(No Model.) 2 Sheets—Sheet 1.

J. J. WOOD.

FIELD MAGNET POLE.

No. 571,181. Patented Nov. 10, 1896.

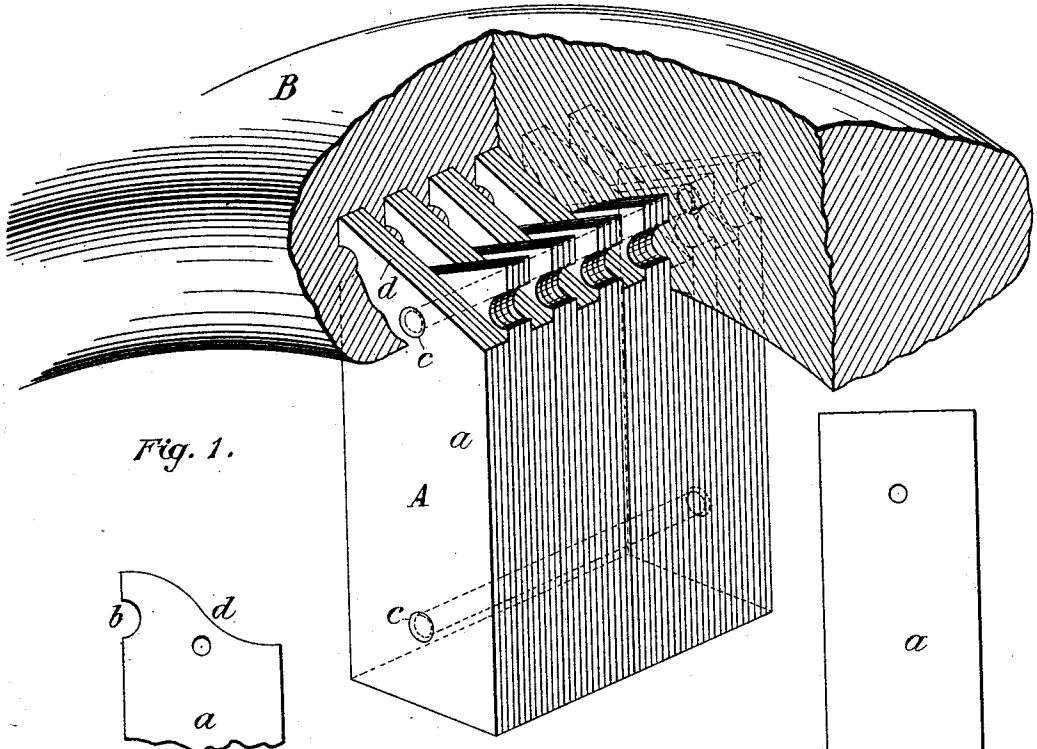

Fig. 1.

Fig 10.

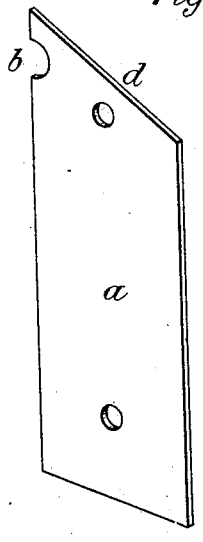

Fig. 2.

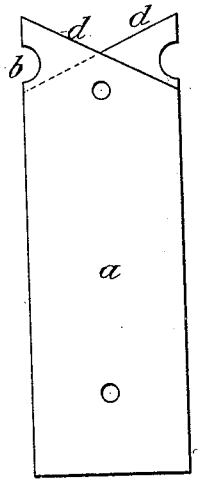

Fig. 3.

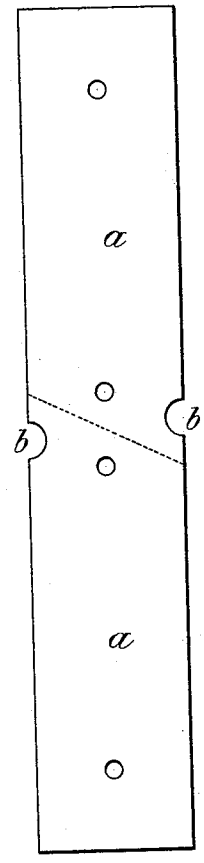

Fig. 4.

