No. 633,772. Patented Sept. 26, 1899.

G. WRIGHT & C. AALBORG.

AUTOMATIC CIRCUIT BREAKER.

(Application filed Mar. 23, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

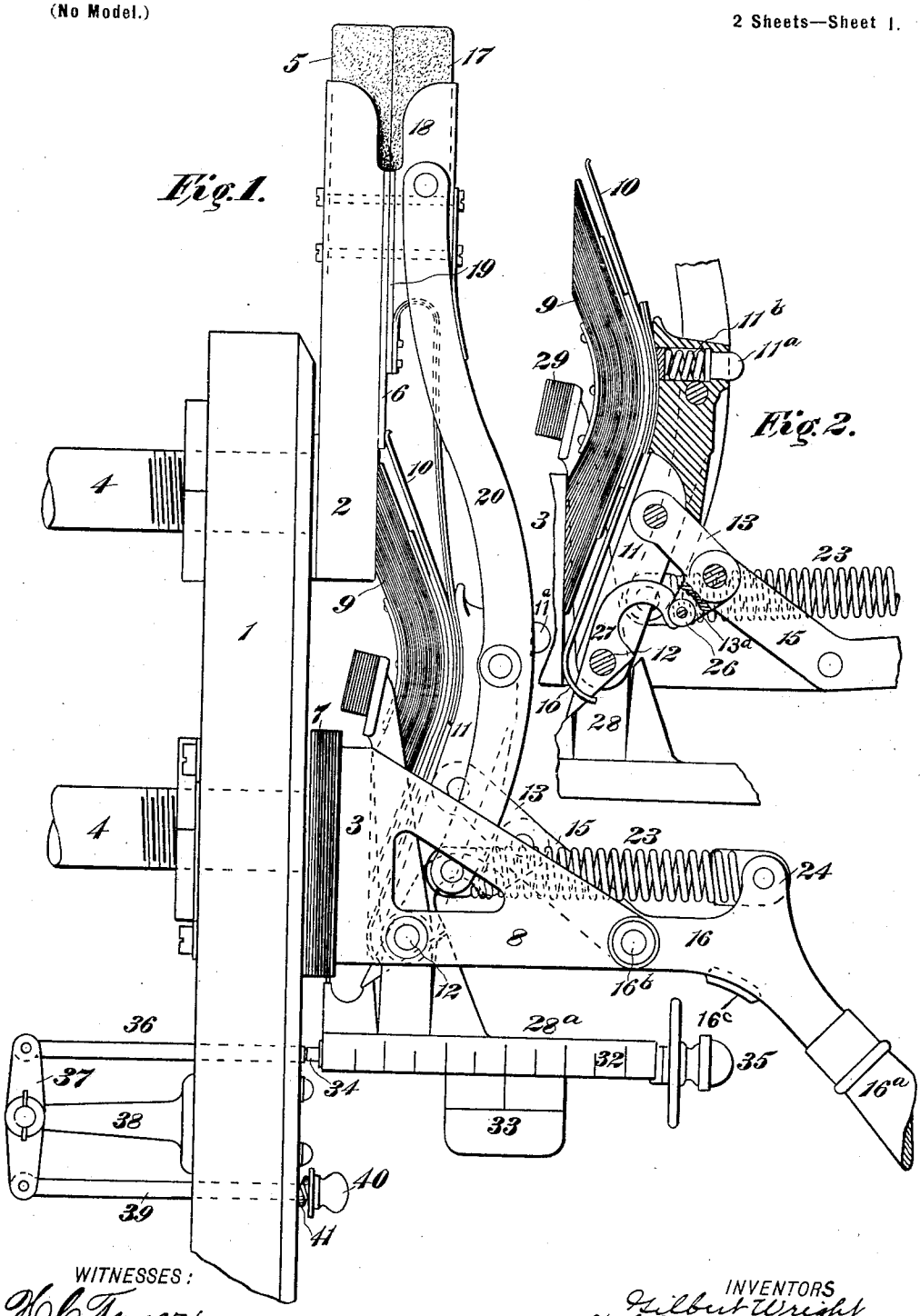


Fig. 2.

WITNESSES:

H. C. Fenner

W. D. Noble

INVENTORS

Gilbert Wright

& Christian Aalborg

BY

Wesley G. Carr

ATTORNEY.

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

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Fig. 3.

