No. 635,395. Patented Oct. 24, 1899.

J. SACHS.

ELECTRIC CUT-OUT.

(Application filed Oct. 15, 1898.)

(No Model.)

Fig. 1.

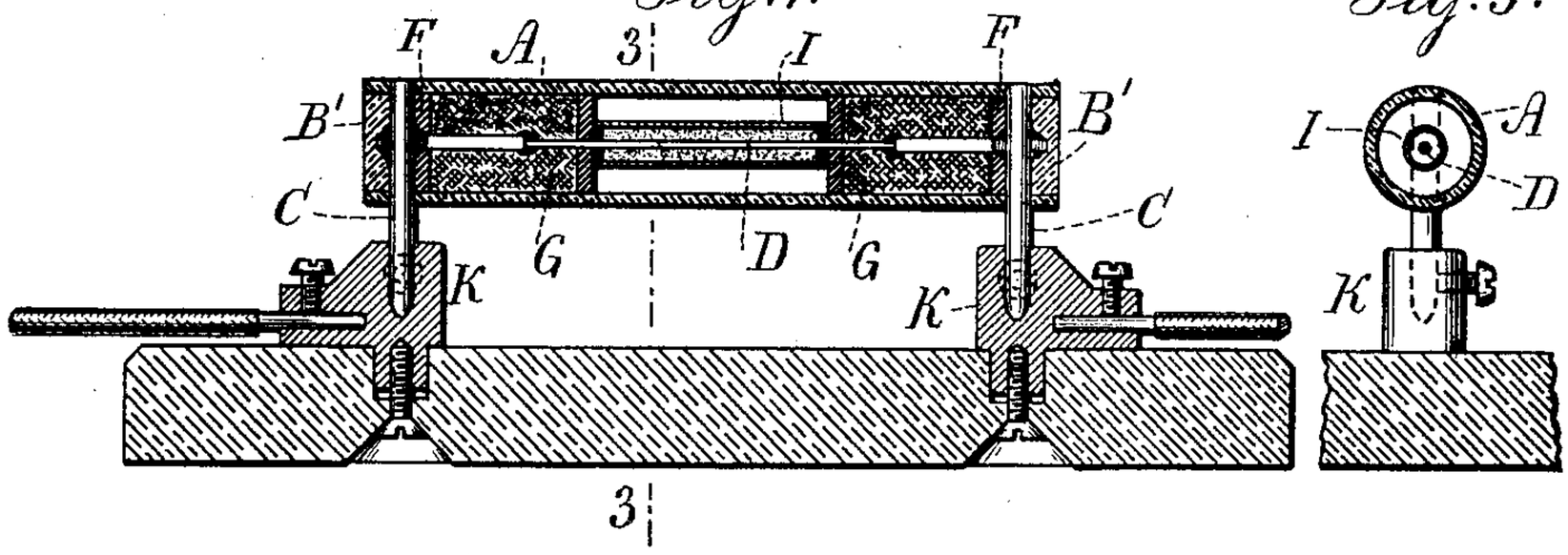
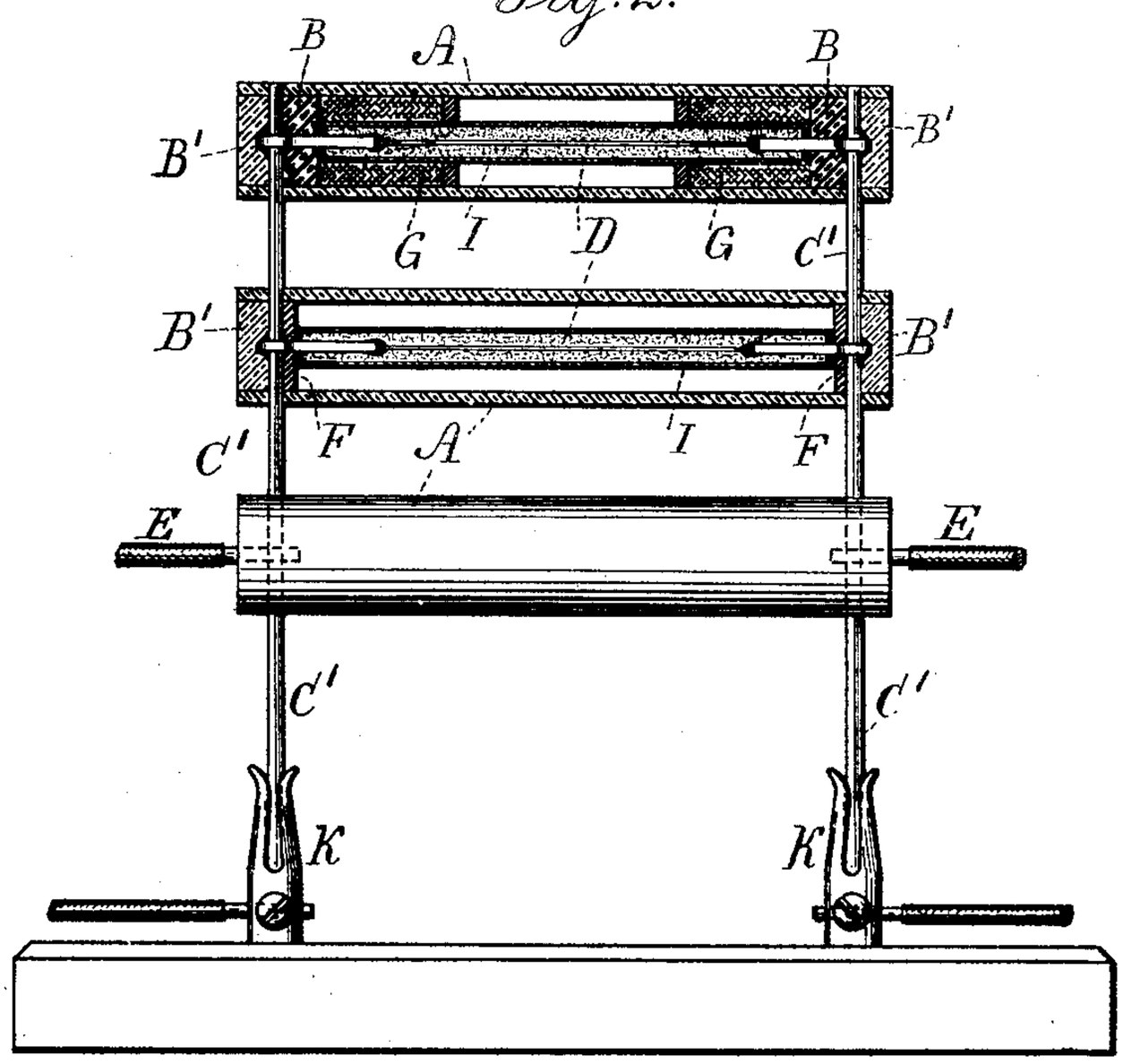


