

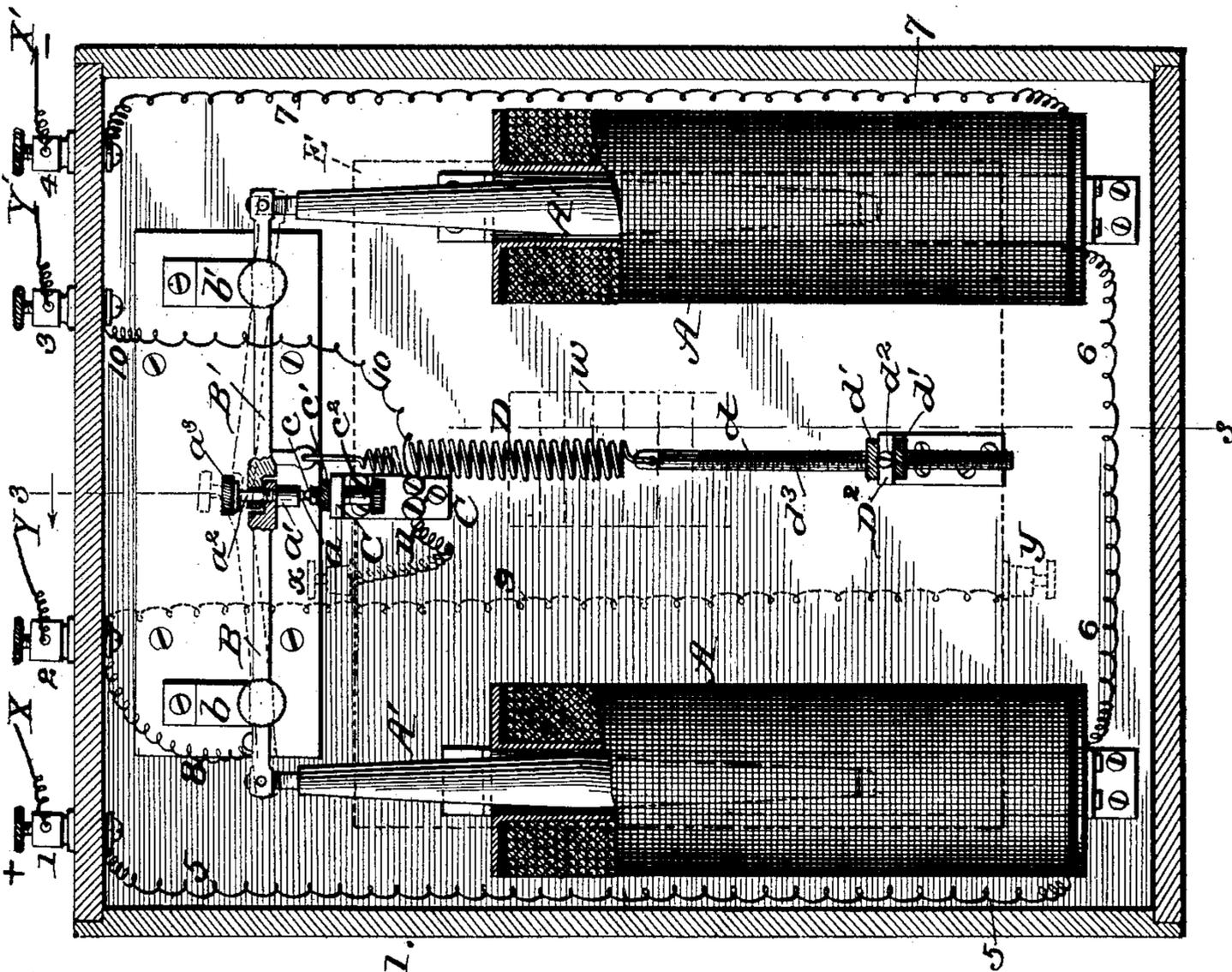
