

Nov. 11, 1952

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2,617,844

WIRE TERMINAL CONNECTOR

Filed June 29, 1949

2 SHEETS—SHEET 1

Fig. 1.

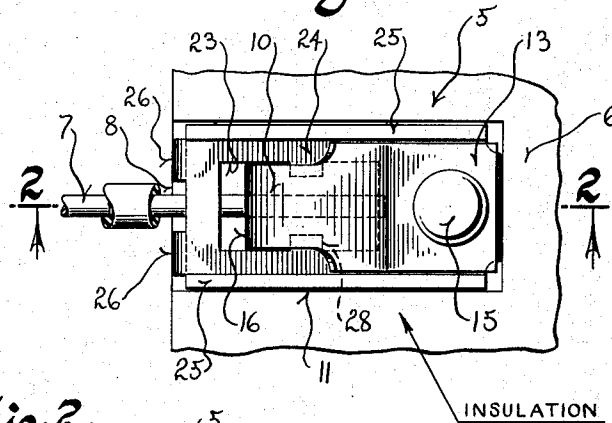


Fig. 2.

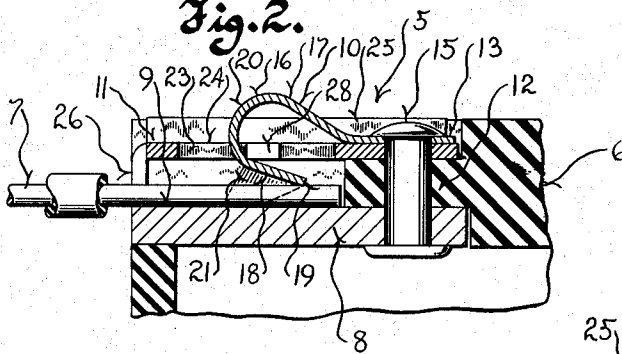


Fig. 3.

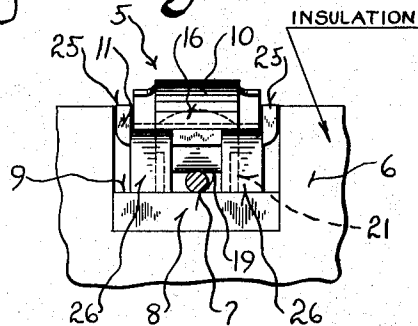
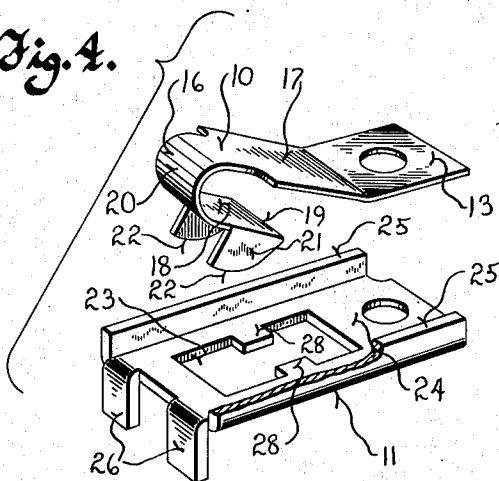


Fig. 4.



