

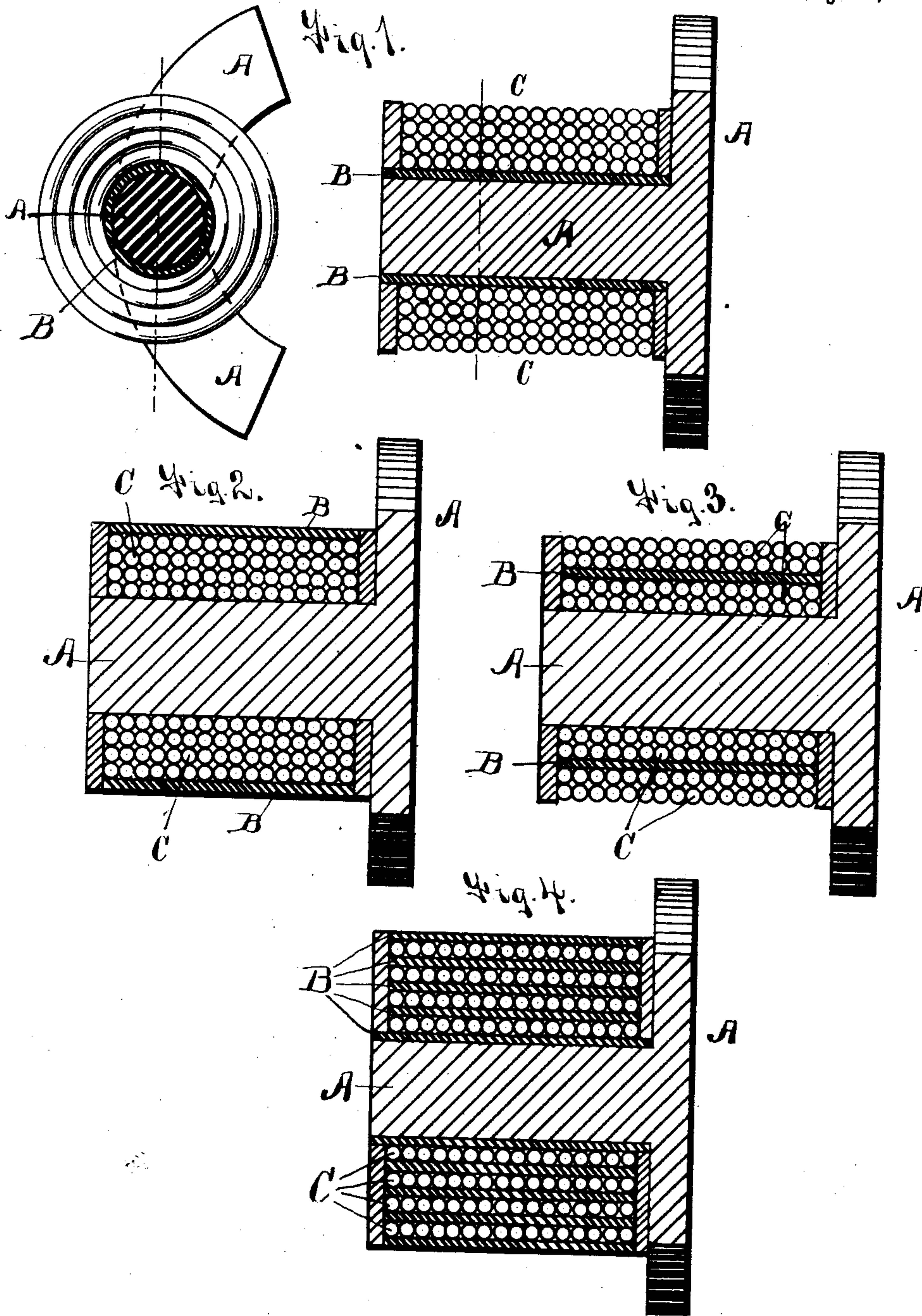
(No Model.)

2 Sheets—Sheet 1.

C. F. BRUSH.  
DYNAMO ELECTRIC MACHINE.

No. 260,652.

Patented July 4, 1882.



