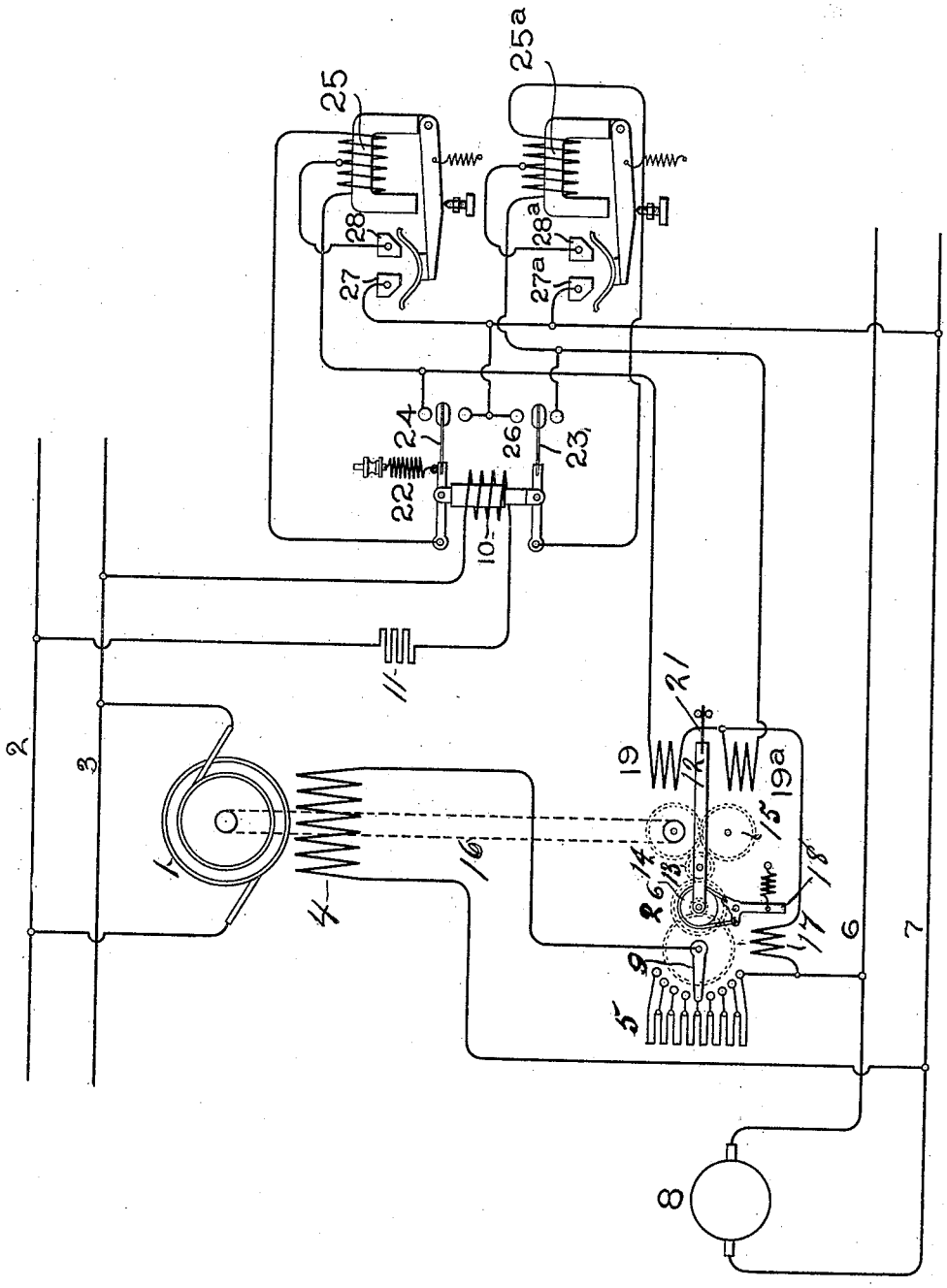
No. 648,493. Patented May 1, 1900.

E. M. HEWLETT.

REGULATING DYNAMO ELECTRIC MACHINES.

(Application filed Oct. 27, 1899.)

(No Model.)



Witnesses.

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UNITED STATES PATENT OFFICE.

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REGULATING DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 648,493, dated May 1, 1900.

Application filed October 27, 1899. Serial No. 734,917. (No model.)

To all whom it may concern:

Be it known that I, EDWARD M. HEWLETT, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Regulating Dynamo-Electric Machines, (Case No. 957,) of which the following is a specification.

The object of the invention is to promote a sparkless interruption of current at the contacts of electric relays.

The invention is particularly designed for operation in connection with the regulation of dynamo-electric machines where the potential of the circuit controlled by the relay-contact is sufficient to cause vicious sparking, which demands special provisions for quieting said sparking. The invention, however, is of general application and may be applied in any cases in which it is desirable to reduce the sparking at the contact-points where a circuit is broken.

The drawing exemplifies an application of the invention to a system of alternating-current distribution where the relay is controlled by the potential of the distribution-circuit and governs by its contacts the field-magnet strength of the generator.

In the diagram which illustrates the invention, 1 represents an alternating-current generator the ring-contacts of which connect with bus-bars 2 3 in electric continuity with a system of current-distribution.

