(No Model.)

# N. MARSHALL.

## ELECTRIC CUT-OUT.

No. 588,686. Patented Aug. 24, 1897.

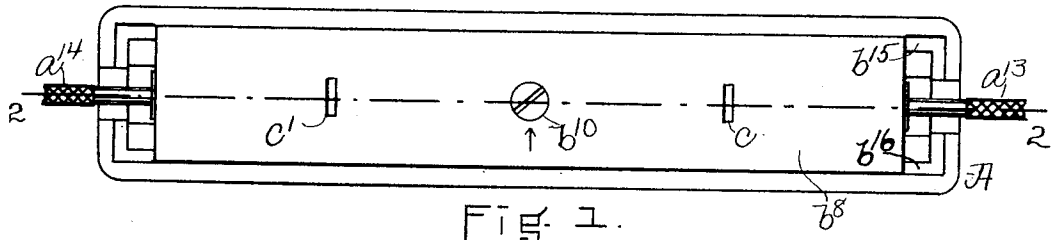



Fig. 1.

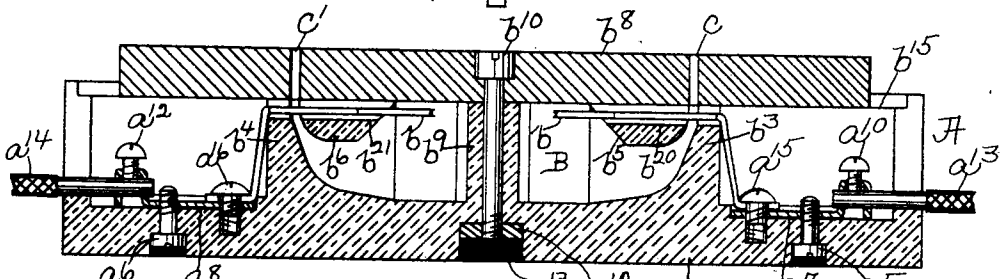



Fig. 2.

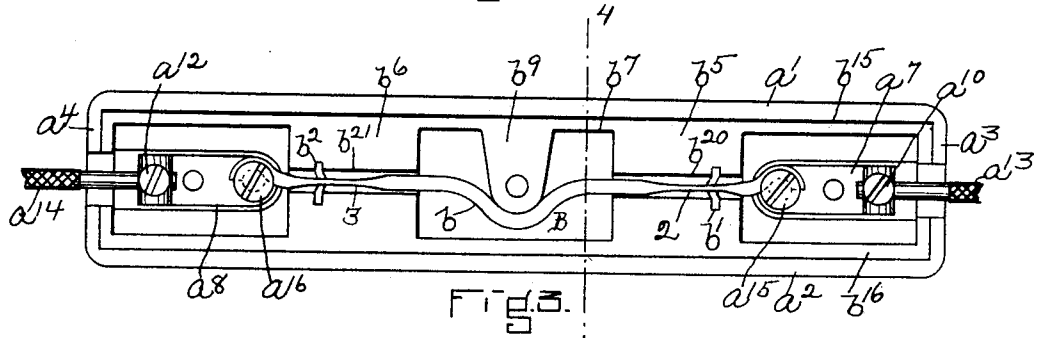



Fig. 3.

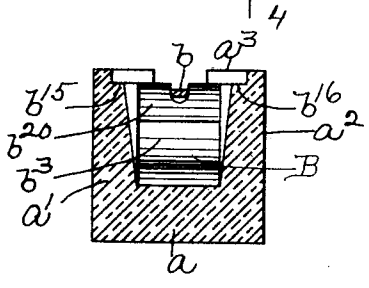



Fig. 4.

WITNESSES.

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ATT'Y.

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# UNITED STATES PATENT OFFICE.

NORMAN MARSHALL, OF BOSTON, MASSACHUSETTS.

## ELECTRIC CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 588,686, dated August 24, 1897.

Application filed May 29, 1896. Serial No. 593,570. (No model.)

*To all whom it may concern:*

Be it known that I, NORMAN MARSHALL, residing in Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Electric Cut-Outs, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

This invention relates to a novel method and apparatus for interrupting electric arcs between two terminals normally connected by fusible material, which apparatus is commonly known as "fusible circuit-controllers or cut-outs." These circuit-controllers as now commonly constructed consist of sections of fusible material, usually metal, interposed between and connecting circuit-terminals secured to a suitable support or base usually made of porcelain or other suitable material.

