(No Model.) 2 Sheets—Sheet 1

R. H. MATHER.

ARMATURE FOR DYNAMO ELECTRIC MACHINES.

No. 377,683. Patented Feb. 7, 1888.

Fig. 1

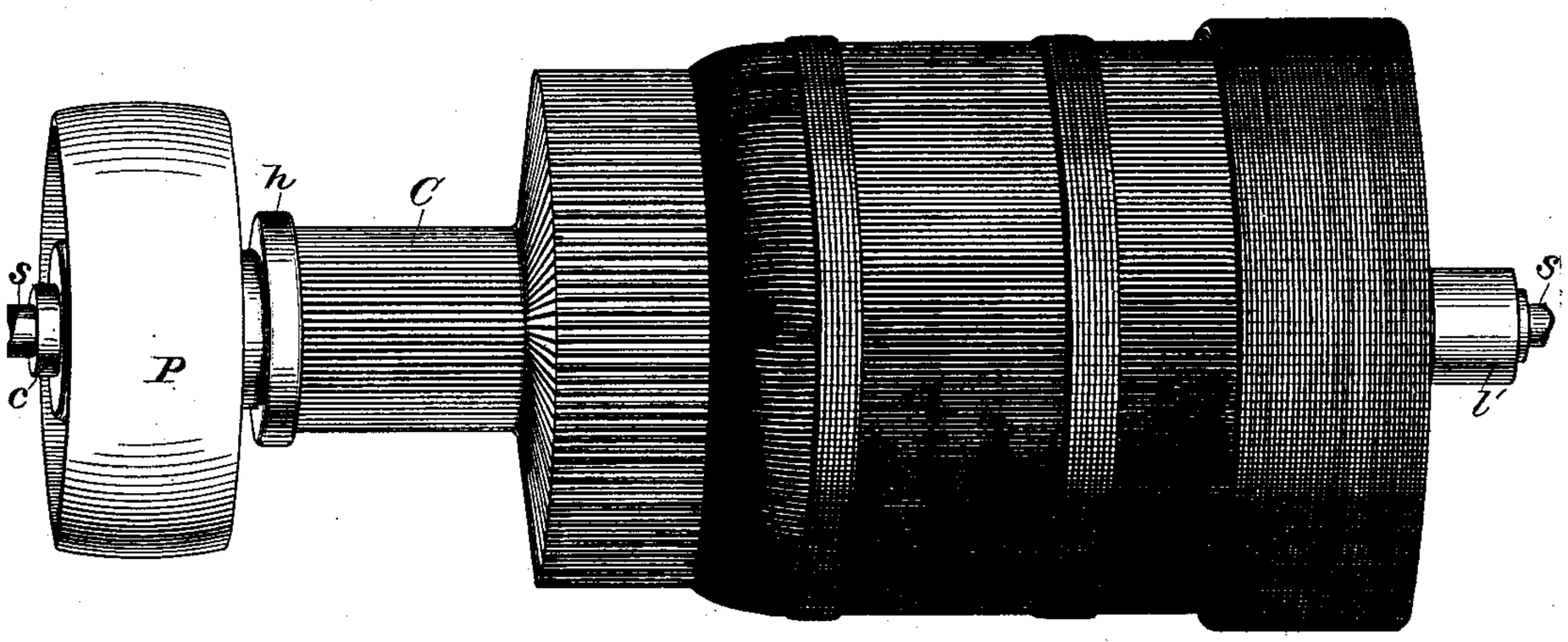


Fig. 2

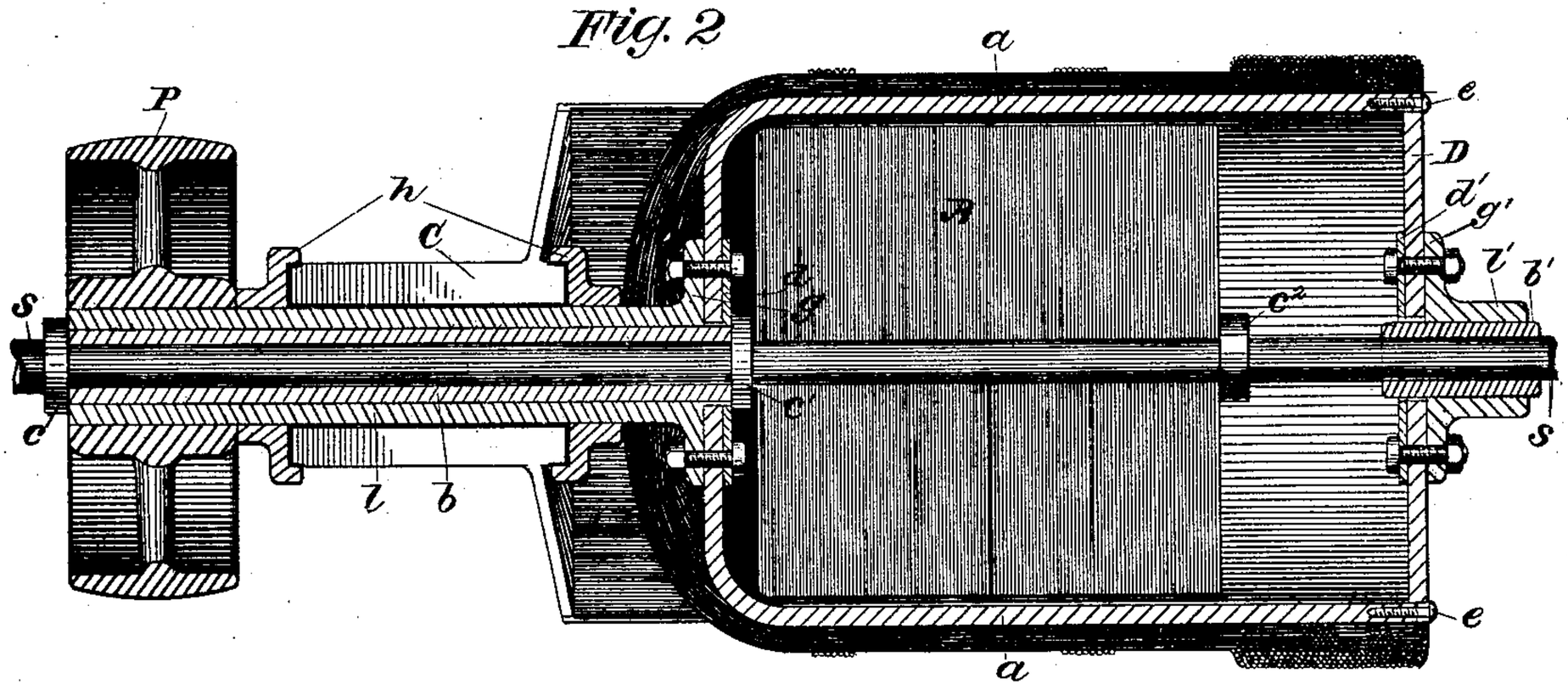
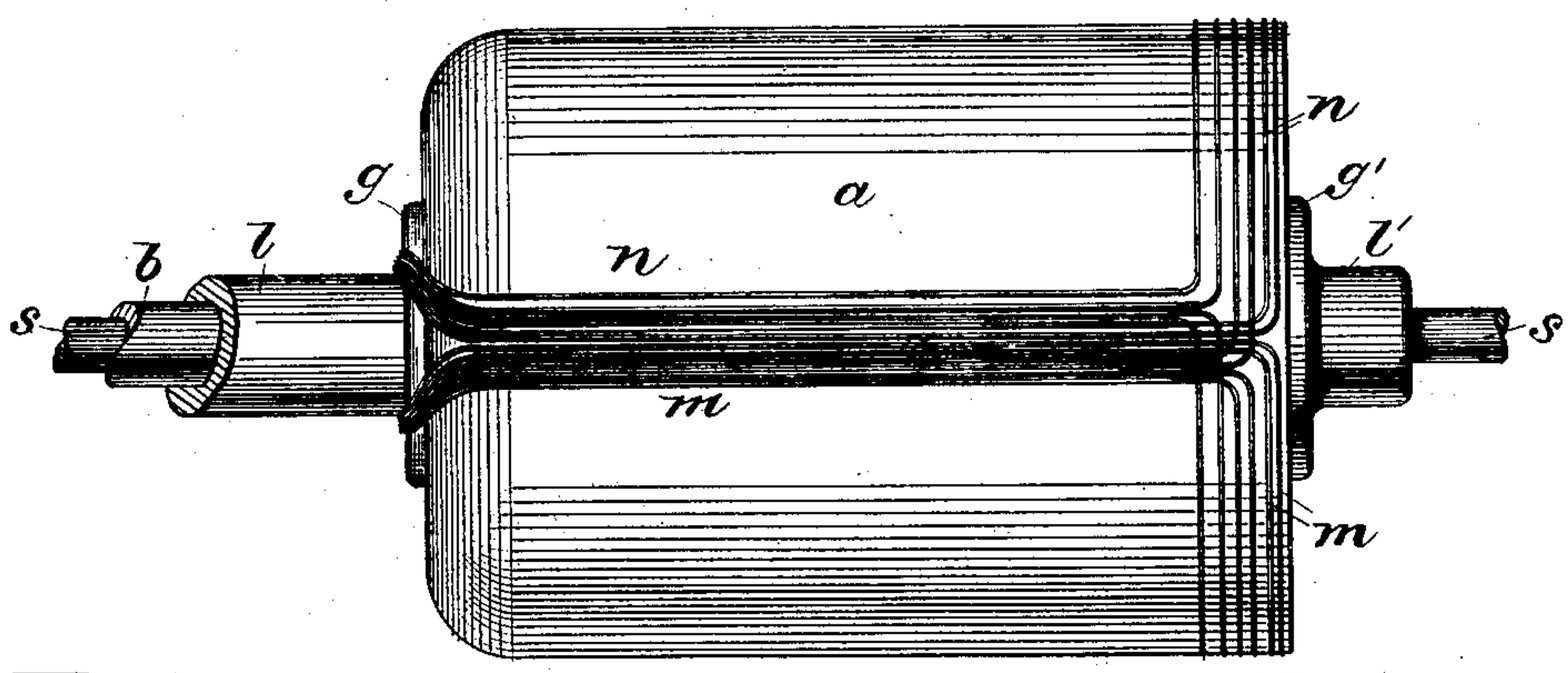