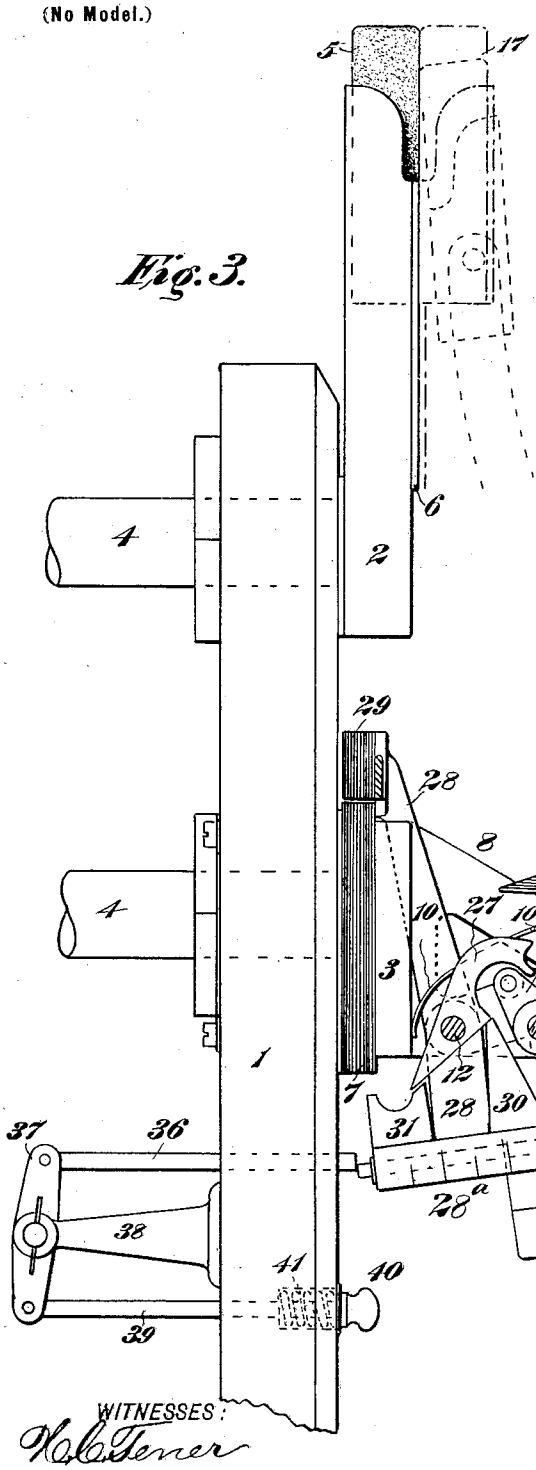
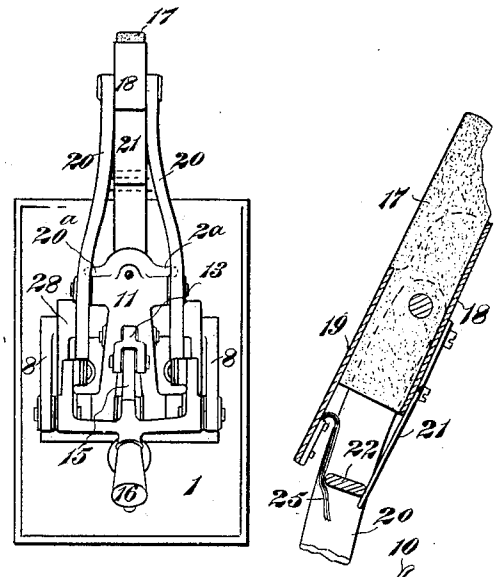


Fig. 4.



WITNESSES:
H. C. Fenner
W. D. Wales

INVENTORS
Gilbert Wright
& Christian Aalborg
BY
Wesley G. Carr
ATTORNEY.

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

UNITED STATES PATENT OFFICE.

GILBERT WRIGHT AND CHRISTIAN AALBORG, OF WILKINSBURG, PENNSYLVANIA, ASSIGNORS TO THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, OF PENNSYLVANIA.

AUTOMATIC CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 633,772, dated September 26, 1899.

Application filed March 23, 1899. Serial No. 710,225. (No model.)

To all whom it may concern:

Be it known that we, GILBERT WRIGHT and CHRISTIAN AALBORG, citizens of the United States, residing at Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Automatic Circuit-Breakers, (Case No. 810,) of which the following is a specification.

Our invention relates to devices employed for automatically opening electric circuits upon the passage therethrough of a current materially in excess of that which the circuit is intended to carry.

The object of our invention is to provide a circuit-breaker that shall have a large current-carrying capacity in proportion to the mechanical dimensions of the device, which shall be easily brought into operative position and locked therein, which shall be certainly and quickly opened whenever the current in the circuit exceeds that for which the locking mechanism is set, and which shall serve to interrupt the circuit without danger of injury to the main contact-terminals. The means for accomplishing these results are disclosed in the accompanying drawings and will now be described.

Figure 1 of the drawings is a side elevation of the circuit-breaker in closed position; Fig. 2, a detail sectional view of a portion of the circuit-breaker; Fig. 3, a side elevation of the circuit-breaker in open position, parts being, however, broken away and others in section in order to more clearly show the details of construction; and Fig. 4, a front elevation of the entire structure on a reduced scale.

