(No Model.) 2 Sheets—Sheet 1.

W. J. HAMMER.

SAFETY CATCH FOR ELECTRICAL CIRCUITS.

No. 368,765. Patented Aug. 23, 1887.

Fig. 1.

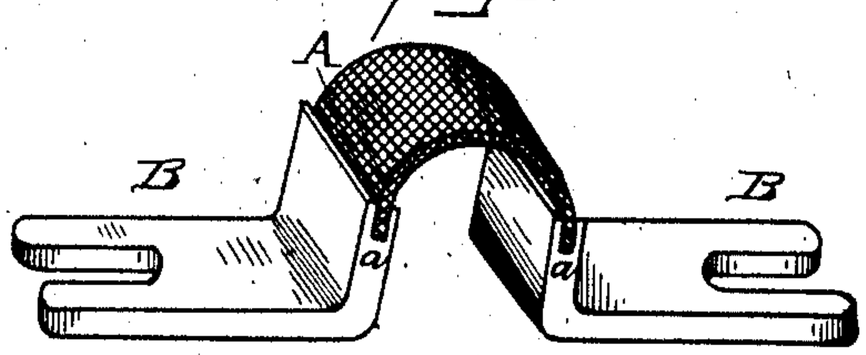

Fig. 2.

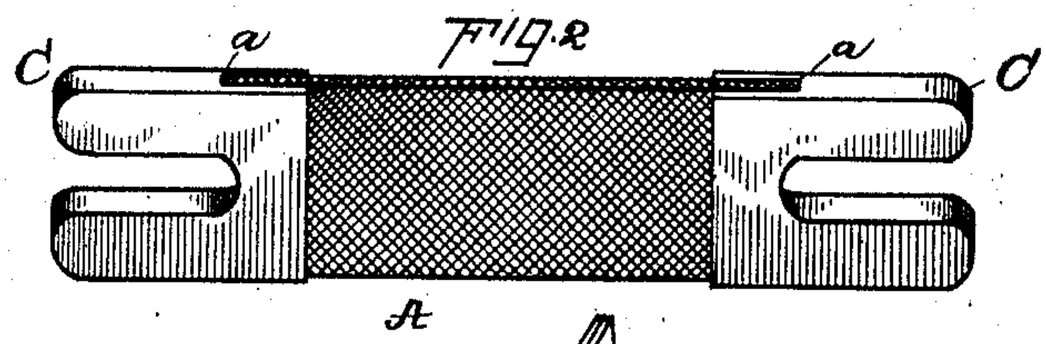

Fig. 3.