Witnesses.
Lewis Apbell.
Fred White

Inventor,
James J. Wood,
by his Attorneys
Arthur O. Brown & Co

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. J. WOOD.

FIELD MAGNET POLE.

No. 571,181. Patented Nov. 10, 1896.

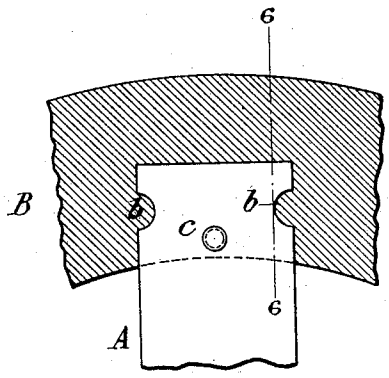

Fig. 5.

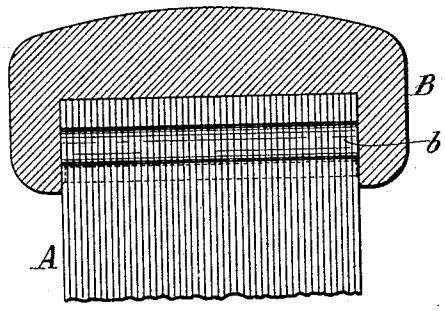

Fig. 6.

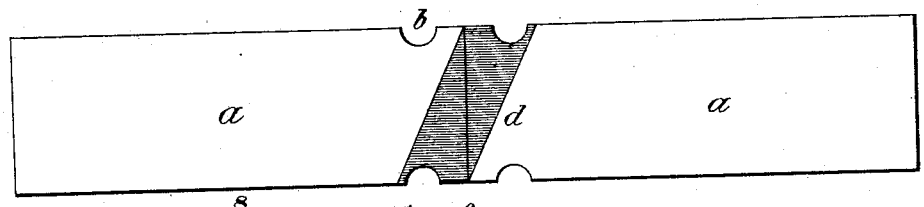

Fig. 9.

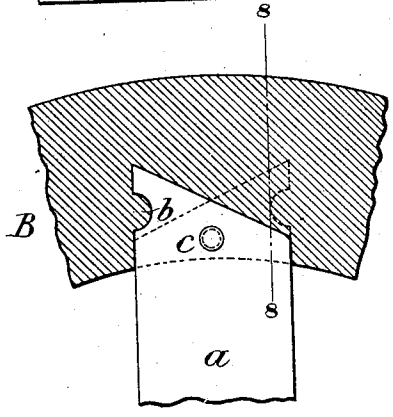

Fig. 7.

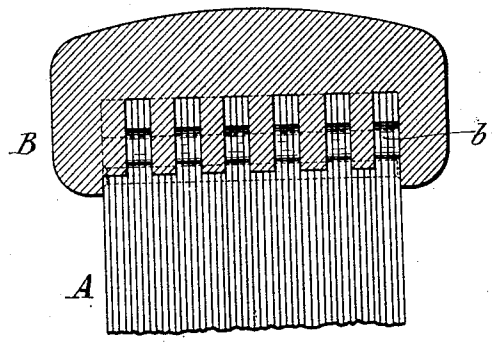

Fig. 8.

Witnesses.
Lewis Postbell.
Fred Whitz.

Inventor.
James J. Wood,
by his Attorneys,
Munn & Bacon & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES J. WOOD, OF FORT WAYNE, INDIANA.

FIELD-MAGNET POLE.

SPECIFICATION forming part of Letters Patent No. 571,181, dated November 10, 1896.

Application filed September 8, 1896. Serial No. 605,154. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. WOOD, a citizen of the United States, residing in Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Field-Magnet Poles, of which the following is a specification.

