

(No Model.)

C. E. BALL.

REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 294,180.

Patented Feb. 26, 1884.

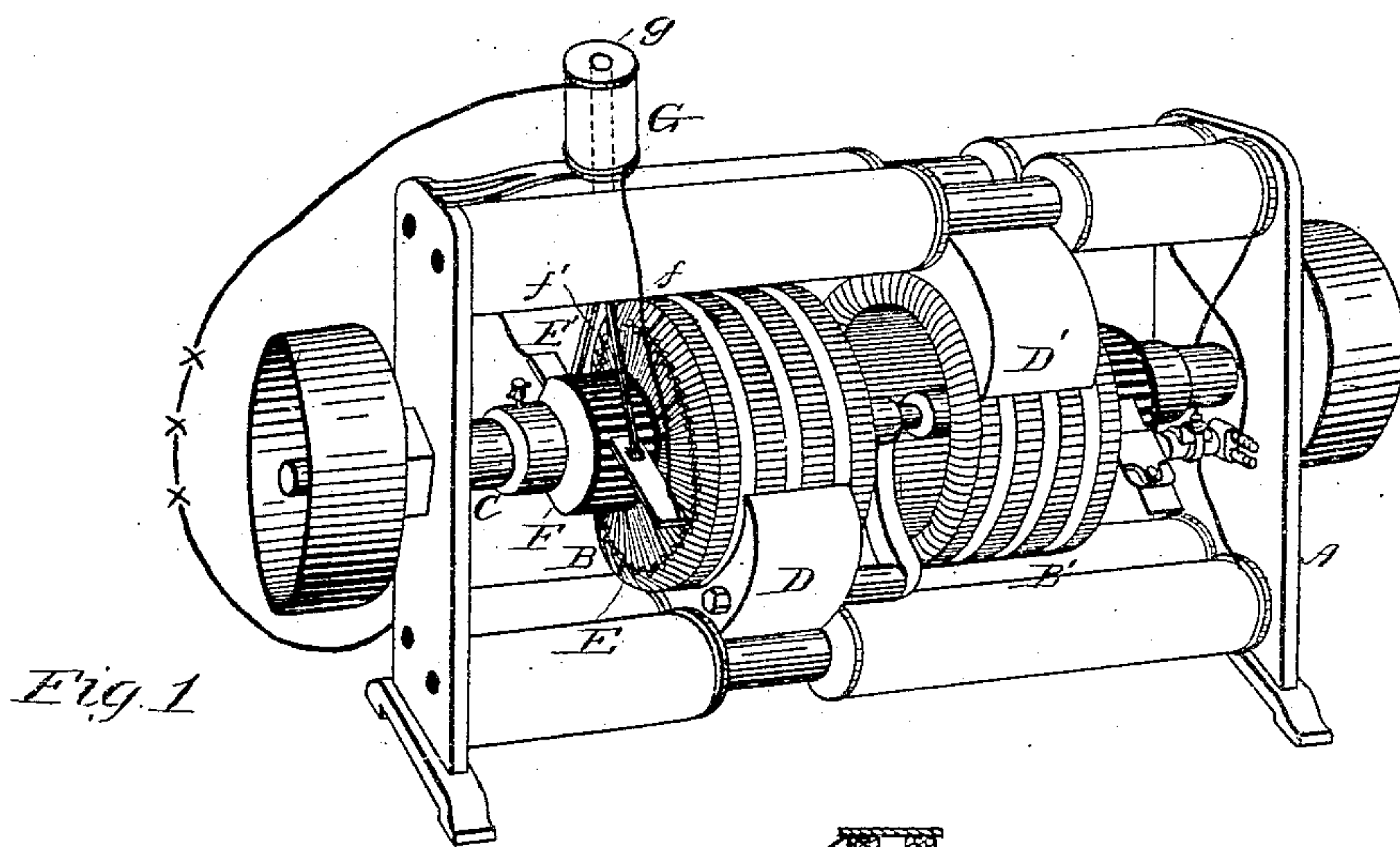
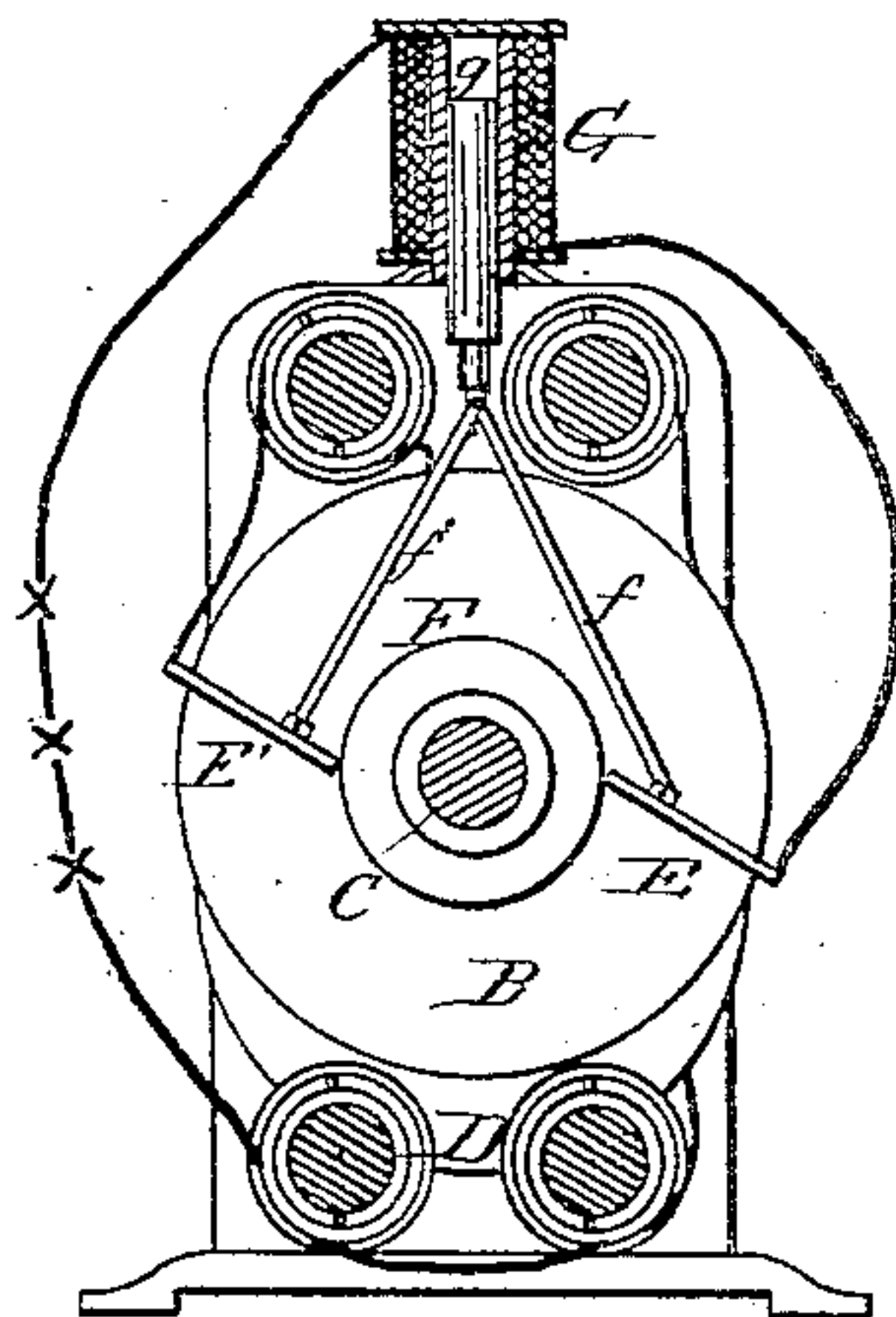


