No. 753,429. PATENTED MAR. 1, 1904.

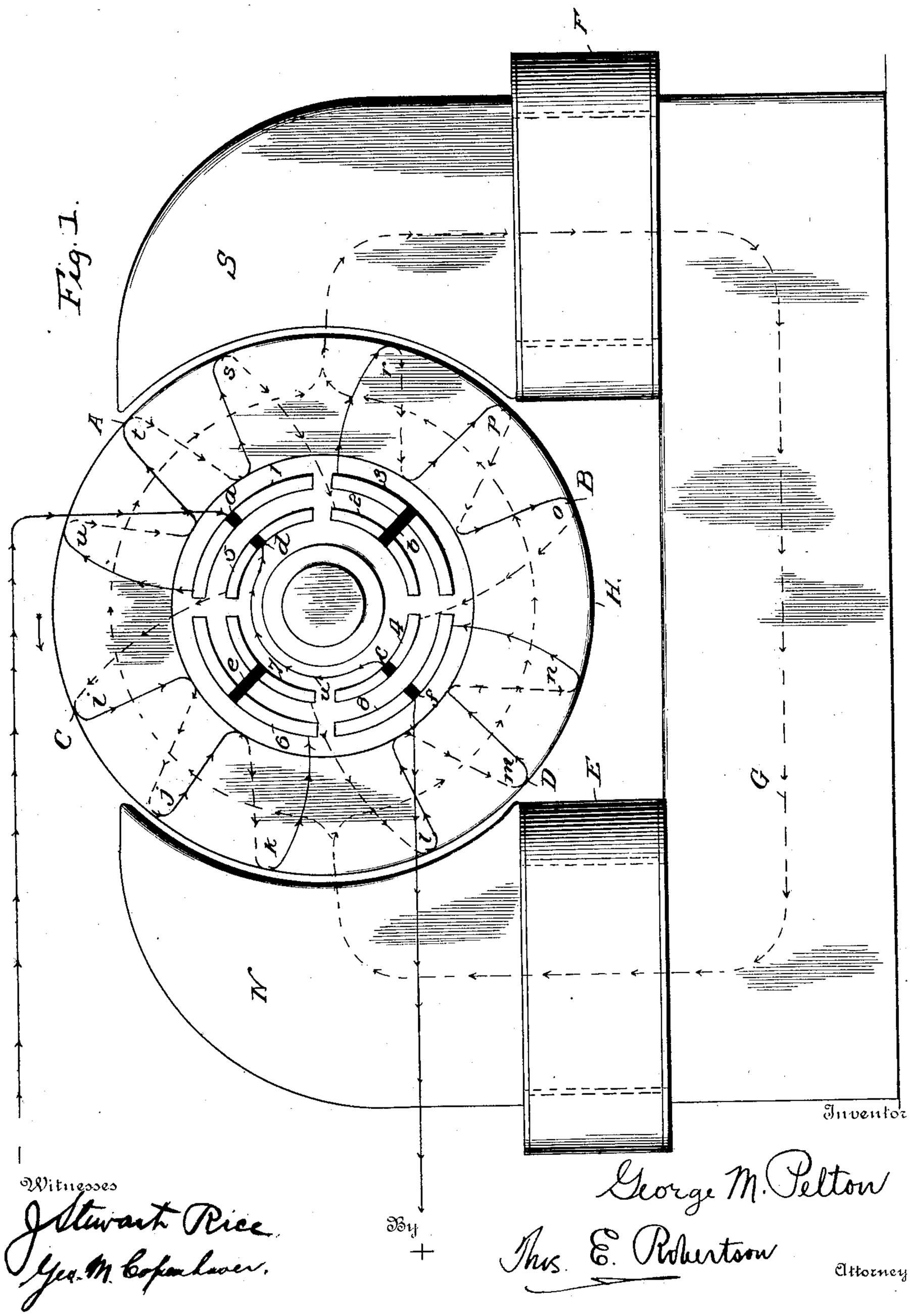
G. M. PELTON.

ELECTRODYNAMIC GENERATOR.

