(No Model.) 2 Sheets—Sheet 1.

C. S. BRADLEY.

DYNAMO ELECTRIC MACHINE OR MOTOR.

No. 503,574. Patented Aug. 22, 1893.

Fig. 1.

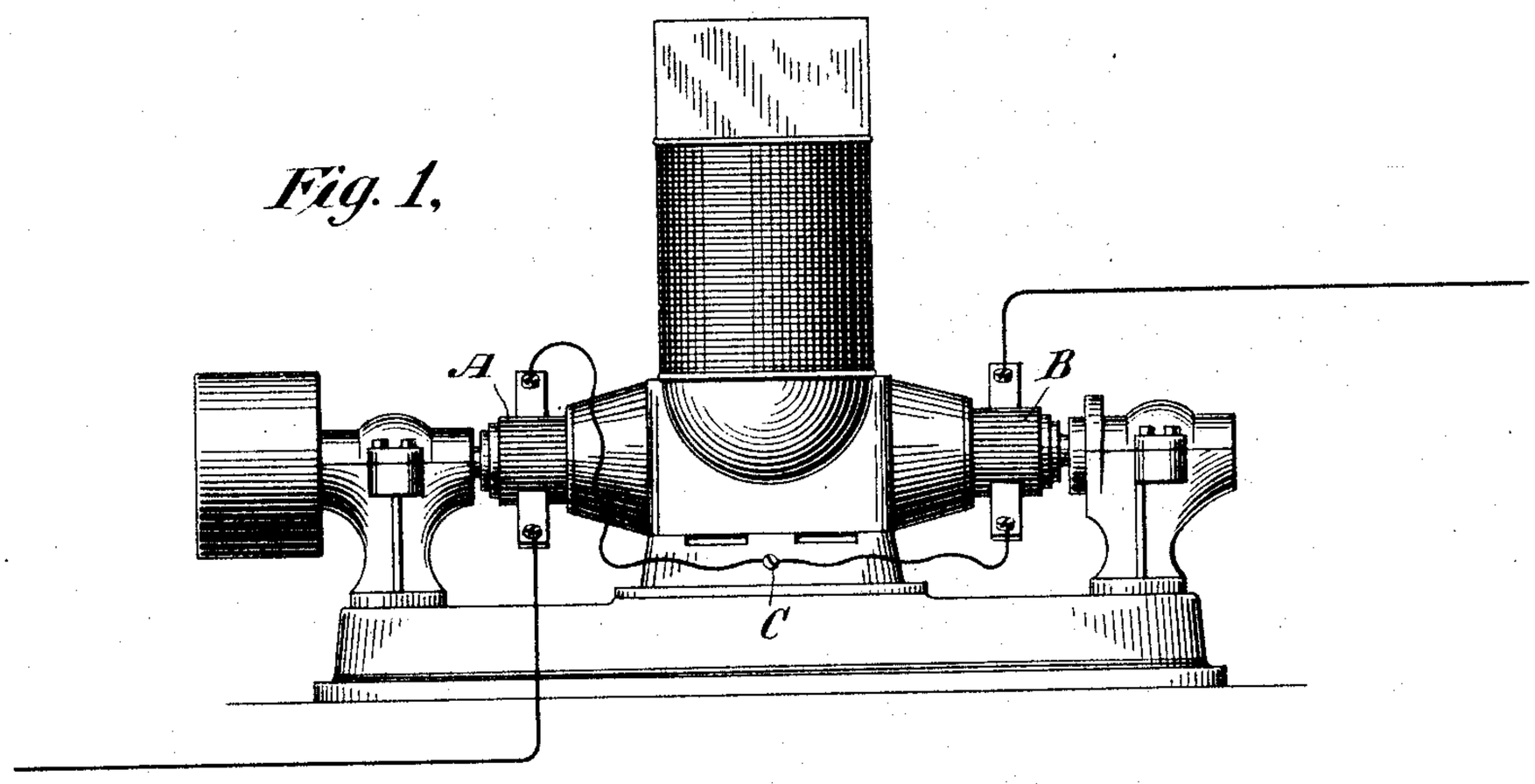


Fig. 2.

