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ELECTRIC TERMINAL CONNECTOR

Filed Feb. 24, 1961

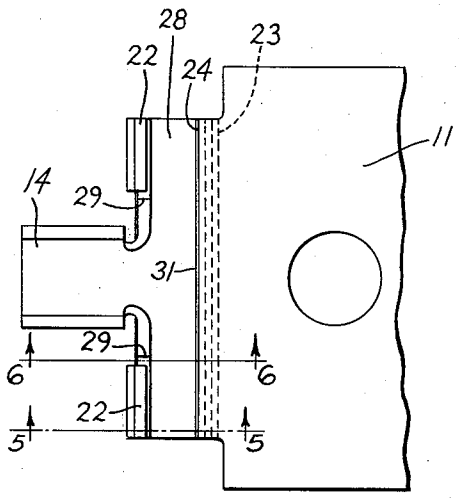


Fig. 4

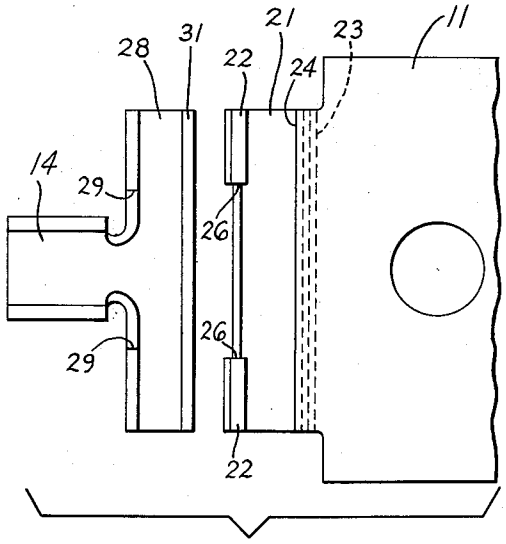


Fig. 3

Fig. 5

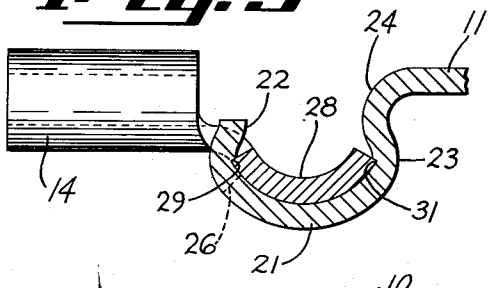
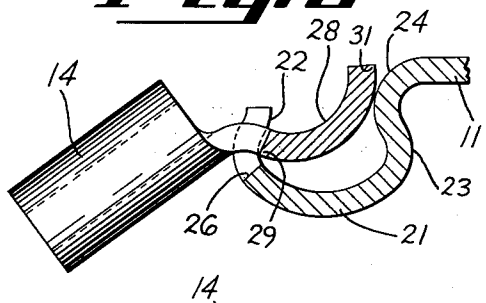


Fig. 6



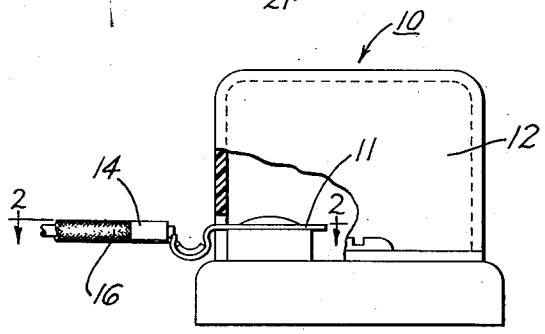


Fig. 1

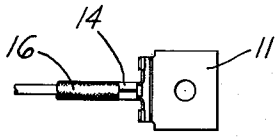


Fig. 2

INVENTOR.
EVERETT C. ARMENTROUT

BY

Lloyd M. Keighley.

HIS ATTORNEY

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ELECTRIC TERMINAL CONNECTOR

Everett C. Armentrout, New Carlisle, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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This invention relates to an electrically conductive connection between two sheet metal terminals of an electric circuit or the like.

