

No. 720,661.

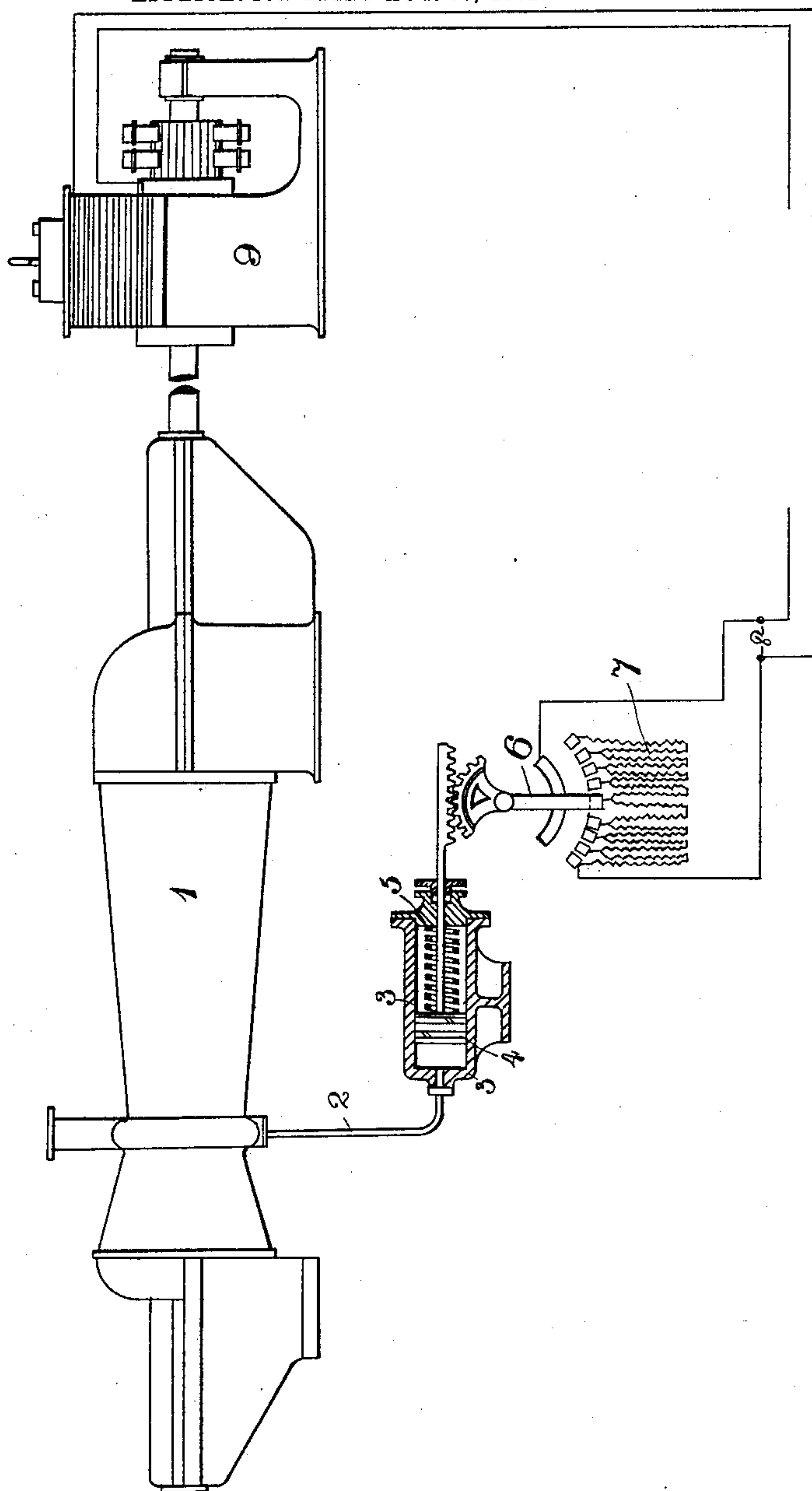
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REGULATING DEVICE FOR ELECTRICAL MACHINES DRIVEN BY  
STEAM MOTORS.

APPLICATION FILED AUG. 30, 1902.

NO MODEL.



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# UNITED STATES PATENT OFFICE.

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REGULATING DEVICE FOR ELECTRICAL MACHINES DRIVEN BY STEAM-MOTORS.