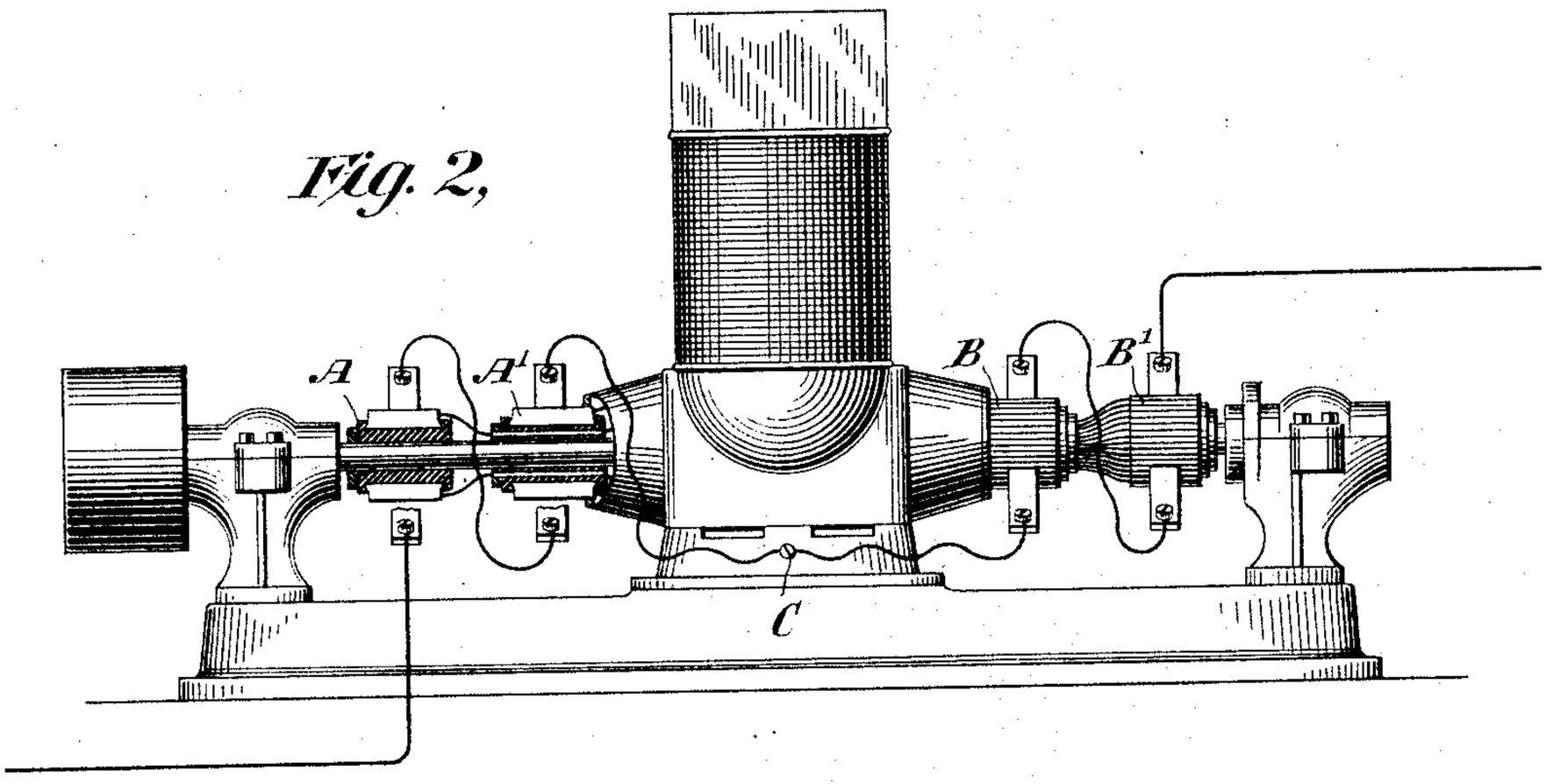
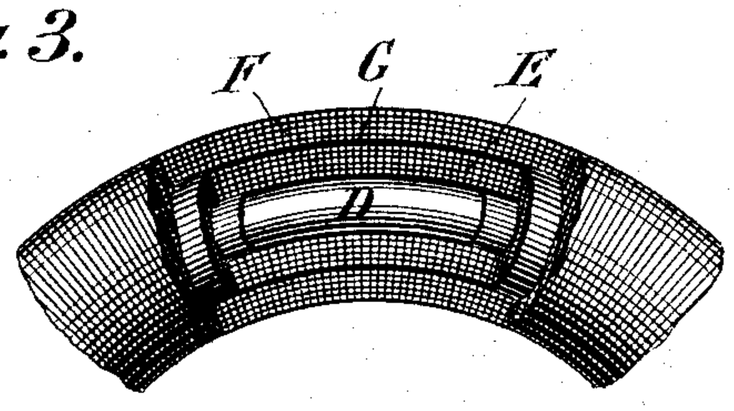