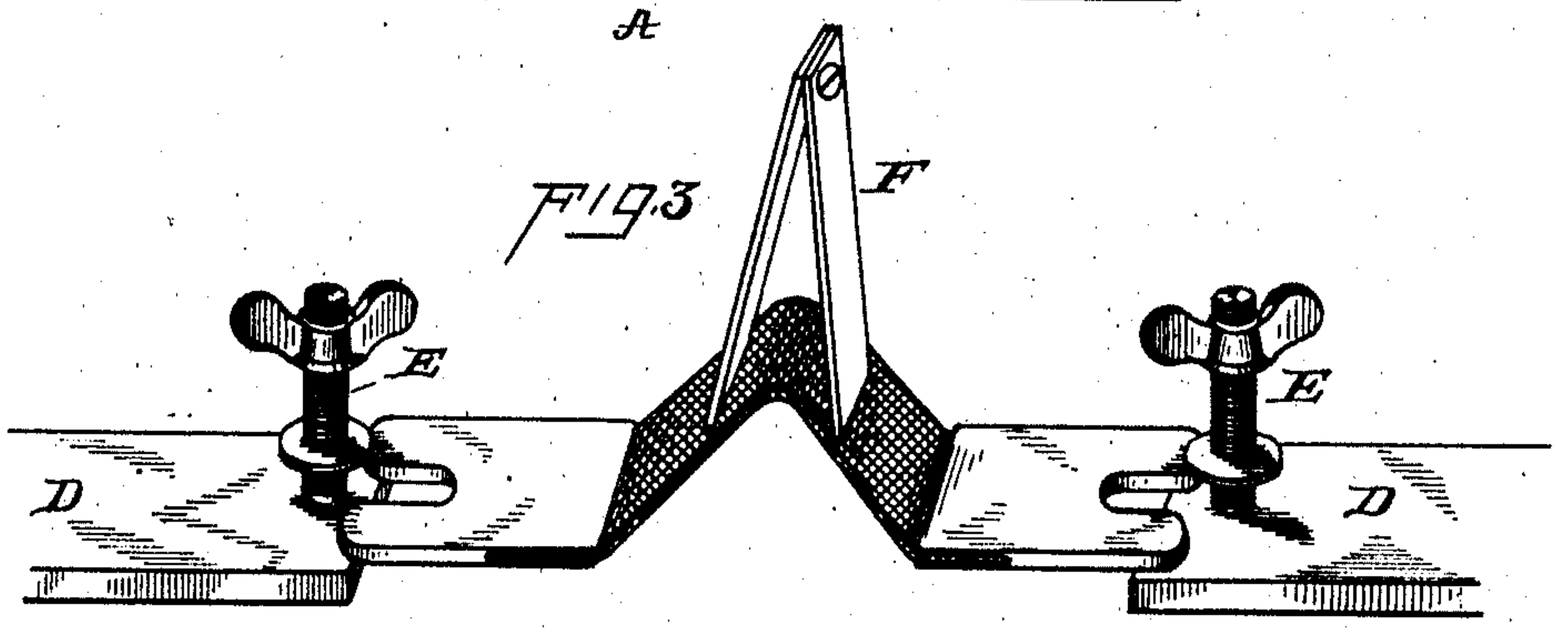

Fig. 4.

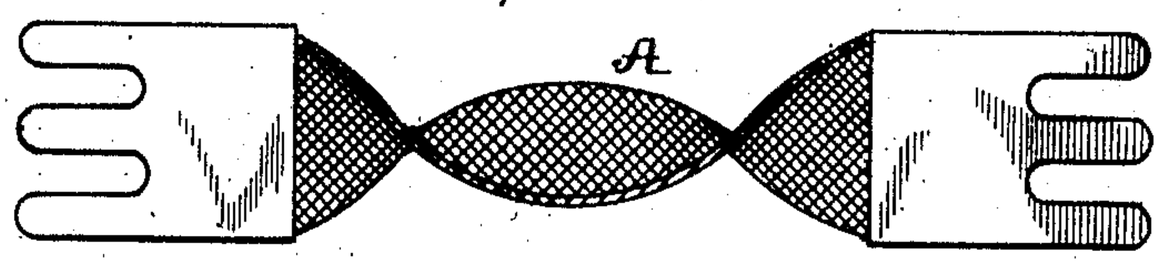

Fig. 5.

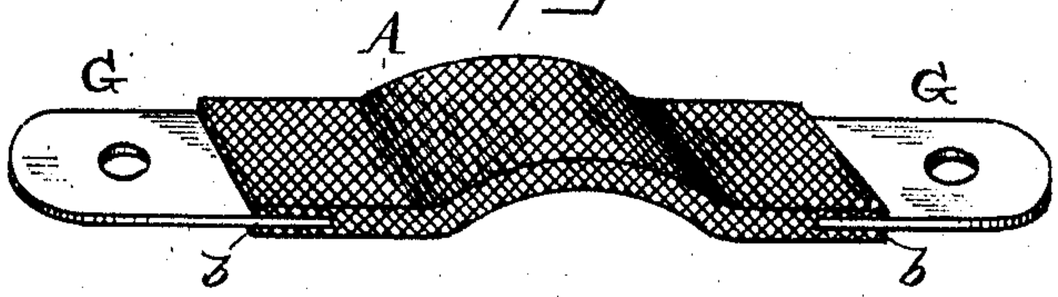

Fig. 6.

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(No Model.) 2 Sheets—Sheet 2.

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SAFETY CATCH FOR ELECTRICAL CIRCUITS.

No. 368,765. Patented Aug. 23, 1887.

Fig. 7.

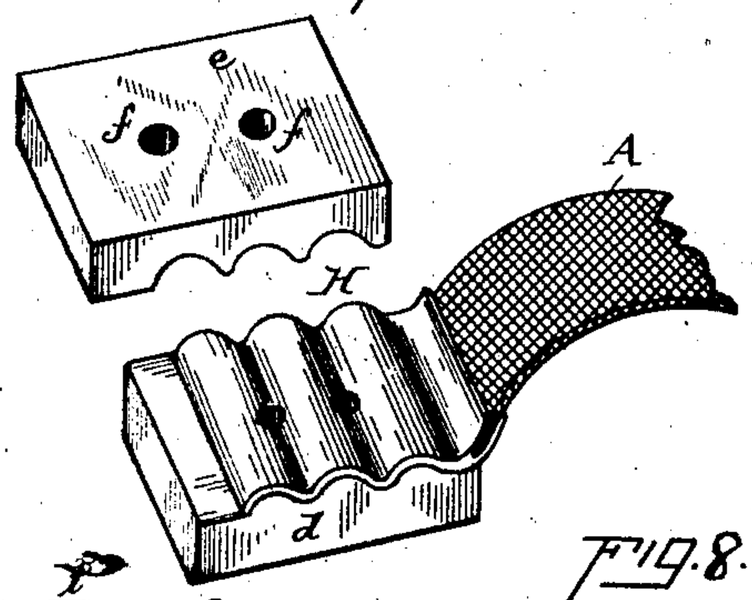


Fig. 8.