The supporting-base 1 may be of any dimensions and of any material, but ordinarily it will be a switchboard-panel of marble, slate, or similar material. The main stationary contact-terminals 2 and 3 of the circuit-breaker are provided with studs 4, which project from the front to the rear through holes bored in the base for connection with the bus-bars, as is usual in switchboard construction. The upper stationary contact-terminal 2 is elongated upwardly and is provided with a block 5 of carbon or other substantially infusible conducting material, a metal plate 6 being mounted upon and fastened to the front of the main terminal 2, so as to be flush with the face of the carbon block and therefore constitute a continuation of it. The lower stationary contact-terminal 3 is partially surrounded by a body of magnetizable metal 7. Two metal brackets 8 are bolted to the base either upon or adjacent to the lower stationary terminal 3 and the body of magnetizable material 7 in order to serve as supports for the movable parts of the circuit-breaker. These brackets may obviously be joined by a base-plate, the three parts constituting a single casting.

The main movable contact member 9 of the circuit-breaker consists of a body of thin copper plates of curved form riveted or otherwise fastened together, but having free ends which are beveled with reference to the body portions of the laminæ, so that when the circuit-breaker is closed or nearly closed they are in a plane that coincides with or is parallel with the plane of the faces of the stationary contact-terminals 2 and 3. A thicker plate 10 of greater length than any of the main laminæ is riveted to said main laminæ and is of such form and dimensions that its upper end makes contact with the plate 6 on the face of the upper stationary contact-terminal 2 when the circuit-breaker is closed, and its lower end is permanently in engagement with the face of terminal 3. The member 9 is rigidly fastened by any suitable means, such as bolts or rivets, to the upper end of a supporting-frame 11, the lower end of such frame being bifurcated and pivoted between the brackets 8 at 12. Pivoted between the arms of frame 11 is one arm 13 of a toggle-lever 14, the other arm 15 of such lever being part of a casting 16, which is provided with an operating-handle 16^a. The casting 16 is mounted upon rod 16^b, which is supported by the outer ends of brackets 8. The arms 13 and 15 of the toggle-lever 14 are so located and proportioned with reference to the brush-contact member and the contact-terminals 2 and 3 that the former will be brought to its closed or operative position by a degree of movement that falls a little short of bringing the centers of the three pivots of

the toggle-lever into alinement, this adjustment being desirable in order that when the movable member of the breaker is released the toggle-joint may act readily and quickly under the action of the opening means to be hereinafter described.

The movable shunt-contact member comprises a block 17 of carbon or other substantially infusible conducting material mounted in a suitable metal frame 18 and having a metal plate 19, the face of which constitutes a continuation of the face of the infusible block 17, so as to engage with the face of the plate 6 on the stationary terminal when the circuit-breaker is closed. This frame 18, carrying the infusible block 17, is pivoted between two arms 20, a spring 21 being fastened to said frame and extending downward, so as to bear against a cross-piece or other suitable stop 22, and thus tend to throw the upper end of the block 17 inward slightly toward the cooperating stationary block 5. The two arms 20 are pivoted to the upper end of the frame 11 at a point corresponding to the middle of the member 9 and project downward beyond this point to corresponding points between the pivot 12 and the point at which the toggle-lever arm 13 is pivoted to frame 11. The free ends of arms 20 are connected by coiled springs 23 to lugs or ears 24, projecting from casting 16.

The metal plate 19, forming part of the movable shunt-contact terminal, has fastened to it by means of screws or rivets one end of a flexible strip or the ends of a plurality of such strips 25, which extend downward and are electrically and mechanically joined to the brush-contact member 9. The frame 11 is provided with a plug 11^a and a spring 11^b, so that when the circuit-breaker is thrown open the plug will strike against a piece 16^c on the casting 16.

In order to lock the circuit-breaker in closed position and to release the same when the current therethrough exceeds a predetermined amount, we provide the following devices: The toggle-lever arm 13 is provided with an extension 13^a, substantially at right angles to its main portion, in the end of which is journaled a small roller 26, adapted to be engaged by the notched end of a latch 27, the latter being pivotally mounted upon the shaft or pivot 12. Mounted upon the pivot or shaft 12, so as to move independently of the other parts already described, is a frame 28, carrying at its upper end an armature 29 and at its lower end two upwardly-projecting portions 30 and 31, the former of which terminates adjacent to the latch above its pivot and the other adjacent to the lower end of the latch. These projections 30 and 31 are of such length that there is a slight degree of movement possible independently of the latch in order that the latter may be given a blow when the frame 28 is tilted by magnetic action. The base portion 28^a of the frame 28 is provided with a scale 32 and with a weight 33, which is adjustable by means of a screw 34 and thumb-nut 35. The inner end of the screw 34 rests against a rod 36, that projects through the base-plate 1, the end of such rod at the rear of the base-plate 1 being pivoted to one end of an arm 37, the said arm being pivoted at or substantially at its middle point to a suitable supporting-bracket 38 and having pivotally connected to its other end a rod 39, which also projects through an opening in the base-plate 1. The front end of the rod 39 is provided with a push-button 40, that is normally forced outward by means of a coiled spring 41.