Fig. 3



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(No Model.) 2 Sheets—Sheet 2.

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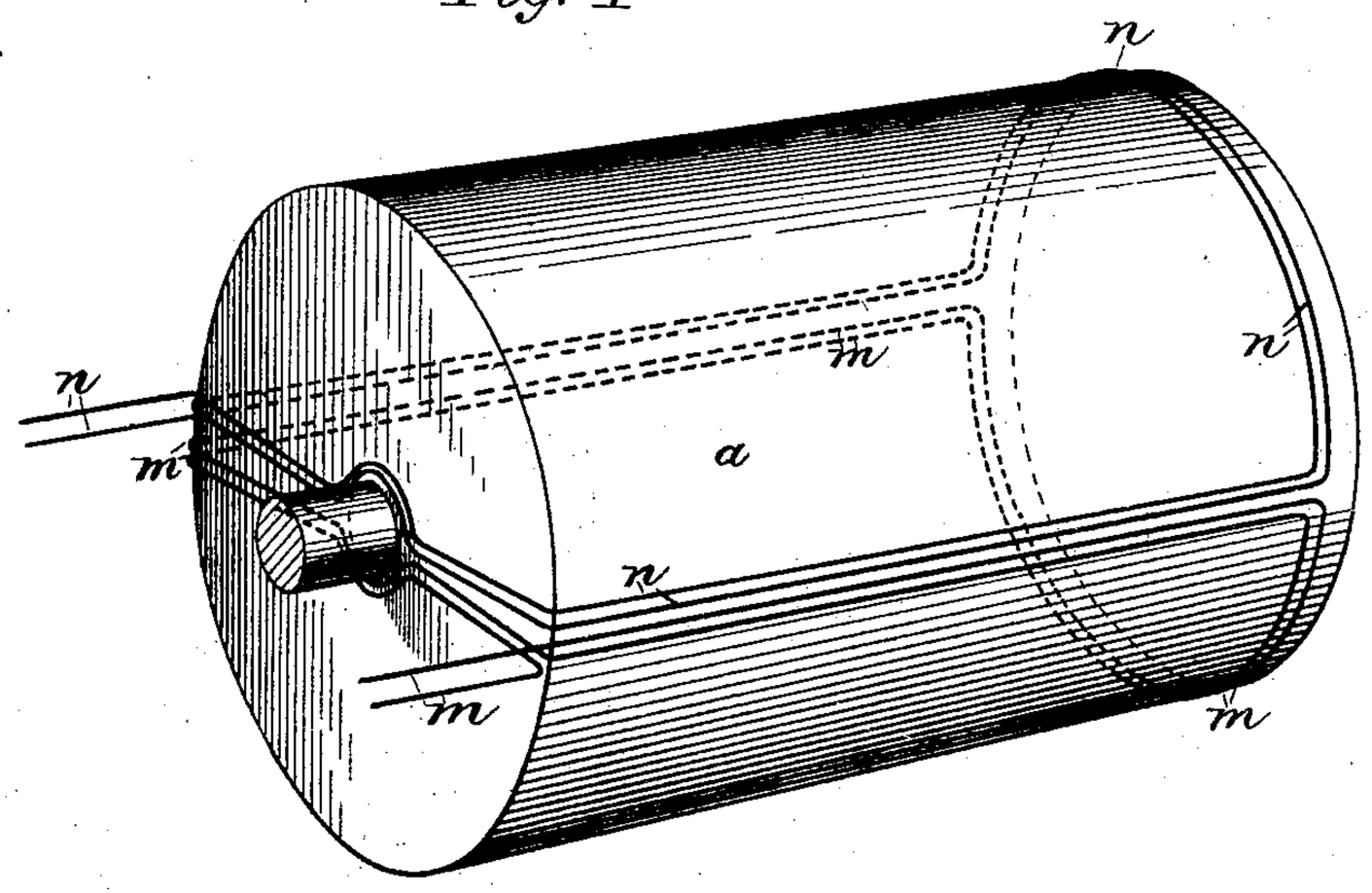
Fig. 4



