(No Model.)

W. H. ELKINS.

DYNAMO.

No. 485,181. Patented Nov. 1, 1892.

FIG. 1.

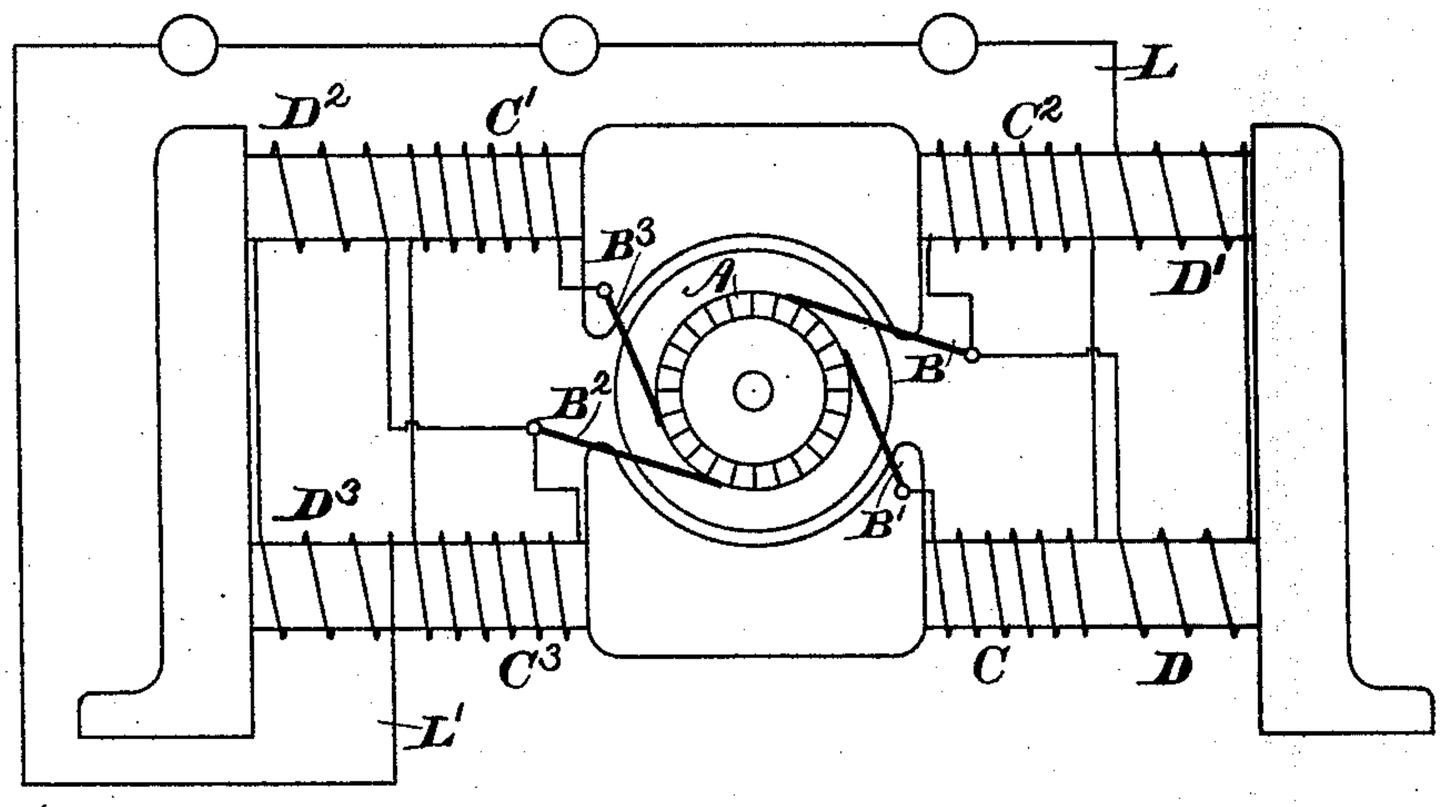
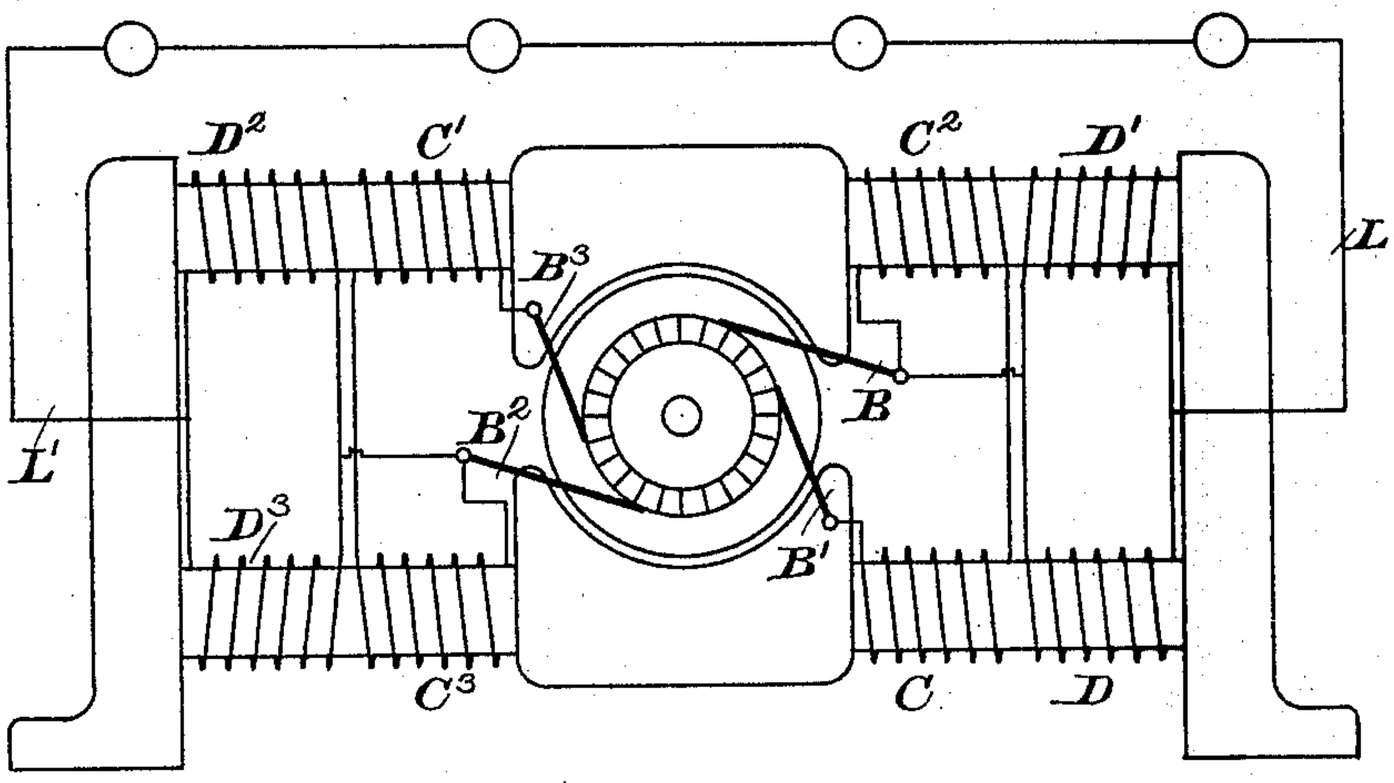