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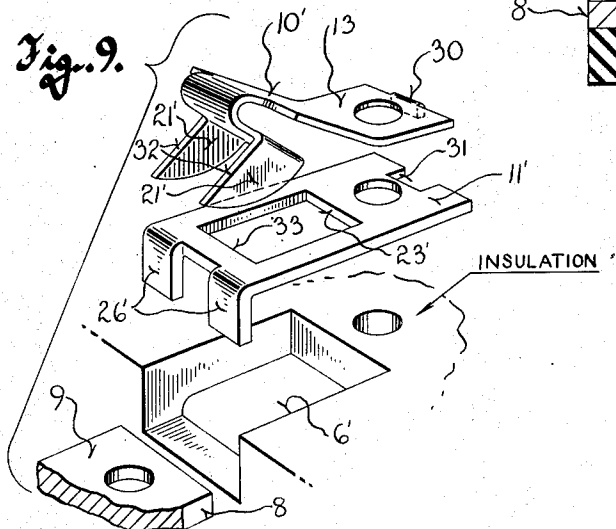
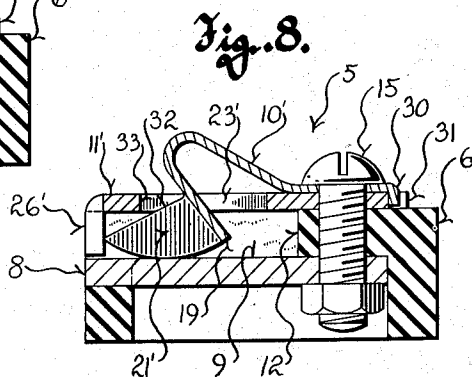
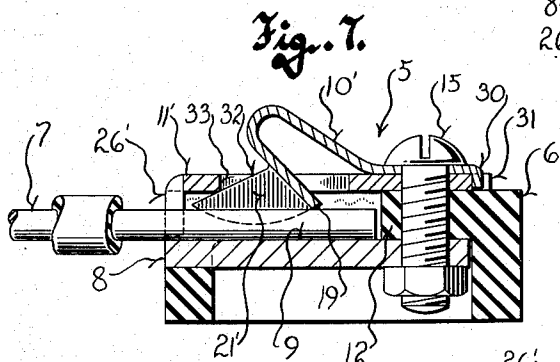
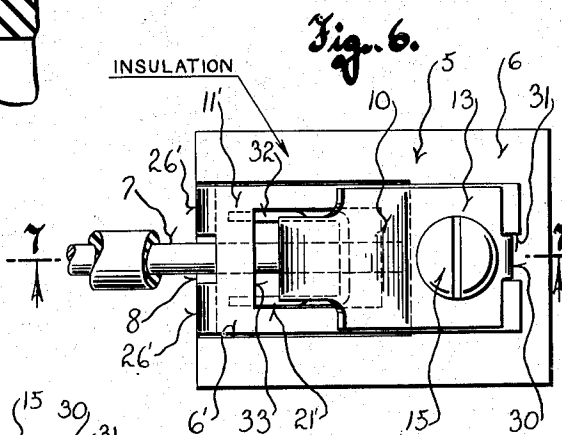
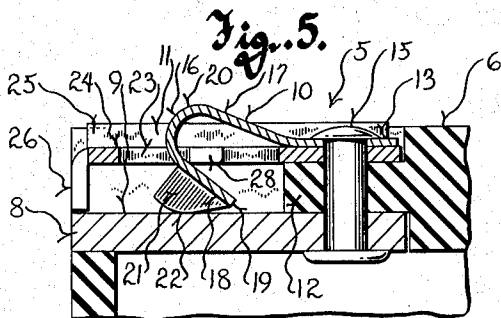
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WIRE TERMINAL CONNECTOR

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2 SHEETS—SHEET 2



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WIRE TERMINAL CONNECTOR

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5 Claims. (Cl. 173-259)

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This invention relates to electrical connectors and refers more particularly to connectors for securing electrical conductors to electrical instrumentalities.

Heretofore the connection of an electrical conductor to an electrical instrumentality, such as a switch, has entailed the use of at least one tool, as for example, a screwdriver, a staking tool or a soldering iron, and has usually been accomplished at the cost of a considerable amount of time and labor. In some instances, moreover, as where solder connections have been used, subsequent disconnection of the conductor has also proved to be difficult and time consuming.

By contrast, it is an object of this invention to provide a connector device whereby electrical conductors may be quickly and securely connected to an electrical instrumentality without necessitating the use of any tools whatsoever in making the connection.

The best known past connector of this type has been the Pfanstock clip which, although quick and convenient to use, was relatively cumbersome and bulky and had the serious disadvantage of permitting a straight length of wire to slip out of the connector if sufficient axial force were applied to the wire.

It is therefore an object of this invention to provide a device of the character described which will enable simple and rapid connection of a wire to an electrical instrumentality and will also permit the wire to be readily disconnected at any time, but which will nevertheless securely retain it against axial displacement.

It is a further object of this invention to provide an extremely inexpensive electrical connector of the character described which may be readily fabricated from simple stampings held together by a single bolt, rivet or bonding connection.

Another object of this invention resides in the provision of an electrical connector of the character described capable of insuring an excellent electrical connection with a wire secured thereto, by reason of the fact that a substantial length of the wire is pressed into firm engagement with a flat surface on the connector.

