(No Model.)

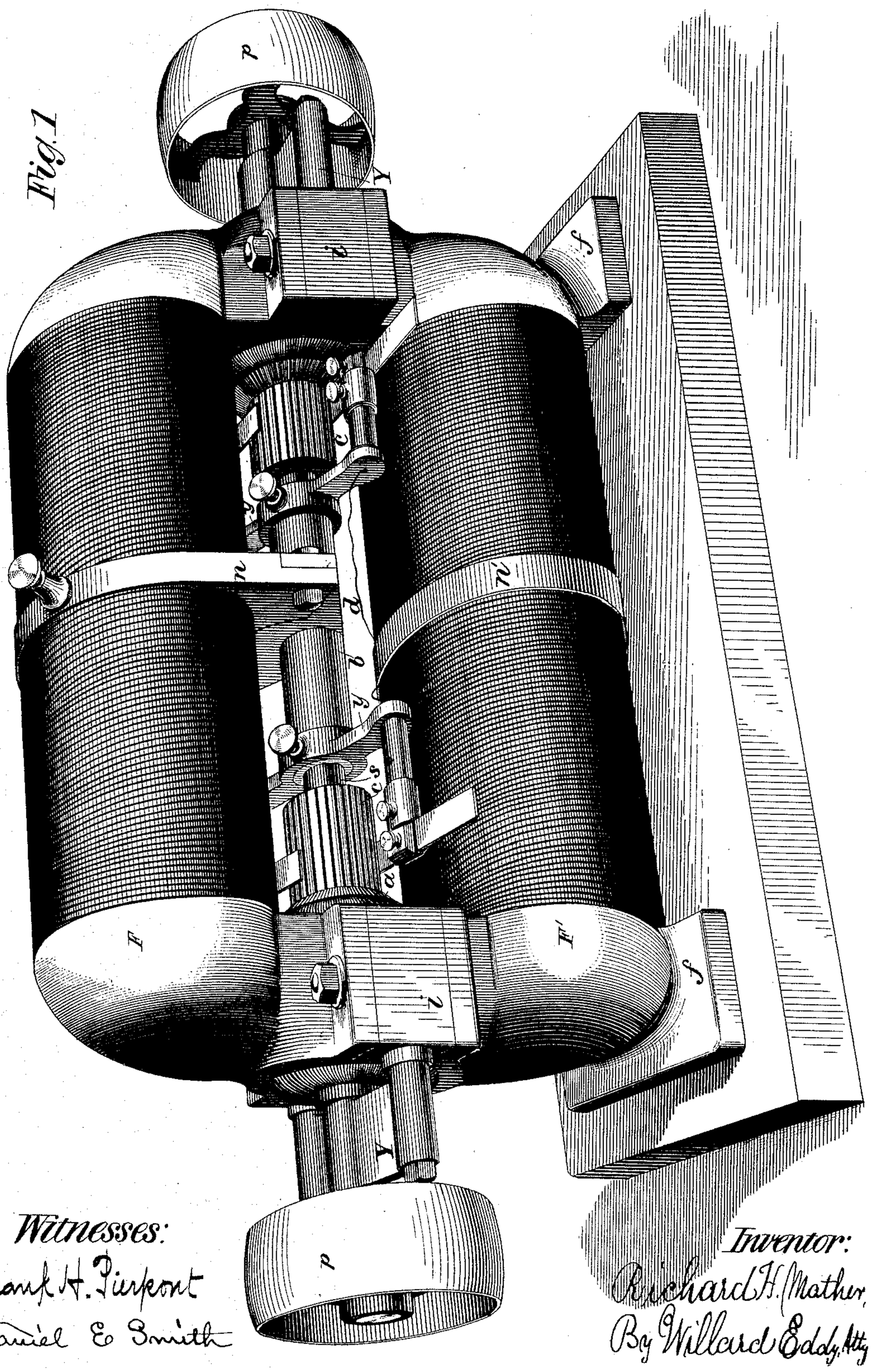
4 Sheets—Sheet 1.

R. H. MATHER.

DYNAMO ELECTRIC MACHINE.

No. 353,151. Patented Nov. 23, 1886.

Fig. 1



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(No Model.) 4 Sheets—Sheet 2.

