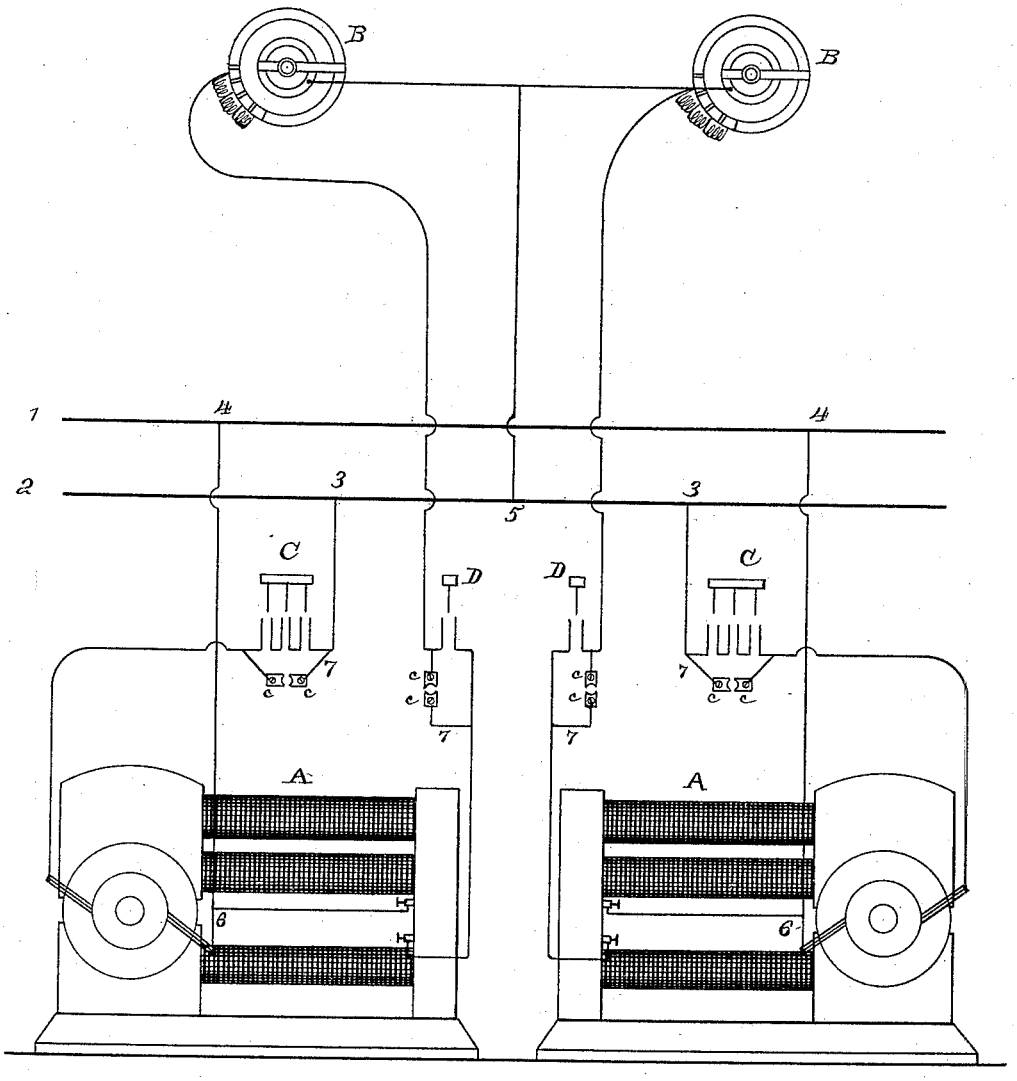
(No Model.) 2 Sheets—Sheet 1.

T. A. EDISON.

CIRCUIT CONTROLLER FOR DYNAMO ELECTRIC MACHINES.

No. 395,123. Patented Dec. 25, 1888.

Fig. 1.



ATTEST:

E. C. Rowland

K. W. Lemly

INVENTOR:

Thomas A. Edison,

By Rich'd N. Dyer

Atty.