I am aware of the fact that there is in existence many different electric terminal connectors for use in electric wiring circuits to switches, relays, etc. However, most of the prior connectors require an element or elements in addition to the sheet metal terminals to make a connection between the terminals which will mechanically lock them together as well as to secure the terminals in good electric current conductive relationship with one another. The prior terminal connectors are also rather expensive, difficult to assemble and require considerable time in assembling the terminals thereof together. Furthermore, prior connectors have been of a relatively long character and the terminals thereof project outwardly beyond a switch, relay or the like housing a considerable or unnecessary distance. I therefore contemplate the provision of means on sheet metal electric current conducting terminals which will permit connecting them together in a low-cost fashion and in a manner to substantially reduce the time required to make their connection both contributing to simplify and speed up completion of electric wiring systems in electrical installations contained in household appliances and the like.

An object of my invention is to provide an improved combined mechanical and electric current conducting connection between two terminals which is compact and short coupled.

Another object of my invention is to form complementary electrical terminals with means thereon which, when the terminals are brought into association with one another and manipulated in a certain manner, provide a strong mechanical and effective current conductive interlock therebetween to thereby eliminate the use of other or additional elements in connecting the terminals.

A further object of my invention is to provide a connector for two sheet metal electric terminals which, while being connected, creates a wedging action between portions or parts of the terminals to mechanically lock them together in good electric current conducting relationship and which lock is not likely to be accidentally unlocked.

A still further and more specific object of my invention is to form an out-of-round socket or hinge pin-like receiving portion having a side entry opening on a sheet metal terminal, a portion or hinge pin-like part on another sheet metal terminal, to associate the terminals with each other and to rotate one of them relative to the other for wedgingly interlocking the hinge pin-like part of the one terminal with the socket-like or hinge pin-like receiving portion of the other terminal so as to provide without the aid of additional means a combined electric current conducting connection and strong mechanical lock intermediate the terminals.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

FIGURE 1 is a view partly in section and partly in elevation of an electric switch, relay, junction block or the like with a terminal thereof connected to another terminal

having a wire leading therefrom in a manner according to my invention;

FIGURE 2 is a substantially full-size plan view of the connected terminals taken along the line 2—2 of FIGURE 1;

FIGURE 3 is a greatly enlarged view of the terminals shown in FIGURES 1 and 2 separated from one another to better illustrate their construction;

FIGURE 4 is a view similar to FIGURE 2 illustrating the terminals on an enlarged scale connected to one another;

FIGURE 5 is a sectional view taken along the line 5—5 of FIGURE 4 of a combined mechanical and electric current conducting connection at one point through the terminals; and

FIGURE 6 is a sectional view taken along the line 6—6 of FIGURE 4 illustrating association of the contacting portions of the terminals prior to locking them together.

Referring to the drawings, for illustrating my invention, I show in FIGURE 1 thereof an electric switch, relay or the like, generally represented by the reference character 10, and such element insofar as the present disclosure is concerned could be any electrical device in an electric circuit. Switch 10 has an electric terminal 11 securely mounted therein or thereon in any conventional or well-known manner which terminal projects outwardly of the switch through a suitable aperture or notch provided in a cover 12 for the switch. Terminal 11 is connected, in a fashion to be hereinafter described, to another terminal 14 having a wire 16 of an electric circuit or the like attached thereto for conducting electric current to and/or through the switch or device 10. Both terminals 11 and 14 are preferably stamped or punched from .020 to .031 inch thick metal of high electric current conductive properties. Full size of the connected terminals is illustrated in FIGURE 2 of the drawings and my invention is equally applicable to larger terminals.