The operation of the circuit-breaker is as follows: Assuming that the breaker is in open position, arms 20 will be held against the stops 20^a on frame 11 by the coiled springs 23, and the other parts will be in the position indicated in Fig. 3. The operator will now grasp the handle and press downward upon it, thus moving the toggle-joint upward and at the same time carrying the laminated contact member inward toward the stationary terminals, the shunt-terminal and its supporting-arms being carried with the laminated contact member, so that the shunt-terminals will be first brought into engagement, and thereafter the movable terminal will slide on the stationary terminal, and thus tend to keep it clean and make good contact. As the movement is continued until the toggle-lever pivots are brought nearly into alinement, both the shunt-terminals and the main terminals will be brought into close engagement, the ends of the laminæ of the latter being deflected sufficiently to make good contact with the faces of the terminal blocks. When this final position is reached, the frame 28 and its weight acting through the projection 31 on the lower end of the latch 27 will cause the notched end of the latter to engage the roller 26, and thus hold the parts in this locked position. If the current through the circuit-breaker exceeds the amount for which it is set by the adjustment of the weight 33 in its frame, such current will produce a magnetic flux through the body 7 of magnetizable material, which will have sufficient strength to draw the armature 29 inward and downward. When this action takes place, the projection 30 on the frame 28 strikes against the latch and throws its recessed or notched end upward away from the roller 26, whereupon the coiled springs 23 will throw the toggle-joint downward and, supplemented by the action of gravity, will throw the circuit-breaker completely open. The laminated contact member will obviously first leave the stationary terminal 2. Hence the current will be shunted through the strips 10 and 25 and the carbon blocks, the final interruption being effected by the separation of the blocks. By reason of interrupting the circuit at a single point—that is, making a single break and locating that break above the main terminals—the resulting arcs cannot by any possibility

do any damage to the circuit-breaker, they being broken upward at a single point and away from all of the metal parts of the device.

We desire it to be understood that our invention is not limited to any specific form or arrangement of parts except in so far as such limitations are specified in the claims.

We claim as our invention—

1. In an automatic electric-circuit breaker, the combination with a pair of main stationary contact-terminals and a carbon shunt-terminal in approximately vertical alinement, of a pivoted laminated contact member for bridging said main terminals, toggle-levers for moving said laminated contact member into operative position, a movable shunt contact-piece, and a supporting-arm therefor pivoted to the laminated contact member.

2. In an automatic electric-circuit breaker, the combination with a base and stationary main and shunt contact-terminals located in approximately vertical alinement thereon, of a movable laminated contact member pivoted to said base, a movable shunt-contact member pivoted to said laminated contact member, toggle-levers for operating said movable members, means for locking the breaker in closed position, and a tripping device projecting into a magnetic circuit.

3. In an automatic electric-circuit breaker, the combination with a base provided with a pair of main contact-terminals in approximately vertical alinement and a single shunt-contact terminal above the upper main terminal, of a bridging laminated contact member pivoted to the base, a movable shunt contact-terminal, a supporting-arm therefor pivoted to the laminated contact member, a flexible extension-piece for making permanent contact with the lower stationary terminal, toggle-lever supporting and operating mechanism for said movable members, locking and tripping devices and means coöperating with gravity to open the breaker when released.

4. A circuit-breaker having two stationary main contact-terminals and a carbon shunt contact-terminal located above said main terminals, in combination with a pivotally-mounted main contact member and a shunt member eccentrically pivoted to said main member, toggle-lever-closing mechanism, a latch and electromagnetic means for tripping said latch when subjected to an excessive current.

5. In a circuit-breaker, the combination with main stationary contact-terminals and a stationary shunt-terminal located above the same, of a pivoted main contact member, a shunt-contact member pivoted to said main member at a distance from its axis of movement, means for yieldingly holding the movable shunt-contact in a position in advance of the plane of the faces of the main movable member when in open position, toggle-lever mechanism for closing the breaker, a latch and electromagnetically-actuated means for tripping the latch, said toggle-lever, latching and tripping mechanism being located below both the main and the shunt separable terminals.

In testimony whereof we have hereunto subscribed our names this 17th day of March, 1899.

GILBERT WRIGHT.
CHRISTIAN AALBORG.

Witnesses:
H. C. TENER,
WESLEY G. CARR.