APPLICATION FILED SEPT. 29, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

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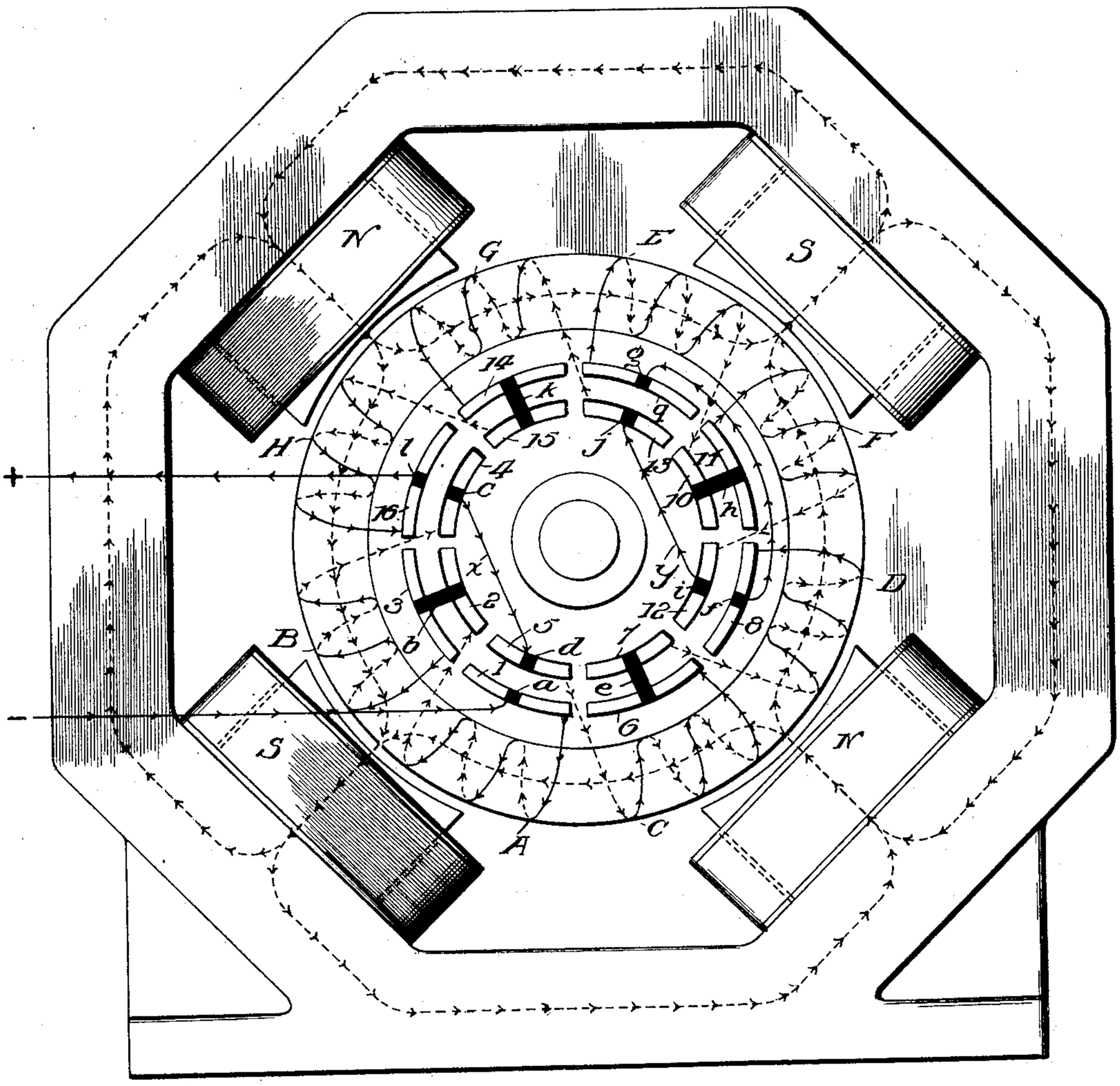
NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.

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APPLICATION FILED SEPT. 29, 1902.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3.

