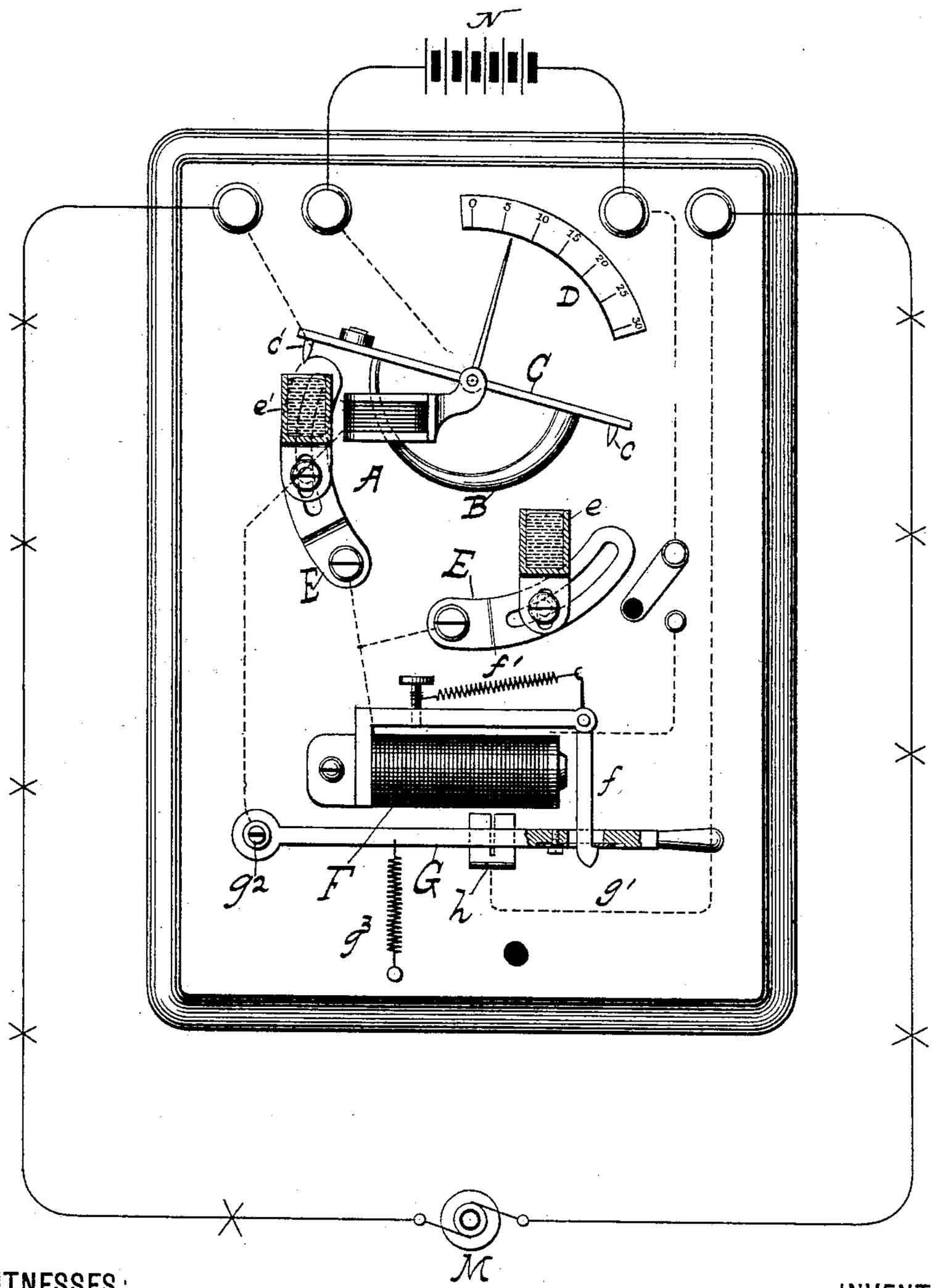
(No Model.)

E. R. KNOWLES.

AUTOMATIC ELECTRIC CUT-OUT.

No. 396,940. Patented Jan. 29, 1889.



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AUTOMATIC ELECTRIC CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 396,940, dated January 29, 1889.

Application filed September 25, 1888. Serial No. 286,328. (No model.)

