No. 677,353. Patented July 2, 1901.

E. M. HEWLETT.

CIRCUIT BREAKER.

(Application filed Jan. 29, 1900.)

(No Model.) 3 Sheets—Sheet 1.

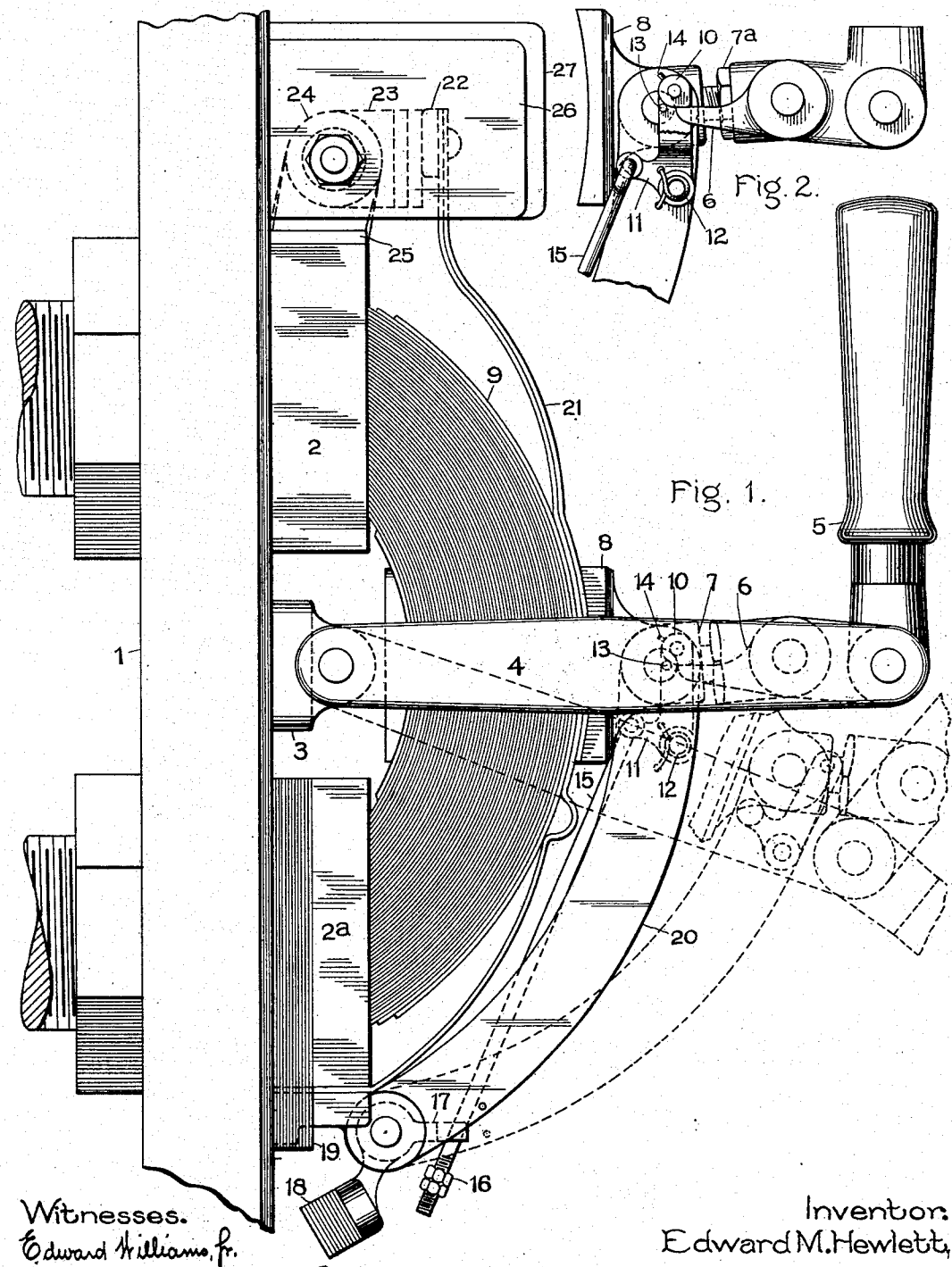


Fig. 2.