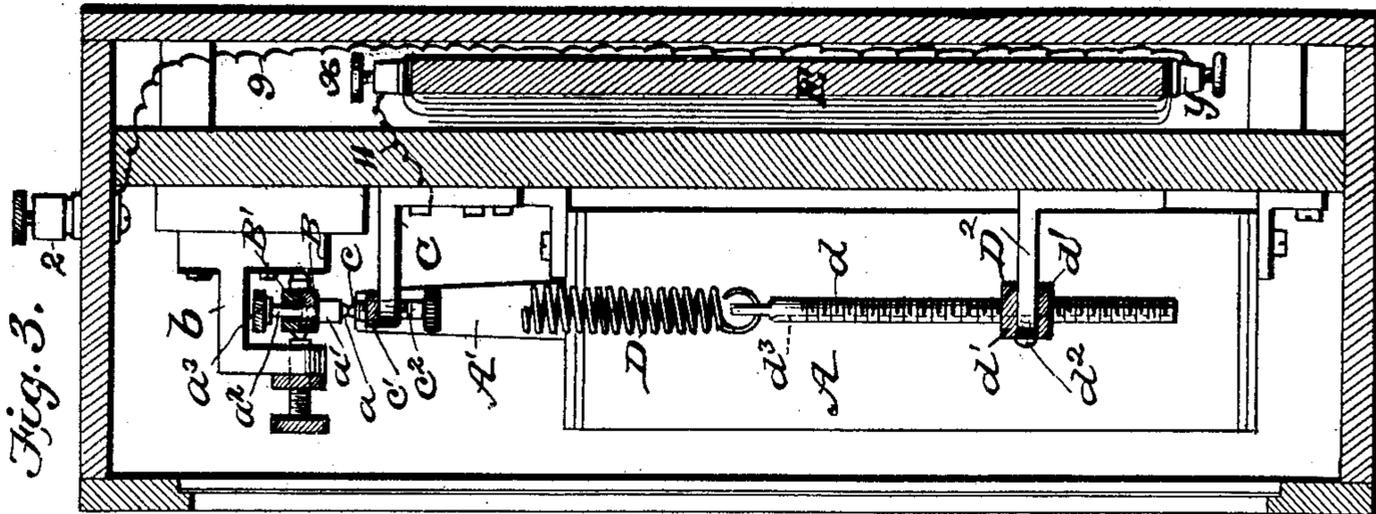
(No Model.)

