

(No Model.)

I. N. LEWIS.
SELF REGULATING DYNAMO.

No. 516,497.

Patented Mar. 13, 1894.

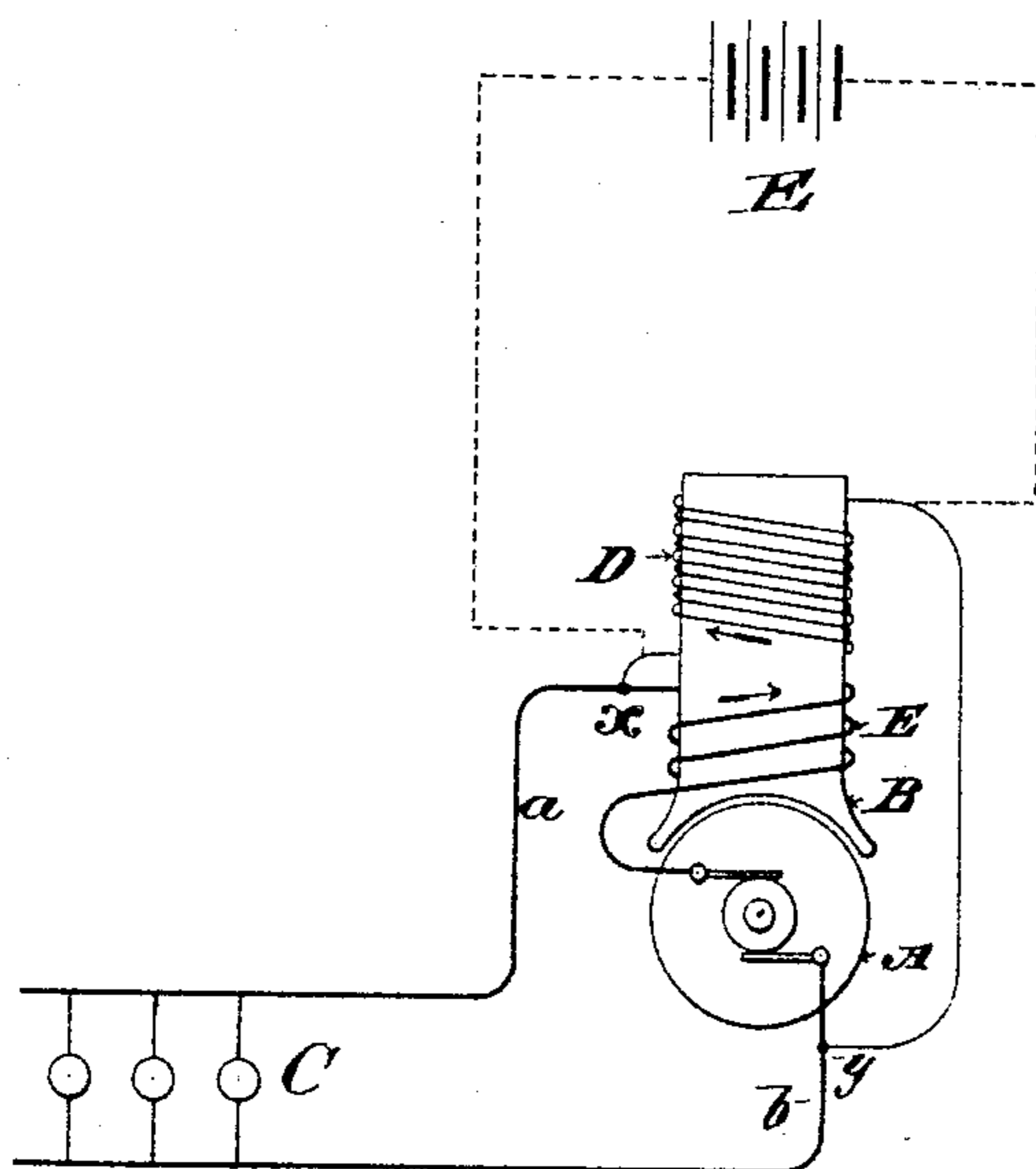


Fig. 1.