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UNITED STATES PATENT OFFICE.

RICHARD H. MATHER, OF WINDSOR, CONNECTICUT.

ARMATURE FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 377,683, dated February 7, 1888.

Application filed January 16, 1886. Serial No. 188,723. (No model.)

To all whom it may concern:

Be it known that I, RICHARD H. MATHER, a citizen of the United States, residing at Windsor, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Armatures for Dynamo-Electric Machines, of which the following is a specification.

My invention relates to the form and arrangement of parts in the armature and to the manner of winding the same, and has for its object to prevent heating in the armature-core and to increase the efficiency of the armature. To accomplish these objects I make use of a stationary armature-shaft and a stationary armature-core mounted thereon, in combination with a revolving cylinder or drum, which is formed of non-magnetic and non-conducting material, is wound with the armature-coils in a peculiar manner, is mounted upon said shaft, and contains said armature-core.

I will now proceed to point out the best mode of constructing and applying my invention.

In the accompanying drawings, Figure 1 is a perspective view of my improved armature for dynamo-electric machines with commutator, shaft, and pulley. Fig. 2 is a longitudinal section of the same. Fig. 3 is a side view of the armature partly wound, showing the position of armature-coils. Fig. 4 is a perspective view showing the method of winding.

In the figures, *s* is the armature-shaft, C is the commutator, and P is the pulley.

The commutator, whose segments connect with the armature-coils in any ordinary or convenient manner, needs no description. The armature-coils, instead of being wound directly upon the armature-core, are wound upon a drum, *a*, which is a cylindrical shell of non-magnetic and insulating material, and preferably of paper-pulp, made and pressed in a mold by a process similar to that employed in making paper barrels. At one end this drum is nearly closed, like a thimble, but has there a central opening, where the shaft *s* passes through. At the other end this drum has an end piece or cover. The disk D, which is formed of like material with the drum *a*, is secured to the cylindrical part of the same by suitable screws, *e e*, and has also a central opening where said shaft passes through. The latter has bushings *b* and *b'*, of bronze or other bearing metal, which are snugly fitted and driven into the iron sleeves *l* and *l'*, respectively. In small machines the disk D may be omitted. When used, it has numerous perforations for air-holes. The sleeves *l l'* are provided with flanges *g g'* for ample contact with the ends of the drum.