FIG. 2.



WITNESSES

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INVENTOR

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UNITED STATES PATENT OFFICE.

WILLIAM H. ELKINS, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

DYNAMO.

SPECIFICATION forming part of Letters Patent No. 485,181, dated November 1, 1892.

Application filed October 7, 1891. Serial No. 407,992. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY ELKINS, a citizen of the United States, residing at Cambridge, in the county of Middlesex and State of Massachusetts, have invented a certain new and useful Improvement in Dynamos, of which the following is a specification.

This invention relates to improvements in dynamo-electric machines whereby they are adapted to give a substantially-constant current when supplying a circuit of variable resistance. This effect I obtain by providing two sets of commutator-brushes, one of which is connected to the external circuit through a set of field-magnet coils, which may be termed "main coils," the other set of brushes being connected to the first set through an additional set of field-coils, which I will call "regulating-coils," as their effect preponderates in the regulation.

The special object of this invention is to arrange these coils in a symmetrical or non-distorting manner on the field-magnets and to proportion the field-coils so as to attain the best results.

In the accompanying drawings, Figure 1 is a diagram showing the preferred manner of applying my invention to a dynamo-electric machine. Fig. 2 is a similar view of a modified arrangement.

The dynamo to which my invention is applied has two sets of brushes B B^2 and B′ B^3 bearing on its commutator A. From the set of brushes B B^2 connection is made through field-coils D D′ D^2 D^3 to the line-wires L L′, while from the brushes B′ and B^3 connection is made, respectively, through field-coils C C^2 and C′ C^3 to the respective brushes B B^2. The brushes are so arranged on the commutator that the potential of set B′ B^3 is considerably higher than that of set B B^2, and I prefer to so proportion this difference of potential and the windings of the field-coils as to cause the currents from the two sets of brushes to be equal under normal load. It is desirable to make the magnetizing effect—that is, the ampère-turns—of the two coils about equal under full load. Thus under full load the ampère-turns in the two coils are about equal, and the brushes are so arranged that under these conditions the neutral line on the commutator is near the brushes B′ B^3. When the resistance of the external or work circuit is diminished, the current through the field-coils and the armature is varied, causing the neutral line to shift forward, so that more current passes through brushes B B^2 and less through the brushes B′ B^3. This weakens the field-magnetism and brings the generated current down to substantially-normal strength. A reverse action occurs when the working resistance is increased, the neutral line being shifted rearward, more current flowing through the brushes B′ B^3, increasing the field-magnetism and bringing the current up to normal strength.

In order to prevent field distortion and to obtain a symmetrical and well-balanced machine, I arrange the coils so that each leg of the field-magnet is provided with both a main coil and a regulating-coil. Thus if the field-magnet has four legs or cores, as shown, there will be four main coils D D′ D^2 D^3 and four regulating-coils C C′ C^2 C^3. The two coils C C^2 may be connected in series, coils C′ C^3 being similarly connected. The coils D D′ D^2 D^3 may be coupled up in series, as indicated in Fig. 1, in which case each would have one-half as many turns as a regulating-coil; or they may be coupled in multiple, as in Fig. 2, each then having the same number of turns as a regulating-coil. By arranging the field-coils in this symmetrical manner and proportioning them as described, so that the magnetizing effects of the two currents from the two sets of brushes shall be substantially equal under full load, I obtain a machine which is very efficient and has an extensive range of regulation.

What I claim as new, and desire to secure by Letters Patent, is—

1. A dynamo-electric machine having two sets of brushes on its commutator, a set of field-coils connected to one set of brushes and to the work-circuit, and a set of field-coils connected between the two sets of brushes, the two sets of coils having substantially-equal ampère-turns under full load.

2. A dynamo-electric machine having two sets of brushes on its commutator, each set

being so arranged as to normally take up a definite fraction of the normal line-current, and a field-magnet with two or more core portions, each of which has two coils belonging to different sets, the coils of one set being connected to one set of brushes and to the line and the coils of the other set being connected between the two sets of brushes.

3. A dynamo-electric machine having two sets of brushes placed at points of normally-different potential on the commutator and taking equal current at full load and two sets of field-magnet coils, one being connected to one set of brushes and to the work-circuit and the other being connected between the brushes.

In testimony whereof I have hereto set my hand this 24th day of September, 1891.

W. H. ELKINS.

Witnesses:
C. L. HAYNES,
N. F. HAYES.