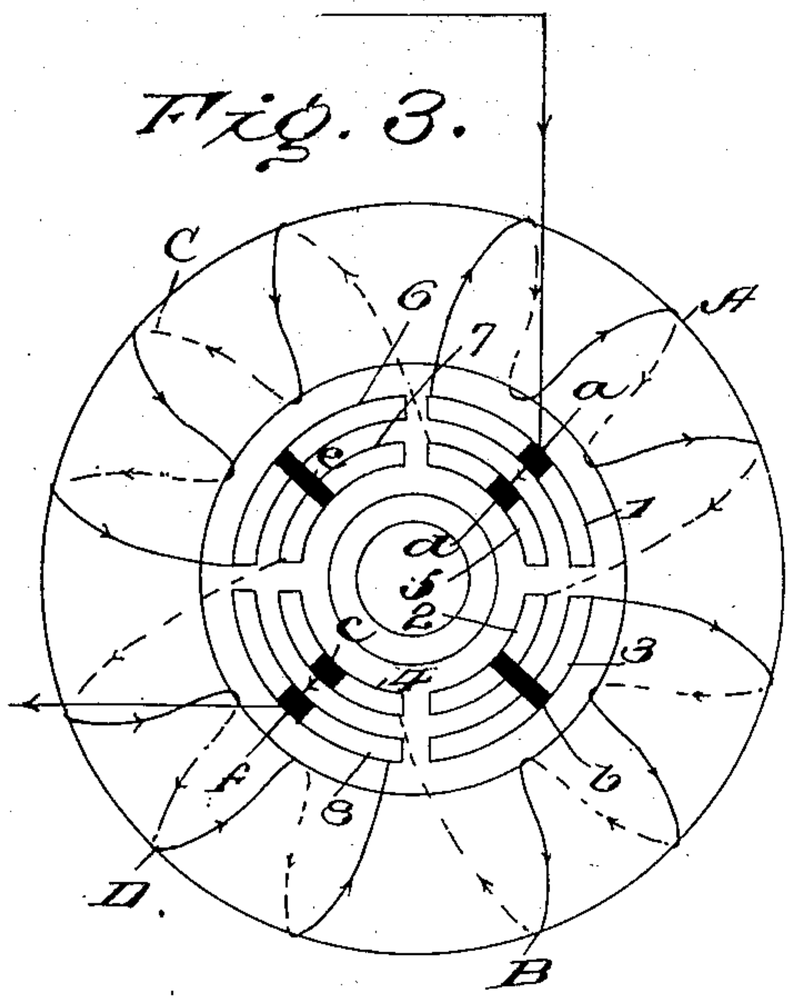



Fig. 5.

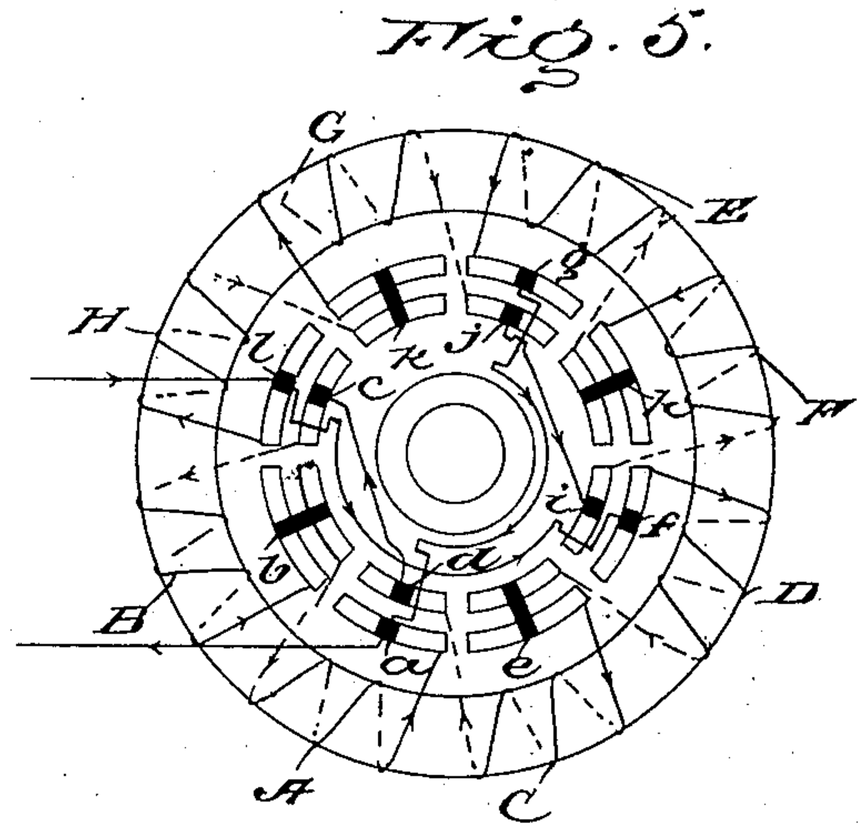



Fig. 4.

