

(No Model.)

2 Sheets—Sheet 1.

J. FERRAND.

REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 529,117.

Patented Nov. 13, 1894.

FIG - 3 -

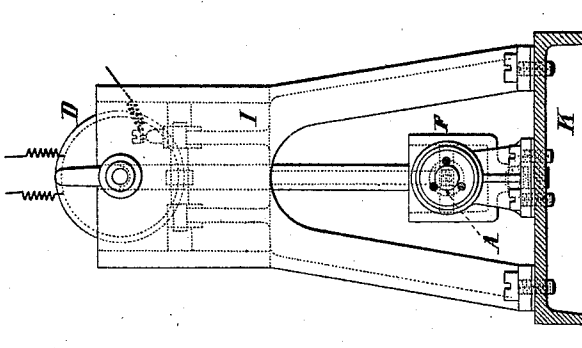
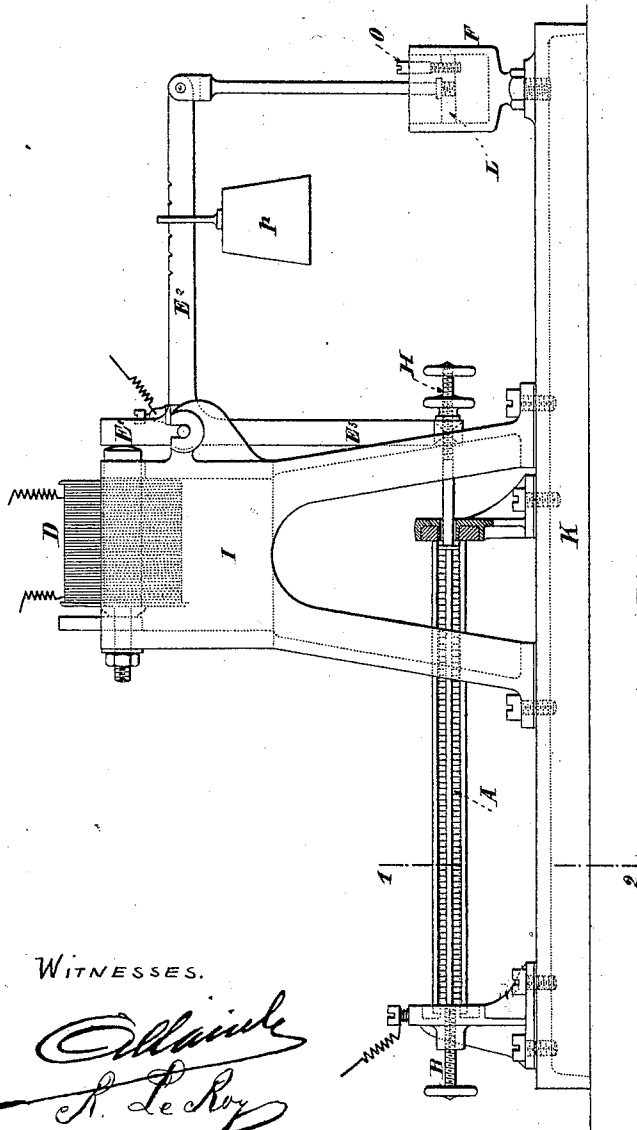


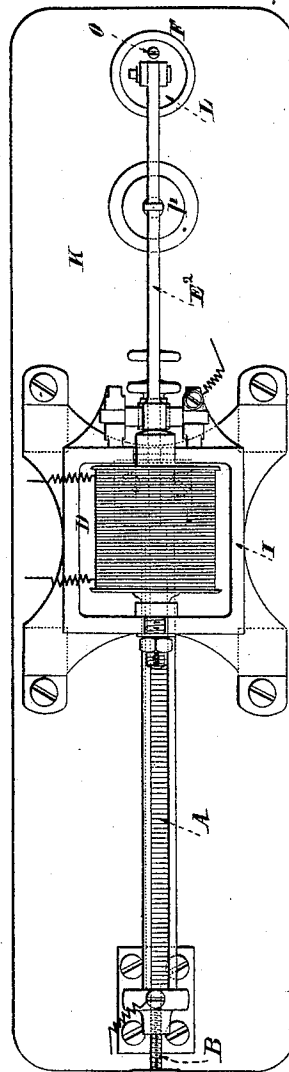
FIG - 1 -



WITNESSES.

Witness
A. Le Roy

FIG - 2 -



INVENTOR
Jules Ferrand
BY *Brisson & Knapp*
ATTORNEYS.

(No Model.)