Fig. 3.

Fig. 2.



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ELECTRIC CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 635,395, dated October 24, 1899.

Application filed October 15, 1898. Serial No. 693,595. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH SACHS, a citizen of the United States, residing at the city of New York, in the county and State of New York, have invented an Improvement in Electric Cut-Outs, of which the following is a specification.

In the construction of safety-fuse cut-outs lead, tin, and alloys of various metals have been used in the form of wires or strips connected with the electric wires, so as to be fused or disrupted by abnormal currents, and thereby protecting the circuit and the transmitting devices therein.

Where these cut-outs or fuses are left open and unprotected, they are objectionable, especially because they are liable to sudden and violent disruption, and sometimes personal injury or fire results. To obviate this, the fuse has been placed in an inclosure.

Where the metal is of such a character that an oxid or similar formation occurs on its surface, it has been found that the metal may be brought to a molten condition and held within the inclosing envelop of oxid or similar material and the point of disruption is rendered uncertain, and this occurs especially where lead and its alloys are made use of.

Where the fusible strip or wire is closely surrounded by an inclosing material, the metal may be retained in a melted condition by such inclosure, and the circuit will not be broken until the electric current is much greater than anticipated. Hence it is impossible to rely upon the accuracy of the cut-out.

Where the wire or strip has been closely inclosed in a surrounding jacket, it is often difficult to produce a proper rating, because where the material surrounding the fuse-wire is large in proportion to the wire and has a good heat capacity the inclosure will absorb heat, and it will take much more current to disrupt the fuse when the material is cold than when the environment has become heated, especially when the current has been near the maximum and the inclosure has become heated throughout. The carrying capacity of a certain size of fuse-wire is materially increased by its inclosing material over the carrying capacity of the same size of fuse-wire when exposed to the atmosphere.

Fuse-wires that are open and suspended in the air are particularly objectionable in consequence of the current arcing and flashing when the cut-out melts, particularly when the current is short-circuited and high-potential currents are employed, and where the safety-strip is inclosed this action frequently takes the form of an explosion, and being in a confined space the surrounding jacket or inclosure is often ruptured.