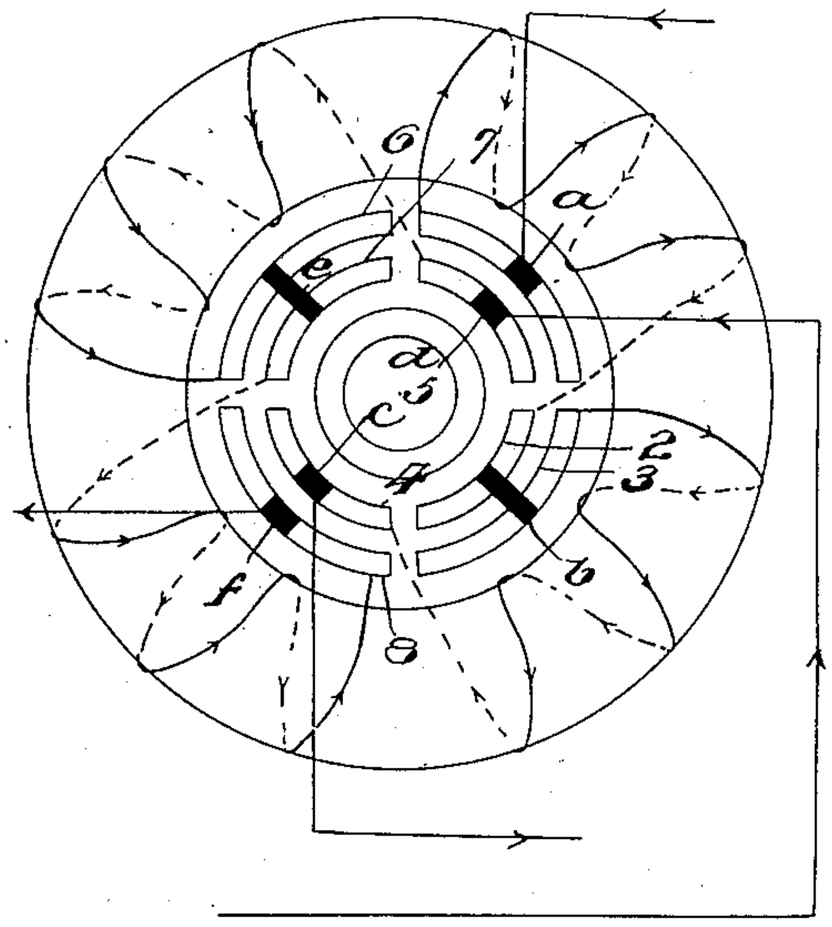
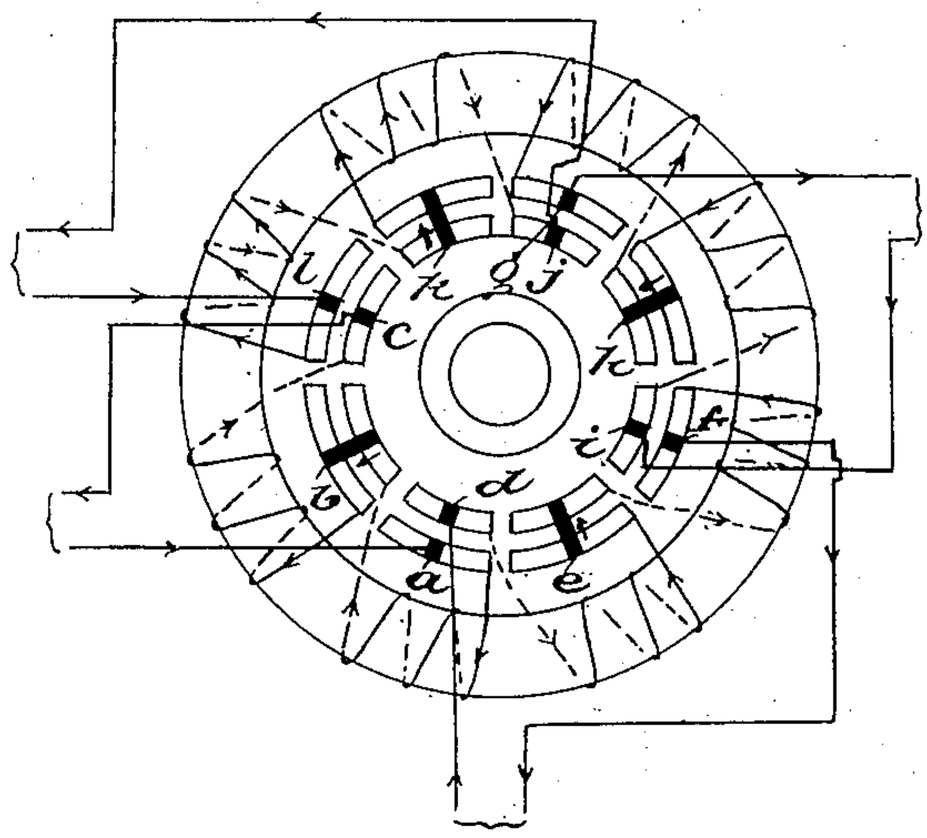



