No. 888,760. PATENTED MAY 26, 1908.

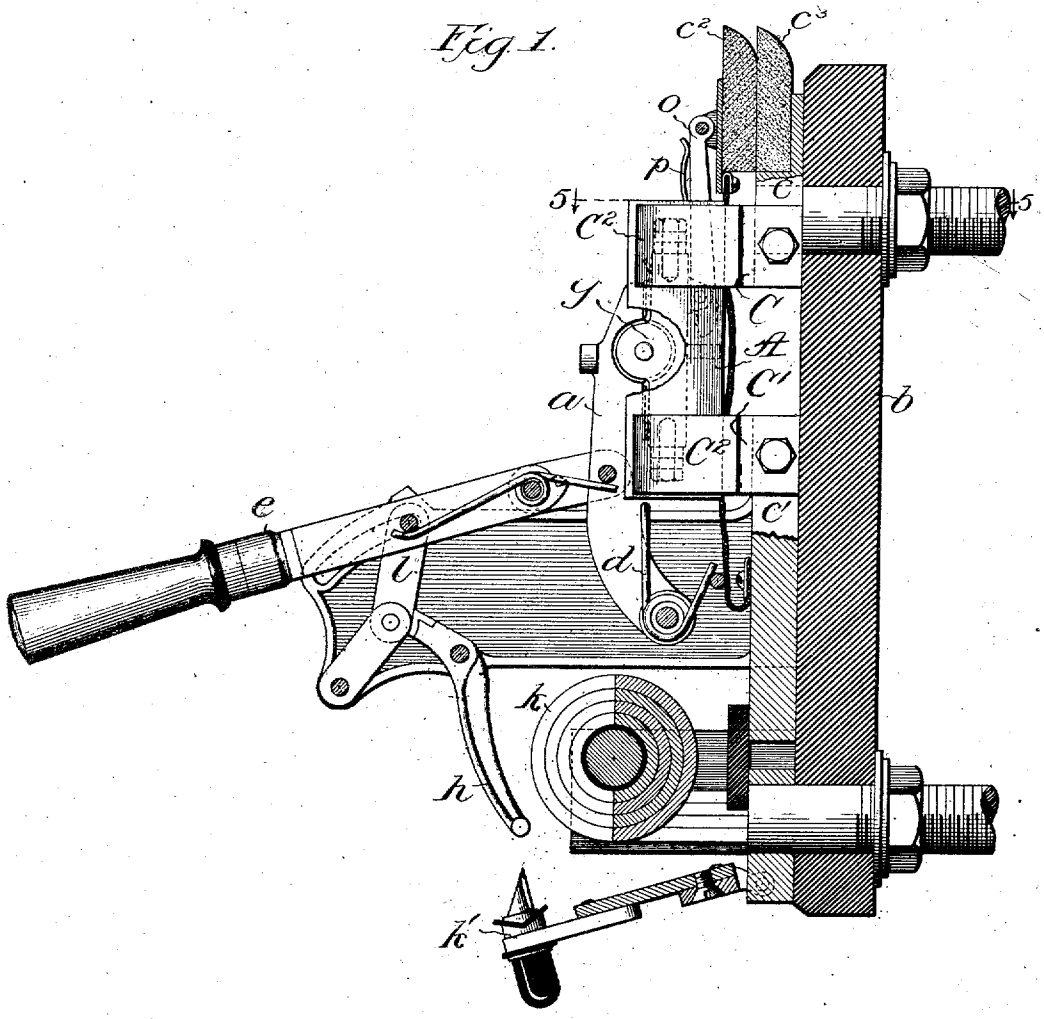
E. H. SMYTHE.

CIRCUIT BREAKER.

APPLICATION FILED AUG. 17, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



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Attys.

No. 888,760. PATENTED MAY 26, 1908.