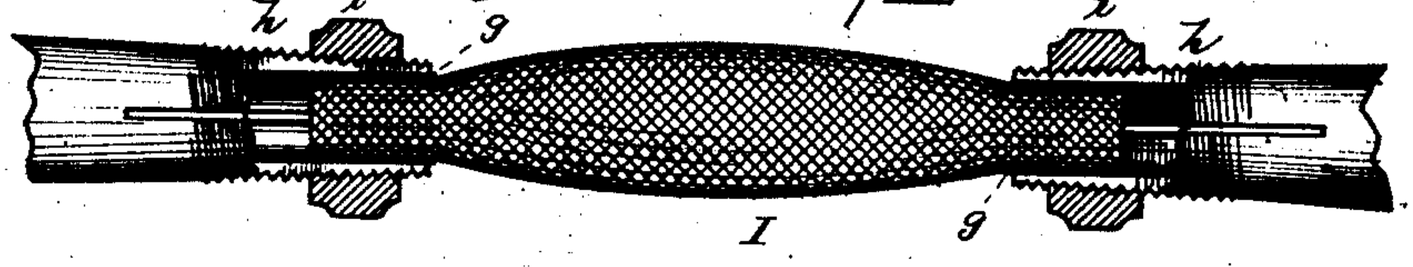


Fig. 9.

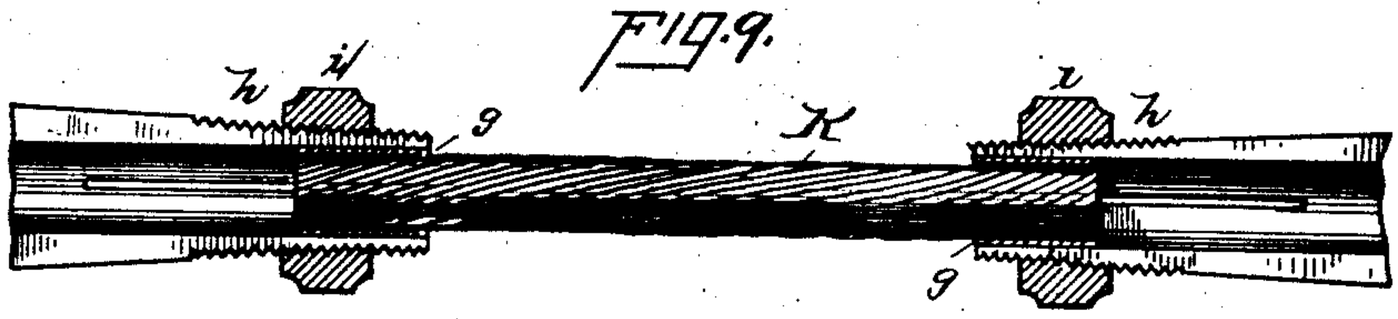


Fig. 10.

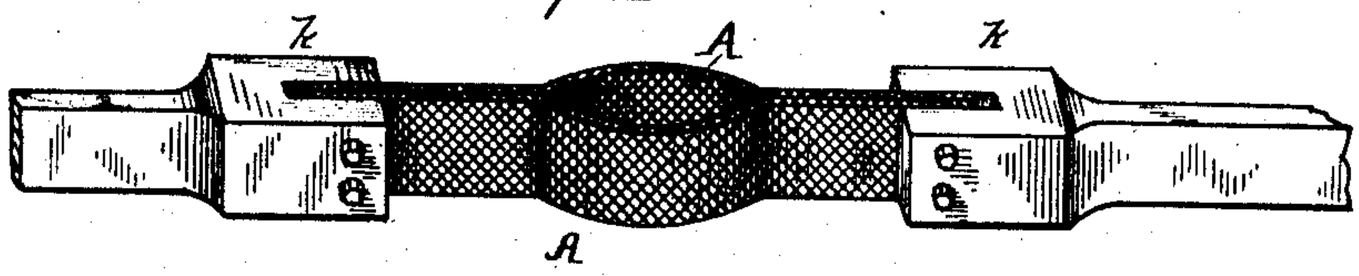
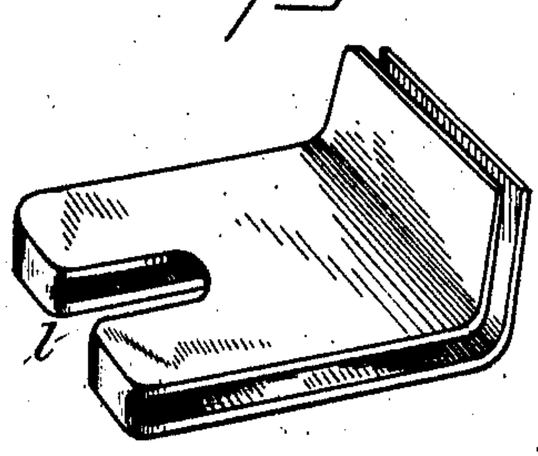


