G. A. SCHAEFER.

CONNECTOR CLIP.

APPLICATION FILED FEB. 11, 1918.

1,327,844. Patented Jan. 13, 1920.

Fig. 1.

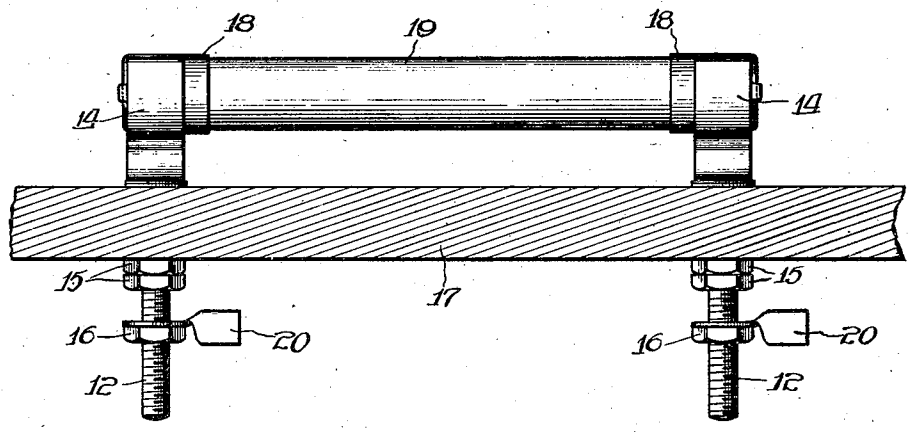


Fig. 2.

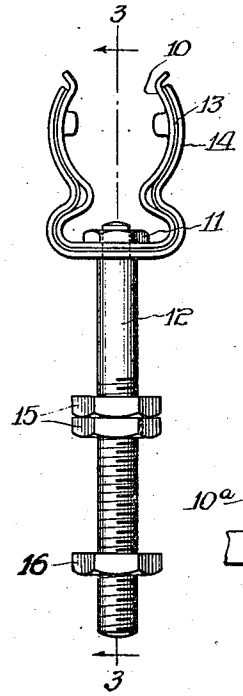


Fig. 4.

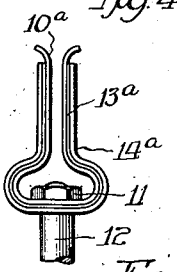


Fig. 5.

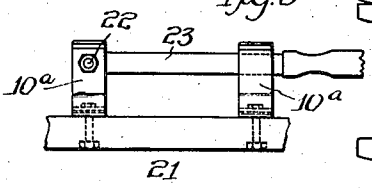
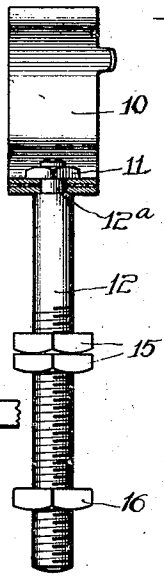


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE A. SCHAEFER, OF CHICAGO, ILLINOIS.

CONNECTOR-CLIP.

1,327,844. Specification of Letters Patent. Patented Jan. 13, 1920.

Application filed February 11, 1918. Serial No. 216,595.

To all whom it may concern:

Be it known that I, GEORGE A. SCHAEFER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Connector-Clips, of which the following is a specification.

My invention relates to an improved construction of connector clip by which a strip of conducting metal such as copper is supported at its middle portion and bent at its ends to conform with and engage the conductor with which the clip is to be used and in addition to the structure referred to a similarly conformed spring, preferably of steel surrounds the conducting strip and is insulated therefrom by a suitable strip of insulating material, such for example as mica, all of the parts being secured together and to a suitable support by fastening devices engaging the middle portions of said strips.

As a result of my improved construction the conducting strip forming a part of the connector clip is supported and reinforced at its portions engaging the conductor with which the clip is to be used in a manner to hold the strip securely in engagement with said conductor, so that a good electrical contact is maintained between the conducting strip and the conductor at all times. This reduces the heating which would otherwise take place as a result of poor contact to a minimum and the device is not dependent on the spring of the conducting strip to secure the electrical contact referred to between said strip and said conductor. Furthermore the insulation between the conducting strip and the spring protects the spring throughout practically its whole extent from the action of any heat which may be developed in the conducting strip, and furthermore said insulation prevents the flow of current through the spring and thus the production in the spring of heat as a result of said current flow.