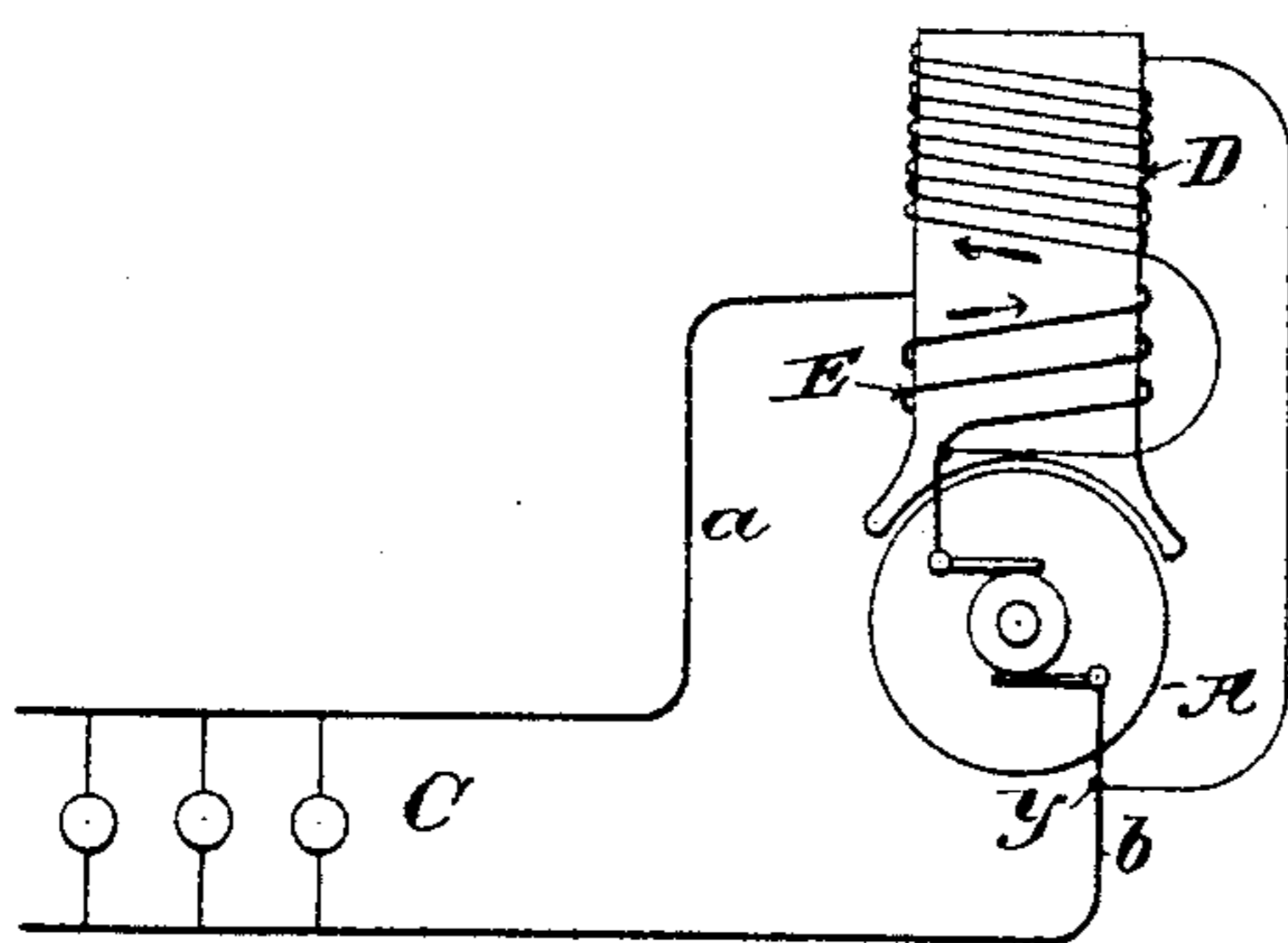


Fig. 2.

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UNITED STATES PATENT OFFICE.

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SELF-REGULATING DYNAMO.

SPECIFICATION forming part of Letters Patent No. 516,497, dated March 13, 1894.

Application filed September 6, 1893. Serial No. 484,898. (No model.)

To all whom it may concern:

Be it known that I, ISAAC N. LEWIS, a citizen of the United States, and a resident of Fort Wadsworth, in the county of Richmond and State of New York, have invented a certain new and useful Self-Regulating Dynamo, of which the following is a specification.

My invention relates more particularly to dynamo electric machines operated by a power which drives the machine at a varying or fluctuating speed.

As is well known the voltage or output of a dynamo of ordinary construction will, other things being equal, rise with the speed of rotation of its armature.

The principal aim of my invention is to secure a practically constant voltage or output irrespective of the speed.

As will be apparent the invention applies especially to cases where the current demanded of the machine for operating the translating device or devices, is practically constant in amount.

My invention consists in a method of automatically regulating a dynamo machine to deliver a substantially constant potential irrespective of the speed by increasing the strength of a current which cuts down the field magnetism with an increase of speed and vice versa, thereby automatically regulating the voltage so that any tendency to increase thereof with increase of speed will be practically compensated for by the decrease of the magnetic field.

In carrying out my invention the opposing or neutralizing current which responds to or varies automatically with the speed may be obtained and applied in any way, the only essential being that it shall rise with the rise of speed in sufficient amount or in such ratio to the main magnetizing power that the strength of the field magnetism shall decrease and thereby keep down the voltage. The most obvious and simple manner of obtaining and applying such current is to include an opposing or demagnetizing coil in a circuit with the armature of the machine, the effect being that the higher the speed of the armature and the higher the voltage thereof the greater the current which will flow in said coil. I do not limit myself, however, to using

the armature current of the machine itself or to varying the opposing current by variations in the voltage of the armature itself, since, as will be obvious, the increase of current might be brought about in other ways where the speed rises.