Fig. 3.



Witnesses
C. E. Ashley
H. W. Lloyd

Inventor
Charles S. Bradley
By his Attorneys
Read & Price

(No Model.) 2 Sheets—Sheet 2.

C. S. BRADLEY.

DYNAMO ELECTRIC MACHINE OR MOTOR.

No. 503,574. Patented Aug. 22, 1893.

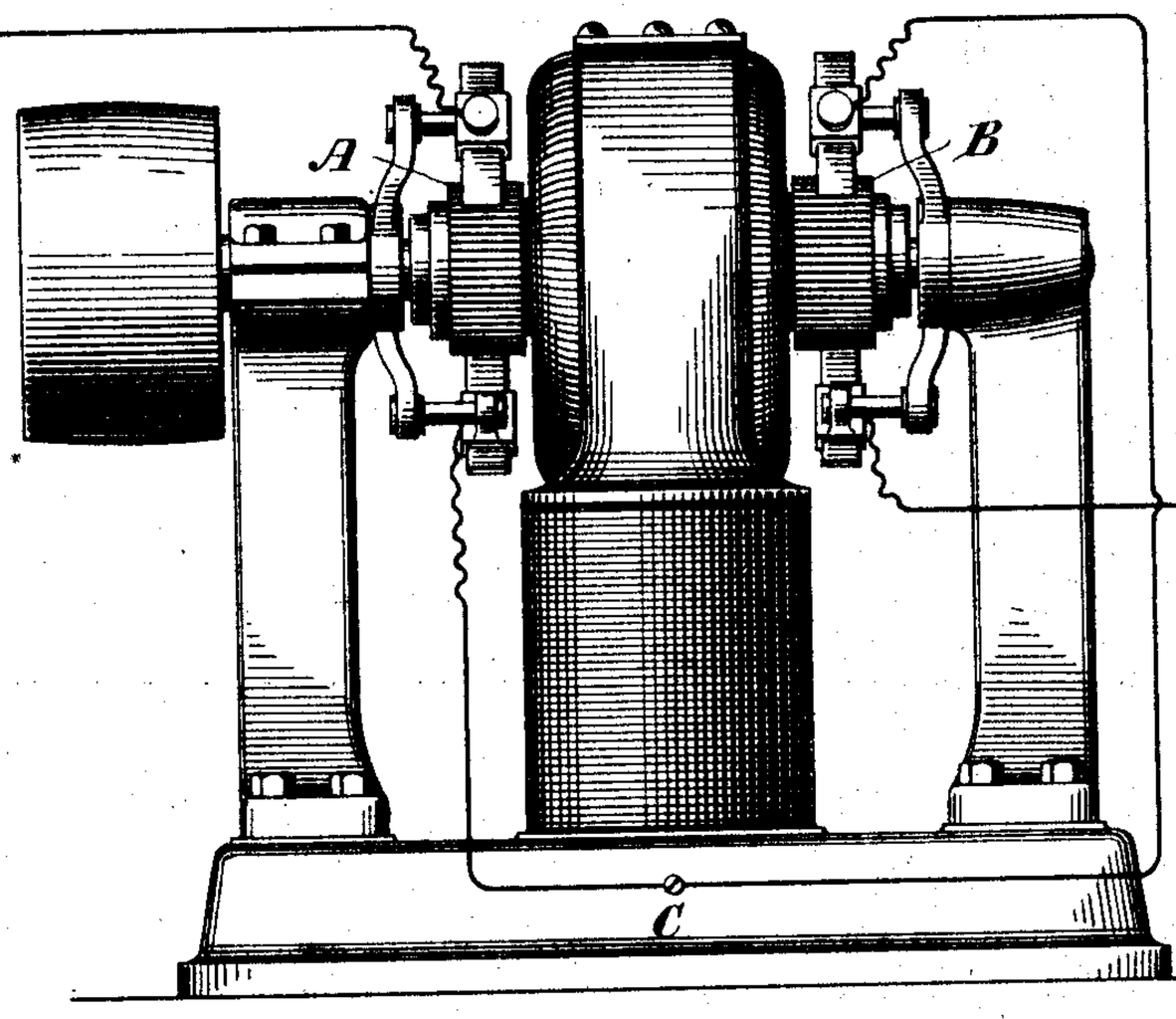
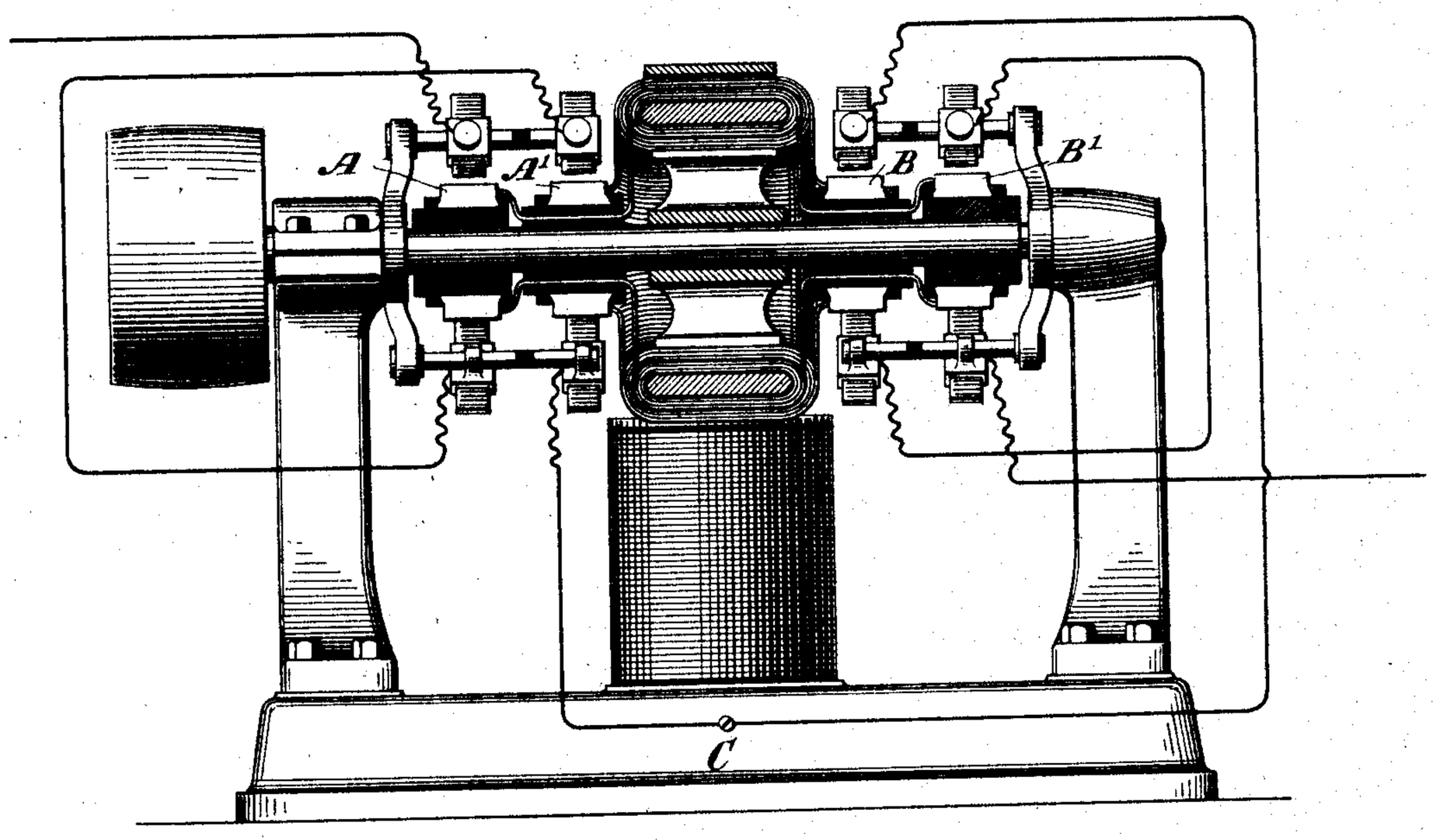