It has also been found that although a jacket or mass surrounds the fuse wire or strip that will protect it from its injurious effects yet if it is intended to carry a current that is close to that at which the fuse will be ruptured the temperature of the surrounding mass will be brought up closely to that of the fuse-strip, which is in all cases very objectionable.

The objects of this invention are to eliminate the before-named objectionable features and to provide a cut-out which will operate accurately at a predetermined current and without holding the melted metal in suspension after the contemplated maximum current has been reached, and in the present improvement the melting or disruption of the fuse-wire is effected without arcing or flashing, whether operated by an overload of current or by a short circuit, and a low temperature will be maintained and the point at which the fuse will disrupt or melt varies but little when the surrounding envelop may be either hot or cold.

I also provide means whereby the safety cut-out is rendered non-interchangeable in the receptacles or blocks, because the terminals are so constructed that a safety-fuse adapted to a high current cannot be inserted into the hole or block intended for a lower current.

In carrying out this invention I provide a material that surrounds or is in contact with the fuse wire or strip and which will act as a flux for destroying any inclosing envelop of oxid or other formation which would hold the metal in a melted or other condition, and with this flux or similar agent around the wire other materials may be mixed, so as to combine or mix with the safety-strip as the same is disrupted, or a non-conducting substance may be formed by the heat of the safety-strip, causing the same either to com-

bine with or diffuse into the surrounding material. This surrounding material is sometimes applied directly to the surface of the safety strip or wire in the form of a paste that will harden and form a surrounding cylinder of greater or less size; but it is generally preferable to introduce this flux or similar material into a tube, preferably small and of glass, through which the safety-strip passes. The character of this fluxing, deoxidizing, or combining material will vary according to the material of which the safety-strip is composed. I have found that borax or sal-ammoniac is well adapted for this purpose, especially when the safety-strip is of lead or its alloys.

The safety strip or wire is supported in an exterior case, so that an air-space is left inside the case and around the wire, and this outer casing is preferably of insulating material in the form of a tube, and the ends of the shell or tube are closed by heads that are advantageously held in place by pin-terminals passing through the tube and projecting for some distance either on one or both sides of the case, and a disk or washer is generally employed close to the pin-terminals and within the case, and the ends of the case are advantageously sealed with wax or other cement or covered with metal or paper caps. These pins are advantageously used as the terminals for the safety cut-out strip, which extends between such pin-terminals or is connected to them by short pieces of wire.

It is generally advantageous to connect the fuse wire or strip with copper or other wires and to have the safety-strip shorter than the distance between the washers; but I do not limit myself in this particular, and I usually employ within the case and near each end or head a filling, preferably of yielding material, around the fuse-strip or wire-terminals beyond the ends of the inner tube, so that in case there is a sudden disruption or explosion within the case direct pressure upon the heads is relieved by the yielding material at the ends of the air-space in the central portion of the case.

In the drawings, Figure 1 is a vertical section of the safety-fuse as applied to the receiving-sockets. Fig. 2 is a similar view of smaller-sized safety-fuses in multiple arc. Fig. 3 is a cross-section at the line 3.

The case A is tubular and preferably of insulating material, such as vulcanized fiber, and the ends are closed by heads, which may be in the form of vulcanized fiber B or cement at B′, and the crossing pins C pass through the case and secure the parts in position and hold them firmly against the pressure which may result from the sudden disruption of the fusible strip or wire D, and this fusible strip or wire D is of the desired diameter and length and is connected to the crossing pins C, and it is advantageous to apply the metal disks F within the case and adjacent to the heads, so as to aid in properly supporting such heads against any internal pressure, and where there is risk of sudden internal pressure I apply loose porous or elastic materials at G adjacent to the inner sides of the heads or ends, so as to lessen the concussion or force of explosion.

The fusible strip D is protected from external influences by being within the case A, and usually it is advantageous to surround the same with a layer of material that will combine with the metal or act as a flux—such, for instance, as borax—and this may be applied in a pasty condition with or without other materials and form a surrounding cylinder, or it may be within a tube I, which is advantageously of glass, the fluxing or combining material being packed around the fusible strip, so as to act in connection with the heat developed in the strip to reduce any oxid or to otherwise combine with the material of the strip in effecting its disruption or destruction at the proper temperature as such temperature may be developed by the passing electric current.