Fig. 1.

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

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Fig. 3.

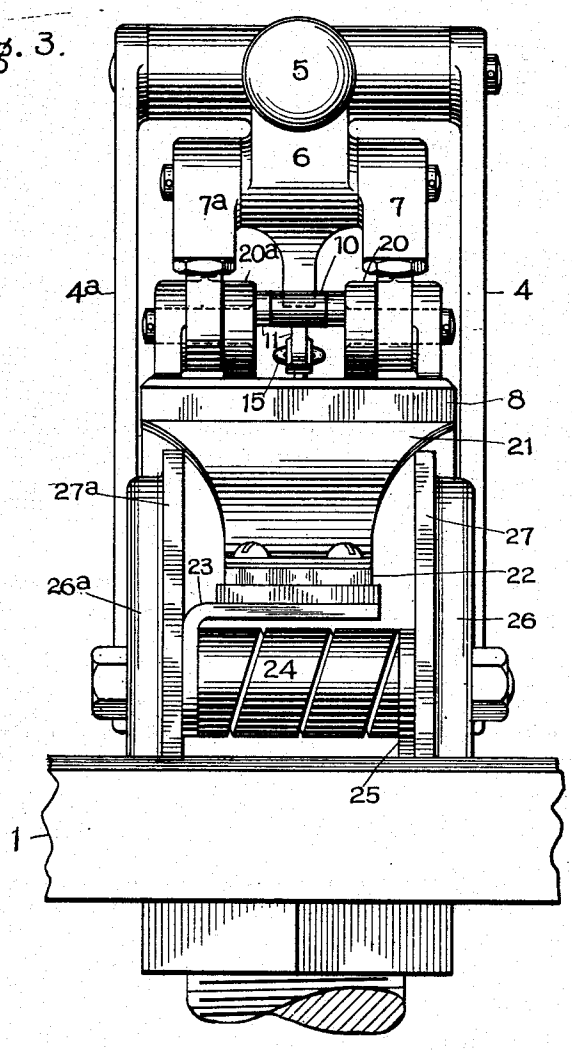
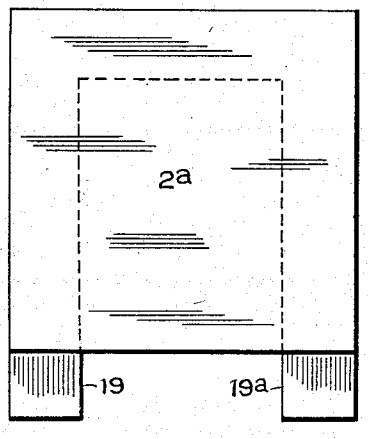


Fig. 4.



