

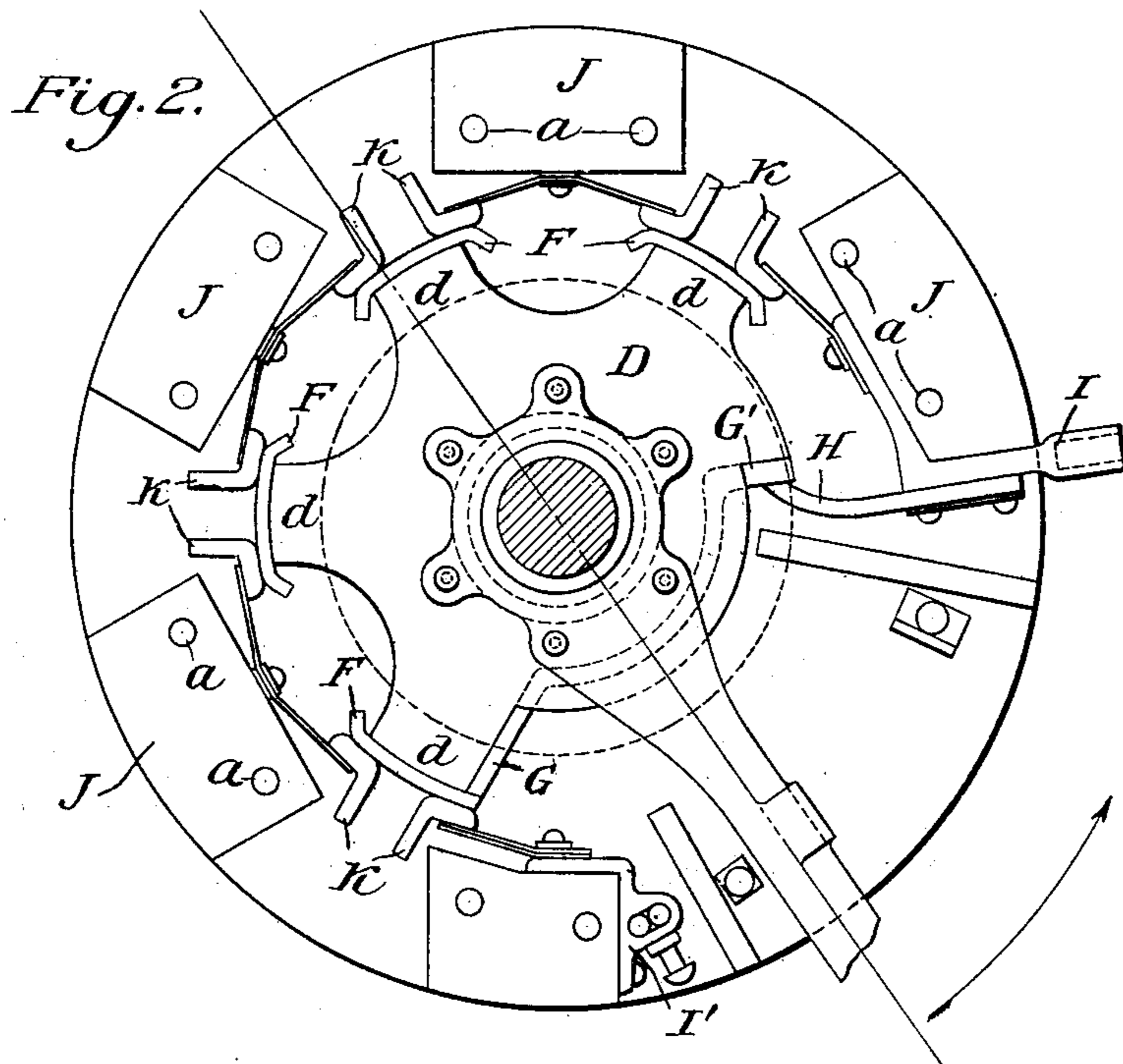