Fig. 11.



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UNITED STATES PATENT OFFICE.

WILLIAM J. HAMMER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HIMSELF, AND FRANCIS R. UPTON, OF ORANGE, NEW JERSEY.

SAFETY-CATCH FOR ELECTRICAL CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 368,765, dated August 23, 1887.

Application filed March 25, 1887. Serial No. 232,359. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. HAMMER, of Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Improvement in Safety-Catches for Electrical Circuits, of which the following is a specification.

My invention relates to safety-catches or fusible strips which are interpolated in the conductors of electrical circuits, and are designed to fuse and so break the circuit upon the passage of a current greater than that which the circuit is intended to convey.

My object is to so construct these strips that they will not be injuriously affected by the expansion and contraction of the metal due to changes in temperature; that effective connections may be made between them and the terminals of harder metal, to which their ends are permanently connected; that they may be readily and conveniently placed in circuit, and, generally, to increase the efficiency, economy, and convenience of devices of this character.

The main feature of my invention consists in making a safety-catch strip of a number of wires of readily-fusible metal, preferably an alloy of lead and other metal, which wires are braided, woven, twisted, or otherwise formed or massed into a strip which has great flexibility and is readily and conveniently put into use. In this strip the wires preferably extend from end to end of the strip.

My invention further consists in various novel devices and combinations of devices employed by me in accomplishing the above-named objects, as hereinafter set forth and claimed.

My invention is illustrated in the accompanying drawings, in which—

Figures 1 and 2 are views of simple forms of safety-catches embodying my invention. Fig. 3 is a view showing the manner in which a safety-catch may be placed in the circuit; Fig. 4, a view showing a safety-catch arranged for greater flexibility and to economize space; Fig. 5, a view showing another way of attaching the copper terminals to the fusible strip; Fig. 6, an enlarged view of a portion of one of the strips, showing the way in which it may be made; Fig. 7, a view showing another form of terminal; Fig. 8, a view of a hollow braided strip; Fig. 9, a view of a modified form of my invention; Fig. 10, a view of a double safety-catch for additional flexibility, and Fig. 11 a view illustrating a way of making the copper terminals.

Referring to Fig. 1, A is a fusible strip composed of a number of fusible wires braided or otherwise woven or formed into a flat strip of matting. A portion of such a braided flat strip is shown in Fig. 6. The wires are thus braided or woven together, preferably by a suitable machine, in any well-known manner. B B are lugs or terminal plates of copper. As shown in Fig. 1, these plates have upwardly-extending shoulders, and in the edge of each is a slot, *a*. In these slots the ends of the fusible strips are placed and secured by soldering, the strip being bent or curved, as shown, so that it may be free to expand and contract under variations of temperature without danger of injury to the strip or its connections.

Fig. 2 shows straight terminals C C, and the braided strip A, extending straight between them, being secured, as before, in the slots *a a* in the edges of the terminals.

Fig. 3 shows the manner of placing these safety-catches in circuit. D D represent plates forming terminals of a broken conductor of a circuit, and each provided with a binding-screw, E, as usual. Heretofore in putting safety-catches in circuit, especially in catch-boxes of the Edison underground system, while the current is on there has been danger of a shock or of burning the hand of the operator, because it was necessary first to secure one terminal by the binding-screw and then to swing the strip around and bring the other into place and secure it. In this handling of the metal parts the difficulty mentioned occurs. By reason of the flexibility of my safety-catch, however, it may be grasped in the middle by a pair of insulating-nippers, as represented by F, the strip being bent between the nippers, and its terminals then allowed to slide out under the binding-screws, which may then be screwed down one at a time upon the terminals.

In Fig. 4 the fusible strip A is given a twist whereby its flexibility or expansibility is increased and the space taken up lessened.