(No Model.) 2 Sheets—Sheet 2.

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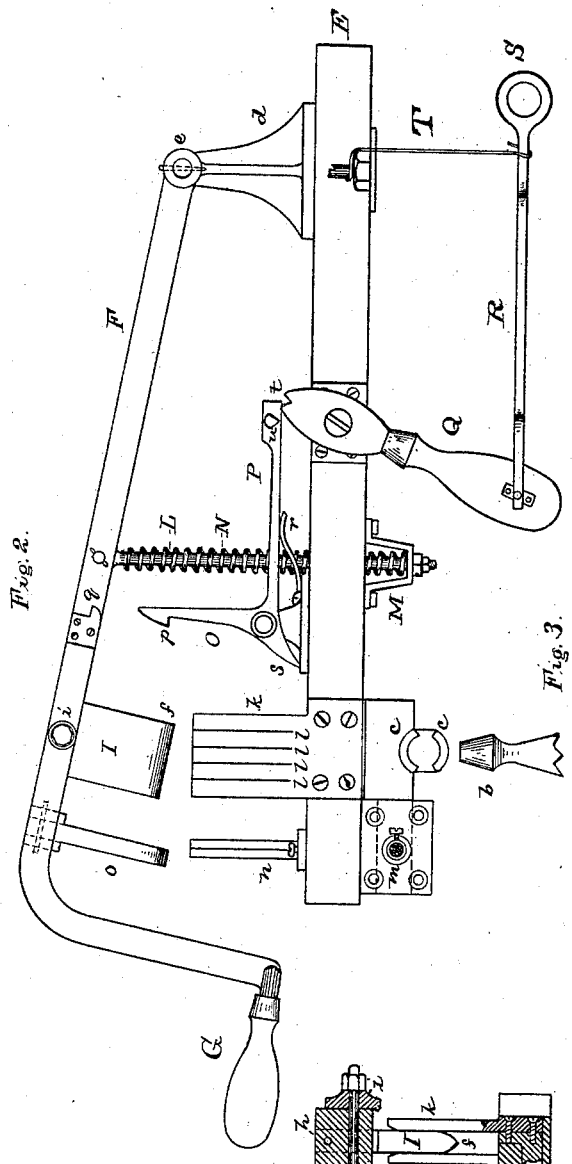

Fig. 2.

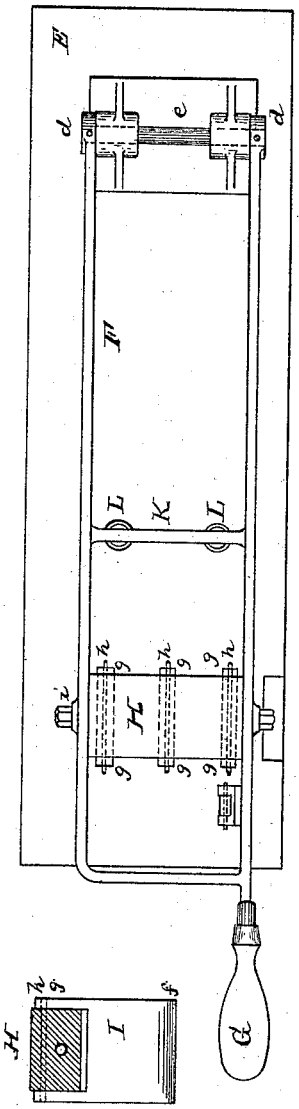

Fig. 3.

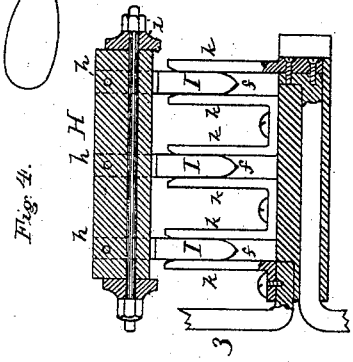

Fig. 4.

Fig. 5.