2 Sheets—Sheet 2.

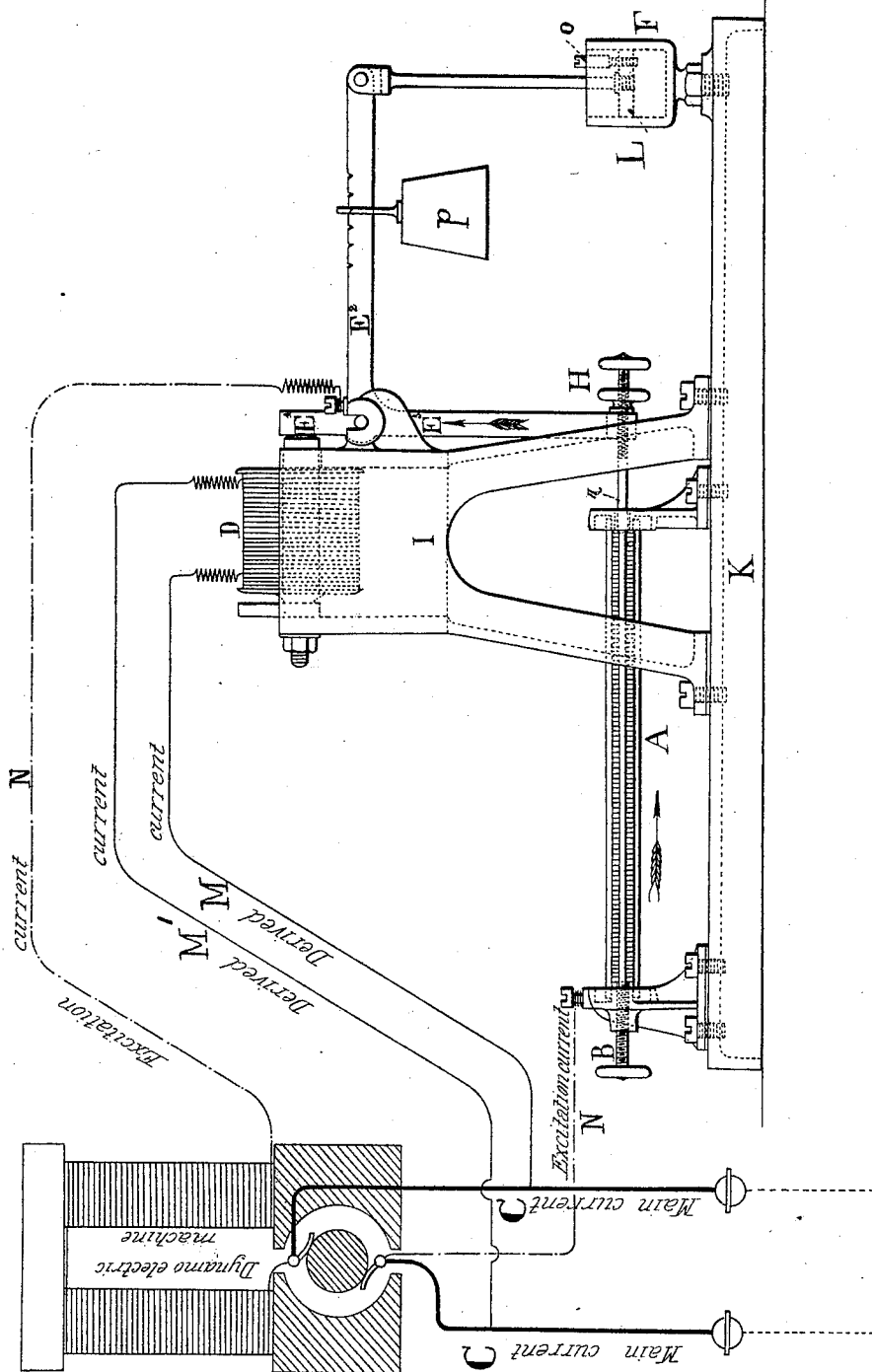
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FIG. 4—



Witnesses.

Harry M. Smith
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UNITED STATES PATENT OFFICE.

JULES FERRAND, OF DARNETAL, FRANCE.

REGULATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 529,117, dated November 13, 1894.

Application filed July 3, 1891. Serial No. 398,336. (No model.) Patented in France December 29, 1890, No. 210,436; in Belgium June 25, 1891, No. 95,420; in England June 25, 1891, No. 10,843; in Italy June 25, 1891, No. 29,979/499; in Switzerland June 25, 1891, No. 3,699, and in Germany June 26, 1891, No. 62,433.

To all whom it may concern:

Be it known that I, JULES FERRAND, of Darnetal, (Seine-Inférieure,) in the Republic of France, have invented a new or Improved
5 Regulator with Carbons for Dynamo-Electrical Machines and for Electrical Currents, (for which I have obtained Letters Patent of France for fifteen years, No. 210,436, dated December 29, 1890; Letters Patent of Belgium,
10 No. 95,420, dated June 25, 1891; Letters Patent of Great Britain, No. 10,843, dated June 25, 1891; Letters Patent of Italy, No. 29,979/499, dated June 25, 1891; Letters Patent of Switzerland, No. 3,699, dated June 25, 1891, and Letters
15 Patent of Germany, No. 62,433, dated June 26, 1891;) and I do hereby declare that the following is a full and exact description thereof, reference being made to the accompanying drawings.