In the form shown in Fig. 5 the fusible strip A has straight ends, and in each end is sawed

or cut a slot, *b*, in which the thin copper terminal plates, G, are placed and soldered, instead of inserting the strip in the slotted terminals, as in the preferred form.

The arrangement shown in Fig. 7 is designed to give greater conducting area to the connections between the terminals of the safety-catch and those of the conductors. The copper terminals H are crimped or bent, as shown, and the conductor terminals consist each of a corrugated base, *d*, fitting the crimps of the safety-catch terminal, and a corrugated cover, *c*, fitting over it, the whole being secured together by screws passed through the screw-holes *f*.

In Fig. 8 the safety-catch is a hollow tube, I, of braided wires, which may be formed in the well-understood manner of braiding or weaving in this form. Upon each end of this tube I place a sheathing of copper, *g*. (Shown in section in Fig. 8.) With this form I may employ the kind of connection set forth in my application filed February 16, 1887, Serial No. 227,775—that is to say, the copper-covered end of the safety-catch is inserted in the tapering screw-threaded split sleeve *h*, and the nut *i* is screwed up upon this sleeve, so as to make a secure and firm connection. This kind of connection may also be made with a safety-catch, such as in Fig. 9, formed as a rope, K, of wires twisted together with copper-sheathed ends.

Fig. 10 shows a safety-catch composed of two braided strips placed together and bent out oppositely at their middles, so as to give greater expansibility and increased radiating-surface. These are shown as inserted in slots and secured therein by screws in the terminal plates *k k*. They may, however, be soldered, or solder may be used in addition to the screws. The terminals of this figure are different from those shown in the other figures, but are of a form sometimes used.

I would mention that in those forms of my invention in which solder is employed to secure the strip to its terminals, I may instead, or in addition, electroplate these parts together.

In the arrangement using two superimposed strips the copper terminal may be readily inserted and soldered or plated between the ends of these strips, making a connection similar to that of Fig. 5.

Fig. 11 illustrates a convenient method of making the terminals, such as those of Fig. 1. A flat strip of copper, perforated at *l*, may be bent over into the form shown, and the horizontal parts *m* may then be stamped together, whereby the terminal with an opening for the binding-screw and a slot or opening for the safety-strip is formed.

In all the forms of my invention employing flat terminal plates I have shown such plates as made with rounded corners. This is a feature of my invention, such plates having been made heretofore with squared or rectangular corners. These are inconvenient, since in turning the safety-catch, after one terminal is connected, to bring the other into position, the squared corners occupy a great deal of space and, especially in a narrow safety-catch box, come into contact with other parts, and may produce a ground or a short circuit. The round corners, however, do not project like the square ones, so that this difficulty does not occur.

What I claim is—

1. A flexible safety-catch consisting of a number of fusible wires braided, woven, or twisted together, substantially as set forth.

2. A flexible safety-catch consisting of a number of fusible wires braided, woven, or twisted together in such manner that all the wires extend from end to end of the safety-catch, substantially as set forth.

3. A flexible safety-catch consisting of a number of fusible wires braided or woven into a flat strip, substantially as set forth.

4. A flexible safety-catch consisting of a number of fusible wires braided, woven, or twisted together and secured to end plates of harder metal, substantially as set forth.

5. A flexible safety-catch consisting of a number of fusible wires braided or woven into a flat strip and secured to terminal plates of harder metal, substantially as set forth.

6. A fusible safety-catch consisting of a number of fusible wires braided or woven into a flat strip and having its ends secured in slots or openings in the edges of terminal plates of harder metal, substantially as set forth.

7. A fusible safety-catch consisting of a number of fusible wires braided or woven into a flat strip and having its ends secured by soldering in slots or openings in the edges of terminal plates of harder metal, substantially as set forth.

This specification signed and witnessed this 23d day of March, 1887.

WM. J. HAMMER.

Witnesses:
C. R. WOLCOTT,
E. W. GODFREY.

Correction in Letters Patent No. 368,765.

It is hereby certified that Letters Patent No. 368,765, granted August 23, 1887, upon the application of William J. Hammer, of Boston, Massachusetts, for an improvement in "Safety Catches for Electrical Circuits," was erroneously issued to Francis R. Upton as assignee of the entire interest, that the said Letters Patent should have been issued to said *William J. Hammer and Francis R. Upton, jointly*, said Upton being the assignee of one-half interest only in said invention; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 30th day of August, A. D. 1887.

[SEAL.]

D. L. HAWKINS,
Acting Secretary of the Interior.

Countersigned:

BENTON J. HALL,
Commissioner of Patents.