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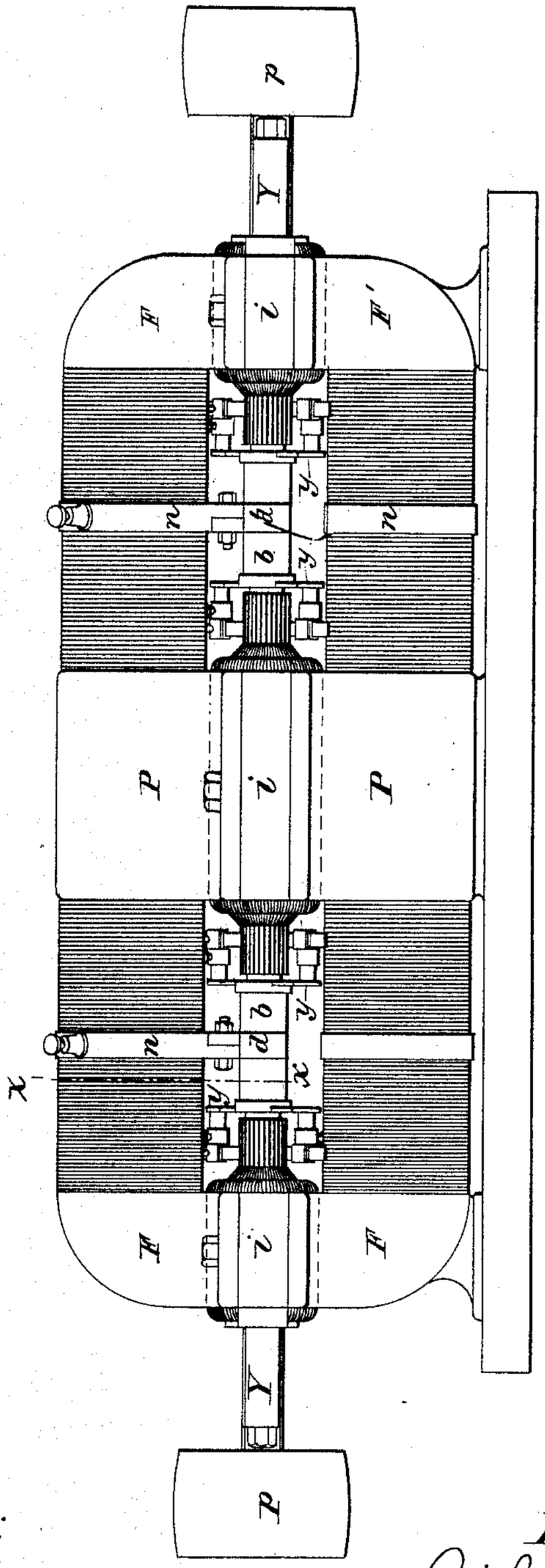