A further object of this invention is to provide an extremely simple and compact terminal connector of the character described which will not only hold a wire connector in good mechanical and electrical engagement with a contacting element on the connector but which will also exert increasing gripping force upon the wire as increasing axial displacing force is applied to the same.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substan-

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tially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate several complete examples of the physical embodiments of the invention constructed according to the best modes so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a plan view of the electrical connector of this invention with a wire secured in place therein;

Figure 2 is a sectional view taken along the plane of the line 2-2 in Figure 1;

Figure 3 is a front elevational view of the Figure 1 connector;

Figure 4 is a perspective view of the spring member and guide member of the connector of this invention shown in their proper relationship for assembly, a portion of the guide member being cut away to show detail;

Figure 5 is a view similar to Figure 2 but showing the connector without a wire in place therein;

Figure 6 is a plan view of a modified embodiment of the connector of this invention;

Figure 7 is a sectional view taken along the plane of the line 7-7 in Figure 6;

Figure 8 is a view similar to Figure 7, but showing the modified embodiment of the connector without a wire secured therein; and

Figure 9 is an exploded perspective view of the essential portions of the modified connector.

Referring now more particularly to the accompanying drawings, in which like numerals designate like parts throughout the several views, the numeral 5 designates generally the electrical connector of this invention. For the sake of illustration the connector is shown mounted upon an insulative base 6 such as the terminal plate or back of an electrical switch or other electrical instrumentality (not shown) and with an electrical conductor 7 secured therein.

The base of the connector comprises a single conductive element 8, preferably consisting of a substantially rectangular piece of flat metal, but in any event having a flat surface 9 along which the bare end of the wire conductor 7 is adapted to lie and with which it is adapted to have contacting engagement.

The wire is held firmly against the conductive element by means of a spring member 10, and a guide member 11 secures the spring member against rotational displacement relative to the conductive element.

The guide member and the conductive element are held spaced apart and parallel to one another by means of an insulative spacer 12 interposed between them at the rear of the connector and comprising either an integral overhanging ledge

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on the insulative terminal plate of the electrical instrumentality with which the connector is used, as shown, or a separate block of insulative material.

The spring member 10, which cooperates with the conductive element 8 to provide in effect a clamp, preferably comprises a unitary stamping fabricated from a substantially flat strip of flexible metal such as stainless steel, spring brass or the like, but while it is preferably made of conductive material it is not necessarily so, since the engagement of a wire with the surface 9 of the conductive element affords an excellent electrical connection thereto.

The rear attaching portion 13 of the spring member is relatively wide and flat and is adapted to flatwise overlies the rear portion of the guide member 11, the spring member, the guide member and the conductive element 8 being secured to one another and to the insulative spacer 12 in superimposed relation by means of a rivet 15 or other suitable securement means passing through aligned holes in the several members.

The front portion 16 of the spring member is narrower than its rear attaching portion 13 and is substantially U-shaped as viewed from the side, the legs 17 and 18 of the U being substantially parallel to one another. The attaching portion of the spring member is bent at an angle to its U-shaped front portion so that the latter is held in a position in which its legs overlies one another and the flat surface 9 of the conductive element, and are disposed at an acute angle to said surface, with the free edge 19 of the lower leg 18 adjacent to the surface and adapted to be flexed upwardly away from the same. In other words, from the rear attaching portion 13, the spring member extends forwardly upwardly to provide a wide, relatively stiff upper leg 17 and thence narrows and curves back upon itself to provide a flexible spring portion 20, from which the lower leg 18 projects rearwardly downwardly toward the surface 9.

The lower leg 18 is substantially rigid by reason of the fact that an integral wing-like flange 21 is bent downwardly toward the conductive element, at right angles to the body of the leg, along each side edge thereof. The lower free edge 19 of said leg is cut off squarely, along a line parallel to the surface 9, to provide a sharp edge adapted to bite into the surface of a wire conductor to preclude axially forward displacement of the wire. The bottom edge 22 of each flange is rounded or arcuate to enable the lower edge 19 of the leg to swing through a relatively wide arc, to thus accommodate wire conductors of a wide range of thicknesses.

The guide member 11 is preferably formed as a unitary stamping. The front portion of the spring member passes through a slot 23 in the flat body portion 24 of the guide member, the slot being substantially equal in width to the front portion of said spring member so that the sides of the slot afford guiding engagement with the spring member. A rail-like ledge 25, bent upwardly along each side edge of the guide member, stiffens the member and at the same time precludes rotation of the spring member about the rivet 15, since the rear attaching portion of the spring member has a width equal to the distance between the ledges 25.

A pair of spaced apart lug-like abutments 26 are bent downwardly at right angles to the front of the guide member so as to be disposed one at each side of the surface 9 in positions where

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they preclude lateral displacement of a wire from beneath the sharp edge 19. It will be noted that the flanges 21 cooperate with these lugs in preventing such displacement of the wire.