My present invention is an improvement on that set forth in Patent Number 1,169,431 which issued to me January 25, 1916.

My present invention is adapted for use in any connection where connector clips are employed for removably engaging conductors such for example as for supporting inclosed fuses and for electrical switches of the knife blade type.

My invention will best be understood by reference to the accompanying drawings showing preferred embodiments thereof, in which—

Figure 1 shows two of the improved connector clips mounted on a suitable base and supporting an inclosed fuse of the ferrule type,

Fig. 2 shows in elevation one of the connector clips on an enlarged scale removed from the base and separate from the conductor to be engaged thereby,

Fig. 3 is a sectional view of the parts shown in Fig. 2 taken along the line 3—3,

Fig. 4 shows a modified construction of clip for use with flat conductors, and,

Fig. 5 is a diagrammatic view showing the use of clips of the type illustrated in Fig. 4 in a knife switch arrangement.

Similar numerals refer to similar parts throughout the several views.

As shown in Figs. 2 and 3 the connector clip consists of a strip of conducting metal 10 such as copper secured at its middle portion by a fastening device such as a nut 11 to a supporting rod or stud 12. The rod 12 is threaded and carries lock nuts 15 for securing the clip to a base and an additional nut 16 for connecting a conducting wire to the rod 12. The ends of the conducting strip 10 are bent away from its middle portion so that they extend in the same general direction and for the construction shown in Figs. 2 and 3 are given a circular conformation to engage a cylindrical conductor such for example as the ferrule of a ferrule type fuse. The strip 10 is surrounded by a strip of insulation 13 preferably of mica or other heat and moisture resisting insulating material and around this strip 13 a spring 14 is disposed, the strip of insulation 13 and the spring 14 being of substantially the conformation of the conducting strip 10. The conducting strip, the strip of insulation and the spring are secured together by the nut 11 or an equivalent fastening device engaging the projecting end 12^a of reduced diameter which projects from the rod 12 through holes therefor in said parts. In constructing the connector clip the spring 14 which is preferably of steel is conformed to hold the end portions of the conducting strip 10 somewhat closer together than the position they occupy when engaging the conductor for which the clip is designed, as a result of which when the conductor is in place in the clip sufficient pressure is ex-

erted by the spring 14 upon the end portions of the conductor strip and thus upon the corresponding portion of the conductor engaged by the clip to insure good electrical contact between the conductor and the conducting strip. It is well known in the art that connector clips depending for their effectiveness on the spring of the conducting strip are not effective since said strip is usually of copper and the amount of spring possessed by it is insufficient to maintain the strip in good electrical connection with the conductor engaged thereby, and furthermore that little heating of the conductor strip is required to decrease the temper of the strip. The spring construction referred to as forming a part of my improved clip maintains the conducting strip in good electrical contact with the conductor engaged thereby whether the conducting strip is of spring material or not and any softening of the metal of the conducting strip does not, therefore, decrease the effectiveness of the clip. The spring is preferably protected throughout its entire extent by the strip of insulating material both from receiving heat from the conducting strip by conduction and also by radiation, and furthermore electrical contact between the conducting strip and the spring is prevented by said insulating material as a result of which there is no current flow through said spring, and therefore the heating which would otherwise result from said current flow is eliminated and the spring remains sufficiently cold at all times so that its full temper is retained.

In the construction shown in Fig. 1 two of the connector clips 14 constructed as shown in Figs. 2 and 3 are mounted on a base 17 so as to engage the ferrules 18 of an inclosed fuse 19 so that the latter may readily be removed from the clips and a new one inserted when the fuse is blown. Terminals 20 are shown upon the rods 12 for receiving the ends of the wires to be connected to the rods 12 and thus to the clips 14, these terminals being clamped in place between the nuts 15 and 16 when the wiring is completed.