Fig. 2

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Fig. 4

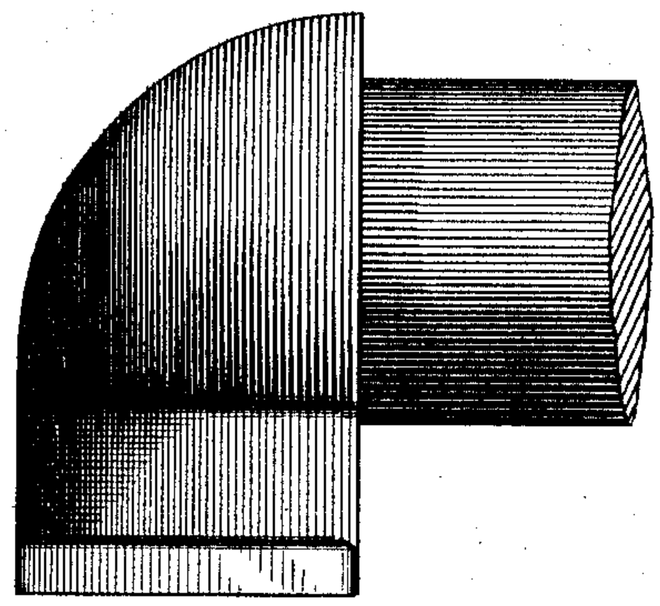

Fig. 5

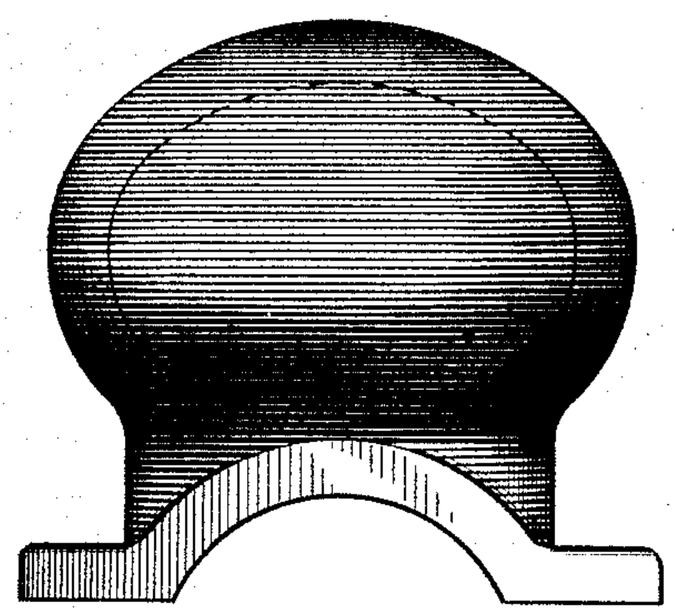

Fig. 3

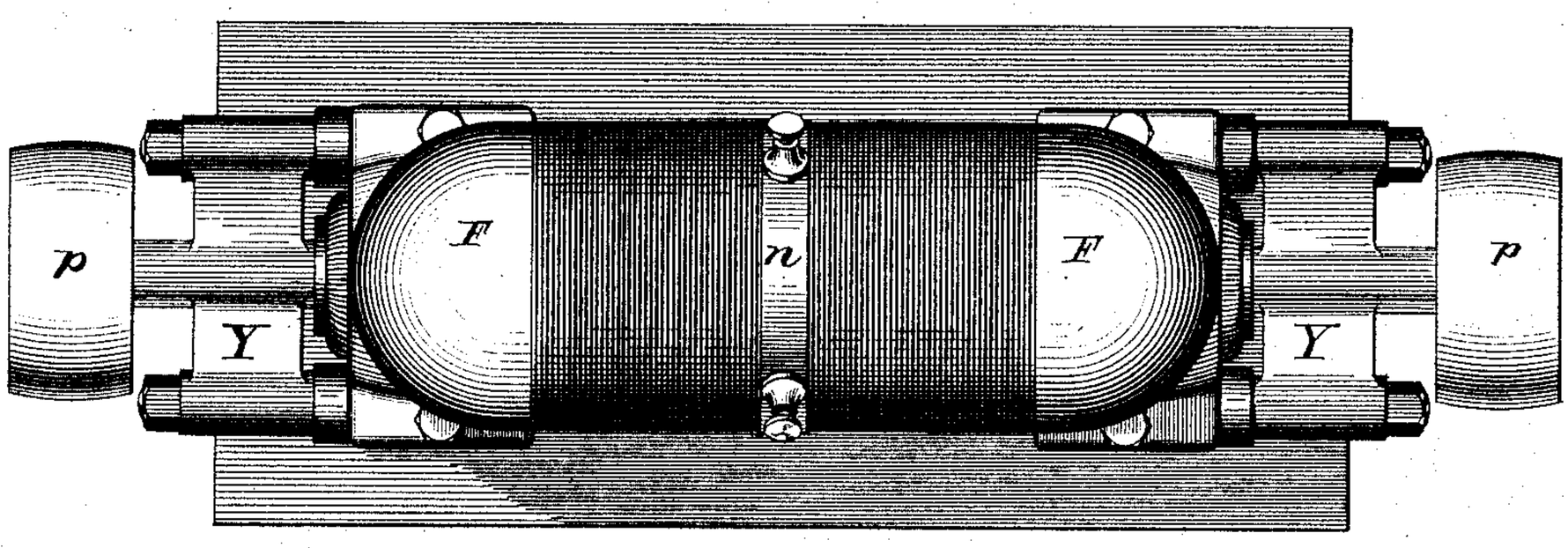