WITNESSES

Frank M. Faber.  
William C. Donnelly

INVENTOR

Chas. F. Brush.  
By Seagott & Seagott.  
ATTORNEY

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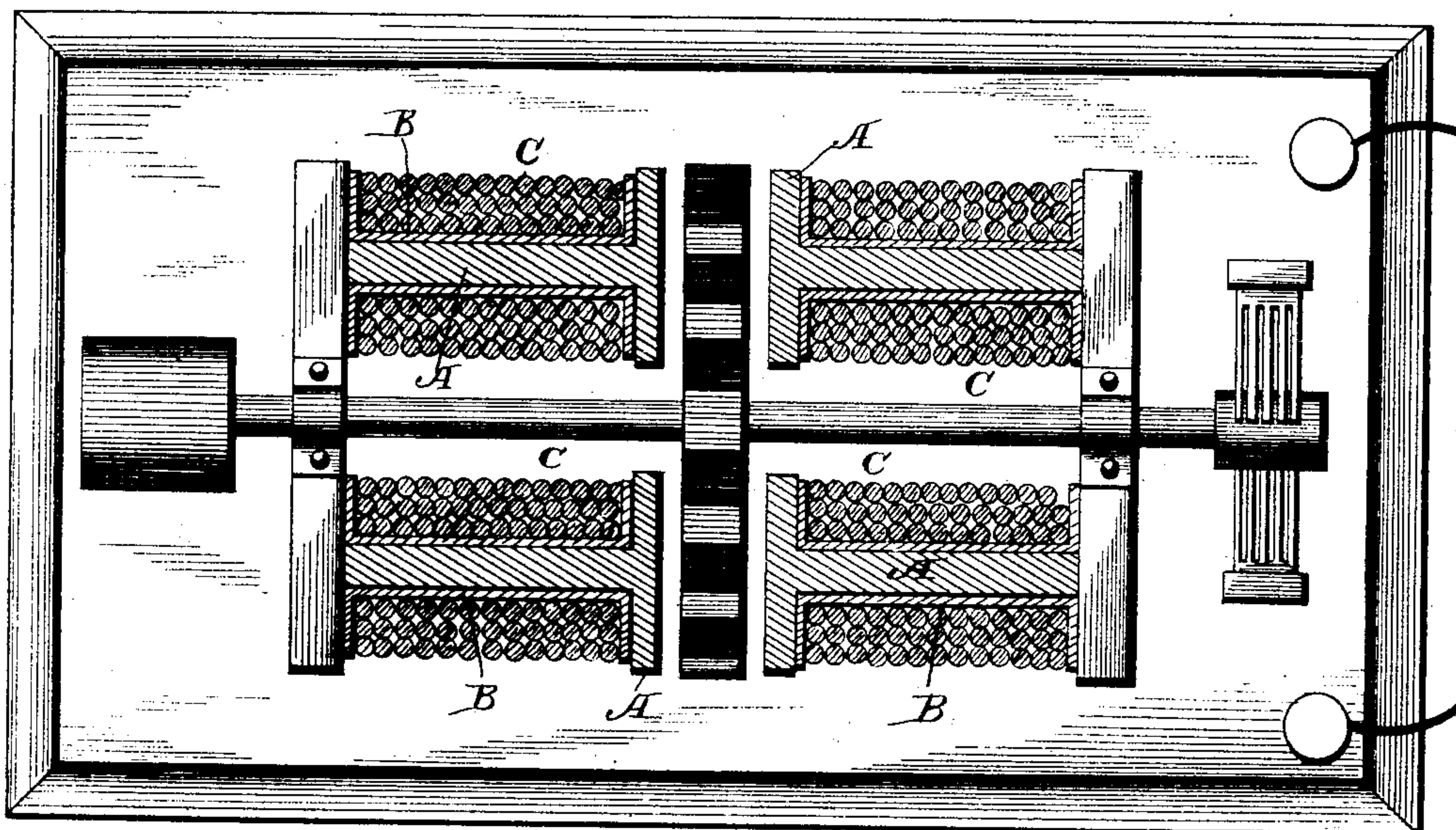
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*Fig. 5.*



WITNESSES  
*S. H. Nottingham.*  
*Herman Moran.*

INVENTOR  
*Chas. F. Brush.*  
*By Sargent & Sargent.*  
Attorney



# UNITED STATES PATENT OFFICE.

CHARLES F. BRUSH, OF CLEVELAND, OHIO.

## DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 260,652, dated July 4, 1882.

Application filed June 1, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES F. BRUSH, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Dynamo-Electric Machines; 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to dynamo-electric machines, and has for its object the suppression to a considerable extent of the "extra current" induced in the helices of the field-of-force magnets of such machines when from any cause fluctuations of magnetic intensity occur. The advantages arising from the suppression of this extra current obtain with dynamo-electric machines of all capacities and in all applications, but are more especially prominent in those machines which are adapted to produce currents of high electro-motive force and considerable volume. The conspicuous evils attending the presence of the extra current in such machines are danger to the insulation of the apparatus and exaggeration of accidental or unavoidable current fluctuations.

In dynamo-electric machines producing currents of high tension the number of convolutions of the helices exciting the field-magnets must be large on account of the comparatively small volume of current in circulation. Now, when the current from such a machine is suddenly diminished by sudden increase of resistance to its passage, or when it is stopped altogether by the breaking of its circuit, the extra current produced by the discharge of the magnetism of the field-magnets and by the inductive action of the different convolutions of the exciting helices on each other is of very high tension, capable of bursting through heavy insulation or traversing a very considerable air-space. Again, when one or more voltaic lamps are operated in the circuit of a machine a peculiar rythmical fluctuation of the current strength, as indicated by corresponding motion in the mechanism of the lamp or lamps, may often be observed, while the speed at which the armature of the machine is rotated remains perfectly constant. By preventing motion of the mechanism of the lamps for

a short time this action may cease, but is liable to appear again upon any disturbance of the circuit-resistance. Thus a state of unstable equilibrium is indicated either in the lamps, dynamo-machine, or both. Although this condition of affairs may obtain in the lamps where it is easily remedied, it may also appear in the machine, as is proven by the success of the remedy applied, consisting in the suppression, as far as is practicable, of the extra current in the field-magnet helices and the absorption of the opposing or inverse electro-motive force caused by rising magnetism of the inclosed cores. The exact manner in which the elimination of the inverse and direct currents in the helices of the field-magnets due to the rising or falling of the magnetism of their cores acts as a remedy for the evil last indicated is not easy to explain. I have developed several theories concerning the phenomenon, but, as none are entirely satisfactory, I will not state them.

I accomplish my object by surrounding the cores of the field-magnets of a dynamo-electric machine with a continuous band of sheet copper or other suitable conductor wound in the direction of the magnetising helices. Over these bands are coiled the said magnetising helices in the customary manner.

Figure 1 of the drawings shows this form of my invention. Figs. 2, 3, 4 show various modifications of the same. Fig. 5 illustrates a dynamo machine provided with my improvement.

In Fig. 1, A is the iron core of one of the field-magnets of a dynamo-electric machine.

B is a tube, of copper or other suitable conductor, surrounding the core A.

C is the usual magnetising-helix.

The function of the tube or envelope B in affording a free path for both the inverse and direct currents, due to rising or falling magnetism of the core A, and thus absorbing the greater part of the inductive influence of the latter, is too obvious to require further explanation.

Obviously the tube or band B may envelop both core A and helix C, as shown in Fig. 2, or it may inclose a portion only of the helix, as shown in Fig. 3.

For the purpose of further absorbing the inverse and direct currents induced directly by



rising or falling currents in the helix itself, several conductors, B, may be arranged between the various layers of the helix-wire C, as shown in Fig. 4.

5 Instead of a conducting tube or band, B, a layer of wire with its ends joined may be employed, or the core A may be wound with two or more helices in any manner, one or more of said helices having its ends joined.

10 What I claim is—

1. In a dynamo-electric machine, the combination, with the moving coils or bobbins of conductors, of field-of-force magnets having their cores encircled by one or more closed conductors, substantially as set forth.

15 2. In a dynamo-electric machine, the combination of the moving coils or bobbins of conductor within which the electric current is induced and one or more field-of-force electro-  
20 magnets that are surrounded by one or more

closed diamagnetic conductors, substantially as and for the purposes set forth.

3. In a dynamo-electric machine, the combination, with the moving coils or bobbins of conductor within which the electric current is 25 induced, of one or more field-of-force electromagnets that are surrounded by one or more closed diamagnetic conductors, and an exciting helix or helices, also surrounding said field magnets, substantially as set forth, whereby the 30 insulation of the apparatus is preserved during fluctuations in the current exciting said field-magnets.

In testimony whereof I have signed my name to this specification in the presence of two sub- 35 scribing witnesses.

CHARLES F. BRUSH.

Witnesses:

JNO. CROWELL, Jr.,

LEVERETT L. LEGGETT.