This invention relates to the construction of field-magnets for electric machinery having poles of laminated iron embedded in cast-iron yokes or crowns. Such laminated poles require to be embedded for a considerable depth in the cast yoke, in order to give sufficient mechanical strength to their connection, and also to provide sufficient contact-surface between the wrought-iron and cast-iron to avoid choking the lines of magnetic force, it being well known that a given cross-section of wrought-iron is capable of carrying twice as many lines of force as the same cross-section of cast-iron.

The objects of the present invention are to avoid the weakening of the cast yoke or crown where the cast metal is displaced by the embedment of the laminated pole in it, thereby avoiding the necessity of thickening the cast metal at this point, in order thereby to preserve sufficient mechanical strength; second, to increase as much as possible the contact-surface between the wrought-iron and cast-iron, in order to prevent choking of the lines of magnetic force at their contact, and thereby introducing a wasteful resistance in the magnetic circuit; third, to reduce the amount of wrought-iron required and avoid waste thereof; fourth, to reduce the amount of copper required to excite the field at a given density, and, fifth, to reduce the cost of the machine. To these ends my invention introduces the novel construction shown in the accompanying drawings, wherein—

Figure 1 is a perspective view showing the laminated pole with the cast yoke or crown broken away to show the construction of the pole. Fig. 2 is a perspective of one of the plates or laminæ of which the pole is built up. Fig. 3 shows two plates superposed and reversed. Fig. 4 shows one of the wrought-iron punchings, which by being cut across on the dotted line forms two of the pole plates or laminæ. Fig. 5 is a fragmentary section showing the old-style construction upon which my invention is most directly an improvement, Fig. 6 being a transverse section thereof on the line 6 6. Figs. 7 and 8 are sectional views corresponding to Figs. 5 and 6 and illustrating my improved construction, the plane of Fig. 8 being on the line 8 8. Fig. 9 indicates two punchings or plates of the old construction shown in Fig. 5, the tinted portion indicating the metal which is saved according to the construction introduced by my invention. Fig. 10 is a fragmentary view of a modified form of plate.

I will first describe the old construction shown in Figs. 5 and 6. The plates or laminæ are punched out with the outlines shown in Figs. 5 and 9, with half-round notches *b b* on opposite sides of the root or embedded portion of the pole, and the plates being piled together in alinement, so as to form a block constituting the pole, these notches coinciding with one another, so as to form grooves or channels on opposite sides of the root of the pole, as indicated in Fig. 6. The plates are joined together in a solid block by means of pins *c*, passing through coinciding holes and riveted down on the ends. The block or pole-piece A thus built up is placed in the mold, and the yoke or crown B of cast-iron is cast around it, the cast-iron filling the channels *b b* and forming thereby a dovetail connection by which the embedded portion of the pole is firmly united with the yoke. In order to afford a sufficient surface of contact, and also a sufficiently-strong mechanical connection between the pole and the yoke, the pole is embedded in the yoke to such depth as to occupy a considerable proportion of the cross-section of the cast metal, thereby notably weakening the latter or necessitating that it be strengthened by increasing its cross-section.

According to my improved construction I form the root or embedded end of the pole with oblique ribs recurring at intervals and alternated with oblique channels to the effect best shown in Fig. 1. To this end the pole is made up of punchings or laminæ *a a*, one of which is shown in Fig. 2 and the outline of which is shown in Fig. 3. Several of these plates (four, for example, more or less) are superposed in coincidence; then an equal number are superposed but reversed relatively to the first group, as shown in Fig. 3; then a third group is built up and placed in coincidence with the first group, and so on, each alternate group being reversed relatively

to that which precedes it until the entire width desired for the pole is thus built up. It will be seen that the upper end *d* of each plate or punching is cut obliquely, so that, as seen in Fig. 7, the embedded portion of the lamina is of unequal length at its opposite sides. The laminæ have the same notches or recesses *b* as in the old construction, with the difference that these notches appear on only one side of each of the laminæ, the one on the other being eliminated by reason of the obliquity of the top *d*. It results that in a built-up pole the embedded end or root thereof consists of a series of oppositely-inclined dovetails or ribs, the channels formed by the coincident notches *b* being discontinuous. The entire block of superposed laminæ is held together by rivet-pins *c c*, as formerly.

