pole machine. When applied in place the short rectangular arms, *b*, at the ends of the shorter bar, *a*, will extend inward radially a little way at each end of the core, as seen in Fig. 3, and thus free radial spaces will be left between these respective sections. The web sections, *d*, spring from the inner ends of these short rectangular sections, as already described, and as the coils are put in place will lie one over or outside of the other in a regular tier, as seen in Fig. 3. As stated above, the short end sections, *b* are of the same rectangular shape as the

bar, *a*, and consequently they extend out less at the end of the core than would be the case if they were webs. At the same time they are strong and stiff because of their shape and thus stiffen the ends of the coil, making it stronger and affording a greater resistance to injurious torsion. It will also be seen that free radial openings are provided between these short, straight end pieces of the coil along each end of the armature body or core. The change of the end portions of the coils, from these short rectangular sections, *b*, to webs, provides for a saving of space in filling out at the ends of the core. As already stated, in applying the coils these sections lie one over or outside the other, as seen in Fig. 3; obviously, therefore, the web-shape of these portions of the coils provide for the arrangement of a greater number of wires within the same space at the ends of the armature coil than would be the case if the rectangular form of the straight bars was maintained throughout; for instance, in the exact construction shown, the filling in at the ends of the core is at the rate of only about the diameter of one wire, while, if the bar form was continued throughout it would be double this space, which would, of course, fill up the space between the axis and circumference of the core-head just twice as fast. With this change to web form in the ends of the coil, I am able to accommodate the greater number of wires composing the side bars, as already explained, without filling up the space at the ends of the armature core to an objectionable extent. It will also be noted that in my form of coil the bend in the ends thereof is made only a short distance from the circumference of the armature; this also gives stability and stiffness to the coils, for, obviously, the centrifugal force developed by the rapid revolution of the armature will have less torsionary effect upon the coils than would be the case if this bend was carried in near to the axis. The strength and rigidity of the short rectangular sections, *b*, also assist in resisting this effect of the rapid rotation of the armature, and the ends of the coils are much stiffer and more stable than they would be if they were carried in and bent at about their middle near the axis, or if they were webbed their entire length. It is also obvious from an inspection of Fig. 3 that quite a large free space will be left at the central portion of each end of the core, even when the latter is entirely filled with coils, and that free radial spaces or channels will run outward from this central opening between the respective short rectangular sections, *b*. These openings or spaces provide unobstructed air ducts or channels through which the air is driven by centrifugal force, and results in an improved ventilation at the ends of the armature whereby the temperature of the latter is kept down, and thus the possible electrical output is increased. It is also obvious that the curved webs of the coils are offset from the ends of the core so that they will not interfere with any of the parts or devices at the ends of the armature. It will be understood that the finished coil is covered with insulating material, B, which is wrapped around the several parts of the coil in the usual manner.

It will be seen from the description above, that, with this particular construction of the coils, I am enabled to increase the relative amount of copper upon the surface of the armature without crowding and interference at the respective ends of the core, and that the coils are stiff to properly resist torsion, and the armature is well ventilated at its ends, thereby avoiding objectionable increase of temperature.

In the description above I have referred to the special construction shown in the drawings, having six wires arranged in two layers in the slots. I do not wish to be understood, however, as limiting my invention to this, or to any particular number of wires and layers thereof in the rectangular portions; these particular features of the device may be varied as desired.

Having thus described my invention, what I believe to be new, and desire to secure by Letters Patent, is—

1. In a wound wire coil for slotted armatures, two straight rectangular bars adapted to be laid in the armature slots and one shorter than the other, two short rectangular arms arranged at the respective ends of the shorter of said bars and at right angles thereto, and long curved connecting webs between the said short arms and the longer straight bar, offset from the said short arms and having their faces or widest portion in a direction parallel to the axis, substantially as described.

2. A wound wire coil, A, for slotted armatures, composed of two straight parallel, rectangular bars, *a*—*a'*, the former shorter than the latter, two short rectangular arms, *b*, at the respective ends of the said shorter bar and bent at right angles thereto, and two curved webs, *d*, between the arms, *b*, and the ends of the longer bar, *a'*, bent outward slightly from said arms and with their faces lying parallel to the axis, substantially as described.

3. A circular armature core, C, provided with parallel slots, *c'*, upon its circumference, in combination with a wire coil, A, consisting of rectangular bars, *a*—*a'*, adapted to be laid in said slots, short rectangular arms, *b*, at the ends of the bar, *a*, arranged at right angles thereto and radially of the core, and web sections, *d*, extending from the ends of the arms, *b*, to the ends of the bars, *a'*, and offset from the former, substantially as described.

GILBERT WILKES.

Witnesses:
R. C. PAGE,
J. M. THACHER.