The crossing pins C are advantageously made to project at one or both sides of the case, so as to form pin terminals or contacts adapted to be received into sockets K, to which the circuit-wires are connected. These sockets may be of any desired character, such as spring-sockets or clamp-sockets, for receiving the pin-terminals, and by making these pin-terminals of different sizes and the sockets of corresponding sizes and in proportion to the current to which the safety-fuse is adapted the pin-terminal of the safety-fuse for a heavy current cannot be inserted into the socket that is smaller and adapted to a less electric current. Hence there is no risk of a safety-fuse of too high a capacity being applied where a safety-fuse of a lower current is required.

In Fig. 2 I have shown three safety-fuses upon the pin-terminals C′, such pin-terminals being in the form of wires sufficiently long to receive between them the safety-fuses in multiple arc, and any desired number of these cases and their contained safety-fuses may be employed in this manner upon the parallel pin-terminals, and it is generally advantageous to taper the ends of the pin-terminals so that they will pass into the sockets with freedom. By this arrangement uniformity in the volume, capacity, or action of the safety-fuse is provided and the safety-fuses are very strong, and there is no risk of fire or external injury when sudden and heavy disruptive currents and arcs are formed by the destruction of the fusible strip or wire.

At E, Fig. 2, I have shown terminals that project from the ends of the case and through which the crossing wires may pass for securing the terminals in position, and these terminals may be slotted or hook-ended, according to the places where they are to be used, and where terminals are provided as shown in Fig. 2 they may lead to branch circuits,

and any desired number of such branch circuits may be provided.

I claim as my invention—

1. The combination with the tubular case having heads within the end portions and a fusible strip, of metallic terminals connected with the strip and passing across through the case and the end heads thereof, so as to hold the said heads within the tubular case, substantially as set forth.

2. The combination with the safety-fuses, each having a case and fusible strip, of metallic terminals that are parallel and pass across through the two or more cases and connect the fusible strips in multiple arc, and sockets or clips for receiving the projecting ends of the terminals, substantially as set forth.

3. In a safety-fuse having an inclosing case and a smaller internal tube around the fusible strip and an air-space between the tubes, borax or similar material around and in intimate contact with the fusible strip and within the smaller tube, substantially as specified.

4. In a safety-fuse having an inclosing case and a smaller internal tube around the fusible strip and an air-space between the tubes, heads at the ends of the case and yielding material around the terminals and close to the inner sides of the head, substantially as set forth.

5. The combination with the inclosing case and metallic terminals passing across through the same, of a fusible strip within the case, a small tube surrounding the fusible strip and material such as borax, within the small tube and around the fusible strip and acting as a flux when the fusible strip melts, substantially as set forth.

6. The combination with an inclosing case and metallic terminals crossing through the case near the ends thereof, of a fusible strip connected with the metallic terminals, a small tube surrounding the fusible strip and material such as borax, within the small tube to act as a flux when the fusible strip is heated, substantially as set forth.

7. The combination with an inclosing case and heads within the case, and metallic terminals crossing through the case near the ends thereof, of a fusible strip connected with the metallic terminals, a small tube surrounding the fusible strip, and material such as borax within the small tube, to act as a flux when the fusible strip is heated, substantially as set forth.

8. The combination with a tubular case of insulating material, of terminals passing across through the case near the ends thereof, a fusible strip connected between the terminals and within the case, heads near the ends of the case and sealing material for closing the case air-tight, and a fluxing material such as borax, around the fusible strip and within the case, substantially as set forth.

9. The combination with a tubular case of insulating material, of terminals passing across through the case near the ends thereof, a fusible strip connected between the terminals and within the case, heads near the ends of the case and sealing material for closing the case air-tight, and a fluxing material such as borax around the fusible strip and within the case, the fluxing material being in a layer around the wire so that there is an air-space between the same and the interior of the case, substantially as set forth.

10. A cut-out conductor and a surrounding mixture containing borax or similar material, a tube for surrounding and holding such material and the cut-out conductor, a case for holding the conductor and tube, a heat-insulator between the inner tube and the outer tube, and terminals projecting from the outer case near its ends and a connection therefrom to the cut-out conductor, substantially as set forth.

11. The combination with a tubular case of insulating material, of terminals connected thereto and a fusible strip attached between the terminals and within the case, heads near the ends of the case and a fluxing material, such as borax, around the fusible strip and forming a layer to such strip, so that there is an air-space between the same and the interior of the case, substantially as set forth.

Signed by me this 24th day of March, 1898.

JOSEPH SACHS.

Witnesses:

GEO. T. PINCKNEY,

S. T. HAVILAND.