As will be obvious a dynamo having its voltage governed in accordance with my invention in its simplest form may be said to be a compound wound dynamo having its series coil reversed or so proportioned in its effect to another source of field magnetism that the increased current passing through the series coil upon an increase of speed weakens the magnetic field and thereby keeps the voltage down at the increased speed. The field magnetism may be obtained either in shunt from the armature of the machine or from any other independent source, but I prefer to use an independent or separate source of excitation which determines the polarity of the machine and is practically constant or varies only in such degree as not to prevent the increased current in the main from cutting down the field strength at the increased speed. The shunt coil may, as well understood in the art, be a shunt across the brushes of the armature direct or may be a shunt across the whole external circuit and as will be presently explained in connection with the drawings: wherein—

Figure 1, is a diagram illustrating a machine adapted for carrying out my invention; and Fig. 2, a diagram of another arrangement of circuits.

In the drawings A, typifies the armature and B, the field magnet.

C, indicates the translating device or devices which are operated by current taken from the armature and delivered thereto over the wires or connections *a, b*.

D, in Fig. 1, is a field magnet coil which forms the principal field energizing coil of the machine and is supplied with current from any desired source. In Fig. 1, I have shown it as connected at the points *x, y*, to the circuit *a, b*, so as to be fed in shunt to the whole external circuit. When so fed as a shunt it is preferably made of fine wire as well understood in the art. The said principal coil might, however, be fed from an independent

source typified at E, as a storage battery or other generator of electricity.

E, is the regulating coil which in Fig. 1, is illustrated as a main circuit coil so that its current will vary directly with any variation of voltage of the armature itself. The coil E, as shown, is wound reversely to the coil B, so as to act as a demagnetizing or opposing coil tending to cut down the field magnetism and, therefore, to reduce the voltage of the armature. The proportioning of the effects of the two coils by the number of turns and their resistance is made such that when the voltage of the armature rises from increase of speed the opposing effects of the main circuit coil shall rise in proper ratio with respect to any increase of current in the other coil, to result in the production of a field which is weaker with the increase of speed. As will be seen any tendency to increase of voltage of the armature due to increase of speed will be thereby automatically compensated for as the increased current thereby flowing in coil E, will cut down the field magnetism and bring the voltage or electro-motive force of the armature back to normal.

It will be understood by electricians that the proportions of the various coils are to be determined by the particular circumstances of each case. I have shown the regulating coil E, as wound directly upon the field magnet itself but, as well understood by electricians it might be applied in other ways or in other positions so as to have the effect, when the increased current flows through it, of cutting down the electro-motive force in the armature coils. Hence, it is to be understood that the use of the coil in the manner shown directly upon the field magnet is simply typical of any coil that operates in a similar manner to control the voltage or electro-motive force of the armature when the speed increases.

In the diagram Fig. 2, I illustrate that modification of my invention before referred to which involves the use of a principal energizing coil D, supplied in a shunt directly across the terminals of the armature.

In all cases there is of course a critical speed determined by the winding up to which the voltage when the machine starts into operation will increase but beyond which any further increase of speed will be accompanied by the compensating or regulating action above described, resulting in a practical constancy of voltage although the speed may fluctuate within any limits above such critical speed.

My invention is particularly applicable to cases where the external resistance is low and the resistance of the armature itself is low since under these conditions a small increase

in the voltage will produce a large increase in the amount of current flowing in the main circuit coil and when the machine is shunt wound will produce a comparatively small increase in the derived circuit coil.

What I claim as my invention is—

1. The herein described method of automatically regulating a dynamo machine to deliver a substantially constant potential when driven at variable speed, consisting in increasing the strength of an electric current with an increase of speed and by such increased current cutting down the increment of electro-motive force or voltage which would arise from the increased speed of rotation of the armature.

2. The herein described method of regulating the voltage or potential of a dynamo for changes of speed in its driving power, consisting in cutting down the strength of the field in which the armature rotates by increased current from the armature of said dynamo upon an increase of speed.

3. The combination with a dynamo machine driven by a variable speed, of a magnet coil in the circuit of the armature wound or applied in the manner described to tend to cut down the voltage or electro-motive force of the armature when the current in said coil due to increase of speed rises.

4. The combination in a dynamo electric machine delivering constant potential irrespective of speed driving, of two field coils one of which is the principal field energizing coil and determines the polarity of the machine while the other opposes the action of the first in variable amount to vary the field magnetism inversely as the speed of the armature, as and for the purpose described.

5. The combination in a dynamo electric machine for delivering constant potential with variable speed of driving, of two field magnet coils one of which is the principal energizing field coil while the other is wound to oppose the effect of the first and is connected into the main circuit of the armature so as to cut down the field magnetism when the speed of the armature rises.

6. The combination, substantially as described, with a dynamo having a separate and approximately constant excitation from any source, of an opposing main circuit field coil in the direct circuit between the armature and the work, substantially as and for the purpose described.

Signed at New York, in the county of New York and State of New York, this 5th day of September, A. D. 1893.

ISAAC N. LEWIS.

Witnesses:

WM. H. CAPEL,
THOS. F. CONREY.