Fig. 6

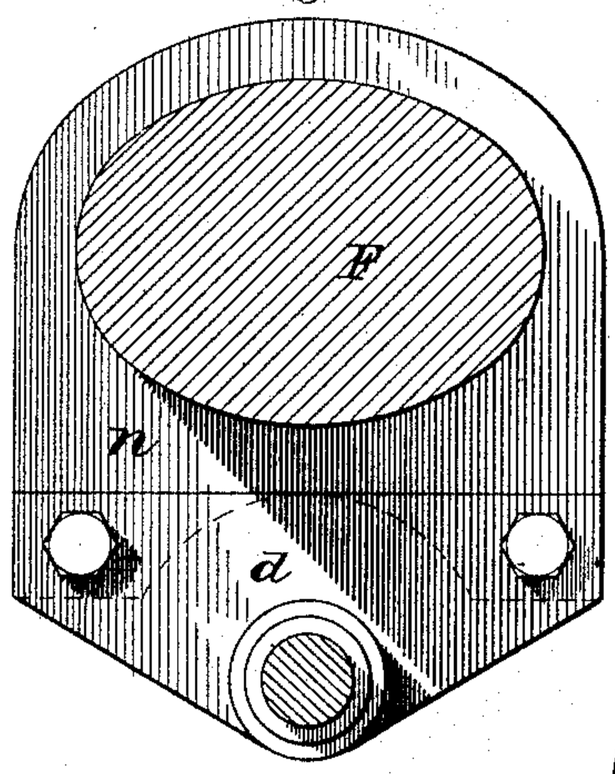

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Fig. 7

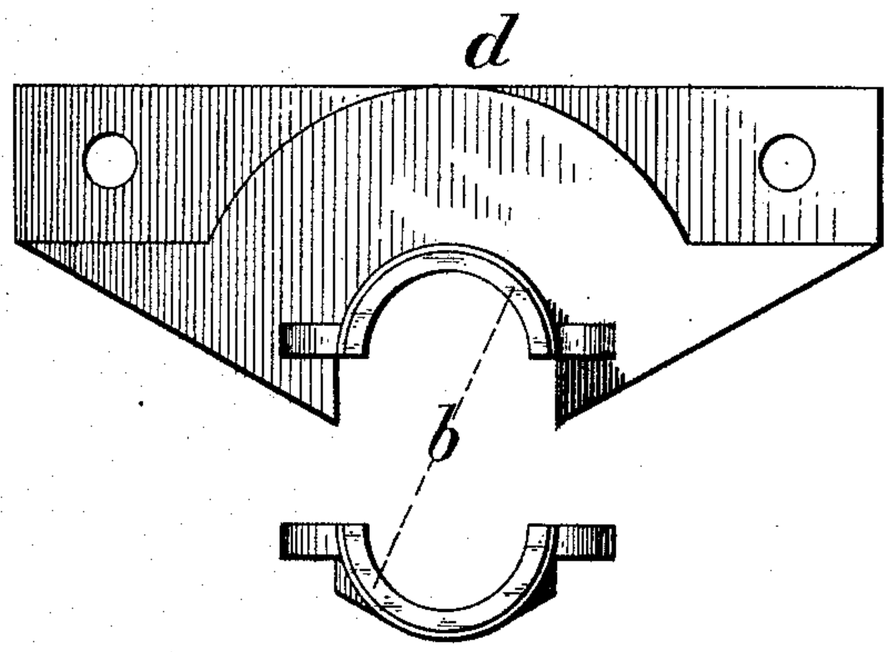
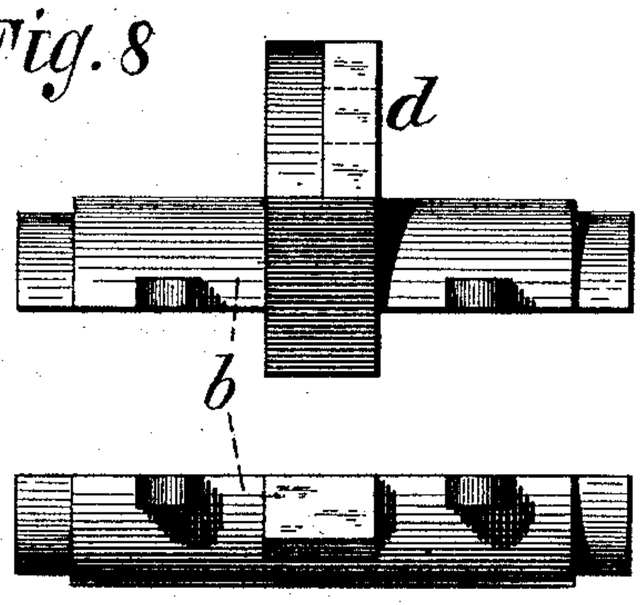