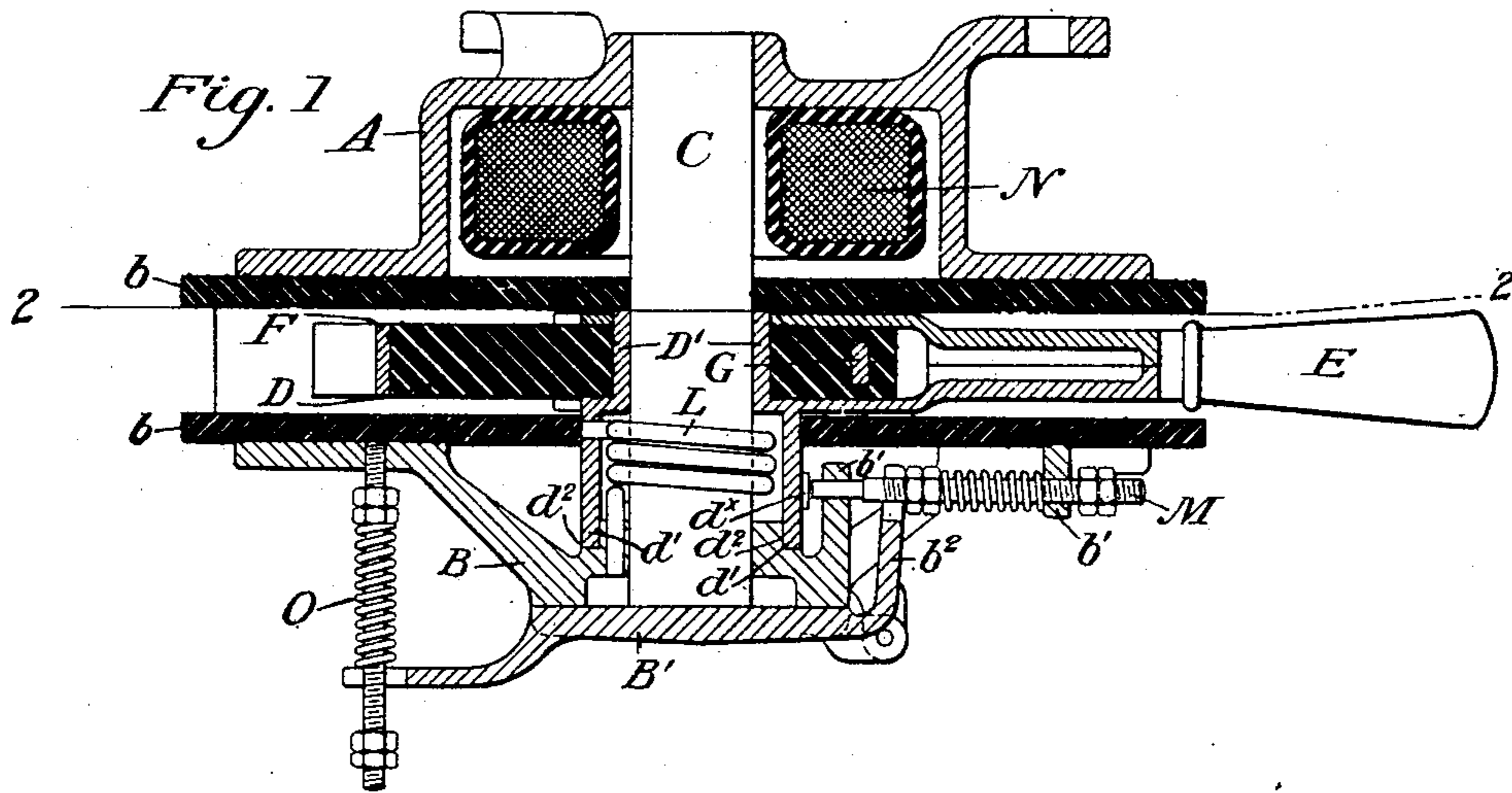
No. 741,239.