20 My invention has for its object the automatic regulation of electrical generators for multiple arc distribution, to automatically compensate for variations in the number of translating devices, such as lamps, in circuit,
25 variations in the speed of the generator, &c.

The invention consists mainly in combining with a shunt dynamo a regulator of the character hereinafter described, and having
30 one or more carbon columns through which the exciting current passes, and the resistance of which is controlled in the manner to be described.

The invention consists further in the regulator to be described, independently of its
35 connection with a dynamo or other special apparatus.

When the regulator is employed for the regulation of a dynamo-electric machine for the production of electric light and distribution in
40 multiple arc, and with a single winding in the field magnet coils, the regulating lever is extremely sensitive to the variations of intensity in the main current and the regulation is effected instantaneously, notwithstanding the
45 variations in the speed of the motor and independently of the greater or smaller number of lamps operated.

Referring to the accompanying drawings, in which like letters indicate similar parts,
50 Figure 1 is a side elevation of my improved

regulating device in connection with a carbon column. Fig. 2 is a plan view of the same. Fig. 3 is a side view, partly in section on line 1—2 of Fig. 1; and Fig. 4 is a side elevation showing various circuits and their connection with the regulating apparatus.

In said drawings K represents a base-plate to which is secured a standard I and oil or dash-pot cylinder F. In the upper part of the standard I is secured a regulating electro-magnet D, and on one side of this standard is pivoted a regulating lever composed of three integral or connected arms E', E², E³, the upward extending arm E' serving as an armature for the electro-magnet D and the
65 outwardly extending arm E² having pivoted thereto at its outer end a rod connecting with a piston L in the oil cylinder F. This arm E² also supports a counterbalance p. The piston L is perforated with a hole, the cross-
70 sections of which are increased or diminished by means of a screw O.

Upon the base K are secured in any desired manner, supports or arms provided with insulated bearings for a casing or frame carrying a column of carbon plates A. One end of this carbon column is adapted to bear or rest against a regulating screw B turning in a threaded nut or opening on the support for the carbon column. The other end of the
80 carbon column bears or rests against a rod r the outer end of which is threaded as shown at H, the threaded portion passing through a threaded opening in the lower end of the lever arm E³ and adjustable therein by means
85 of ordinary thumb screws as shown.

The current which it is desired to maintain continually in the main line is first predetermined and the screw B is adjusted to the proper point to produce the required field
90 magnet strength.

When a dynamo-electric machine is employed, as shown in Fig. 4, the exciting current passes from the dynamo to and through the carbon column and lever arm back to the
95 dynamo as shown at N N' in said figure.

From the main circuit there is a shunt circuit M M' leading to and through the electro-magnet D thus energizing it, as shown in Fig. 4.

When the current passing through the carbon column is maintaining the current required in the main line, the electro-magnet D will have a magnetic force dependent on the strength of the derived current and the construction of its coil. Under these circumstances, the magnetic force of the electro-magnet D will maintain the armature lever E' in a position of equilibrium corresponding to the predetermined pressure on the carbon column in the exciting circuit.

Assuming that a machine is regulated at one hundred volts and ten ampères for feeding twenty lamps in multiple, as long as the number of lamps remains constant the regulator has simply to compensate for irregularities in the speed of the generator, but suppose twenty more lamps be thrown into use: the line current will fall for an instant several volts when there is no automatic regulator, but with my regulator as soon as the potential begins to fall magnet D loses a little of its power, and weight P, overcoming the pull of the magnet, presses the carbons more closely together, thus reducing their resistance and allowing a stronger current to pass through the field magnet coils. This raises the main line current to one hundred volts and twenty ampères. If, on the other hand, some of the lamps are thrown out of circuit, the operation described will be reversed.

I do not limit myself to the precise form of generator shown, as the regulator can be applied to other machines for use in multiple are distribution.

What I claim as my invention is—

1. In a current regulator constructed to operate in connection with an electric genera-

tor, the combination with the wire carrying the field magnet exciting current, and carbon column A interposed in said wire and through which the exciting current passes, of means for automatically regulating the pressure upon the carbon column, consisting of a shunt circuit, electro-magnet D therein and adapted to be energized by a derived current, armature arm E', pressure arm E³, made integral with said arm E', adjusting rod H r at one end of said arm E³ adapted to bear against one end of the carbon column, and weighted lever arm E² made integral with arms E' E³, all substantially as described and for the purposes set forth.

2. The combination in a regulator of a standard I, magnet D supported thereby, a three armed pivoted lever E', E², E³, arm E' serving as an armature for said magnet, a weight on the arm E², a pressure or contact device carried by arm E³, and the carbon column A, all arranged, substantially as described.

3. The combination in a regulator of the standard I, magnet D supported thereby, a three armed pivoted lever E', E², E³ serving as an armature for said magnet, a movable weight on the arm E², a pressure or contact device carried by arm E³, the carbon column A, and the dash-pot, all arranged substantially as described.

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

JULES FERRAND.

Witnesses:

O. MAINE,
R. LE ROY.