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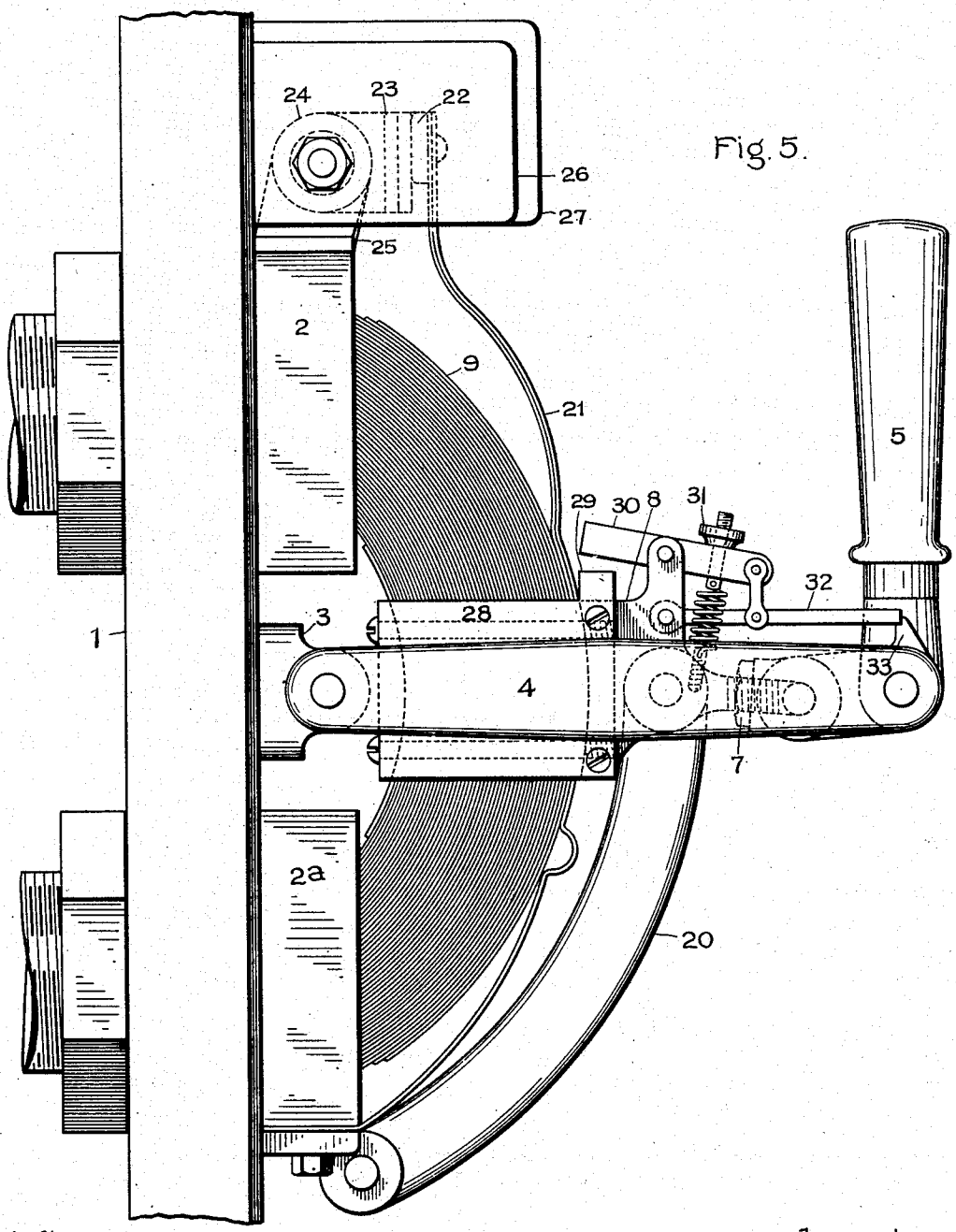
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(No Model.) 3 Sheets—Sheet 3.

Fig. 5.



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UNITED STATES PATENT OFFICE.

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

CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 677,353, dated July 2, 1901.

Application filed January 29, 1900. Serial No. 3,113. (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 Circuit-Breakers, (Case No. 1,181,) of which the following is a specification.

My present invention relates to circuit-breakers for electric currents, and is designed particularly to facilitate the rupture of circuits of heavy amperage and render the manipulation of the device convenient and the construction substantial and simple.

In carrying out my invention I mount the circuit-terminals upon an insulating fireproof support, and I support in operative contact to these terminals a bridging contact of great current-carrying capacity, supported in a rocking frame provided with a handle for compressing and latching the bridging contact into good electrical engagement with the terminals, this rocking frame being so mounted that its direction of stress when the bridge is cramped into good contact is in a direction at right angles to the supporting-board.

In order to facilitate the rupture of the circuit, I provide as a cramping device for the bridge-piece a toggle capable of being released either by hand or automatically and linked to an outer portion of the board or supporting-frame, so that when the toggle is knocked down and the circuit ruptured the parts will drop by gravity to an open position of the circuit-breaker and remain in that position until reset.

In addition to the features already noted the invention comprises other features, the novelty of which will be hereinafter more fully described, and will be definitely indicated in the claims.

In the accompanying drawings, which represent my invention, Figure 1 is a side elevation of a type of circuit-breaker for heavy currents embodying my improvements. Fig. 2 is a detail of the latching device for the cramping-toggle. Fig. 3 is a top plan view of the device shown in Fig. 1. Fig. 4 is a detail of one form of overload-releasing device, and Fig. 5 is a side elevation of a slightly-modified form of my invention.