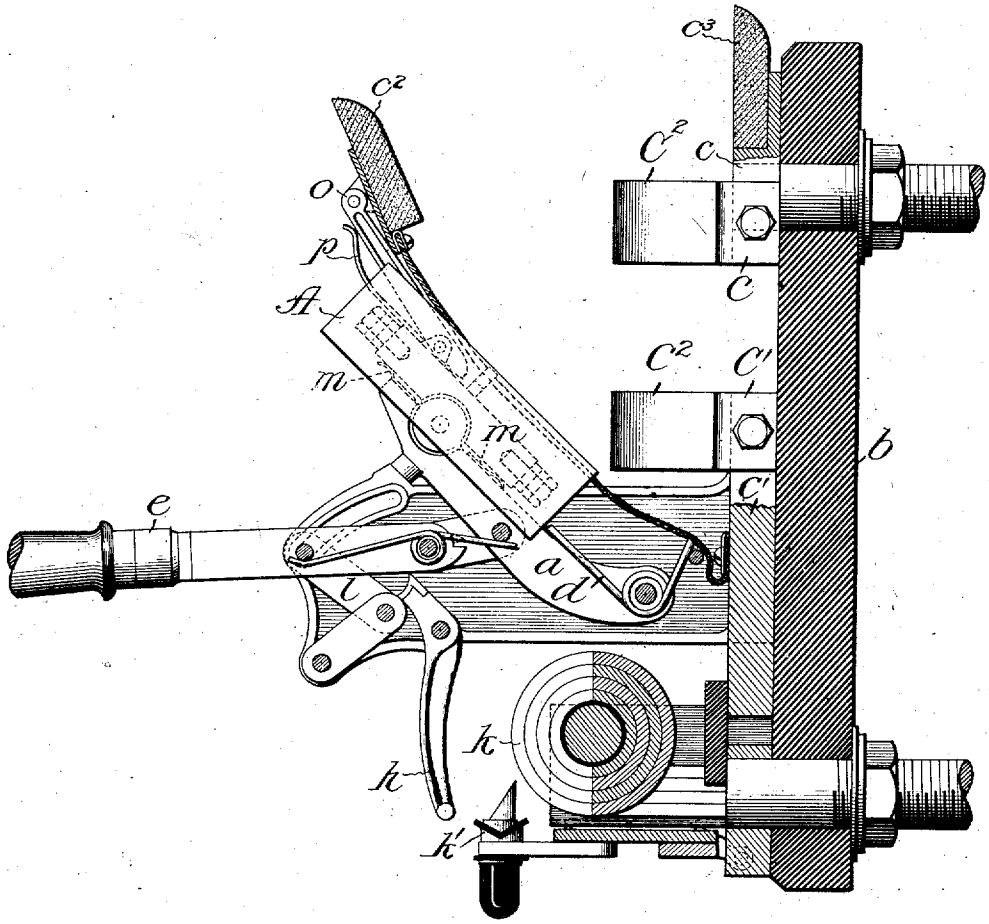
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CIRCUIT BREAKER.

APPLICATION FILED AUG. 17, 1905.

3 SHEETS—SHEET 2.

Fig. 2.



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No. 888,760. PATENTED MAY 26, 1908.

E. H. SMYTHE.

CIRCUIT BREAKER.

APPLICATION FILED AUG. 17, 1906.

3 SHEETS—SHEET 3.

Fig. 3.

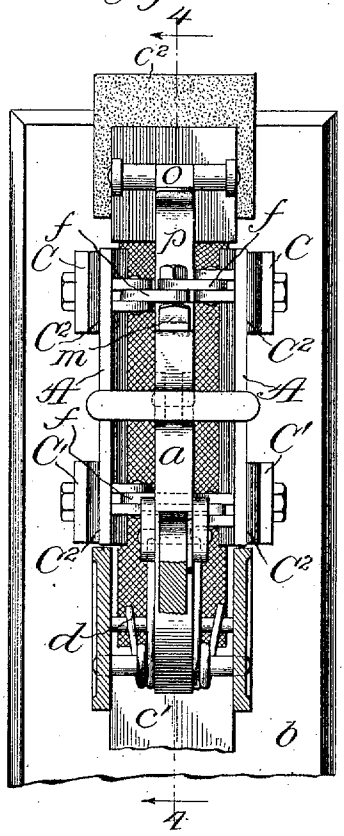


Fig. 4.