With reference now more particularly to the enlarged illustration in FIGURE 3, it is to be noted that the first metal terminal 11 comprises, in addition to its mounting portion, opposed spaced-apart hinge pin-like receiving portions or out-of-round yieldable socket portions adapted to receive in interlocking contact therewith a hinge pin-like part or substantially rigid rounded or arc portion of the second or other terminal 14. The socket or hinge pin-like receiving portion of terminal 11 includes a wing part 21 which is curved or rounded about a predetermined radius throughout the greater area or contacting part thereof and has parts 22, 23 and 24 reversely bent about smaller radii forming a side entry opening in the socket. Part 22 is cut away as at 26 to provide the spaced-apart hinge pin-like receiving portions 22 on terminal 11. The predetermined radius of arc part 21, the smaller radii of spaced opposed parts 22 and of parts 23 and 24 of terminal 11 cooperate to provide the side entry out-of-round resilient or yieldable socket or hinge pin-like receiving portion thereon. Terminal 14 includes, in addition to its wire receiving, clamping and retaining part, a substantially rigid contacting arc portion 28 bent or curved about a predetermined radius and which portion is cut away as at 29 so as to fit between the two opposed portions 22 provided by the cut-away parts 26 on terminal 11 when connecting the terminals to one another. The one sharp edge 31 and the sharp edge of cut-away parts 29 of terminal 14 provide detent means thereon for a purpose to be hereinafter described. Formation of the contacting portions of terminals 11 and 14 is preferably predetermined to provide the hinge pin-like part 28 on terminal 14 with a width dimension which is greater than the maximum internal diameter or the out-of-round part or hinge pin-like receiv-

ing portion or portions of terminal 11. This dimensional differential causes a wedging action between part 28 and walls of the socket formed by portions 21, 22, 23 and 24 as the terminals are manipulated into interlocking engagement with one another to make a combined mechanical and electric current conducting connection intermediate the terminals according to my invention.

Having described the construction of the contacting portions of terminals 11 and 14 the method of assembling and interlocking these portions of the terminals together will now be described in conjunction with the illustration thereof in FIGURE 6 of the drawings. Terminal 14, with conductor wire 16 secured thereto, is placed or moved into cooperation with terminal 11, on switch or device 10, so that the part of terminal 14 between the cut-away portions 29 thereof overlaps a portion of part 21 intermediate the ears or hinge pin-like receiving portions 22 provided on terminal 11 by the cut-aways 26. It is to be noted that a portion of the ears 22 on terminal 11 serve as a fulcrum point for edge portion 29 of part 28 on terminal 14 and that edge portion 31 of part 28 engages the bent or out-of-round portion 24 on terminal 11. Terminal 14, in this associated or cooperative position with the side entry opening in socket or hinge pin-like receiving portion of terminal 11, is now manually rotated relative to terminal 11 or is rotated in a clockwise direction with respect thereto as viewed in FIGURE 6. This rotation of terminal 14 with edge part 29 and edge part 31 on portion 28 thereof bearing against walls 22 and 24 respectively of the yieldable socket portion of terminal 11 causes a forcing apart of walls of the side entry opening of the socket or hinge pin-like receiving portion and the substantially rigid hinge pin-like or arc part 28 then springs into frictional interlocking engagement or contact with portion 21 of terminal 11 as shown in FIGURES 4 and 5. As the greater dimensioned portion 28 of terminal 14 snaps past the smaller internal dimension between walls of the socket or hinge pin-like receiving portion of terminal 11 into the larger dimensioned or wall part 21 thereof, the sharp edge portions 29 and 31 bite into a wall surface of the socket. The sharp edges 29 and 31 provide detent means in the connection intermediate terminals 11 and 14 which limit or restrict relative rotation of the terminals after they have been locked to each other. Wedging action of contacting portions 21 and 28 of terminals 11 and 14 obtained by the assembling operation described and the particular construction or different shapes of the interlocked together parts of the terminals provide a strong mechanical and effective electric current conducting connection therebetween. This connection, in addition to locking terminals 11 and 14 to each other, also prevents sliding movement of one terminal relative to the other in all directions away from one another. In other words terminals 11 and 14 cannot be accidentally slid in any direction away from each other after they have been interlocked together and therefore a substantially permanent connection therebetween is provided. However, should it, for any reason, become necessary to separate terminals 11 and 14, a tool such as a screw driver or the like may be inserted between walls 22 and 24 of the out-of-round socket or hinge pin-like receiving portions of terminal 11 and then rotated to spring or spread these resilient or yieldable walls of the side entry opening apart to thereafter permit rigid or larger dimensioned portion 28 on terminal 14 to be rotated or swung out of the socket.