Referring first to Fig. 1, 1 represents an insulating supporting-board, of fireproof material—such as slate or marble, for example—as usually employed in the construction of switchboards, and 2 2^a represent circuit-terminals of large current-carrying capacity rigidly mounted so as to be exposed on the front side of the board and in good conductive relation to bus-bars or leads on the rear of the board. Between these terminals is fixed a low standard 3, in which is journaled a frame 4 4^a, composed of two arms extending outwardly from the board and connected by a rod on which is journaled a handle 5. Rigid with or forming a part of the handle is a latch 6, on which are pivotally hung two links 7 7^a, to which is pivoted a stout frame 8, forming a carrier or support for a laminated bridge formed of thin strips of phosphor-bronze and bent to a curve, as shown at 9. The arched shape of the bundle of laminæ permits it to yield when pressed into contact with the terminals 2 2^a, and when the circuit-breaker is thrown open its tendency to straighten out to its uncompressed condition knees the toggle and opens the circuit, this toggle being formed by the latch 6 and the links 7 7^a. When the toggle is cramped to a position where the centers are almost in line, as indicated in Fig. 1, the nose of the latch 6 passes over a pivoted detent 10, mounted on an axis carried by a bell-crank lever 11, normally held in the position shown in Fig. 1 by the tension of a coil-spring 12 around its axis. A stop-pin 13 limits the range of movement of the detent 10 by engaging a projection 14 from the face of the detent. The bell-crank lever which carries the detent is linked to a rod 15, threaded at its rear end and provided with a nut 16 to vary the adjustment of the releasing-point, and over this rod is a sleeve carried by an arm 17, rigid with a laminated armature 18, mounted on the lower terminal or a suitable part of the board. Around the lower terminal is a bundle of iron-stampings, as shown in Figs. 1 and 4, which under the influence of the heavy currents passing through the terminal are magnetized, and the two poles 19 19^a thus formed at the open end of the stamping act upon the armature when the

circuit is overloaded and release the latch 6 of the toggle by drawing down the free end of the bell-crank lever carrying the detent 10. The reaction of the spring-bridge thereby knees the toggle and throws the bridge away from the terminal, and the weight of the parts opens the circuit. Two arc-shaped rods 20 20ª (see Figs. 1 and 2) are linked to the same axis on which the armature is mounted and at the other end pivoted to the lower ends of the links 7 7ª of the toggle to act as a stop for the movable element of the circuit-breaker when it falls to its open position.

The release of the parts is shown in dotted lines in Fig. 1, parts being omitted to avoid confusion. It will be seen, however, that when the circuit is opened by kneeing the toggle the latter doubles up, bringing the two centers which are farthest apart when the circuit is closed into comparatively close relation and producing a long break between the terminals 2 2ª and the bridging contact 9. In order to avoid damage by arcs between the bridging contact and the terminals, I employ a shunt-contact and provide an independent path for the current from terminal to terminal for this contact. I effect this result by mounting one or more broad strips of phosphor-bronze, as indicated at 21, lapping one end over the end of the terminal 2ª and securing it in good conductive relation thereto and providing at its other end a contact-block 22, coöperating with a corresponding contact-block mounted on the end of a metal plate 23, (see Fig. 3,) soldered in good conductive relation to the coil 24 of the blow-out magnet, the other end of which is soldered to the plate 25, the end of said plate engaging in good conductive relation the first main terminal 2 and overlapping the same on a broad face, as indicated in Fig. 1. Thus it will be seen that the shunt-contact has a path from terminal to terminal independent of the bridging contact, and the latter may be opened and rendered absolutely dead before the shunt-contact opens, the latter meanwhile being provided with current over a path of its own. The coil of the blow-out magnet is mounted between two iron pole-pieces 26 26ª, connected by an iron core extending through the coil and fastened to the pole-pieces by nuts, as seen best in Fig. 3. Between the pole-pieces is a chute formed of strips 27 27ª of fiber or other non-combustible non-conducting material. Thus when the circuit is finally ruptured at the shunt-contact 22 the arc is forcibly driven out of the magnetic field between the pole-pieces 26 26ª and extinguished.