Fig. 8



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UNITED STATES PATENT OFFICE.

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DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 353,151, dated November 23, 1886.

Application filed January 2, 1886. Serial No. 187,338. (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 Dynamo-Electric Machines, of which the following is my specification.

In general my invention relates to the form and arrangement of parts in a dynamo-electric machine, whether motor or generator, and has for its object to promote simplicity, cheapness, and efficiency in such machines.

More particularly my invention relates to that class of dynamos in which a single magnetic circuit is utilized for the production of two or more fields of force, in each of which revolves one of a series of armatures which are located collectively upon a single shaft; and the object of my invention, more particularly stated, is so to arrange the parts of a dynamo-electric machine of that description as to combine the greatest simplicity and cheapness of construction with the highest efficiency and convenience of operation. To accomplish these objects I make use of a field-magnet consisting of two like and parallel segments, whose adjacent ends or pole-pieces are turned toward each other in pairs in the act of embracing two separate armatures, which are located collectively upon a single armature-shaft, which is parallel to the longitudinal axis of each of said segments.

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

In the accompanying drawings, Figure 1 is a perspective view of a dynamo-electric machine embodying my invention. Fig. 2 is an outline front view of the same in a modified and extended form. Fig. 3 is a plan view of the same machine which is shown in Fig. 1. Figs. 4, 5, 6, 7, and 8 are details.

In the drawings, F F′ is the field-magnet, which consists of two segments, F and F′. Each of said segments is of the general form of a cylinder, whose ends are bent over as pole-pieces toward the like ends of the other of said segments. These segments are conveniently arranged one above the other and parallel. The cylindrical part of each segment is wound as an electro-magnet in the usual manner, so that the pole-pieces at each end of the machine shall be of unlike polarity. Fig. 4 is a front view of a portion of the upper segment, F, not wound, and Fig. 5 is an end view of the same. These two figures exhibit the relative size and shape of said pole-piece and the cylindrical portions of the core of segment F.

The pole-pieces, which are all alike, present a cheek or shoulder, which prevents the wire of the field-magnet from slipping off its cylindrical core. Each pole piece also expands laterally in such a manner as to embrace a portion of an armature, and to form a firm contact with the contiguous insulating-blocks hereinafter mentioned.

Midway of the length of each field-magnet core is a projecting ring or annular cheek, *n* and *n′*, which also serves to hold said wire in place. The annular ring *n* of the segment F extends downward, so as to afford convenient support for the apron *d*, which is to be hereinafter described. The lower segment, F′, is provided with feet *f f*, of any convenient size and shape, for the support of the machine. The iron core, annular ring, and pole-pieces of each segment are a single iron casting, and both said segments are of one pattern.

Between each pair of adjacent pole-pieces and on each side of the armature is a block of brass or other non-magnetic material, *i*, which separates and insulates such pole-pieces from each other. To these blocks the contiguous pole-pieces are bolted, and so the segments of the field-magnet and the insulating-blocks bolted together form the frame of the machine. To these blocks the yokes *y y*, with bearings for the armature-shaft, are also bolted, one at each end of the machine. Through these two yokes, from end to end of the machine and parallel to the longitudinal axis of each of said segments, runs the armature-shaft *s*, at each end of which is a pulley, *p*, so that the machine can be run with a double belt. Upon this shaft are the two armatures *a a*, which are of any ordinary construction, and are located one between each pair of terminal pole-pieces aforesaid. Between said armatures and upon the same shaft are their respective commutators *c c*. Said annular cheek *n*, extending downward, as above described, is provided with a

