(No Model.)

T. H. HICKS.

MAGNETIC CORE FOR ARMATURES.

No. 492,355. Patented Feb. 21, 1893.

Fig. 1.

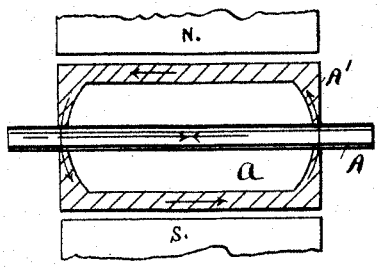


Fig. 2.

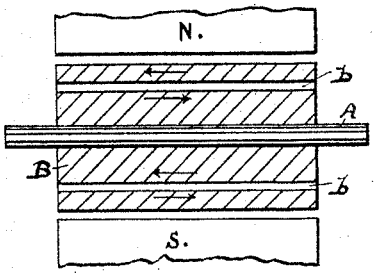


Fig. 3.

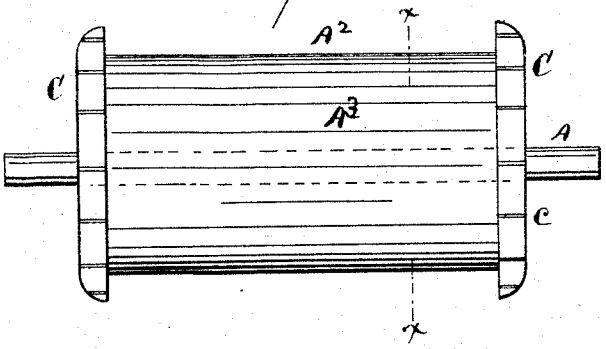


Fig. 4.

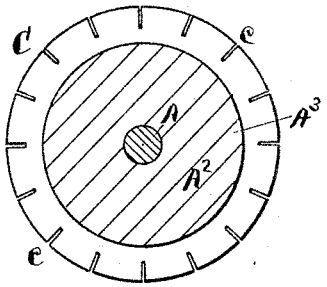


Fig. 5.

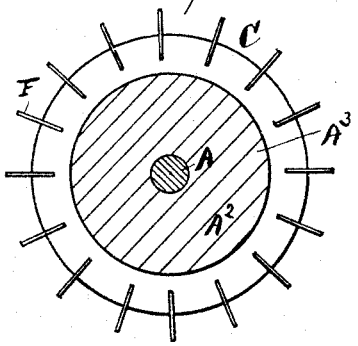
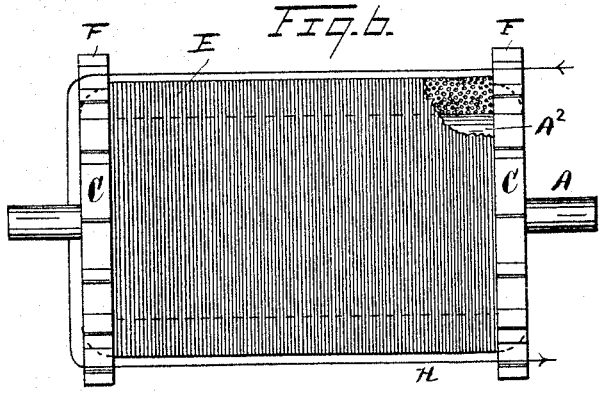


Fig. 6.



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UNITED STATES PATENT OFFICE.

THOMAS H. HICKS, OF DETROIT, MICHIGAN.

MAGNETIC CORE FOR ARMATURES.

SPECIFICATION forming part of Letters Patent No. 492,355, dated February 21, 1893.

Application filed October 6, 1892. Serial No. 448,026. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. HICKS, a subject of the Queen of Great Britain, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in a Magnetic Core for Armatures; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to certain new and useful improvements in the construction of magnetic cores for armatures, to be used in dynamos and electric motors, and it consists of the devices and appliances, their construction, combination and arrangement as hereinafter specified and claimed, and illustrated in the accompanying drawings, in which—

Figures 1 and 2 are views showing armatures in section to illustrate detrimental features which my invention is intended to overcome. Fig. 3 is an elevation of an armature partly constructed showing the foundation spool of an armature upon a shaft. Fig. 4 is a sectional view of the same on the line *x*--*x* Fig. 3, showing the sockets in the collar. Fig. 5 is a similar section, showing the pins in the collars. Fig. 6 is an elevation of a completed magnetic core, showing one convolution of wire wound upon the magnetic core.

My object, more especially, is to provide a cheap and efficient armature to take the place of armatures of the well known Siemen's type. This type of armature is usually formed of laminæ of sheet iron pressed together, and held in place by large collars having a screw threaded engagement upon the shaft at each end of the armature. When such armatures exceed eight inches in diameter, or thereabout, they usually have bolts running therethrough, extending parallel to the shaft, but near the peripheries of the sheet iron disks, to assist in holding the armature disks together. Each sheet iron disk thus requires to have a hole punched therein for the armature shaft and also for each of the connecting bolts. This means much labor and expense in the construction of armatures of that type. Not only this, but moreover, each hole formed in the said disks forms a circuit for eddy currents which I illustrate in Figs. 1 and 2, and which will be understood from the following explanation.

