

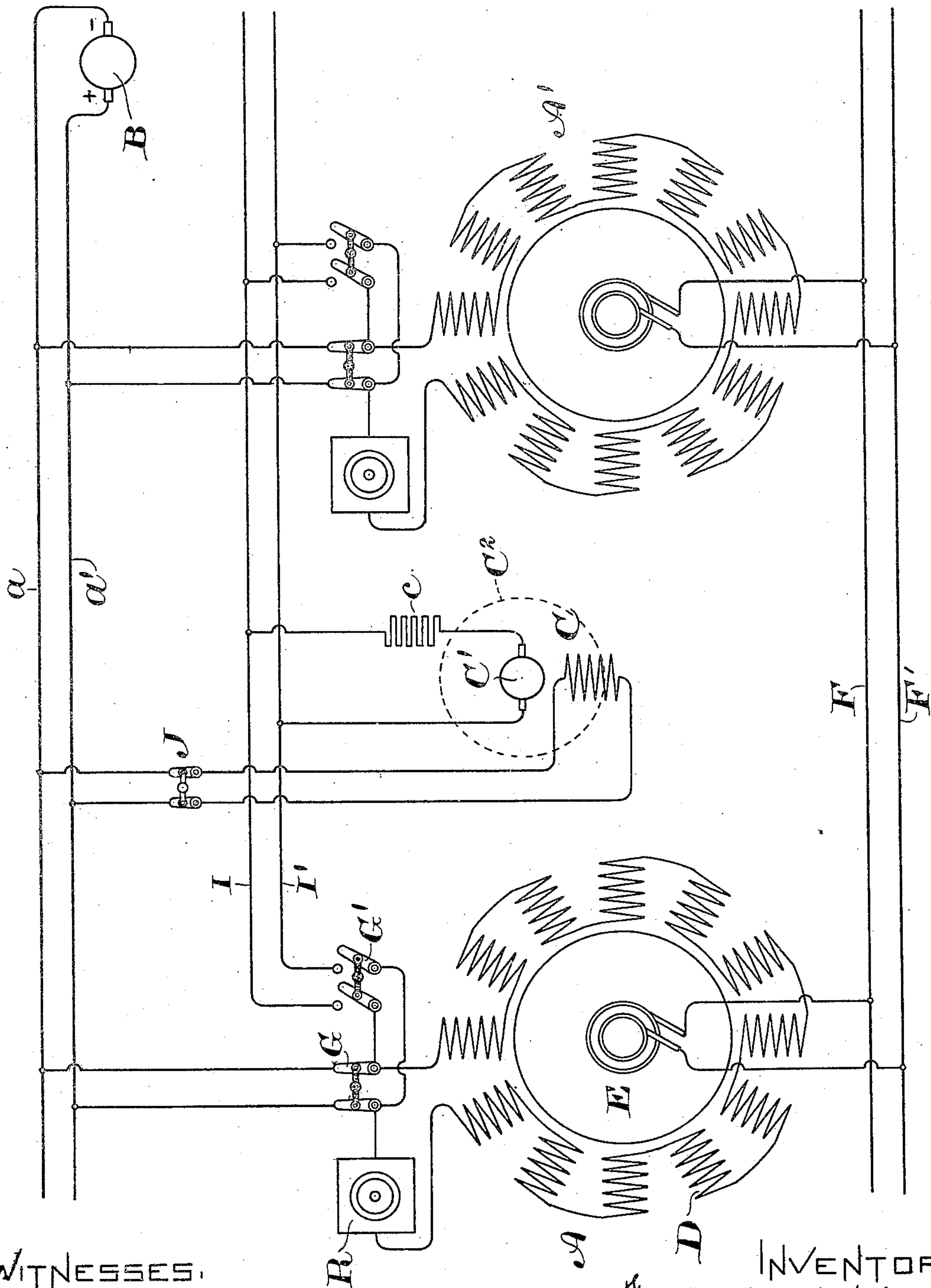
(No Model.)

F. MACKINTOSH.

MEANS FOR PREVENTING DESTRUCTIVE FIELD MAGNET DISCHARGES.

No. 577,141.

Patented Feb. 16, 1897.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

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MEANS FOR PREVENTING DESTRUCTIVE FIELD-MAGNET DISCHARGES.

SPECIFICATION forming part of Letters Patent No. 577,141, dated February 16, 1897.

Application filed October 31, 1896. Serial No. 610,676. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK MACKINTOSH, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Means for Preventing Destructive Field-Magnet Discharges, (Case No. 418,) of which the following is a specification.

When dynamo-electric machines are shut down and the field-circuit interrupted, an electromotive force is induced in the coils of the field-winding by the dying out of the magnetism, the voltage of which is often many times greater than that of the exciting-current. This is extremely liable to destroy the insulation of the field-spools.