metallic apron or plate, *d*, which is firmly bolted to said cheek *n*, and is provided on each side with a sleeve or collar, *b*. This sleeve or collar may be formed in a single piece, as shown in Fig. 1, or may, for convenience of construction, be formed like a split tube in two semi-cylindrical segments fastened together with screws. These segments are shown separately in Figs. 7 and 8. Collar *b*, being of greater diameter than shaft *s*, is preferably free from all contact therewith, as shown in Fig. 6. This collar furnishes a base, to which are attached the yokes *y y*, which support the commutator-brushes. This collar may also support a regulator for the machine when a regulator is used.

The armature-coils and field-magnet coils of this machine are ordinarily connected in series, but may be connected in any desired manner.

Such being the construction of my improved dynamo, its mode of operation is such as to produce a continuous magnetic circuit through both armatures and both segments of the field-magnet.

The modification shown in Fig. 2 is in effect a double machine consisting of two dynamos of the kind just described combined in one in such a manner that one pair of terminal poles or pole-pieces of each single dynamo entering into the combination is cast solid with one pair of poles or pole-pieces of the other dynamo in said combination. Fig. 6 is a sectional view on the line *x x* in Fig. 2. This construction admits of massive pole-pieces P P midway of the length of the machine and consequent poles of opposite polarity having an additional armature of correspondingly-increased length between them. This construction results in two magnetic circuits, each of which is complete through the central armature, the adjacent poles of the field-magnet, one of the remaining armatures with the poles or pole-pieces which embrace it, and the intermediate portions of the field-magnet.

My improved dynamo with armature-coils in series presents this advantage over other dynamos, namely: Although in other dynamos the insulation of the armature-coils commonly breaks down when the electro-motive force exceeds three thousand volts, yet in this machine the electro-motive force may readily be raised to about that limit in each armature, and hence the total electro-motive force generated by the machine and utilized in a single working-circuit may be practically multiplied by two or more, according to the number of armatures which are so connected in series; but since there are as many independent sources of electrical supply as there are armatures the former can be used independently. For example, an arc-light circuit can be operated from one armature and an incandescent-light circuit from the other armature at one and the same time; or the armatures can be wound to run arc lamps of different sizes.

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

1. A dynamo-electric machine having a field-magnet consisting of two segments whose ends, being turned toward each other in pairs, embrace two armatures, the latter being located upon a single shaft which is parallel to the longitudinal axes of said segments, and is provided with a sleeve or collar which is attached to one of said segments, substantially in the manner and for the purpose specified.

2. In a dynamo-electric machine, a metallic plate or apron which is rigidly attached to the middle part of a segment of the field-magnet and supports the yokes to which the brushes of such machine are attached, substantially as set forth.

3. In a dynamo-electric machine, a field-magnet consisting of two like parallel segments provided with like pole-pieces, which are turned toward each other in pairs, and are bolted together upon intermediate blocks of brass or other insulating material, in combination with two separate armatures, both of which are mounted upon a single shaft parallel to the longitudinal axes of said segments, and each of which is supported between a pair of said pole-pieces, and also between a pair of said insulating-blocks by means of suitable yokes which are firmly attached to said insulating-blocks, substantially in the manner and for the purpose specified.

4. In a dynamo-electric machine, two armatures and two commutators upon a single shaft, in combination with an intermediate sleeve or collar which is fixed in an immovable position about said shaft, and serves as a support for two brush-holding yokes, substantially in the manner and for the purpose specified.

5. In a dynamo electric machine, an armature-shaft carrying two armatures and commutators, in combination with two brush-yokes which are mounted upon an immovable sleeve surrounding said shaft between said commutators, substantially in the manner and for the purpose specified.

6. In a dynamo-electric machine, a metallic plate or apron which is rigidly attached to the field-magnet and holds in an immovable position upon the armature-shaft a sleeve or collar, to which the brush-yokes of such machine are attached, substantially in the manner and for the purpose specified.

7. A sleeve or collar which is formed in two longitudinal segments, and is fixed between two commutators in an immovable position upon the armature-shaft of a dynamo-electric machine, substantially in the manner and for the purpose specified.

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