The fusible material, commonly termed the "fuse," is designed to carry a given or predetermined amount of current without rupture, but is also designed to be melted and ruptured by an abnormal current. Fusible circuit-controllers of the class referred to as now commonly constructed and known to me have been found in practice to be efficient for the purpose intended when the circuit is traversed by a current whose potential is not largely in excess of the carrying capacity of the fuse, but when the said circuit is traversed by a current of excessive potential—such, for instance, as five hundred to two thousand volts—the fuse becomes defective because of the formation of an arc between the line-terminals to which the fuse is normally connected, so that notwithstanding the fact that the fuse has been melted the circuit is maintained by the arc and the abnormally high current continues to flow over the circuit to the detriment and oftentimes destruction of the instruments or translating devices in the said circuit, and the said arc is also a source of destructive fires.

This invention has for its object to provide a fuse cut-out or circuit-controller in which an arc which might be formed between the line-terminals may be broken and destroyed by a current of gas or heated air generated or created by the heat developed by the melting of the fuse and the arc itself and directed or projected across the path or plane of the said arc at a point different from that at which the pressure is created. The fuse may be of any suitable or usual construction, but preferably will be of a construction as will be described, whereby the action of the gaseous current created by the melting of the said fuse may work with certainty and with the highest efficiency.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a top or plan view of one form of fusible cut-out or circuit-controller embodying this invention. Fig. 2 is a longitudinal section of the cut-out shown in Fig. 1 on the line 2 2; Fig. 3, a top or plan view of the cut-out shown in Fig. 1 with the cover or top plate removed; and Fig. 4, a transverse section on the line 4 4, Fig. 3, looking toward the right.

In the present instance I have shown one form of cut-out or circuit-controller embodying this invention, in which A represents a base or support, which may be made of porcelain, hard rubber, or other suitable material and which is herein shown as substantially oblong in shape and provided with the bottom $a$, side walls $a'$ $a^2$, and end walls $a^3$ $a^4$, forming a trough-like or box-shaped base or support.

The base or support A has secured to it, preferably at or near its opposite ends, as by screws $a^5$ $a^6$, suitable terminals $a^7$ $a^8$, preferably flat pieces of metal, which are herein shown as secured to the bottom $a$ and have fastened to them, as by binding-screws $a^{10}$ $a^{12}$, the line or circuit wires $a^{13}$ $a^{14}$, which may be of any suitable or desired construction.

The line-terminals $a^7$ $a^8$ are electrically connected by a fuse, which may be of any suitable or desired construction, usually a piece or strip $b$ of metal or composition of metals, fastened to the line-terminals $a^7$ $a^8$, as herein shown, by screws $a^{15}$ $a^{16}$.

In accordance with this invention the strip $b$ extends or is laid across one or more substantially small or contracted gas or air outlet passages or discharge-openings for a substantially large chamber intermediate of the line-terminals and having a substantially large opening distinct from the discharge-

openings, and in the present instance the said strip is laid or extended across two outlet-passages $b'$ $b^2$, located in the present instance at the opposite ends of the chamber B, which may be formed, as herein shown, by cross partitions or walls $b^3$ $b^4$ and top walls $b^5$ $b^6$, extended toward each other, but separated, as herein shown, to leave a substantially central opening $b^7$, which is normally closed by a removable cover or top piece $b^8$ for the base or support A. The chamber B may also have extended partially across it, as shown, a wall or partition $b^9$, preferably extended beyond the longitudinal center of the said base or support, and around the end or side of which the fuse $b$ is carried, as shown in Fig. 3.

The cover $b^8$ may be secured to the base or support A by a screw $b^{10}$, extended through the cover and through a suitable hole in the wall or partition $b^9$, and the said screw may have its lower end extended into a hole in the base A and provided with a suitable nut $b^{12}$, preferably sealed within the hole in the base by insulating material $b^{13}$.

The side walls $a'$ $a^2$ of the base A may be provided with suitable ledges $b^{15}$ $b^{16}$, upon which rests the cover $b^8$, the latter also resting, as herein shown, upon the walls $b^5$ $b^6$ $b^9$. The top walls $b^5$ $b^6$ of the chamber B may be provided with longitudinal grooves $b^{20}$ $b^{21}$, in which the fuse-wire may be laid.