Fig. 6.

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# UNITED STATES PATENT OFFICE.

GEORGE M. PELTON, OF CHAGRIN FALLS, OHIO.

## ELECTRODYNAMIC GENERATOR.

SPECIFICATION forming part of Letters Patent No. 753,429, dated March 1, 1904.

Application filed September 29, 1902. Serial No. 125,289. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE M. PELTON, a citizen of the United States of America, and a resident of Chagrin Falls, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Electrodynamic Generators, of which the following is a specification.

My invention relates to dynamo-electric machines, and has for its object to provide a direct-current generator of the bipolar or multipolar type, with an armature and commutating device so arranged that the machine may be readily converted from a series-wound high-tension generator into one of relatively low voltage and high amperage, and vice versa, or that the generator may be employed to supply two or more separate external circuits with a corresponding reduced voltage and amperage, special provision being made in each case to maintain the output at a uniform maximum.

To these ends the invention comprises a generator having two or more poles, an armature having a number of coils, preferably a multiple of the number of poles, two sets of commutator-segments, each set corresponding in number to the coils, and brushes engaging the commutators and so related that all of the coils may be connected in series, or any number of said coils may be connected in parallel, or any specific number thereof may be connected to separate external circuits to divide and distribute the output among said separate circuits.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a conventional representation of a bipolar generator with the armature-coils connected in series. Fig. 2 is a corresponding representation of a four-pole generator. Fig. 3 is a diagram of the armature of Fig. 1 with a multiple or parallel connection of the coils. Fig. 4 is a like view showing connections for two external circuits. Fig. 5 represents the armature of the machine shown in Fig. 2 with a a parallel connection of coils. Fig. 6 is a like view showing the armature supplying four external circuits.

Referring to Fig. 1 of the drawings, reference characters N and S, respectively, indicate the north pole and the south pole of a bipolar dynamo provided with exciting-coils E and F of the usual type. Within the field thus formed is mounted the armature, which is wound with four coils A, B, C, and D. Upon the armature-shaft and preferably arranged side by side are two commutators, each comprising segments equal in number to the coils, one set being designated by the numerals 1, 3, 6, and 8 and the other by the numerals 2, 4, 5, and 7. Coil A is connected at one end to segment 1 in the first commutator and at the other end to segment 2 in the second commutator. Coil B is connected by its respective ends to segments 3 and 4, coil C to segments 5 and 6, and coil D to segments 7 and 8. Disposed at an angle of one hundred and eighty degrees from each other are two brushes *b* and *e*, which connect adjacent segments of the respective commutators. Disposed between brushes *b* and *e* and engaging only the corresponding segments of the separate commutators are brushes *a* and *f*, which are connected to the external circuit, and brushes *c* and *d*, belonging to the other commutator and which are joined together by cross-connector *u*. Under the conditions described the several coils A, B, C, and D are in series and are adapted to supply a current at a maximum voltage to the external circuit. With the armature in the position indicated in Fig. 1 the circuit may be traced as follows: Beginning at the negative (—) lead connected to brush *a* the current flows to segment 1, coil A, segment 2, through brush *b*, which connects segments 2 and 3 into said segment 3, thence through coil B to segment 4, to brush *c*, cross-connector *u* to brush *d* and segment 5, to coil C, segment 6, brush *e* to segment 7, coil *d* to segment 8, and by way of brush *f* to the positive (+) lead, completing the circuit. As the coils A, B, C, and D are thus connected in series for all positions of the armature and the same number of lines of force are being cut at all times by the same number of turns of the coils, considered in the aggregate, it follows that the potential difference at the terminals is practically constant. For example, when the armature turns