2 Sheets—Sheet 1.

A. A. & P. S. TIRRILL.
AUTOMATIC POTENTIAL REGULATOR FOR DYNAMOS.

No. 596,923.

Patented Jan. 4, 1898.



WITNESSES:
Joe A. Ryan
Edw. W. Byrne.

INVENTORS
Allen A. Tirrill.
Phil. S. Tirrill
BY *Munn & Co.*

ATTORNEYS.

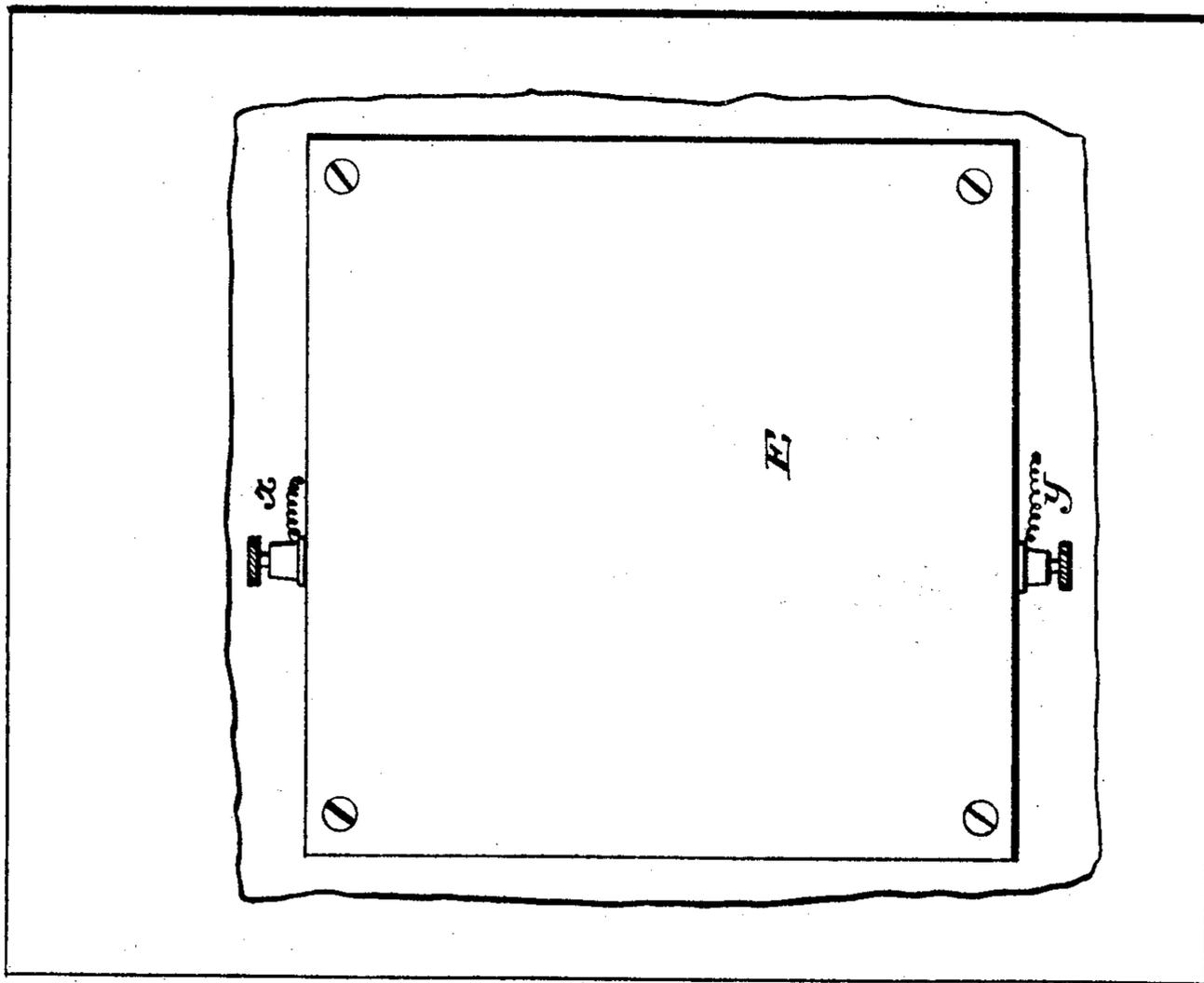
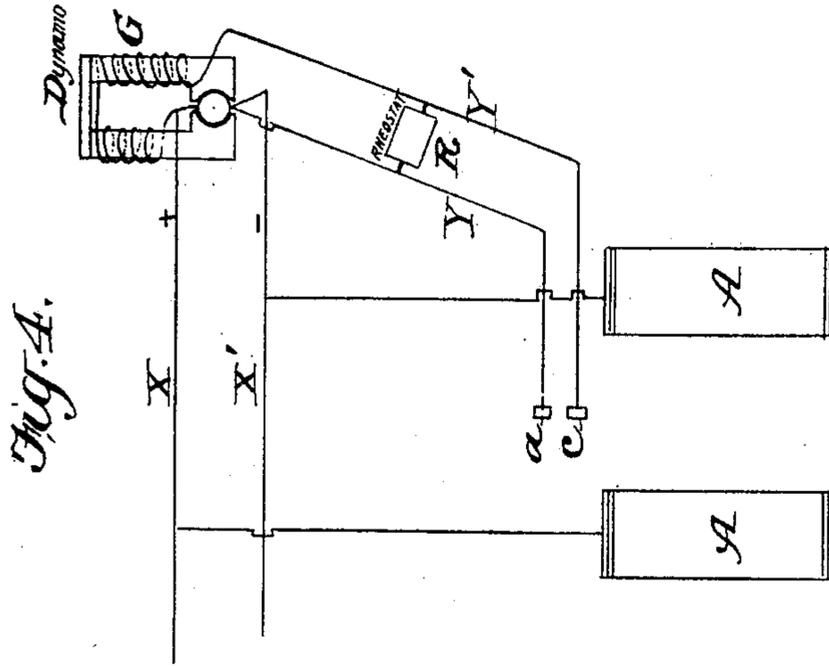
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Fig. 2.