Fig. 1

Fig. 2



WITNESSES:

A. A. Connolly  
W. B. Chaffin

Chas. E. Ball

INVENTOR

By Connolly Bros  
Atty's



# UNITED STATES PATENT OFFICE.

CHARLES E. BALL, OF PHILADELPHIA, PENNSYLVANIA.

## REGULATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 294,180, dated February 26, 1884.

Application filed November 19, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. BALL, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Regulators for Dynamo-Electric Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a perspective, and Fig. 2 a vertical cross-section, of a dynamo-electric machine with my improvements applied.

My invention has for its object to provide an automatic regulator for dynamo-electric machines.

My improvements are applicable to dynamo-electric machines having ring or Gramme armatures, but are designed with special reference to that particular class of machines for which Letters Patent of the United States, dated June 20, 1882, No. 259,791, were granted to me, in which the armature rotates in the inductive field of only one pole of a magnet.

It has heretofore generally been the practice to locate the brushes by which the electrical current is taken off the armature diametrically opposite to each other, and at substantially equal distance from the two sides of the armature, or in what is sometimes known as or called the "theoretical" position of maximum current. By changing the position of the brushes (or of one of them) with reference to each other, the relative number of coils or extent of armature in the inductive field on one side of the armature is varied, and a portion of the current generated on that side of the armature neutralized by the current generated on the opposite side of said armature, and the means of production of such variation is what is herein meant as a regulator for the dynamo-electric machine. To make such regulator automatic, and at the same time give it a larger range of motion and increased sensibility, I construct and arrange the commutator brushes or collectors in such manner that both may be moved around the commutator, so as to bring them nearer together or farther apart; and I connect both with the armature or movable core of a solenoid or electro-mag-

net whose coils are in the main or external circuit of the dynamo-electric machine, so that attraction or repulsion of said armature or core will affect both brushes equally and move both the same distance, either toward or apart from each other, around or on the commutator. As the suppression of a lamp or other change of resistance of variation in the external circuit of the machine produces a reaction on the regulating-magnet, its armature or core is attracted or repelled, according to the character of such change of resistance or variation, and this produces a movement of both brushes, with the effect of reducing or increasing, according to the direction of movement of said brushes, the production of the electrical current in the machine-armature.

My improvements accordingly consist in the combination, with the commutator brushes or collectors of a dynamo-electric machine, of a magnet or solenoid and its armature or core, the latter being connected to both of said brushes or collectors, said magnet or solenoid being in the external circuit of such machine, whereby a variation in or change of resistance in said circuit will produce a movement of both said brushes or collectors and alter their relative positions.

My improvements still further consist in the combination, with the armature of a dynamo-electric machine which rotates in the inductive field of only one pole of the field-magnet of such machine, of a regulating magnet or solenoid in the external circuit of such machine, having its armature or core connected with both the commutator brushes or collectors.

Referring to the accompanying drawings, A designates a dynamo-electric machine having two armatures, B B', on the same shaft, C, each of said armatures being adapted and designed to be rotated in the inductive field of only one pole for such machine, said poles being shown at D and D', respectively. I have shown my improvements as applied to only one of said armatures; but they may be applied to both, as well as to bipolar or multipolar machines employing ring-armatures.

E and E' are two brushes or collectors, applied to the commutator F of armature B, and these may be constructed and arranged in the usual or any suitable manner which will permit their movement around or on the commu-



tator, so as to cause them to approach to or recede from one another. Both of these brushes have connections, (designated at  $f f'$ ,) consisting of connecting rods or links, with the armature or core  $g$  of an electro-magnet,  $G$ , whose coils are in or connected with the main or external circuit of the machine, so that a change of resistance or variation in such external circuit will produce a movement, either of attraction or repulsion, of said armature or core, and move both the brushes or collectors correspondingly and equally, with the result already pointed out. It is obvious that by connecting both brushes with the regulator-armature there will be twice as great a range of motion as could be obtained by connecting only one of them therewith, thus giving a two-fold extent of regulation and double sensibility to the regulating medium.

20 What I claim as my invention is as follows:

1. An automatic regulator for a dynamo-electric machine, comprising an electro-magnet or solenoid in the external circuit of the machine, and having its armature or core con-

25 nected to both the commutator brushes or collectors, said brushes or collectors being movable toward and from each other, substantially as shown and described.

2. In a dynamo-electric machine in which the armature is adapted and designed to rotate in the inductive field of only one magnetic pole, the combination, with two movable commutator brushes or collectors, of an electro-magnet or solenoid in the external circuit of the machine, and having its armature or core connected with both said brushes or collectors, whereby variations in said circuit will affect said magnet and produce the movement of both said brushes or collectors, substantially as shown and described.

40 In testimony that I claim the foregoing I have hereunto set my hand this 31st day of October, 1883.

CHAS. E. BALL.

Witnesses:

ANDREW ZANE, Jr.,  
WILL H. POWELL.