ATTEST:

E. C. Rowland

W. W. Seely

INVENTOR:

Thomas A. Edison,

By Rich'd N. Dyer

Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, ASSIGNOR TO THE EDISON ELECTRIC LIGHT COMPANY, OF NEW YORK, N. Y.

CIRCUIT-CONTROLLER FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 395,123, dated December 25, 1888.

Application filed March 16, 1883. Serial No. 88,355. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Circuit-Controllers, (Case No. 543,) of which the following is a specification.

The object of this invention is to provide a simple and efficient switch or circuit-breaker especially adapted for connecting and disconnecting the dynamo-electric machines employed for generating current in multiple-arc systems of electrical distribution. Each of such machines has its armature and its field-magnet in separate multiple-arc circuits from the same main conductors. When such a generator is removed from circuit it is necessary to break both its field and armature circuits and to break the latter before the former, for if the armature was left in circuit after the field-magnet was cut out the current from the other machines would pass through such armature and burn out its coils. And in connecting the machine the field-circuit should be closed somewhat in advance of the armature-circuit so that the generation of current may begin immediately upon the closing of the latter. It is desirable also that the breaking or closing of both circuits should be accomplished by the same movement.

My invention therefore consists mainly in a circuit-breaker adapted to break two circuits by the same movement, and also to break one of such circuits before the other, such circuit-breaker being also provided with means for locking it when closed and for instantaneously releasing it and breaking the circuit when desired, means for preventing spark and heating at the contacts, and means for maintaining, if desired, a constant field of force in each generator, such means being in addition to the closing of the field-circuit before the armature-circuit by the circuit-controller, the construction of the whole apparatus being such as to insure efficient action in all respects.

Said invention is illustrated in the annexed drawings, in which—

Figure 1 is a diagram illustrating the connections; Fig. 2, an elevation of a circuit-breaker; Fig. 3, a top view of the same; Fig. 4, a sectional view illustrating the contacts for making and breaking the armature-circuit, and Fig. 5 a view of one of the contact-plates.

A A are dynamo-electric machines and 1 2 are main conductors. The armature of each machine is in a multiple-arc circuit, 3 4, from said main conductors and the field-magnets of each are in a circuit, 5 6. Each of said field-circuits contains an adjustable resistance, B, for regulating the generation of current.

In Fig. 1, C C are switches for the armature-circuits and D D for the field-circuits. While in this figure the armature and field switches are shown separately for clearness, it is to be understood that they are parts of the same mechanism and are operated by the same movement, as will be hereinafter set forth. Around the switch in each circuit is formed a shunt, T, which is opened and closed by the withdrawal or insertion of a plug, *b*, between contact-plates *c c*. These plugs are termed "guard-plugs" and are inserted to prevent heating at the circuit-breaking contacts. The field guard-plug may in addition be used for the purpose of maintaining a constant field. Such plug would be inserted sometime before the circuit-controller is closed, so that current may pass through the field and raise it to its normal strength before the armature-circuit is closed. The plug may be kept in circuit after the circuits are broken. The armature guard-plug must, however, be withdrawn before breaking the circuits.

The circuit-controlling mechanism for the field and armature circuits of a generator is mounted on a suitable insulating-base, E. Near one end of said base are placed suitable standards, *d d*, supporting a shaft, *e*, on which is pivoted the frame F, which is provided with a handle, G. A cross-piece, H, of insulating material, is held by a rod, *i*, passing across said frame and through said cross-piece. The latter carries the contacts for making and breaking the armature-circuit. Each of said contacts is a metal plate, I, having its end *f* rounded or beveled off and its upper portion forked, forming the two parts *g g*, one passing on each side of the cross-piece H. A pin,