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UNITED STATES PATENT OFFICE.

ALLEN A. TIRRILL, OF WHITEFIELD, AND PHILL S. TIRRILL, OF GROVETON,
NEW HAMPSHIRE.

AUTOMATIC POTENTIAL-REGULATOR FOR DYNAMOS.

SPECIFICATION forming part of Letters Patent No. 596,923, dated January 4, 1898.

Application filed May 1, 1897. Serial No. 634,687. (No model.)

To all whom it may concern:

Be it known that we, ALLEN A. TIRRILL, of Whitefield, and PHILL S. TIRRILL, of Groveton, in the county of Coos and State of New Hampshire, have invented a new and useful Improvement in Automatic Potential-Regulators for Dynamos, of which the following is a specification.

The object of our invention is to provide a regulator or governor for a dynamo-electric machine which shall automatically regulate the potential or voltage on the supply-wires so that an even potential shall always be maintained on said wires, notwithstanding the varying tax or demand made upon the supply-wires by the starting and stopping of electric motors or the throwing in or cutting out of electric lights or other use of the current.

Figure 1 is a front view of our regulator or governor, partly in section. Fig. 2 is a back view of a condenser employed in connection with our governor. Fig. 3 is a vertical section taken through line 3 3 of Fig. 1, and Fig. 4 is a diagram showing the relation of the principal parts of our governor to the main supply-wires and the shunt-circuit wires of the dynamo.

In the drawings, A A represent the hollow coils of two solenoids arranged in vertical position and fixed within a suitable case. In the centers of these hollow coils there vibrate freely the soft-iron cores A' A', made, preferably, of laminated wire and in double conical form, tapering from the largest diameter in the middle toward both ends. The tops of these cores are jointed to and suspended from the outer ends of delicately-balanced levers B B', of metal, which are fulcrumed upon pivots within frames b and b', and at their inner ends are lapped for a loose jointed connection.

The lever B has fixed to it at its inner end a metal boss a', carrying a platinum contact-face a, which boss is connected to the lever B by a screw-thread and has a stem a² extending loosely through a hole in the inner end of the other lever B' and at the upper end is screw-threaded and provided with an adjustable milled nut a³.

Just below the platinum contact-point a

there is another one, c, mounted upon the upper end of a screw c², which is tapped through a bracket-shaped metal plate C and is fixed in its position by a jam-nut c', the two platinum contact-faces being by this means made adjustable to or from each other.

The inner ends of the levers B B' work together with a loose articulation, and they are drawn downwardly by a spiral spring D, whose lower end is attached to a tension adjusting-screw d, held in a metal bracket D². This screw-stem is grooved longitudinally at d³ and is locked against turning by jam-nuts d' d' above and below the bracket-plate D² and a screw d², whose point enters the longitudinal groove d³ of the screw-stem.

1 2 3 4 are binding-posts. Of these, 1 and 4 connect, respectively, with the positive and negative wires of the supply-circuit and transmit the current through the coils of the two solenoids by wires 5 6 7.

The binding-post 2 is by wire 8 connected to the metal lever B and the contact-point a, while the other binding-post 3 is by wire 10 connected to the metal plate C and the other contact-point c. These two binding-posts 2 and 3 are connected, respectively, to the shunt-circuit wires Y Y' of the dynamo, or the wires which lead a part of the dynamo-current back into the same to regenerate its field-magnets. Fig. 4 shows in diagram these connections, where X X' represent the supply-wires, that extend along the line and connect with the opposite poles of the dynamo G and also with our solenoid-coils A A, while Y Y' are the shunt-circuit wires, which extend to the field-magnets of the dynamo to energize them. These shunt-circuit wires Y Y' have a rheostat R placed between them, but are connected with the contact-points a c of our governor, so that when these contact-points are closed the rheostat is cut out and a larger amount of current is sent to the field-magnets of the dynamo, which increases its power and raises the potential or voltage on the line or supply wires.