PATENTED OCT. 13, 1903.

J. D. FORRER.
CIRCUIT BREAKER.

APPLICATION FILED MAR. 12, 1902.

NO MODEL.



WITNESSES:
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UNITED STATES PATENT OFFICE.

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CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 741,239, dated October 13, 1903.

Application filed March 12, 1902. Serial No. 97,956. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH D. FORRER, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented a new and useful Improvement in Circuit-Breakers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention has relation to certain new and useful improvements in circuit-breakers, and is designed to provide an instrument of this character capable of automatically rupturing a circuit carrying a current of relatively high potential without injury to its parts and which is of simple and durable construction and can be relied upon to operate whenever the volume of current in the circuit exceeds a predetermined amount.

With this object in view the invention consists in the combination, with a fixed main contact and a plurality of fixed auxiliary contacts, of a movable member carrying a main contact arranged to coöperate with the fixed main contact and also a plurality of auxiliary contacts which are arranged to connect the fixed auxiliary contacts all in series with each other and in parallel with the main contacts, the said coöperating auxiliary contacts being arranged to maintain their connection momentarily after the separation of the main contacts. By this arrangement I provide for the final breaking of the circuit at a plurality of points in series, and thus greatly subdivide the arcing. I also provide in connection with the contacts a magnet arranged to produce a strong arc disrupting field, which magnet also controls a locking and tripping mechanism for the said movable member.

My invention also consists in the novel construction, arrangement, and combination of parts, all as hereinafter described, and pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a central vertical section of a circuit-breaker embodying my invention, and Fig. 2 is a section on the line 2 2 of Fig. 1.

Referring to the figures, the letters A and B designate, respectively, the upper and lower

sections of a casing of magnetic material, preferably iron, in which is secured a central vertical shaft or spindle C. The two sections A and B are separated from each other by a short space, in which is placed, between two protecting-disks *b*, of insulating material, a plate or disk D, of wood, fiber, or other non-conducting material. This plate or disk D is sleeved upon the shaft or spindle C and has secured thereto a handle E. This handle is shown as formed in two sections, which embrace a portion of the disk or plate, the central sleeve or hub D' being formed integrally with one of said sections. This, however, is a detail of construction which may be changed at pleasure. The peripheral portion of the plate or disk D is formed with a number of radial arms or projections *d*, (four in the present instance,) to each of which is secured a contact plate or tip F. The first one of these contact plates or tips is electrically connected to a conductor G, which is secured to the said plate or disk and which has a portion G', forming the main movable contact of the instrument. This contact coöperates with a fixed contact H, with which it is arranged to make an abutting engagement and which is connected to a terminal block or lug I. The other terminal block or lug of the instrument is shown at I'.

Secured between the peripheral flange portions of the casing-sections A and B and the insulating-disks *b* are a number of blocks J, of fiber or other insulating material, which provide seats for bolts *a*, which secure the said sections together and to which are secured spring-contacts K. These contacts K, when the circuit-breaker is set as shown in Fig. 2, coöperate with the contacts F, above described, the first contact K forming an electrical connection between the terminal block or lug I' and the first contact F, the intermediate contacts K each connecting two adjacent contacts F, and the last contact K connecting the last contact F with the terminal block or lug I. It will thus be apparent (supposing the current to enter the instrument at the terminal I') that there are provided two paths for the current—one path (the main one)

being through the first contact K to the first contact F, thence through the conductor G to and through the engaged main contacts G' and H to the terminal I, and the other or shunt path being from terminal I' to terminal I through the several sets of contacts F and K in series.

L designates a spring which is coiled about the shaft or spindle C and which is arranged to act upon the plate or disk D to move it in the direction of the arrow on Fig. 2 to thereby cause the disengagement of the contacts G' and H and also the contacts F and K. The plate or disk is held against the action of this spring under normal conditions by means of a spring-pressed latch or pawl M, seated in lugs b' of the lower casing-section B and engaging a lug or projection d' on a downwardly-extending flange d' of the central hub or sleeve D'. This flange d' may, if desired, have a bearing, as shown at d'', on the bottom section of the casing.

The latch or pawl M is tripped or released from its locking engagement by means of an arm b² of a movable portion B' of the bottom casing-section B, said movable portion acting as the armature of a magnet. The coil N of this magnet is inclosed in the upper section A of the casing around the shaft or spindle C and is preferably composed of comparatively few turns of a conductor of considerable carrying capacity connected in series with the instrument in the usual manner. It will be observed that the magnetic circuit of this coil is formed through the casing-sections A and B, the spindle C, and through the movable portion or armature B'. The latter is normally held against the action of the coil by an adjustable spring O, which can be set at the desired tension.

The operation will be readily understood. When the current flow through the coil N becomes sufficient to enable said coil to overcome the spring O, the armature B' is drawn up against the casing-section B and by this movement releases the latch or pawl M. As soon as this occurs the spring L at once rotates the disk or plate D in the direction of the arrow and effects an immediate separation of the contacts G' and H. Inasmuch, however, as the contacts F are of considerable length and have a sliding engagement with the contacts K, they retain such engagement momentarily after the separation of the main contacts, so that the entire current is diverted through the auxiliary contacts, and this current is momentarily thereafter broken simultaneously at each set of these contacts, thus giving a number of breaks (four in the present instance) in series.