The guide member also has a pair of shoulders 28 which, in the Figures 1 to 5 embodiment, comprise lugs located forwardly of the lower leg 18, in a position to engage the upper surface of the leg 18 near the junction of the leg proper with the curved flexible portion 20 of the spring member. When forward axial force is applied to the wire the lower leg 18 tends to in effect pivot about the curved flexible portion of the spring member, but because of the acute angle which the leg 18 defines with the surface 9, the rearward motion of its free edge, consequent to the application of such force to the wire, forces the upper end portion of the leg upwardly against the shoulders 28. Since the shoulder lugs are fixed, however, the resultant force causes the edge 19 to bite more deeply into the surface of the wire.

The modified embodiment of the terminal of this invention shown in Figures 6 to 9 is particularly adapted for installation at the corner of a switch box or the like formed by the juncture of two of its walls. The guide member 11' is precluded from rotating with respect to the switch box by reason of the fact that its lug-like abutments 26' engage the edges of a slot-like recess 6' at the corner of the box, as may be seen in Figure 9. The guide member is not provided with upturned side ledges, but instead relative rotation between the spring member 10' and the guide member is precluded by means of a downwardly turned tongue 30 at the rear of the guide member engaged in a mating slot 31 in the rear edge of the guide member.

The important functional difference between the two illustrated embodiments resides in the fact that the lugs carrying the shoulders 28 on the guide member of the embodiment shown in Figures 1 to 5 are not present in the modified embodiment of Figures 6 to 9. Instead, the flange 21' on the lower leg of the spring member extends farther forwardly, and its upper edge 32 engages a shoulder 33 which comprises the rear edge of the slot 23' in the guide member.

Since the upper edge of each of the flanges in this embodiment slants rearwardly upwardly, the application of axial forward force upon the wire, resulting in forward movement of the leg and consequently of the flanges, will cause the flanges to cam themselves downwardly on the shoulder 33 and thus force the free edge 19 of the lower leg into firmer biting engagement with the wire. In other words, the flanges cooperate with the shoulder to provide a sort of wedging effect in consequence to the application of forward axial force to the wire.

Thus, in the modified form of the invention shown in Figures 6 to 9, as in the Figures 1 to 5 embodiment, a part on the lower leg may be said to cooperate with shoulders on the guide member to provide a camming or wedging action by which the sharp edge 19 is forced into firmer biting engagement with the wire in consequence to the application of forward axial force thereto.

It will be seen that the installation of a wire in either embodiment of the connector of this invention is exceedingly simple, since it is only necessary to skin or bare the end of the wire and to push it axially rearwardly under the sharp edge, where it will then be securely retained against forward axial displacement by

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the edge itself and against lateral displacement by the abutments 26 and the flanges 21. Removal of the wire is readily accomplished by inserting a screwdriver under the edge 19, to lift the same out of engagement with the wire, and then withdrawing the wire axially forwardly.

From the foregoing description taken together with the accompanying drawings it will be readily apparent that this invention provides an extremely simple and compact electrical connector whereby electrical conductors may be quickly and simply hooked up to an electrical instrumentality without the use of any tool and will be permanently and securely retained in place but may nevertheless be instantly disconnected at any time.

What I claim as my invention is:

1. In a wire connector of the character described: a contact element of conductive material having a substantially flat surface along which the bare end portion of a wire is adapted to lie in contacting engagement with the element; a spring strip member having one of its ends fixed with respect to said contact element and extending therefrom forwardly and upwardly away from said surface and thence curved rearwardly and downwardly toward the surface at an acute angle thereto, with its free end adjacent said surface and adapted to be flexed upwardly away from the same; a sharp edge on said free end of the spring member substantially parallel to said surface on the contact member and adapted to bite into the surface of a wire conductor inserted between said free edge and said surface with its axis transverse to said sharp edge, to preclude forward axial displacement of the wire; a substantially flat guide member fixedly secured above said flat surface, spaced therefrom and parallel thereto, said guide member having a slot through which the curved portion of said spring member projects and shoulder means adjacent said slot adapted to cooperate with a part on the downwardly inclined portion of the spring member to provide a fulcrum about which said portion of the spring member is adapted to pivot into firmer biting engagement with the surface of the wire in consequence of forward axial movement of the wire; and a flange at each side edge of the lower portion of the spring member to stiffen the same.