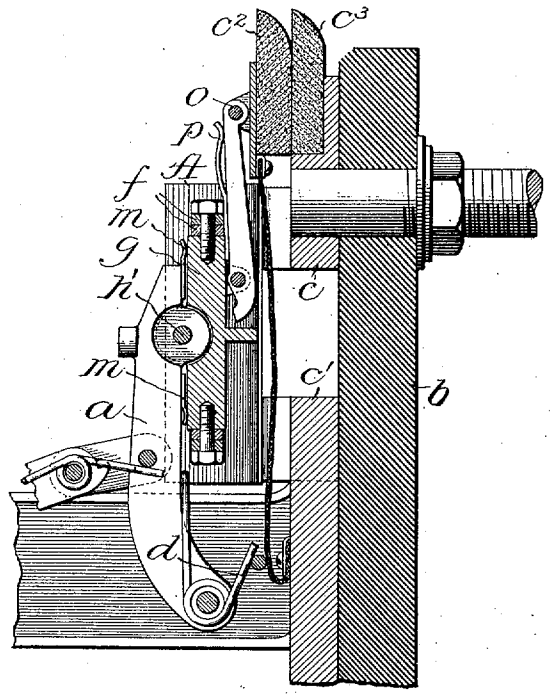
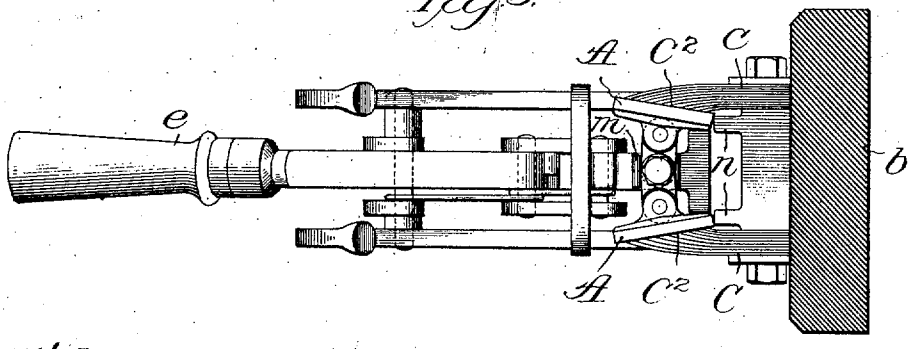


Fig. 5.



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UNITED STATES PATENT OFFICE.

EDWIN H. SMYTHE, OF CHICAGO, ILLINOIS, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CIRCUIT-BREAKER.

No. 888,760. Specification of Letters Patent. Patented May 26, 1908.

Application filed August 17, 1905. Serial No. 274,617.

To all whom it may concern:

Be it known that I, EDWIN H. SMYTHE, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Circuit-Breakers, of which the following is a full, clear, concise, and exact description.

My invention relates to an electric circuit breaker, and its object is to provide an improved and simple switch mechanism which will be strong and effective in its switching operation, and capable of carrying heavy currents, while being easy to operate and causing comparatively slight thrust or strain on the switchboard.

I dispense with the laminated bridging member which is commonly used in circuit breakers, and substitute therefor a solid bridging member, or members, adapted to close the circuit between laminæ constituting the contact terminals of the electric circuit.

More especially, my invention comprises circuit terminals each of which is preferably composed of a pair of laminated contacts, and a bridging member in two parts, linked together by a toggle arrangement, so that when the switch is being closed the parts of the bridging member are first brought freely between the opposing laminæ and then spread outward with great pressure to make their contacts.