It will be observed that by reason of the location of the coil N and the arrangement of its magnetic circuit these breaks take place in a magnetic field of great strength, the lines of force of which are in the proper direction to exert their greatest disruptive effect upon the several arcs. For this reason and also

by reason of their subdivision the arcs are quickly extinguished with but little, if any, injury to the contacts, their products escaping readily through the peripheral openings between the blocks J. The insulating-disks b prevent arcs from coming in contact with the metallic sections of the casing.

By omitting the automatic tripping device and providing means of the usual or any well-known character for holding the instrument in circuit-closing position it may be used to advantage as a canopy-switch, and, in fact, for various purposes where an efficient make-and-break switch is required.

By removing the bolts a the casing-sections may be readily separated to permit access to the interior parts.

I do not wish to limit myself to the particular construction and combination of parts which I have herein shown and described, since various changes may be made in the details thereof without departing from the spirit and scope of my invention as defined in the appended claims.

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

1. In a circuit-opening switch, the combination of a fixed main contact, a cooperating movable main contact, a plurality of auxiliary fixed contacts, and a plurality of cooperating movable auxiliary contacts arranged to connect the fixed auxiliary contacts all in series with each other and in parallel with the main contacts, and means for effecting the separation of the main contacts momentarily prior to the separation of the auxiliary contacts.

2. In a circuit-opening switch, the combination with a movable member carrying a main contact and a plurality of auxiliary contacts, and means for locking, releasing and actuating said member, of a cooperating fixed main contact, and a plurality of cooperating fixed auxiliary contacts, arranged to connect the auxiliary movable contacts all in series with each other and in parallel with the main contacts, said auxiliary contacts being arranged to retain their cooperative engagement momentarily after the separation of the main contacts.

3. In a circuit-opening switch, the combination with a movable member carrying a main contact and a plurality of auxiliary contacts, and means for locking, releasing and actuating said member, of a cooperating fixed main contact, and a plurality of cooperating fixed auxiliary contacts arranged to connect the auxiliary movable contacts all in series with each other and in parallel with the main contacts, said auxiliary contacts being arranged to retain their cooperative engagement momentarily after the separation of the main contacts, and means for producing an arc disrupting magnetic field about said contacts.

4. In a circuit-breaker, the combination

with the support having a relatively fixed main contact and a series of relatively fixed auxiliary contacts arranged in pairs, of a movable member having a main contact arranged
 5 to engage the said fixed main contact, and a number of insulated auxiliary contacts arranged to connect together and in series the pairs of auxiliary fixed contacts, a handle for actuating said member in one direction, a
 10 spring for actuating it in the other direction, and an electromagnetically-controlled locking and tripping device for said member.

5. In an electric switch, the combination with a relatively fixed main contact and a
 15 number of relatively fixed auxiliary contacts, of a movable member having a main contact arranged to make an abutting engagement with the main fixed contact, and also a plurality of auxiliary contacts arranged to have
 20 a sliding engagement with the fixed auxiliary contacts and to connect them all in series with each other and in parallel with the main contacts.

6. In a circuit-breaker, the combination
 25 with a casing composed of two separated sections of magnetic material, insulating contact-supports secured between the peripheral portions of said sections, and a number of auxiliary contacts secured to said supports, of a
 30 movable plate or disk journaled between said sections and carrying a number of insulated

contacts arranged to connect the said auxiliary contacts all in series with each other and with the terminals of the instrument, a fixed
 35 main contact, a movable main contact actuated by said member, a locking and tripping device for said member, and a magnet-coil in said casing for controlling said locking and tripping device and for producing a magnetic
 40 field about said device.

7. In a circuit-breaker of the character described, a sectional magnetic casing having a movable armature portion and a central space, the fixed main and auxiliary contacts
 45 arranged in the peripheral portion of said space, a movable disk or plate journaled in said space centrally of said contacts and carrying cooperating main and auxiliary contacts, a handle for actuating said disk or plate
 50 in one direction, a spring for actuating it in the opposite direction, a locking device controlled by said armature portion, and a magnet-coil arranged in said casing upon the opposite side of said contacts from the said armature portion.
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In testimony whereof I have affixed my signature in presence of two witnesses.

JOSEPH D. FORRER.

Witnesses:

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 H. W. SMITH.