In Fig. 5 I have shown a modification of the overload releasing device and of the detent for the toggle. In this form I provide a laminated yoke 28, of iron, surrounding the bridging contact, and it may also serve as a carrier for said contact. Pole-pieces 29 at the sides of this iron yoke coöperate with a pivoted armature 30, the tension of which may be adjusted by a set-screw 31, spring-connected with a supporting-piece connecting the yoke and the toggle. A latch 32 is linked to the armature and coöperates with a detent 33, rigidly connected with the setting-handle 5.

The operation of the circuit-breaker is the same in all essential respects as that described in connection with Fig. 1. In setting the circuit-breaker the toggle is cramped, the end of the latch 32 dropping behind the detent 33. When an overload exists on the circuit, the armature 30 is attracted and the latch 32 withdrawn, and the rebound of the elastic bridge-piece knees the toggle.

I have herein described my invention as applied to a "circuit-breaker;" but it will be understood that I do not employ such term in contradistinction to a switch in which the features of my invention might be used. I include within the term any device for opening and closing a circuit, whether automatic or hand-controlled.

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

1. A circuit-breaker comprising an elastically-yielding movable contact, a pivoted frame mounted on the base supporting the contact, and a handle for cramping the contact between fixed parts of the frame.

2. A circuit-breaker comprising fixed circuit-terminals, an elastically-yielding bridging contact, a pivoted cramping-frame mounted on the base between the terminals, a handle on said frame for compressing the contact within the frame, a latch for locking the contact when set, and a stop for limiting the opening movement.

3. A circuit-breaker comprising fixed circuit-terminals, an elastically-yielding bridging contact, a cramping-frame pivoted to the base between the terminals, a toggle for setting the contact, and a stop for limiting the opening movement.

4. A circuit-breaker comprising fixed and movable contacts, a cramping-frame pivoted to the base, a toggle for setting the contacts in engagement, a releasing device, and an arm secured to the base and pivoted to the movable contact to limit the degree of separation of the contacts.

5. A circuit-breaker comprising fixed and movable contacts, a cramping-frame pivoted to the base, a toggle for setting the contacts, a releasing device, and a rigid link between the base and the toggle to limit the degree of separation of the contacts.

6. A circuit-breaker comprising fixed circuit-terminals mounted on a vertical board, a cramping-frame pivoted to the board between the terminals, carrying a bridging contact, a toggle acting against the frame to set the contact, and a link pivoted to the toggle at a point below the frame to limit the opening movement of the circuit-breaker.

7. An automatic circuit-breaker comprising fixed and movable contacts on a vertical

board, a pivoted cramping-frame carrying the movable contact, a toggle for setting the contact, a stop for arresting the fall of the frame when the toggle is released, a detent to latch the toggle when set, and a magnetic releasing device for the detent.

8. A circuit-breaker provided with a movable bridging contact, and a shunt-contact mounted on the same support having one end flexibly connected by a fixed connection with one of the circuit-terminals and the other end adjusted to break at the other circuit-terminal after the bridging contact has opened.

9. A circuit-breaker comprising fixed contacts, a movable bridging contact, and a bridging shunt-contact of flexible conductor mounted on the same support and having one end permanently fixed to one of the circuit-terminals and the other end adapted to open the circuit after the bridging contact has left the terminals.

10. A circuit-breaker comprising fixed terminals, an elastic bridging contact formed of a bundle of curved metal sheets, a cramping-frame and toggle supporting the contact, said frame being pivoted between the fixed terminals to drop by gravity when released, and a link fixed at an angle to the frame to limit the extent of its fall.

11. A circuit-breaker comprising fixed terminals, a bridging contact movable with relation thereto, and a shunt-contact carried by the same support as the bridging contact and movable with the same, said shunt-contact engaging by a fixed connection with one terminal and adapted to open its connection with the other terminal independently of the bridging contact.

12. A circuit-breaker for heavy currents, comprising fixed and movable contacts, a shunt-contact, a blow-out magnet formed of a single helical winding of metal, and metal plates engaging its ends connecting respectively with the shunt-contact and one terminal over a large area of contact-surface.

In witness whereof I have hereunto set my hand this 26th day of January, 1900.

EDWARD M. HEWLETT.

Witnesses:
BENJAMIN B. HULL,
C. L. HAYNES.