Fig. 4.

Fig. 5.



Witnesses
C. E. Ashley
H. W. Lloyd

Inventor
Charles S. Bradley
By his Attorneys Read & Price

UNITED STATES PATENT OFFICE.

CHARLES S. BRADLEY, OF AVON, NEW YORK.

DYNAMO-ELECTRIC MACHINE OR MOTOR.

SPECIFICATION forming part of Letters Patent No. 503,574, dated August 22, 1893.

Application filed April 15, 1893. Serial No. 470,436. (No model.)

To all whom it may concern:

Be it known that I, CHARLES S. BRADLEY, a citizen of the United States, residing at Avon, in the county of Livingston and State of New York, have invented certain new and useful Improvements in Dynamo-Electric Machines or Motors; and I do hereby 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.

This invention relates to direct current dynamo electric machines, whether used as generators or motors, its object being to enable such machines to develop or operate under currents of high potential, such as are precluded in constructions now in vogue, by reason of the destructive action of such currents upon the commutator. In a patent issued to me, No. 491,465, and dated February 7, 1893, I described a system in which such results were attainable, involving the use of a considerable number of independent machines. In my present invention, however, the object is to enable the high voltage to be developed by or operate upon a single machine.

The invention consists, essentially, in mounting upon the same shaft an armature wound with a plurality of independent circuits, all of which contribute to the resultant effect through the medium of a plurality of commutators, the brushes of which are coupled together in such a way that the several windings will be in series relation to one another; and in reducing the dielectric strain upon the wire insulation by connecting some intermediate point of the internal circuit with the frame of the machine. The windings will be highly insulated from each other in the most perfect manner attainable, and will preferably be so arranged that parts of the windings which lie in close juxtaposition upon the armature will have as low a difference of potential as is compatible with a symmetrical system of winding.

The several features of novelty of the invention will be more particularly hereinafter described and will be definitely indicated in the claims appended to this specification.

In the accompanying drawings which illustrate the invention, Figure 1 is a side elevation of a machine provided with a drum armature having two windings with separate commutators coupled in series relation. Fig. 2 is a similar view partly in section of a similar machine having four armature windings and four commutators. Fig. 3 is a partial view of a ring armature provided with two windings. Fig. 4 is a side elevation of a machine similar to that shown in Fig. 1, except that the ring armature is used in lieu of a drum armature; and Fig. 5 is a similar view to Fig. 2 of a machine provided with a ring armature.

