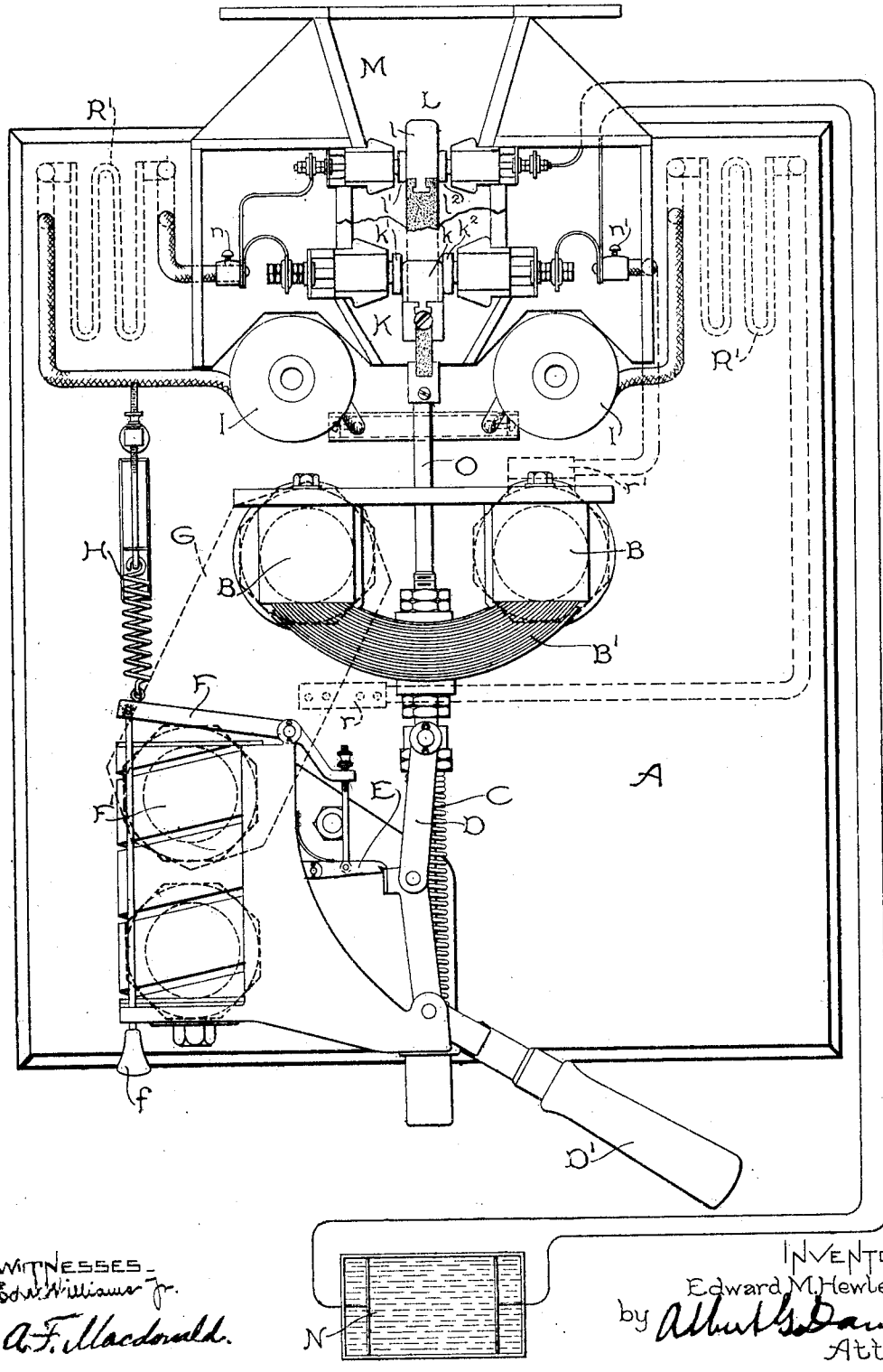
No. 752,552. PATENTED FEB. 16, 1904.

E. M. HEWLETT.

AUTOMATIC CIRCUIT BREAKER.

APPLICATION FILED NOV. 28, 1898.

NO MODEL.



WITNESSES-
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 752,552. Patented February 16, 1904.

UNITED STATES PATENT OFFICE.

EDWARD M. HEWLETT, OF SCHENECTADY, NEW YORK, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

AUTOMATIC CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 752,552, dated February 16, 1904.

Application filed November 28, 1898. Serial No. 697,576. (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, in the county of Schenectady and State of New York, have invented certain new and useful Improvements in Automatic Circuit-Breakers, of which the following is a specification.

My present invention relates to automatic circuit-breakers, and is particularly adapted to those of such large current capacity that the ordinary devices are insufficient to prevent injurious sparking.