h, passes through the forked extremities and the cross-piece H, forming a pivot, so that the contact-plate has a slight swinging movement. These contact-plates, when the frame F is pressed down, enter between contacts mounted on the base E. These are metal plates *k k*, set upright on the base, so that the movement of the contact-plates I opens and closes circuit at three points, thus diminishing the spark. The conductor 3 of the armature-circuit is broken at this point, its ends being attached to the two end plates, *k*, one part of said conductor passing through the base E, as shown. Each plate *k* is divided, as shown at *l l*, into several parts, so that such plates are elastic and will make good contact at every point with the plates I. The upper and inner edges of the plates *k* are beveled, so that the plates I can readily enter between them, such plates I also being pivoted, as described, for the same purpose. The wire 6 of the field-circuit is also broken, and one terminal is connected at the point *m*, from whence a conductor passes through base E to contact-plate *n*. Only one of such contact-plates is shown; but it is understood that a similar one is placed behind it. A contact-piece, *o*, carried by the frame F, makes and breaks connection between these contact-plates. A shunt, 7, around the contacts *k k* runs to the plates *c c*, and the guard-plug *b* is inserted between these plates for the purpose above mentioned. A similar guard-plug is provided for the field-circuit. The contact-piece *o* is, as shown, somewhat longer than the plates I, so that the field-circuit is closed somewhat before and broken somewhat after the armature-circuit. Attached to another cross-piece, K, of the frame F are two rods, L L, which pass through the base E and terminate in brackets M beneath said base. Each of such rods is surrounded by a spiral spring, N, which opposes the downward movement of frame F.

A spring-catch, O, is provided for holding the frame F when the latter is pressed down, the projection *p* engaging with the projection *q* upon said frame, the spring *r* pressing against the arm P to throw the projection *p* into operative position, and the arm *s* acting to limit the movement of said arm P. Sometime before the circuit-controller is closed the field guard-plug may be inserted, so that when it is desired to connect the machine the field will already have reached its normal intensity. After the circuit is closed the lever Q, pivoted on base E, is thrown over, so that the notch *t* on such lever engages with the plate *u* on the arm P and prevents said arm from being pushed down. The arm R is then swung around until the ring S comes opposite the contact-plates *c c*, and the guard-plug *b* is passed through such ring and between said contact-plates. It is therefore rendered necessary to withdraw the guard-plug before the armature-circuit is broken, this arrangement being provided so that the circuit through the armature cannot be maintained after the field-circuit is broken, as otherwise the main conductors might be short-circuited.

The breaking of the circuits is accomplished after the armature guard-plug is withdrawn by throwing the notch *t* off from plate *u* and then pressing down arm P, which throws projections *p* and *q* out of engagement when the springs N throw the frame F up and break first the armature and then the field circuit.

The hooked wire T, or other suitable device, is used to support the arm R when the circuit is broken.

It is evident that this circuit-breaker may be used in any situation where it is desired to control two or more circuits by the same movements.

What I claim is—

1. The combination, with two or more dynamo-electric machines, each having its field-coils and its armature-coils in separate derived circuits from the same main conductors, of a circuit-breaker for each machine, controlling both its field and armature circuits by the same movement and breaking the latter before the former, substantially as set forth.

2. The combination, with a circuit-breaker for the field-circuit of a dynamo-electric machine, of a guard-plug in a shunt around the same, substantially as set forth.

3. In a circuit-controller, the combination, with two or more stationary contact-plates, of a pivoted arm carrying one or more pivoted or swinging contact-plates for closing circuit between said stationary plates, substantially as set forth.

4. In a circuit-controller provided with a guard-plug, the combination, with the arm carrying contact-plates, of a locking device for keeping the circuit closed, means for releasing said device, and means for preventing the operation of such releasing means before the withdrawal of the guard-plug, substantially as set forth.

5. In a circuit-controller provided with a guard-plug, the combination, with the spring-catch for locking the contact-carrying arm when the circuit is closed, of the arm for preventing the movement of said catch, said arm being held in position by the guard-plug and being operative only after the withdrawal of such guard-plug, substantially as set forth.

6. In a circuit-controller, the pivoted frame carrying swinging contact-plates, in combination with upright terminal plates between which said swinging plates enter to close circuit, substantially as set forth.

This specification signed and witnessed this 13th day of February, 1883.

THOMAS A. EDISON.

Witnesses:
H. W. SEELY,
EDWARD H. PYATT.