In machines of large size having many poles the "kick," as it is called, is often very great, which renders it necessary to provide some means—as an incandescent lamp, for example—to consume the energy thus produced. This method has proven in actual practice to be very unsatisfactory. As many as eighteen lamps in series have been blown in pieces by the discharge from a machine of this type, which, as will readily be seen, is unsatisfactory and expensive.

The present invention has for its object to provide means for preventing the destructive discharge from the field-magnet coils.

In carrying out the invention a source of electromotive force is provided of such a character that when connected across the terminals of the field-circuit and the exciting-circuit interrupted it sends a current through the field-coils in the same direction and at a potential approximately equal to that of the exciting-current, but which gradually decreases to zero, permitting the field to die out in a natural manner without any destructive kick.

In the accompanying drawing, attached to and made part of this specification, A A' are alternating-current generators provided with a number of field-magnet coils receiving their energizing-current from the bus-bars *a a'*, supplied by means of the direct-current exciter B. While only two alternators are shown, it is to be understood that the inven-

tion contemplates using any number of generators and supplying their exciting-current from one or more exciter-dynamos.

In circuit with the field-coils D of each machine is an adjustable rheostat R, adapted to vary the field excitation of the dynamos for regulating their output. The armatures E are connected in multiple with the bus-bars F F', from which feeders extend to the external or work circuit. Each field-circuit is provided with a double-pole switch G, and extending therefrom are leads to the switches G'. The latter are to close the circuit between the supplementary bus-bars I I' and the field-circuit.

C is an auxiliary machine having its field-coil supplied with current from the exciter B by means of leads extending from the bus-bars *a a'*. Included in these leads is a double-pole switch J for interrupting the circuit when the auxiliary machine C is not in use. The armature C' is permanently connected through a resistance *c*, which may be variable, with the bus-bars L L'. On the shaft of the armature C' may be mounted a fly-wheel C<sup>2</sup> (shown in dotted lines) for preventing the too sudden slowing down of the armature after a load is thrown thereon.

Assuming that it is desirable to shut down the machine A, the switch J is closed for the purpose of supplying exciting-current to the field-magnets of machine C. The switch G' is then closed, which includes the armature C' in multiple circuit with the field D of the machine A. After the armature C' obtains its maximum speed the switch G is opened, disconnecting the field-coils D from the exciter B. The armature C' now revolving by its momentum in a magnetic field produces a current which flows through the field-coils D in the same direction as that of the exciting-current and at a potential substantially equal thereto. As the speed and current of the armature C are reduced, the field-magnetism dies out slowly, preventing any sudden discharge of the field-coils.

Assuming that the potential of the main excited current is one hundred volts, there is a counter electromotive force generated in the armature C' amounting, for example, to



ninety-five volts, which, as soon as the exciting-circuit is interrupted, sends a current through the field-coils D, maintaining the same direction of magnetization as the main exciting-current. The difference in voltage between the exciting-circuit and the voltage of the armature C' being so slight, no spark is occasioned when the switch G is opened.

It is within the spirit of my invention to employ a storage battery or other similar apparatus in place of the machine C, the essential feature being to provide an electromotive force acting to pass current through the field-coils D in the same direction as that of the main exciter, with means for gradually reducing the electromotive force to zero.

An advantage to be derived from the present invention is that higher exciting-potentials may be employed, with the consequent economy in field-winding and regulators.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The art of preventing destructive discharge from field-magnet coils, which consists in including in circuit with the field-magnet coils and the exciter a secondary source of electromotive force, interrupting the circuit of the exciter causing the secondary source of electromotive force to energize the field-coils, and decreasing the secondary electromotive force.

2. As a means of preventing destructive discharge from field-magnet coils, the combination of an exciter supplying current to the field-magnet, a source of secondary electromotive force in circuit with the exciter, means for interrupting the exciter-circuit causing the secondary source of electromotive force

to energize the field-coils, and means for decreasing the secondary electromotive force. 40

3. As a means for preventing destructive discharge from field-magnet coils, the combination of an exciter supplying current to the field-coils, a dynamo-electric machine in circuit therewith, and a switch for interrupting the exciter-circuit and causing the motor to act as a generator and supply current to the field-coils. 45

4. As a means for preventing destructive discharge from field-magnet coils, the combination of an exciter supplying current to the field-coils, a motor having its armature included in circuit with the field-coils to be discharged, field-coils for the motor excited from a suitable source of energy, and a switch for interrupting the exciter-circuit and causing the motor-armature to supply current to the field-coils in circuit therewith. 50 55

5. In combination, a plurality of dynamo-electric machines receiving their exciting-current from a common source, a motor having its field-magnets excited from a source of constant potential, switches for including the armature of the motor in the field-circuit of any of the dynamo-electric machines, and a switch for interrupting the exciting-circuit of the machine to which the armature is connected, and causing the armature to supply current to the field-coils of the machine. 60 65

In witness whereof I have hereunto set my hand this 23d day of October, 1896. 70

FREDERICK MACKINTOSH.

Witnesses:

B. B. HULL,  
E. W. CADY.