It should, from the foregoing, be apparent that I have provided a strong mechanical and good electric current conducting connection intermediate sheet metal terminals employed in an electric circuit leading to switches, etc. of an electrical installation. This improved connection is provided between two terminals by the interlocking construction of the terminals themselves and without employment of additional clamping or holding elements in the joint therebetween. The connection intermediate the terminals can be quickly and easily made on production lines in assembling appliances or the like and the connection or connector structure is one that cannot be accidentally or unintentionally separated. The terminals or terminal clips can be formed into their particular shapes in mass production and at low cost by stamping or punching them from thin sheet metal. By providing an out-of-round socket or hinge pin-like receiving portion on a first terminal, a socket insert or hinge pin-like part on a second terminal together with the relative rotation of the terminals after they are placed in cooperative association with one another as herein disclosed their locking to each other can be done by hand and the connection completed without the use of special tools. My improved electrical connector is compact and the overall length throughout the terminals thereof is greatly reduced to thereby minimize the distance of projection of the connection and terminals beyond a juncture block, walls of a switch housing or relay and the like.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In an electrical connector, a first stamped sheet metal terminal having a single wing extending therefrom and formed into a substantially C-shaped in cross section socket, said socket being provided with a side wall part adjacent the main body of said terminal and an opposed free side wall part spaced therefrom defining an entry opening for the socket in said single wing adapted to receive therethrough a thin portion of a second stamped sheet metal terminal, said thin portion of the second terminal having edges spaced apart a greater distance than the normal dimension intermediate said opposed side wall parts of the socket opening, one of said socket side wall parts being yieldable, said free side wall part of the socket opening serving as a fulcrum point on said single wing extension of the first terminal for said second terminal when the terminals are brought into cooperation with one another, one of said terminals being rotatable relative to the other terminal while they are in said cooperation for causing said portion of the second terminal to force said free side wall part on the single wing extension of the first terminal away from the other side wall part thereon and to spring said portion of said second terminal into the socket, and said side wall parts on said single wing extension thereafter and without the aid of additional means wedging said edges of the thin portion of said second terminal into tight conductive contact with wall surfaces of said socket to thereby lock the terminals together.

2. In an electrical connector, a first stamped sheet metal terminal having a single wing extending therefrom and formed into a substantially C-shaped in cross section socket, said socket being provided with a side wall part adjacent the main body of said terminal and an opposed free side wall part spaced therefrom defining an entry opening for the socket in said single wing adapted to receive therethrough a portion of a second stamped sheet metal terminal, said second terminal being substantially T-shaped and having a wire secured to the stem thereof, the tab portion of said T-shaped second terminal being thin and provided with sharp edges spaced apart a greater distance than the normal dimension intermediate said opposed side wall parts of the socket opening of said first terminal, one of said socket side wall parts being yieldable, said free side wall part of the socket opening serving as a fulcrum point on said single wing extension of the first terminal when the terminals are brought into cooperation with one another, one of said terminals being rotatable relative to the other terminal while they are in said cooperation for causing said tab portion of the second terminal to force said free side wall part on the single wing extension of the first terminal away from the other side wall part thereon and to spring the tab portion on said second terminal into the socket, said side wall parts on said single wing extension thereafter and without the

aid of additional means wedging the tab portion of said second terminal into conductive contact with wall surfaces of said socket, and the wedging action of said socket side wall parts being of an intensity to cause said sharp edges on the tap portion of said T-shaped second terminal to bite into the socket wall surfaces and lock the terminals together.

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