in the direction of the arrow one-eighth of a revolution coils C and B will be in position of maximum effect—*i. e*, cutting all of the lines of force—and coils A and D will occupy the neutral position, generating no current. Another one-eighth of a revolution brings one-half of each of the coils into action, thereby cutting the same number of lines of force as in the first instance. An additional one-eighth revolution brings coils A and D into position of maximum effect and coils C and B into the neutral zone ready to reverse and be connected in series with A and D. It will thus be seen that the number of lines of force cut by the armature at any instant is constant and that the voltage is maintained at a maximum for all positions of the armature during the revolution thereof. In order to connect coils A and B in parallel or multiple relation with coils C and D, it is only necessary to break the connection *u* between brushes *c* and *d* and establish connection between brushes *f* and *c* and brushes *a* and *d*, as shown in Fig. 3, thereby diminishing the voltage at the terminals by one-half and increasing the amperage on the line twofold. Again, it is to be noted that by connecting a second external circuit to brushes *c* and *d* two working circuits each of the normal voltage with half the normal amperage may be derived from the generator, as indicated in Fig. 4.

Fig. 2 shows a four-pole generator with armature-coils in series. In this arrangement the number of coils is eight, each connected to appropriate segments of the two commutators, which are engaged by twelve brushes in such relation that the follow-circuit maintains: from the negative (—) lead to brush *a*, to segment 1, through coil A, to segment 2, brush *b*, segment 3, coil B, segment 4, brush *c*, cross connection *x*, brush *d*, segment 5, coil C, segment 6, brush *e*, segment 7, coil D, segment 8, brush *f*, connection *z*, brush *g*, segment 9, coil E, segment 10, brush *h*, segment 11, coil F, segment 12, brush *i*, cross connection *y*, brush *j*, segment 13, coil G, segment 14, brush *k*, segment 15, coil H, segment 16, brush *l*, to the positive (+) lead, which completes the circuit. By breaking the connection *z* between brushes *f* and *g* and establishing connections between brushes *f* and *l* and brushes *a* and *g* in the manner shown in Fig. 5 coils E F G H may be connected in parallel or multiple with coils A B C D. It will also be seen on reference to Fig. 6 that by connecting brushes *g* and *f* to a second external circuit, the generator will be adapted for operating two separate circuits, and correspondingly four separate circuits may be derived by connecting a third and a fourth working circuit to brushes *c* and *d* and *j* and *i*, respectively.

It is to be observed that by following the lines indicated a generator may be provided having any number of poles and coils, and with two simple commutators, each provided with a segment for each coil, any desired voltage or amperage may be developed or any desired number of working circuits may be derived without dismantling the machine or permanently altering the armature connections.

What I claim as new is—

1. In a dynamo-electric machine, the combination of a plurality of armature-coils, two commutators each consisting of segments equal in number to said coils, and connections between said coils and said commutators, whereby said coils may be established in series or in multiple relation.

2. In a dynamo-electric machine, the combination of a plurality of armature-coils, two commutators each consisting of segments equal in number to said coils, a plurality of brushes engaging said commutators, and adjustable connections between certain brushes of the respective commutators, whereby said coils may be established in series or in multiple relation.

3. In a dynamo-electric machine, the combination of a plurality of armature-coils, two commutators, each consisting of segments equal in number to said coils, means for establishing a series connection between said coils, means for connecting said coils in multiple and means for connecting certain of said coils to separate working circuits, whereby the output of said machine may be regulated as to voltage and amperage in a single working circuit or in a plurality of such circuits.

Signed by me at Chagrin Falls, Ohio, this 23d day of September, 1902.

GEORGE M. PELTON.

Witnesses:
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