4 represents the field-magnet of the generator, in circuit with which is a variable resistance 5, more or less of which may be included in circuit with the field-magnet across the leads 6 7 of a direct-current exciter 8. The amount of resistance in circuit, and therefore the strength of the field-magnet of the generator, depends upon the position of a switch-lever 9 under the ultimate control of a potential-coil 10, connected across the bus-bars or distributing-mains and having in series therewith an ohmic resistance 11. The action of the potential-coil 10 serves to energize one or the other of two electromagnets 19 19^a, which serve to raise or depress a lever 12 and throw a gear-wheel 13 into operative relation to one or the other of two gears 14 15, geared together and therefore rotating in opposite directions. The train of gearing 14 15 is operated by a pulley connected by a belt 16, driven by the shaft of the movable element of the generator. The gearing which regulates the rheostat is governed by a coil 17, which coöperates with an armature 18, and thereby governs the strap-brake 20, which serves instantly to lock or release the gearing at the proper moment and prevent overadjustment of the rheostat due to the inertia of the parts. The lever 12 carries a flexible spring 21, which plays between two stops, as indicated in the drawing, and serves by its resiliency to center the parts and normally maintain the gear 13 out of active relation with either drive-wheel. The coil 10 may be placed in shunt to the main circuit at or near the generator or may be connected with a distant part of the distributing system. The latter arrangement is preferable for overcompounding and the former for straight compounding. The ohmic resistance 11 in series with the coil 10 is made large relatively to that of the coil in order to prevent material change in the pull of the coil-core under small changes of frequency in the alternating-current circuit. The brake-controlling coil 17 is in a branch of the circuit common to both coils 19 19^a, which control the operation of the rheostat. The coils 19 19^a are cut in or out by the movable contacts 23 24 of the relay. Thus for a determinate increase or decrease of potential one or the other of these coils is energized and the gearing with the rheostat thrown into action in a proper relation to increase or decrease the strength of the field-magnet of the generator to compensate for the fluctuation of potential.

In order to obviate sparking at the relay-contacts, I provide a magnetically-controlled device by which when the relay operates a shunt-circuit is completed around its points of contact, in which is interposed a magnetic releasing device which will hold it closed until after the relay-contacts have opened. The relay is exemplified at 21, being shown as provided with a retractile spring 22. It comprises two insulated contact-levers 23 24, each coöperating with front and back contact-stops. The front stops have a common connec-

tion leading to one terminal of the exciter-circuit, and the back stops connect, respectively, with the terminals of two interrupter-coils 25 25ª. These coils control an armature adapted to bridge two heavy contact-terminals which can safely carry the spark and which are respectively connected to middle points of the coils 25 25ª and the return branch of the exciter-circuit. Thus when the relay is actuated under fluctuation of electromotive force—say by a determinate reduction thereof—the spring 22, or it may be the opposing coil, will bring the relay-contact 23 into engagement with its front stop, thereby closing a circuit from the terminal 6 of the exciter-circuit by way of the field-magnet-regulating coil 19ª, thence by the interrupter-coil 25ª, relay-contact 23, and front stop 26 to the return-main of the exciter-circuit. The contacts 27ª 28ª are then bridged by the armature controlled by the coil 25ª, completing a shunt around the relay-contacts by way of contact 27ª, bridge-piece, contact 28ª, and one-half of the controlling-coil 25ª to contact 23. When the relay-contacts open, one-half of the coil 25ª remains in circuit by way of terminal 6 of the exciter-main, coil 19ª, one section of the coil 25ª, and contact-terminals 28ª and 27ª to main 7. When the relay-contact strikes its back stop, the other section of coil 25ª draws current by completing a branch through contact 23 and its back stop to the supply-main 6. The two sections of coil 25ª oppose one another and its armature is released, opening the circuit without arcing. A similar action takes place with regard to the relay-contact 24. The two contact-levers are so set that on the circuit being opened by one of them it may not be closed by the other. This may be done, as will be seen in the diagram, by placing the levers so that the front stop of the upper one will not engage when the other engages its back stop. Thus by the use of the relay sensitiveness of action may be obtained for the potential-coil, and controlling-currents of considerable strength may be used for operating the rheostat devices.

While I have described my improved form of relay with reference to a particular application in which it may be advantageously employed, it will of course be understood that it may be employed in any case where the potential of the circuit or circuits governed by the relay and the amperages carried are sufficient to produce damaging arcing, the essential point to my invention being the protection of the circuit-opening contacts by auxiliary contacts in parallel relation and electrically-operated means for holding the circuit closed until the relay-contacts have separated.

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

1. A relay having its contacts protected by an auxiliary circuit-breaker controlled by the relay having its contacts in parallel relation to the relay-contacts, and electromagnetic means for holding the circuit closed until after the relay-contacts have separated.

2. An antisparking device for a relay, consisting of a circuit-breaker magnetically controlled by the relay, having its contacts in parallel with the relay-contacts, and connections with the relay back stop for demagnetizing the operating-coil of the circuit-breaker.

In witness whereof I have hereunto set my hand this 26th day of October, 1899.

EDWARD M. HEWLETT.

Witnesses:
BENJAMIN B. HULL,
MABEL E. JACOBSON.