In the ordinary automatic circuit-breakers a main switch or bridging contact of large current-carrying capacity is provided, over which the current normally passes. A shunt-circuit around the contact is provided of such resistance that little current normally flows therein with contacts for opening this latter circuit after the bridging contact has opened. All of such devices are customarily provided with magnetic blow-outs of one form or another. It is usual to place the blow-out coils in the shunt-circuit. This form of circuit-breaker has been found efficient and durable; but for large current capacities—as, for example, ten thousand amperes or over (for which circuit-breakers are now demanded)—it is desirable not to depend upon the present methods. They are open to the objection that if the resistance in shunt to the main contacts be made low enough to entirely prevent sparking at the bridging contacts the auxiliary contacts in the shunt will carry more current than is desirable, both in the ordinary running of the circuit-breaker and at the time when it opens. If, on the contrary, the resistance be made high enough to prevent this difficulty, then under some conditions the bridging contact is apt to spark. I obviate the trouble by providing a number of shunts of different resistances. These are so proportioned that each one will shunt sufficient current from the preceding one to prevent serious sparking. It is manifest that the principle here pointed out may be carried as far as may be desirable. In practice, however, two sets of shunting contacts in addition to the main contacts will usually be found sufficient even in very large circuit-breakers. The first of these should be of just such resistance as to prevent sparking at the main contacts. The second shunt may be of very high resistance and will reduce the current before the opening of the circuit to such a volume as to be readily handled. I prefer for this latter resistance a water-rheostat inasmuch as this is a convenient form and does not involve so great an expense as other kinds of resistance devices; but any type of resistance may be used.

The accompanying drawing shows an embodiment of the invention in front elevation, the parts of the circuit-breaker behind the base being indicated in dotted lines.

In the drawing, A is the base, of slate or other non-combustible insulating material. B B are the main circuit-terminals bridged by the laminated contact B′. C is a spring for opening the circuit. D is a toggle by which it may be readily closed, and D′ is the handle. E is a latch for holding the toggle closed and is operated by an armature F against the pull of the adjustable spring H. A rod *f* is attached to the armature F, so that the switch may be opened by hand when desired. A bar of copper G (shown in dotted lines) connects one of the terminals B with the coil F′. All of these parts are well known.

The coils I I of the blow-out magnet are in circuit with resistance R′ R′. The circuit of this resistance starts from the bar G at *r*, passing through part of the resistance R′, then through the blow-out magnet-coils, and the rest of the resistance R′ to the shunting contact K, composed of spring-contacts k' k^2 and the plug *k*, closing the circuit between them when the circuit-breaker is closed. After passing this set of contacts the lead returns to the other terminal B at r'. The second path for current starts from *n* near the resistance R′, passing over the second shunting contact L, having spring-contacts l' l^2, similar to those shown at K, and a plug *l*. The circuit then passes through the water-rheostat N, which may be located in any convenient position, and thence to the other side of the circuit-breaker at n'. In this way the resist-

ance R′ and the blow-out coils are included in both of the shunt-circuits. It will be observed that the plug *l* extends farther above its contacts than does the plug *k*. All of the circuit-opening contacts are carried by the rod O, the shunt being "staggered."

The operation of the device, though sufficiently apparent from the statement of invention, is as follows: When an overload occurs, the pull of the series coil F′ draws down the armature F, tripping the latch E, and the bridge B′ leaves the terminals B B. A moment afterward the plug *k* opens the circuit of the resistance R′, and later the plug *l* opens the circuit entirely. The plugs *k* and *l*, with their contacts, are located in a chute M of insulating material, such as compressed fiber, and within the influence of the blow-out magnet. By the opening of the bridge B′ sufficient current is shunted through the blow-out magnet-coils I I to energize suitable pole-pieces to produce a strong magnetic field within the chute, so that should any spark be formed at the contact *k* it will be immediately blown upward. As this contact is, however, protected not only by the blow-out, but by the shunting contact *l*, in practice but little or no spark is formed at it. Immediately after the contact K is opened the contact L is also opened, and any arc that is formed is violently expelled by the magnet and by the inrush of air at the base of the chute, according to principles which are well understood in the art. I have not illustrated the terminals, pole-pieces, &c., as they are similar to those found on circuit-breakers well known in the art.

Modifications may readily be devised by engineers in the embodiment of my invention which I have here described, which I do not attempt to illustrate, as they are manifest and are within the scope of the claims in this case.

My device is applicable to direct or alternating currents. When applied to the latter, magnetic reactances or choke-coils may be used to replace the resistances in the several shunt-circuits to give the proper amount of toning value to the current flow.

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

1. A circuit-breaking device comprising main contacts of large current-carrying capacity, a group of shunts around said contacts including a movable part adapted to open the circuit after the main contacts have parted, and circuits connected with said movable part of differing resistance.

2. In a circuit-breaking mechanism, main contacts and a plurality of shunting contacts closing circuits of different resistance, all the contacts carried on the same rod, and those of lower resistance arranged to open before those of higher resistance; in combination with a chute inclosing the shunted contacts, and arc-extinguishing means, such as a blow-out magnet, for the shunting contacts.

3. In a circuit-breaker, a plurality of circuits of progressively-increasing resistance in shunt or parallel relation to one another with means for opening them in sequence, so arranged that the lower resistance is connected in series with the next higher resistance as the contacts closing the circuits are successively opened.

In witness whereof I have hereunto set my hand this 26th day of November, 1898.

EDWARD M. HEWLETT.

Witnesses:

B. B. HULL,

J. LED. LANGDON.