The automatic operation of our governor is as follows: If there should be from any cause a diminution of potential in the supply-wires X X', then the attractive influence of the solenoid-coils on their cores A' will be correspond-

ingly decreased and the spring D, whose tension is adjusted to act at any desired voltage by the adjusting devices below it, pulls down the inner ends of the levers B B' and closes contact between the points *a c*. This (see Fig. 4) cuts out the rheostat R in the shunt-circuit Y Y' and, by increasing the amount of current returned to the field-magnets of the dynamo, correspondingly increases its power and brings the potential of the line-wires up to normal, at which moment the increased attraction of the solenoid-coils overcomes the spring D and breaks the shunt-circuit at *a c* again. In this way the making and breaking of contact at the points *a* and *c* are so sensitively regulated in an automatic manner as to preserve a practically uniform potential on the supply-wires of the line at all times, regardless of the varying contingencies of use of the current drawn from said wires. To prevent sparking between the points *a c*, these terminals are connected to the opposite poles of a condenser E. (Shown in Figs. 2 and 3.) This is made in the usual way of alternating layers of tin-foil and insulating-sheets, and one pole, *x*, is connected by wire 11, Fig. 1, to the metal plate C and contact *c*, while the other pole, *y*, of said condenser is connected to the other contact *a* through wire 9, binding-post 2, wire 8, and lever B. This condenser not only prevents the sparking in closing and opening the contact-points *a c*, but it also gives a better action for the governor. As an equivalent for such condenser a Leyden jar might as well be used.

Instead of using a spring D to bring the contacts together graduated weights might be used, as shown in dotted lines at *w*. Instead of using two solenoids and two levers B B' only one of each might be used, but we prefer two, as giving a quicker, stronger, and more sensitive action and a better proportioned instrument.

We are aware of the British Patent No. 1,535, of 1889, and the United States Patent No. 354,273, and we make no claim to anything shown therein. Our invention is distinguished by our means for balancing the solenoid-core and adjusting the sensitiveness of the contacts of the field-magnet shunt, which is very necessary to the automatic regulation of the potential.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. An automatic potential-governor for dynamos, consisting of one or more vertical solenoid-coils, arranged in a branch of the main supply-circuit, a vertical core for each solenoid, a lever fulcrumed above and outside of

the solenoid and attached to and suspending the core of the solenoid, contact-points arranged as terminals to a shunt from the field-magnets of the dynamo, one of said contact-points being stationary, and the other mounted upon the lever and movable, and a spring and adjusting device attached to the said lever for balancing the solenoid-core and adjusting the sensitiveness of the contacts substantially as and for the purpose described.

2. An automatic potential-governor for dynamos, consisting of a case having a vertical partition, one or more solenoid-coils mounted in vertical position on one side of said partition and having its wires arranged in a branch of the main supply-circuit, a core for the solenoid, and a lever fulcrumed outside of and above the solenoid and attached to and supporting the core of the solenoid, contact-points arranged as terminals to a shunt from the field-magnets of the dynamo, one of said contact-points being stationary and the other mounted upon the lever and movable, a spring and adjusting devices attached to said lever for balancing the solenoid-core and adjusting the sensitiveness of the contacts, and a condenser arranged vertically on the opposite side of the partition from the solenoid, said condenser having its opposite terminals connected to the opposite contacts of the shunt from the field-magnets substantially as and for the purpose described.

3. An automatic potential-governor for dynamos, consisting of two vertically-arranged solenoids with cores, a pair of levers loosely connected to each other in the middle and to the cores at their outer ends, a spring for pulling down the inner ends of said levers, two contact-points, one carried by the said levers, and the other by an adjusting-screw, and means for regulating the tension of the spring substantially as and for the purpose described.

4. The combination of the vertical solenoids A and cores A', the horizontal levers B B' lapped and loosely connected in the middle and provided with boss *a'*, contact-point *a*, stem *a*² and nut *a*³, the adjustable screw *c*² carrying contact-point *c*, tension-spring D for the levers, and the tension regulating and locking devices, consisting of the longitudinally-grooved and screw-threaded stem *d*, bracket-plate D², nuts *d'* *d'* and screw *d*², and circuit-wires, all arranged substantially as shown and described.

ALLEN A. TIRRILL.
PHILL S. TIRRILL.

Witnesses:

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EDWD. W. BYRN.