To all whom it may concern:

Be it known that I, EDWARD R. KNOWLES, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have made certain new and useful Improvements in Automatic Electric Cut-Outs, of which the following is a specification.

The invention relates to automatic electric cut-outs for dynamo-electric machines of that particular class in which the main circuit is adapted to close a local circuit including a cut-out magnet.

The invention consists of a current-indicating apparatus of the kind described in my application filed September 25, 1888, Serial No. 286,329, in combination with a pair of contacts connected therewith, a pair of adjustable contacting devices, and a local circuit controlled thereby, and including a cut-out magnet, whereby the burning out of the armature of the dynamo or reversals of the dynamo or discharges of the battery through the circuit are prevented when for any cause the circuit may be short-circuited, grounded, or the dynamo stopped or slowed down.

In the accompanying drawing the figure represents a general view of the apparatus and circuits.

The indicating device consists of a solenoid, A, having a semicircular core, B, attached to a dipping arm or bar, C. The bar C carries a weight at one end to maintain the bar normally horizontal and a pointer which plays in front of a scale, D, to indicate the amount of current flowing. I have extended the bar C at each end, in order to attach contacting-points *c c*, which are usually pointed downward or at an angle. The purpose of these contacts will appear later on.

E represents racks or brackets of curved shape. These brackets carry ways or guides for a pair of mercury-cups, *e e'*, which are constructed to be adjustable at any position upon the guide.

F represents an ordinary electro-magnet acting upon its armature *f* in opposition to spring *f'*. The lower end of the armature is formed into a hook, and is adapted to pass through a slot in the lever G. The slot is slightly elongated and is partially covered on the under side by a sliding lid, *g'*, which may be adjusted in a longitudinal direction to insure the hook catching upon the lip, and thus holding the lever G. The lever is pivoted at g^2, and is pulled downward when released by a spring, g^3. When locked to the armature, the lever makes contact with the spring *h*.

The circuits are arranged as follows: The main circuit or the circuit to be controlled, which includes a dynamo, M, leads from the generator through translating devices to the solenoid A of the indicator, thence to the lever G, to contact g^2, to line, and back to generator. A local circuit generated by battery N flows through magnet F, then branches and terminates in each of the mercury-cups *e e'*. From the other side of battery the circuit leads to bar C of the indicator and terminates at each of the points *c*.

The operation of the device is as follows: The mercury-cups *e* and *e'* are adjusted upon the guide and set so that the dipping of the bar C in either direction beyond a certain limit will establish contact between one or the other of the extremities of the bar and its corresponding mercury contact. Now supposing the cup *e* to be adjusted so that its corresponding contact-point will connect with it when the indicator-points to 25 and the cup *e'* to be set so that contact will be made with it when the indicator points to 5, when the main current rises for any cause to the limit the local circuit will be closed and magnet F, drawing up its armature, will release the lever G, when it will immediately drop and break the main circuit at g^2. The same effect will be produced when the current in the main circuit drops to the limit. By this means the current can never rise to such an extent as to injure the dynamo, and can never fall below a fixed amount without opening the main circuit, and as the current never falls to zero the batteries cannot discharge through the dynamo, and the dynamo can never have its polarity changed.

Having described my invention, I claim—

1. A main circuit including the coils of a current-indicator, the movable element of said current-indicator provided with a pair of contacts, both of which connect with the same side of a local generator, a pair of adjustable

contacts adapted to connect with said pair of contacts upon the said moving element, said adjustable contacts being connected with the opposite side of said local generator.

2. The combination, with a main circuit and a local circuit, the main circuit including the coils of a current-indicator, and the local circuit including a magnet adapted to open the main circuit, the movable element of the current-indicator carrying two contact-points, forming one terminal of the local circuit, and two adjustable corresponding contacts forming the other terminal of said local circuit.

3. In an automatic cut-out, a pivoted arm carrying a contact on each side of its pivot, a curved support carrying corresponding adjustable contacts, an electro-magnetic device causing movement of the pivoted arm, a main circuit including said electro-magnetic device, and a local circuit including a magnet adapted to open the main circuit, the terminals of said local circuit being the pivoted arm and the curved support, substantially as described.

4. In combination with an electrical indicator carrying a pair of contacts, the said contacts adapted to move in a circular path, a curved track or guide, and a pair of contacts adjustable thereon.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EDWARD R. KNOWLES.

Witnesses:

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