The annular disks *d* and *d'* in each end of the drum are clamped upon the material of the drum and its cover D, respectively, by means of suitable screws and nuts, as shown in Fig. 2, and thereby the drum and its sleeves *l l'* become a single member of the armature, capable of rotation upon the shaft *s* on the bushings *b b'*. The commutator C is held in position upon the sleeve *l* by suitable flanged collars, *h h*.

The pulley P, which may be placed upon either of the sleeves *l l'*, is mounted thereon in like manner as said commutator, and is held in position by suitable collars, *h* and *c*, as shown in the drawings; but the commutator is more accessible when the pulley and commutator are placed at opposite ends of the armature. Within the drum *a* is the core A, consisting of a number of annular disks or washers of soft iron, which are insulated from each other by painting with asphalt, or otherwise, are fastened side by side upon the shaft, and are held in position by collars *c'* and *c²*. The diameter of the laminated core so constructed is a trifle less than that of the drum, so that the latter may revolve about the core without touching it. By preference the length of the core A is equal to its diameter. The collars *c* and *c'* hold the intermediate parts in position.

The armature-coils are wound upon the drum in the following manner: The system of winding is that of the "Siemens armature," so called, with an important modification. At that end of the drum which is remote from the commutator each armature-coil, instead of passing, as in the Siemens winding, diametrically over or across that end of the armature, turns to one side and passes circumferentially almost half-way around the drum, and then goes back the length of the same in the usual manner. This is illustrated in Figs. 3 and 4, in which it may be seen that one pair of wires, *m*, being so much wire as is connected as one coil to two adjacent segments of the commu-

tator, pursues the following course, viz: Starting at the appropriate segment of the commutator C, the wire *m* first traverses the near side of drum lengthwise, then turns downward at a right angle to its former course and passes peripherally around to the opposite side of the drum, then, turning again at right angles, returns lengthwise of the drum to that end of the latter which is nearest the commutator, then crosses the end of the drum last mentioned diametrically in the usual manner, with a divergence about the shaft to the point of starting, then repeats the course just described, and then connects with the next segment of the commutator. The next pair of wires, *n*, being so much wire as is connected as one coil to two adjacent segments of the commutator, starting at a point on the opposite side of the drum at the appropriate segment of the commutator, first traverses the drum lengthwise, then turns upward at a right angle and passes over to the opposite side of the drum, then, turning again at a right angle, returns lengthwise of the drum to that end of the latter which is nearest the commutator, then crosses the end of the drum last mentioned almost diametrically in the usual manner to the point of starting, then repeats the course just described, and then connects with the adjacent segment of the commutator, and so on, the remaining armature-coils being wound alternately, as just described, and as illustrated in Fig. 3.

Such being the construction of my improved armature, its mode of operation is as follows: The drum *a*, with coils, as described, the commutator C, the pulley P, and sleeves *l l'* revolve upon the shaft *s*, while the latter, together with the core A, is stationary. This construction presents the ordinary advantages of an armature having a stationary core, while the non-conducting character of the drum *a* prevents that from heating. At the same time all parts of the armature are accessible for inspection and repair. In case the insulation of the armature-coils should fail, the drum may be removed and a new one put in its place in a very short time. In short, the entire armature may be conveniently taken apart whenever that is necessary.

By reason of the non-conducting character of the drum *a* there is no danger that electricity will escape from the coils to the core of my improved armature; hence the latter is particularly adapted to be used in dynamos of high electro-motive force.

I claim as my invention and desire to secure by Letters Patent—

1. A cylindrical armature-drum traversed longitudinally by conductors which pass circumferentially from side to side of said drum at one end of the same and diametrically across the other end of the same, substantially as and for the purpose specified.

2. A hollow cylindrical non-magnetic and insulating armature-drum open at one end or closed by a removable cover and containing a stationary core mounted upon the same shaft, substantially in the manner and for the purpose specified.

3. A cylindrical armature-drum of non-magnetic and insulating material open at one end or closed by a removable cover and traversed longitudinally by conductors which pass circumferentially from side to side of such drum, in combination with a stationary core contained in said drum and mounted upon the same shaft, substantially in the manner and for the purpose specified.

In witness whereof I hereunto set my hand in the presence of two witnesses.

RICHARD H. MATHER.

Witnesses:
WILLARD EDDY,
WM. H. SHELDON.