2. In a wire connector of the character described: a contact element of conductive material having a substantially flat surface along which the bare end portion of a wire conductor is adapted to lie in contacting engagement with said surface; a spring strip member having one of its ends fixedly secured with respect to said contact element and having its other end portion substantially straight and extending rearwardly downwardly toward said surface, at an acute angle thereto, the medial portion of said strip member being curved and being adapted to be flexed upon upward movement of the free end of the strip; a sharp edge on the free end of said spring member, parallel to said flat surface and adapted to bite into the surface of a wire lying along said flat surface and having its axis transverse to said sharp edge to preclude forward axial displacement of said wire; and a substantially flat guide member fixedly secured above said flat surface, spaced therefrom and parallel thereto, said guide member having a slot through which the curved portion of said spring member projects, and having a shoulder adjacent said slot adapted

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to cooperate with said other end portion of said spring member at a point thereon spaced from the sharp edge to provide a fulcrum about which said portion pivots to cause said edge to bite more deeply into the surface of the wire upon forward axial movement of the wire.

3. In a wire connector of the character described: a conductive element having a substantially flat surface along which the bare end of a wire conductor is adapted to lie, in contacting engagement with the element; a curved spring element overlying said flat surface and spaced therefrom, said spring element having one of its ends fixedly secured with respect to the conductive element and its other end free to flex toward and from said surface; a rigid elongated wire clamping element having its upper end connected with the free end of the spring member and extending rearwardly downwardly therefrom, at an acute angle to said surface, with its free lower end adjacent to said flat surface and adapted to be flexed upwardly away from the same; a sharp edge on the lower end of said rigid element, parallel to said flat surface and adapted to bite into the surface of a wire interposed beneath said free edge with its axis transverse thereto, to preclude axially forward displacement of the wire; a substantially flat guide member fixedly secured above said flat surface, spaced therefrom and parallel thereto, said guide member having a slot through which the free end of said spring element extends; and shoulder means on said guide member against which the free end of said spring element is adapted to abut upon flexure of the spring away from said surface to thereby cause said rigid element to wedge its sharp edge into firmer biting engagement with the surface of a wire upon the application of forward axial force to the wire.

4. In a wire connector of the character described: a contact element of conductive material having a surface against which the bare end portion of a wire conductor is adapted to be placed to lie therealong in contacting engagement therewith; an elongated spring member having one of its ends fixed with respect to said contact element and extending forwardly and upwardly away from said surface and thence rearwardly downwardly toward the same at an acute angle thereto, the free end of said spring member being adjacent said surface and adapted to be flexed upwardly in consequence to the interposition of a wire conductor between the surface and said free end; a sharp edge on said free end of the spring member adapted to bite into the surface of a wire conductor lying along said contact element to preclude forward axial displacement of the wire; a downwardly extending flange along each side edge of the rearwardly extending portion of the spring member; shoulder means fixed with respect to the contact element and spaced above the contact element; and abutments on said flanges engageable with said shoulder means upon insertion of a wire beneath said edge to cam the sharp edge on said portion of the spring member into firmer biting engagement with the surface of said wire in consequence of axial forward movement of the wire.

5. In a wire connector of the character described: a conductive element having a substantially flat surface along which the bare end of a wire conductor is adapted to lie in contacting engagement with the element; a curved spring element overlying said flat surface and spaced therefrom, said spring element having one of its ends

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fixedly secured with respect to the conductive element and its other end free to flex toward and from said surface; a rigid elongated wire clamping element having its upper end connected with the free end of the spring member and extending rearwardly downwardly therefrom, at an acute angle to said surface, with its free lower end adjacent to said flat surface and adapted to be flexed upwardly away from the same; a sharp edge on the lower end of said rigid element, parallel to said flat surface and adapted to bite into the surface of a wire interposed beneath said edge with its axis transverse thereto, to preclude axially forward displacement of the wire; means on said wire clamping element providing an upwardly facing abutment beneath the lower surface of said element and spaced above said sharp edge; and a downwardly facing abutment fixed with respect to said conductive element and spaced thereabove and against which said abutment on the wire clamping element abuts when said clamping element is flexed upwardly upon insertion of a wire beneath said edge, to thereby cause said element

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to wedge itself into firmer biting engagement with the wire upon the application of axially forward force to the wire.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
740,358	Esmond	Sept. 29, 1903
1,387,252	Fredricks	Aug. 9, 1921
1,531,816	Russell	Mar. 31, 1925
1,635,256	Carter	July 12, 1927
1,950,826	Smart	Mar. 13, 1934
2,445,772	Frese	July 27, 1948
2,503,559	Miloché	Apr. 11, 1950

FOREIGN PATENTS

Number	Country	Date
216,289	Great Britain	May 29, 1924