SPECIFICATION forming part of Letters Patent No. 720,661, dated February 17, 1903.

Application filed August 30, 1902. Serial-No. 121,584. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES EUGEN LANCELOT BROWN, a subject of the King of Great Britain and Ireland, residing at Baden, in the canton of Aargau and Republic of Switzerland, have invented certain new and useful Improvements Relating to a Regulating Device for Electrical Machines Driven by Steam-Motors, (for which I have made application for Letters Patent in Great Britain, No. 15,431, dated July 10, 1902; in Switzerland, February 4, 1902, and in Germany February 6, 1902,) of which the following is a specification.

This invention relates to the regulation of electric machines driven by steam-motors, the object of the invention being to effect improvements in the regulation of such machines by causing the excitation of the field-magnets to vary proportionally to the load, and more particularly to enable a smaller and less-costly generator to be employed than has hitherto been necessary.

In steam-motors the pressure at certain points of the steam-cycle varies in close proportion to the work being done. Thus, for example, in multicylinder-engines such points occur in the intermediate and low pressure receivers. As the output increases the steam-pressure rises, attaining its maximum at full load, while with a decreasing load the pressure falls and reaches its lowest point when the machine is running idle. This fact has been previously taken advantage of in Parsons and Stoney's United States Patent No. 669,803, to adjust the brushes in a dynamo to their point of minimum sparking, it being found that the displacement of the brushes necessary to effect this also varies approximately as the load.

This invention consists in employing the variation of steam-pressure with load in a steam-motor driving an electric generator to effect regulation of the generator as regards output.

The accompanying drawing illustrates the mode of application of one modification of the invention.

According to one modification of this invention a rack connected to the piston-rod of a regulating-cylinder 3, fed with steam through a pipe 2 from a point in the motor 1 where the pressure varies as the load, may

gear with a toothed quadrant on the arm 6 of a variable-resistance switch, the resistance itself, 7, being in circuit through the conductors 8 with the field-magnet windings of a dynamo 9. The movement of the piston 4 is controlled by a spring 5.

One modification only has been described; but other well-known mechanical means may be employed without departing from the spirit of the invention, which is equally applicable to alternating, polyphase, or continuous current machines.

The following important advantage follows from the fact that the field-magnet excitation varies as the load: As is well known, the total electromotive force induced in the armature is not available at the terminals of the machine on account of the volts lost in driving the current through the armature itself. The masses of iron in the machine have therefore to be made of sufficient size to compensate for this loss, which is greatest at maximum load. If, however, as the load increases the excitation of the field-magnets likewise increases, as in this invention, smaller masses of iron will be capable of inducing the required maximum electromotive force—that is to say, the machine as a whole can be made smaller for a given maximum output.

By careful calculation the compounding or self-regulation of alternating or polyphase generators according to this invention becomes possible with simple means—a result not attained hitherto. For instance, when separate exciters are used the regulating resistance may be put in circuit with the exciting-coils of the exciter, thus automatically varying the output of the exciter and through it regulating the alternator itself.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In electric generators driven by steam-motors, means for automatically causing the excitation of the field-magnets to vary as the load, consisting of an element moving under the influence of the steam from a point of the motor where the pressure varies as the load, and a rheostat in the circuit of the field-magnet windings of the generator, actuated by said element, substantially as set forth.

2. In electric generators driven by steam-



- motors, means for automatically causing the excitation of the field-magnets to vary as the load, consisting of a spring-controlled piston moving in a cylinder under the influence of the steam from a point of the motor where the pressure varies as the load and a rheostat in the circuit of the field-magnet windings of the generator, actuated by the piston, substantially as set forth. 15
- 5 the steam from a point of the motor where the pressure varies as the load and a rheostat in the circuit of the field-magnet windings of the generator, actuated by the piston, substantially as set forth. 20
- 10 3. In electric generators driven by steam-motors, means for automatically causing the excitation of the field-magnets to vary as the load, consisting of a spring-controlled piston moving in a cylinder under the influence of

the steam from a point of the motor where the pressure varies as the load, and a rack connected to the piston-rod gearing with a toothed quadrant on the arm of a rheostat which is in circuit with the field-magnet windings of the generator, substantially as set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

CHARLES EUGEN LANCELOT BROWN.

Witnesses:

FRITZ FINN,  
C. BANMANN.