By reference to Fig. 2 it will be seen that with the construction herein represented the chamber B is substantially a closed chamber when the cover $b^8$ is in place and that the passages $b'$ $b^2$ form discharge openings or outlets transverse to the fuse and that these outlets substantially register or are in line with slots or passages $c$ $c'$ in the cover $b^8$. The operation of the cut-out or circuit-controller herein shown is as follows: The circuit is maintained by the fuse $b$ while a current of normal strength is flowing over the line—say, for instance, a current of one hundred and ten volts; but if the current is increased abnormally—as, for instance, by the circuit-wires $a^{13}$ $a^{14}$ becoming crossed with a line carrying five hundred or more volts—the fuse $b$ is melted by the abnormal current and the air in the chamber B is expanded by the heat generated by the heating and melting of the fuse $b$, and the said expanded air seeking an outlet is forced through the substantially narrow discharge outlets or passages $b'$ $b^2$ for the chamber B and interrupts or breaks the arc which might be formed between the terminals $a'$ $a^8$, thus opening the circuit, and thereby protecting the instrument therein and preventing fires being started by the said arc, and consequently reducing the danger of fire from this source, which at the present time is an important item, owing to the growing demand and use of high potential currents. In order to increase the efficiency of the cut-out and render the same more certain to break the arc, I prefer to make the fuse $b$ so that it will respond to or be first melted by the abnormal current in the immediate vicinity of the discharge-outlets for the chamber B, and this result may be accomplished by making the fuse $b$ thinner or weaker, as at 2 3.

I may prefer to make the fuse-block or cut-out as herein shown; but I am aware that this construction may be varied without departing from my invention, which resides, essentially, in the interruption of the arc by a current of air or gas created by the heat generated by the melting of the fuse and by the arc itself, and therefore I do not desire to limit my invention to the particular apparatus herein shown. The chamber B, as herein shown, is provided with two outlets, and while I prefer this construction only one such outlet may be advantageously used.

I claim—

1. The method of interrupting electric arcs formed between two circuit-terminals normally connected by fusible material, which consists in creating a substantially large gaseous or air pressure by the heat generated by the melting of the said fusible material and consequent formation of the arc, and causing the same to pass in a smaller or restricted amount across the plane or path of the arc formed between the said terminals at a different point from that at which the pressure is created, substantially as described.

2. In an electric cut-out or circuit-controller, a base having secured to it circuit-terminals, and provided with a chamber intermediate of said terminals and having a substantially large opening and a separate and restricted discharge-outlet, and a fuse normally connecting said terminals and extended across said discharge-outlet and the substantially large opening, whereby the gas or air pressure created in the chamber at the substantially large opening is caused to pass out of the said chamber through the said restricted discharge-outlet, substantially as and for the purpose specified.

3. In an electric cut-out or circuit-controller, a base provided with a chamber intermediate of its ends having a substantially large opening, and a restricted discharge-outlet for said chamber, a cover for said base normally closing said substantially large opening and provided with a gas-outlet adapted to communicate with the restricted discharge-outlet of the said chamber, circuit-terminals on opposite sides of said chamber, and a fuse normally connecting said circuit-terminals and extended across the substantially large opening and across the discharge-outlet for the chamber between the outlet in the wall of the chamber and the outlet in the cover, substantially as and for the purpose specified.

4. In an electric cut-out or circuit-controller, a base provided with a substantially large chamber having a substantially large opening and a separate contracted or substantially small outlet or discharge opening, circuit-terminals carried by said base, and a fuse connecting said terminals and extended across

both the discharge opening or outlet and the substantially large opening to effect a cutting or rupturing of the arc, which may be formed between the terminals, by the gases or air-pressure created by the melting of the fuse in the substantially large opening, forced out through the substantially small outlet-orifice, for the purpose specified.

5. In an electric cut-out or circuit-controller, a base consisting of a bottom and side walls, cross partitions or walls $b^3$ $b^4$, and top walls $b^5$ $b^6$ coöperating with the bottom and side walls of the base to form a chamber B provided with outlet or discharge openings in the top walls $b^5$ $b^6$, a cover secured to said base and provided with outlets communicating with the discharge-openings for the chamber B, circuit-terminals secured to the base on opposite sides of the chamber B, and a fuse connected to said terminals and extended across the discharge-openings for the said chamber, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NORMAN MARSHALL.

Witnesses:
JAS. H. CHURCHILL,
J. MURPHY.