One of the advantages resulting from my invention is that a very close contact is made between the bridging member and the circuit terminals. Furthermore, when the switch is being closed, the usual carbon shunt terminals make good contact with each other before the bridging member approaches sufficiently near the circuit terminals to produce an arc, and likewise said carbon blocks remain in close contact while the switch is being opened until after the circuit is broken through the bridging member; said carbon blocks thus effectively taking the arc both when the switch is being opened and closed.

A further advantage arising from my invention is that, owing to the peculiar construction thereof, there is very little thrust tending to open the breaker when it is closed, and hence the releasing mechanism may be made lighter than that in common use, and can be more delicately adjusted.

I will describe my invention more particularly by reference to the accompanying drawings, in which

Figures 1 and 2 are side elevations showing the switch in its closed and in its open position, respectively; Fig. 3 is a front elevation, partly in section, and with parts broken away; Fig. 4 is a sectional elevation on the line 4—4 of Fig. 3; Fig. 5 is a sectional plan view on the line 5—5 of Fig. 1, with parts omitted in order to more clearly illustrate certain parts.

The same letters of reference are used to designate the same parts wherever they are shown.

In general the switch of the circuit breaker comprises a pivoted switch arm *a* carrying a bridging member composed of a solid blade or blades A adapted to engage and electrically unite the main contact terminals C C′, formed of laminæ mounted upon blocks of copper *c c′* which are secured to the base *b*. The upper end of the switch arm may also carry a carbon block c^2, and a carbon block c^3 may be affixed to the block *c*, the carbon blocks taking the arc when the switch opens, in a manner well understood.

The spring *d* tends to open the switch which is readily closed by the toggle *l*, operated by the handle *e*. The latch *h* holds the toggle closed, and said latch is adapted to be released by the armature *k′* of the electromagnet *k*. The operation of these parts may be readily understood from the drawing, and is moreover fully described in my application Serial No. 229,476, filed Oct. 21, 1904. Any other suitable means for operating the switch arm may be substituted therefor.

Upon the copper blocks *c c′*, which in the devices in common use constitute the terminals of the electric circuit, are mounted main contact terminals C C′, respectively. Each of said terminals C C′ comprises a pair of contacts, composed of laminæ, the opposing faces of each pair being preferably beveled outwardly as shown at C^2.

The terminals C C′ are preferably bridged by two solid blades A A held in the desired relation to each other by toggles *f f*. The blades are here shown as having their corresponding longitudinal edges parallel and the planes of their faces inclined toward each other, forming substantially a wedge-shaped

bridging member. The toggles *f f* when extended thrust the blades A A in close contact with the beveled edges C^2 of the terminals C C'. Said toggles are pivotally mounted upon a block *g*, which is pivotally secured by the pin *h'* to the arm *a* and held in proper relation thereto by the spring *m*, as best shown in Fig. 4.

The blades A A are so positioned that they readily pass between the opposing pairs of contacts C C', when the circuit is being closed. The spreading of the blades to contact with the terminals C C' is automatically determined by their reaching a limiting stop *n* at the final stage of their forward movement, whereupon any further forward movement of the arm *a* carries the toggles *f f* to spread the blades apart and force them into intimate contact with the beveled edges C^2, as is clearly shown in Fig. 5.

The carbon block c^3 is affixed in any suitable manner to the copper block *c*. The carbon block c^2 is pivotally secured to the extremity of the arm *o*, the other end of which is pivoted to the block *g*. The spring *p* tends to press the arm *o* inwardly, and hence causes the carbon shunt terminals C^2 C^3 to make contact earlier and break contact later than the main switch members, as the switch is respectively closed or opened. Said blocks c^2 c^3 are thus in close contact with each other before the circuit is closed through the bridging members A A, and remain in contact with each other when the arm *a* is moved outward until after the circuit through said members A A is broken. It is apparent therefore that the carbon blocks effectively take the arc when the switch opens or closes.