In the modified construction shown in Fig. 4 the conducting strip 10^a, the strip of insulation 13^a and the spring 14^a are related to each other in substantially the manner shown above in Figs. 2 and 3, the only difference being that the end portions of these parts are substantially parallel to each other so that the connector clip may engage a flat conductor as for example the blade of a knife switch or the conducting end portions of a fuse of the knife type.

In the switch construction shown in Fig. 5 two of the connector clips 10^a are shown mounted on a base 21 and a switch blade 23 is shown as pivotally connected at 22 with one of said clips, the other clip serving as the contact clip of the switch.

From the description above given it will appear that my improved connector clip is extremely simple to make and effective in operation. While I have shown my invention in the particular embodiments above described it will be understood, however, that I do not limit myself to these exact constructions as I may employ equivalents thereof known to the art at the time of the filing of this application without departing from the scope of the appended claims.

What I claim is:

1. A connector clip comprising in combination, a strip of metal bent to make contact with opposite sides of a conductor to be engaged by said clip, a strip of insulating material extending around the outer surface of said bent metal strip and having its ends adjacent the opposite conductor engaging portions of said bent strip, and a flat spring having substantially the conformation of and surrounding said insulation and tending to hold said metal strip firmly in its conductor engaging position, whereby said metal strip is held firmly in engagement with said conductor by said spring and said spring is protected from heating by said insulation.

2. A connector clip comprising in combination, a strip of metal bent to make contact with opposite sides of a conductor to be engaged by said clip, a strip of insulating material extending around the outer surface of said bent metal strip and having its ends adjacent the opposite conductor engaging portions of said bent strip, a flat spring having substantially the conformation of and surrounding said insulation and tending to hold said metal strip firmly in its conductor engaging position, whereby said metal strip is held firmly in engagement with said conductor by said spring and said spring is protected from heating by said insulation, and a mounting stud secured to and extending through the middle portions of said metal strip, insulation and spring to hold the same together.

3. A connector clip comprising in combination, a one piece jaw of strip metal, said jaw having end portions conformed to engage an electrical conductor between them and a flat middle portion in a plane substantially at right angles to the planes of said end portions to engage a support, a strip of insulating material extending substantially from end to end of said jaw along the outer surface thereof, and a flat spring of substantially the conformation of and engaging the outer surface thereof for holding the end portions of said jaw in their conductor engaging position.

4. A connector clip comprising in combination, a one piece jaw of strip metal, said

jaw having end portions conformed to engage an electrical conductor between them and a flat middle portion in a plane substantially at right angles to the planes of said end portions to engage a support, a strip of insulating material extending substantially from end to end of said jaw along the outer surface thereof, a flat spring of substantially the conformation of and engaging the outer surface thereof for holding the end portions of said jaw in their conductor engaging position, and means extending through the middle portions of said jaw, insulation and spring for holding the same together.

5. A connector clip comprising in combination, a one piece jaw of strip metal, said jaw having end portions conformed to engage an electrical conductor between them and a flat middle portion in a plane substantially at right angles to the planes of said end portions to engage a support, a strip of insulating material extending substantially from end to end of said jaw along the outer surface thereof, a flat spring of substantially the conformation of and engaging the outer surface thereof for holding the end portions of said jaw in their conductor engaging position, and a conducting bolt extending through the middle portions of said jaw, insulation and spring for holding the same together and mounting said clip.

6. A connector clip comprising in combination, a one piece jaw of strip metal, said jaw having end portions conformed to engage an electrical conductor between them and a flat middle portion in a plane substantially at right angles to the planes of said end portions to engage a support, a strip of insulating material extending substantially from end to end of said jaw along the outer surface thereof, a flat spring of substantially the conformation of and engaging the outer surface thereof for holding the end portions of said jaw in their conductor engaging position, the end portions of said jaw being circular in conformation to engage and retain a cylindrical conductor between them, and the end portions of said insulation and spring being of similar circular conformation to laterally support said jaw throughout the conductor engaging portions thereof.

In witness whereof, I hereunto subscribe my name this 28th day of January, A. D. 1918.

GEORGE A. SCHAEFER.

Witness:

JOHN WEINBERGER.