Let A′ in Fig. 1 represent a cylindrical metallic armature core rotatable between two field poles N, S, upon the shaft A. It will be found that the cylinder will become quite hot, the heat being due to the electricity generated and short circuited, as indicated by the arrows in Fig. 1. In said figure I have shown two arrows in opposite direction on the shaft A to indicate that the two lines of currents generated in opposite sides of the cylinder would equal and therefore oppose each other, thus preventing any current from passing through the shaft. But instead of using a cylinder, as shown in Fig. 1 for purposes of explanation, if I substitute a solid metallic core, said core upon being rotated will be found not to manifest any heat, for the reason that the core being solid it thus forms only one conductor and consequently no electricity can be generated. The two magnets N, S would tend to induce currents in opposite directions as in Fig. 1, but the solid core forming only one conductor, the two lines of currents would meet as in the shaft of Fig. 1. Now, if a hole be bored in any part of the core B, shown in Fig. 2, parallel to the shaft A, as indicated for example by the lines at "*b*" in Fig. 2, it will be found that that portion of the core next the said hole will be warm, due, of course, to locally generated currents.

When the opening "*a*" in the core A′ is equidistant from the periphery as in Fig. 1, the current will be in continuous direction, but when the opening is nearer one side of the core than the other, the currents will alternate in direction as the opening passes each magnet. The opening divides the core into two circuits, the opening also forming an insulation. Bolting an armature together, made of metallic disks, will set up similar currents at each bolt hole. Such detrimental openings which are necessary when constructing large laminated armatures I avoid entirely by my present invention, which I will now proceed to describe.

As shown in Figs. 3, 4, 5 and 6, my improved armature core consists of a shaft A provided with a spool A^2, said spool formed with a body A^3, and with outstanding collars C, C at the ends thereof.

E denotes a winding of wire, as of iron wire, wound upon the body A^3 between the collars C, C.

F denotes pins inserted in the collars C, C, which serve to hold the induction coils in place, which may be connected to either a commutator or rings in the usual manner. I show one convolution of such induction coils at H.

In constructing an armature core in accordance with my present invention, I prefer to cast the spool A^2 upon the shaft A, using cast iron, on account of its cheapness, although the collars C, C may be of separate parts and of distinct material if desired. When the spool A^2 is cast upon the shaft A in this way, the shaft and spool form one solid integral body. After the spool is thus cast upon the shaft it is properly turned up in a lathe and then wound with wire E. I prefer to use in winding, rusted iron wire, although unrusted iron wire may be employed if wound upon the iron spool so as to have good metallic contact therewith. Or iron wire having a suitable covering may be used; but this would make the armature much more expensive and the results would not be so good, from the fact that too much valuable induction space would be taken up by the covering of the wire. The corrosion of the iron wire forms a suitable insulation without other covering, and economizes space. The collars C, C are either slotted or drilled as indicated at "*c*" to receive the pins F.

It is evident that an armature core cast upon the shaft in this manner is especially adapted for large armatures. The cast iron also serves to strengthen the shaft, and when properly cast thereupon, the shaft and the spool become fused together, and any cylindrical opening around the shaft which would divide the cast iron spool into two conductors is thereby entirely prevented.

Of course, the spool A^2 could be first cast and then bored to fit the shaft, and I would have it understood that I contemplate such a construction as coming within the scope of my invention. But such a construction would cause extra labor and expense, in boring the spool, turning the shaft and securing the spool upon the shaft. Moreover a much larger shaft would be required in the latter case than when the spool is cast upon the shaft. So in various ways my invention is calculated and adapted to secure economy of construction together with superior efficiency.

It will be understood that the amount of wire wound upon the spool will vary with different sized armatures; the minimum depth of the spool between the collars being about half an inch in small armatures, and the maximum being about two and a half inches in large armatures.

In Fig. 6 is shown one convolution of one conductor bobbin. It will be understood that the armature bobbin will be wound in all respects similar to the well known Siemen's drum armature, each bobbin of said conductors being wound over the iron wire E parallel with the shaft and crossing the end of the armature near the shaft, and will therefore need no further description.

Having thus described my invention, what I claim as my invention is—

1. The combination with an armature shaft, of an armature core constructed of cast metal and provided with outstanding collars at its ends, said core wound with magnetic wire, substantially as described.

2. The combination with an armature shaft, of an armature core cast thereupon and provided with outstanding collars at its ends, said core wound with magnetic wire, substantially as described.

3. The combination with an armature shaft, of an armature core constructed of cast metal and provided with outstanding collars at its ends, said core wound with magnetic wire, said collars provided with pins to hold said wire, substantially as described.

4. The combination with an armature shaft, of an armature core constructed of cast metal and provided with outstanding collars at its ends, said core wound with magnetic wire, said collars constructed with sockets to receive pins F, substantially as described.

5. The combination with an armature shaft, of an armature core constructed of cast metal and provided with outstanding collars at its ends, and a winding of magnetic wire, said core turned up before the application of said wire thereupon, substantially as described.

6. The combination with a shaft, of an armature core constructed of cast metal and provided with outstanding collars C C, and rusted iron wire E wound upon said core, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

THOMAS H. HICKS.

Witnesses:
N. S. WRIGHT,
JOHN F. MILLER.