The pole A having been built up as thus described is placed in the mold, and the yoke B is cast upon it. I have shown only one pole and a fragment of the yoke, but in practice there are always two poles or a multiple of two, as is understood. The preferred extent of embedment of the pole in the cast yoke is clearly indicated in Fig. 7. In casting, the cast metal flows into all the spaces between the projecting ribs or dovetails of the core, thus forming a rib of cast metal wherever there is a channel or space between two of the laminated ribs or dovetails of the core. It results that the cast-iron resolves itself into a series of obliquely-crossing ribs. The existence of these ribs enormously increases the strength of the yoke or crown, which actually appears under test to be as strong as if both yoke and pole were of solid cast-iron. The several ribs, by crossing each other and interlocking in the manner shown, produce a very strong and rigid construction, while the cast metal in the act of shrinking presses the laminæ into the closest contact, making a most perfect joint. By the flowing of the cast metal into the channels or spaces between the projecting ribs or dovetails the contact-surface between the cast and wrought metal is greatly increased as compared with the old construction.

In the old construction (shown in Figs. 5 and 6,) the yoke is much weakened by the embedment of the pole in it, the gain in strength of the yoke being perceptible at a glance by comparing Figs. 6 and 8. In the old construction the shrinkage of the metal does not tend to make as good a contact, since the part of the yoke in contact with the wrought-iron is not supported by ribs of cast metal extending across from side to side and tending to hold it in close contact. On the contrary the form of its shrinkage tends to spring it away at the lower edge and thereby weaken the crown mechanically while impairing the magnetic conductivity.

Fig. 4 shows how the punchings are cut out in pairs, forming no waste except where the notches *b b* occur, and the waste due to these is reduced one half, since each punching has only one notch instead of two. The punchings are afterward cut apart upon the dotted line.

Fig. 9 shows the saving in wrought metal by my improved construction as compared with the old style, the tinted portion indicating the metal saved. The figure shows two of the old-style punchings placed together head to head, whereupon by severing each one on the oblique line it is converted into my improved punching. The space of the wrought-iron saved, as shown by the tinted portion, is in my improved construction occupied by the cast-iron of the yoke, thereby correspondingly strengthening the yoke.

Fig. 10 shows a slight modification, the top of the punching being formed with a reverse curve instead of an oblique straight line, a difference, however, which is immaterial, the construction first described being preferred.

The laminæ may be of greater or less thickness, as desired, and more or less of them may be grouped together to form the successive groups constituting the alternate right and left hand dovetail-ribs.

My invention might even be modified to the extent of alternating each successive punching or lamina, especially if the laminæ were of considerable thickness, but this is not recommended.

I claim as my invention the following defined novel features or improvements, substantially as hereinbefore specified, namely:

1. A field-magnet having a cast yoke and laminated poles embedded in it, said poles made of laminæ having sides of unequal length at their embedded ends, and said laminæ reversed at intervals to form oblique ribs projecting to alternately opposite sides, so that oblique spaces are left between them which are filled with ribs of cast-iron, serving to strengthen the yoke and increase the area of surface-contact between the wrought and cast iron.

2. A laminated field-pole adapted at one end to be embedded in a cast yoke made of laminæ having sides of unequal length at their embedded ends, and reversed at intervals to form oblique ribs projecting to alternately opposite sides, so that the embedded end of the pole presents an alternation of oppositely-inclined ribs with inclined channels between them.

3. A lamina or punching for a field-magnet pole, having its end *d* formed with an oblique outline so as to be longer on one side than the other, and with a notch *b* formed in the longer side.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JAMES J. WOOD.

Witnesses:
CHARLES C. MILLER,
M. C. GROSS.