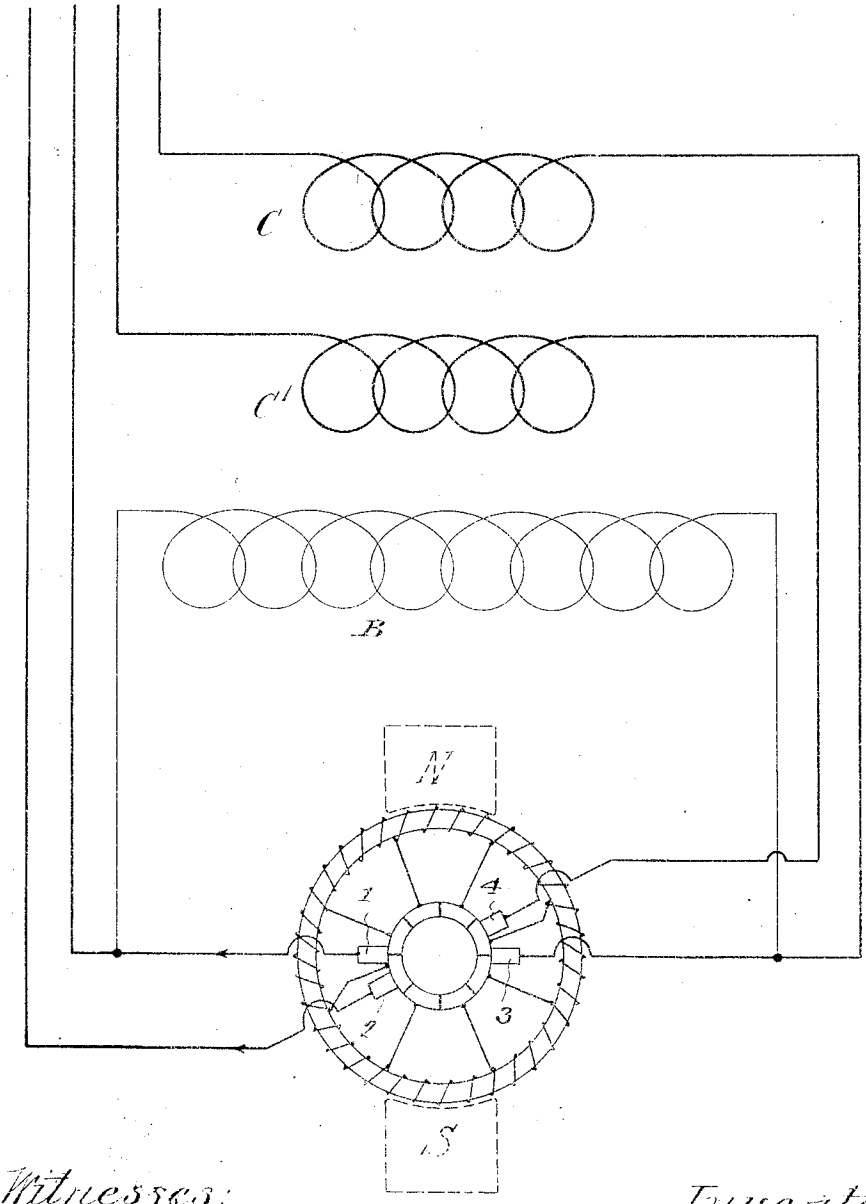
J. F. KELLY.

ELECTRIC GENERATOR.

APPLICATION FILED DEC. 20, 1910.

1,088,781. Patented Mar. 3, 1914



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JOHN F. KELLY, OF PITTSFIELD, MASSACHUSETTS.

ELECTRIC GENERATOR.

1,088,781. Specification of Letters Patent. Patented Mar. 3, 1914.

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To all whom it may concern:

Be it known that I, JOHN F. KELLY, a citizen of the United States, residing at Pittsfield, county of Berkshire, and State of Massachusetts, have invented certain new and useful Improvements in Electric Generators, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to dynamo electric generators for supplying a plurality of circuits at different voltages. The ordinary compound wound generator having a single brush or terminal on one side of the neutral plane of the armature, and a single series coil connected therewith may be used for supplying a plurality of circuits at different voltages by providing a plurality of differently disposed brushes on the other side of the armature. All the working circuits will then pass through this coil and the one brush to which it is connected, and this one coil may be made to give good service in preventing too great a depression in the voltage in any of such circuits if there is no comparatively large difference in voltage between the circuit of highest and the circuit of lowest voltage. The difference in voltage is obtained in such case, however, wholly by displacing the brushes on one side only of the machine, and to obtain a wide difference of voltage in this way would result in placing one or more of the brushes where commutation would be bad or even disastrous. This is avoided in accordance with the present invention by providing two or more brushes on each side of the neutral plane of the armature, and a separate series coil for each of the brushes on either side of the machine if the same number of brushes is provided on both sides, or a series coil for each of the brushes on the side having the lesser number of brushes if there is a different number of brushes on the two sides of the machine; the object of the invention being to provide a compound wound dynamo electric generator which may be used for supplying a plurality of circuits with currents of substantially different voltages, with proper regulation or control of the voltage of each circuit and without having the current drawn through any one or more circuits re-act on the voltage of the other circuit or circuits.