To close the circuit by means of the bridging member the switch arm *a* is moved forward by the manipulation of the lever *e*. The blades A A, together forming a wedge-shaped bridging member, readily enter the space between the opposing beveled faces of the main contact terminals C C'. Prior to the engagement of the blades with said terminals, the carbon block c^2 engages closely with the carbon block c^3. The forward movement of the blades A A is limited by the stops *n*, whereupon any further forward movement of the arm *a* will operate the toggles *f f* and spread apart the blades A A, forcing them in strong contact with the beveled faces C^2 of the terminals C C'.

If, while the switch is closed, a short circuit should come upon the line, the armature *k'* of the electromagnet *k* will be drawn up and will trip the trigger *h*, thus releasing the mechanism by which the switch is held in closed position. The switch is then immediately opened by the spring *d*. When the switch is in its closed position the members of the toggles *f f* are very nearly in a straight line, as shown in Fig. 5, and hence there is very little thrust tending to open the breaker. Owing to this fact the releasing mechanism may be made lighter than that in common use, and may be adjusted more delicately.

What I claim is:

1. In a circuit breaker, the combination with circuit terminals each of which has a pair of contacts, the opposing faces of which are beveled outwardly, of a wedge-shaped bridging member composed of two parts adapted to be brought forward in between each pair of contacts and then laterally in opposite directions to engage the beveled faces thereof, and means for operating the bridging member to open and close the circuit.

2. In a circuit breaker, the combination with circuit terminals having fixed contacts, of a bridging member comprising two blades connected together by toggles and mounted to move forward freely in between said contacts, and means for operating the toggles at the limit of the forward movement of the blades to spread the blades outwardly against the contacts to close the circuit.

3. In a circuit breaker, the combination with circuit terminals each of which has a pair of laminated contacts, of a bridging member comprising two blades connected together by toggles and mounted to move forward freely in between each pair of contacts, and means for operating the toggles at the limit of the forward movement of the blades to spread the blades outwardly against said contacts to close the circuit.

4. In a circuit breaker, the combination with circuit terminals having fixed contacts, the opposing faces of which are beveled, of a wedge-shaped bridging member comprising two blades connected together by toggles and mounted to move forward freely in between said contacts, and means for operating the toggles at the limit of the forward movement of the blades to spread the blades outwardly against the beveled faces of said contacts.

5. In a circuit breaker, the combination with circuit terminals each having a pair of fixed contacts, the opposing faces of which are beveled, of a wedge-shaped bridging member comprising two blades connected together by toggles and mounted to move forward freely in between each pair of contacts, and means for operating the toggles at the limit of the forward movement of the blades to spread the blades outwardly against the beveled faces of said contacts.

6. In a circuit breaker, the combination with circuit terminals each having a pair of fixed contacts, the opposing faces of which are beveled outwardly, of a wedge-shaped bridging member comprising two blades connected together by toggles and adapted to be freely brought in between said pairs of contacts, means for operating the bridging member, and a stop for limiting the forward movement of the blades, whereby any fur-

ther closing movement of the bridging members is in a lateral direction against the beveled faces of the fixed contacts, substantially as described.

7. In a circuit breaker, the combination with circuit terminals, of a pair of fixed contacts secured to each of said terminals, the opposing faces of said contacts being beveled outwardly, a switch arm and means for operating the same, a block pivoted to said switch arm, a carbon contact pivoted to said block and electrically connected to one circuit terminal and adapted to engage a corresponding carbon contact secured to the other circuit terminal, a pair of blades carried by said block in wedge-shaped relation to each other and connected together by toggles pivoted to said block, said pair of blades being adapted to be freely brought in between said pairs of fixed contacts, and a stop for limiting the forward movement of the blades, whereby further closing movement of the switch arm operates the toggles and spreads said blades outwardly with great pressure against the beveled faces of the contacts, substantially as described.

In witness whereof, I hereunto subscribe my name this 22nd day of July A. D., 1905.

EDWIN H. SMYTHE.

Witnesses:

DE WITT C. TANNER,

JOHN G. ROBERTS.