In Fig. 1, A and B represent two independent commutators both highly insulated from the armature shaft, the several segments of each of which communicate with two independent windings upon the armature. I preferably provide each commutator with a large number of segments, so that the difference of potential between adjacent commutator segments may be as low as possible and yet the aggregate difference of potential at the brushes may be as high as possible. By a fine subdivision of the commutator each commutator may be made to readily withstand a thousand volts. Each commutator is provided with a pair of brushes, and two brushes of opposite sign are connected together, and the remaining two brushes connected to the terminals of the line. Under these circumstances there will be thrown upon line a current having an electro-motive-force behind it equal to the sum of the electro-motive-forces developed by the two windings, and the dielectric strain between the frame of the machine and the windings would be equal to the aggregate electro-motive-force, a condition which it is very necessary to avoid, inasmuch as the insulation of that portion of the winding where the potential is highest is liable to rupture, and the machine thus rendered practically inoperative. In order to avoid this difficulty I connect the frame of the machine with some portion of the circuit between the line brushes, so as to raise the potential of the machine and thus lower the dielectric strain. The best way to accomplish this is to connect the two brushes which interlink the two windings by a good, firm connection with the base of the machine. Under these circumstances if each winding develops an electro-motive-force of a thousand volts the frame of the

machine will be brought to a potential of one thousand volts and the strain upon the insulation will only be the difference between the final electro-motive-force or two thousand volts and one thousand volts or just one-half of what it would be without the base connection. This base connection is indicated at C. In mounting the machine care will be taken to highly insulate it from earth in order to prevent leakage from the base, which, under the system of connections described, will have a considerable potential.

In Fig. 2 I have shown a machine as provided with four commutators, the several brushes of which are inter-connected so as to couple four independent armature windings in series. In this case if each winding developed an electro-motive-force of one thousand volts the ultimate electro-motive-force developed by the machine when acting as a generator will be four thousand volts, and similarly in the case of a motor the drop across the terminal brushes will be four thousand volts, whereas the drop across the brushes of any single commutator will be only one thousand volts. By reason of this fractional drop in the case of a motor or fractional difference of potential in the case of a generator, the safety of the commutator may be assured and overheating avoided. The commutators will preferably be placed at opposite sides of the shaft for convenience, and where, as in Fig. 2, a greater number than two commutators is employed, they will be distributed on the two sides of the armature shaft, and the connections from the outside commutators will preferably be led through a hub of good insulating material forming part of the inside commutators.

In the case illustrated in Fig. 2 the middle point of the internal circuit of the machine will be connected with the base as indicated at C. The four commutators A, A′ and B, B′ are connected in series relation, and the final electro-motive-force is quadruple the electro-motive-force or difference of potential between any pair of brushes. The field-magnet of the generator may be excited in any suitable way in shunt or series with the armature or by an independent exciting circuit. When self-excited by a shunt the latter may connect with one pair of brushes A or B in Fig. 1, or where more than two commutators are used with that pair of brushes which will result in a minimum difference of potential between the field-magnet winding and the frame of the machine, thus reducing the dielectric strain upon the insulation of the field-magnet coils.

In winding a ring armature the several windings will be preferably superposed with mica insulation between. For example, in Fig. 3, where D represents the core of the armature, the two windings E and F will be insulated from each other by a substantial layer G of mica. The several sets of brushes at each side of the machine might, for convenience, be mounted upon the same rocker frame, care being taken to perfectly insulate the two brushes of like sign mounted upon the same support from each other.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A dynamo electric machine or electric motor provided with a number of independent armature windings carried by the same shaft, commutators connected with the several windings, connections between the several windings coupling them in series, and an electrical connection between the base of the machine and a point of the circuit between the terminal brushes.

2. A dynamo electric machine or electric motor provided with a plurality of armature windings on the same core, and electrical connections with the base of the machine and an intermediate point of the windings and the circuit terminals.

3. A dynamo electric machine or electric motor provided with a plurality of armature windings carried by the same shaft, separate commutators for the several windings, connections between the commutators coupling the several windings in series, and an electrical connection between the base and the middle point of the compound armature circuit.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES S. BRADLEY.

Witnesses:
OCTAVIA STEWART,
M. C. GROSS.