It has been sought to use a compound wound generator for supplying the operating magnets of an electrically operated piano player with current of different voltages for producing the desired variations in strength of action and loudness of tones produced, but it has been found that such use is practically limited to two circuits of such difference in voltage as is necessary to produce the desired difference in loudness of tones. The present invention has been made primarily with the object of providing a generator for such use from which three or more circuits at substantially different voltages may be supplied. It will be understood, however, that the invention is not limited in its application to generators intended for such use, or to generators for supplying low voltage currents such as are adapted for this use, this application of the invention being mentioned merely for the purpose of giving an example of conditions to be met and results which can be obtained by the present invention which could not be met or obtained by the use of the ordinary compound wound dynamo.

The accompanying diagram illustrates an application of the invention to a generator for supplying up to four circuits at different voltages.

Referring to said diagram, the armature A will be of the closed circuit type and will be provided with three or more brushes or terminals. As shown, four such brushes or terminals are provided, marked 1, 2, 3, and 4, the brushes 1 and 2 being of one polarity, say positive, and the brushes 3 and 4 of the opposite or negative polarity, that is, the brushes 1 and 3 are in the neutral plane and the brushes 2 and 4 on opposite sides of the neutral plane of the armature.

The shunt field coil B is shown as connected between the brushes 1 and 3, and two series field coils C and C′ are provided, one in each of the lines leading from the brushes 3 and 4 respectively. Four circuits at voltages differing according to the position of the brushes are thus provided for, that is, a circuit connecting the brushes 1 and 3, one connecting the brushes 1 and 4, one connecting the brushes 2 and 3, and a fourth circuit connecting the brushes 2 and 4. Two of the brushes, as 1 and 3, are preferably positioned with relation to the armature at diametrically opposite points of greatest

potential, and the other brushes 2 and 4 on each side of the neutral plane or that of the greatest potential and in which the brushes 1 and 3 are placed are located at a distance from the brush 1 or 3 according to the different voltages desired to be taken off, and preferably, also, on opposite sides of the plane passing through the points of highest potential of the armature. For example, we may suppose the generator to be a low voltage generator providing an electro-motive-force of 14 volts between the brushes 1 and 3, and having the brush 2 set to provide an electro-motive-force of 12 volts between it and the brush 3, and the brush 4 set to give an electro-motive-force of 10 volts between it and the brush 1. Then we would get an electro-motive-force of 14 volts for the circuit connecting the brushes 1 and 3, 12 volts for the circuit connecting the brushes 2 and 3, 10 volts for the circuit connecting the brushes 1 and 4, and 8 volts for the circuit connecting the brushes 2 and 4. It will be observed that there is thus obtained a very large relative difference in voltage between that of the circuit connecting the brushes 1 and 3 and that of the circuit connecting brushes 3 and 4, and that this comparatively great difference in voltage is obtained without having the brushes on either side of the neutral plane of the armature set at any considerable distance apart or any brush set at any considerable distance from the point of highest voltage on its side of the armature. It will be observed, moreover, that each series coil is called on to regulate only for two circuits, each of which circuits is completed through brushes which are comparatively close to being diametrically opposite to each other, and which circuits are supplied with current at voltages which do not differ largely, so that each series coil may be adjusted to regulate with practical accuracy for such two circuits. Efficient regulation for voltage is thus obtained for each circuit and the electro-motive-force of the generator maintained, whether any one or more of the four circuits is taking current from the generator, and under normal variations in load on any one or more circuits.

While the construction illustrated in the diagram provides for efficient regulation with three or four circuits taking current at different voltages from the generator, the provision of the two series compounding coils is useful where close regulation for only two circuits of different voltages is desired, and in such case the brush 2 might be omitted unless the difference in voltage is comparatively large, in which event the brush 2 is best retained.

Obviously the number of circuits of different voltages supplied by the generator might be increased without departing from the invention by increasing the number of differently disposed brushes or terminals and the number of series field coils.

What is claimed is:

In a multi-circuit compound-wound dynamo electric machine designed to supply independent external circuits with currents whose voltages are different and constant, in combination with a single field magnet-member and a closed circuit armature, of a plurality of positive and negative brushes, a shunt-coil connected to a pair of brushes, coöperating series coils equal in number to the brushes of one polarity and having one terminal of each series coil connected respectively to said brushes of that polarity and their other terminals connected respectively to and forming part of the external circuits to compound the field, and leads also forming a part of the external circuits and connected one each to the brushes of opposite polarity, said brushes of opposite polarity being arranged at different potential points, whereby currents of different and independent voltages may be supplied to the external circuits, as described.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

JOHN F. KELLY.

Witnesses:

MICHAEL L. EISNER,

LE ROY E. SHAW.