Sept. 26, 1950 L. A. SANDA 2,523,782

CONNECTOR FOR ELECTRICAL CONDUCTORS

Filed March 30, 1949

Fig. 1.

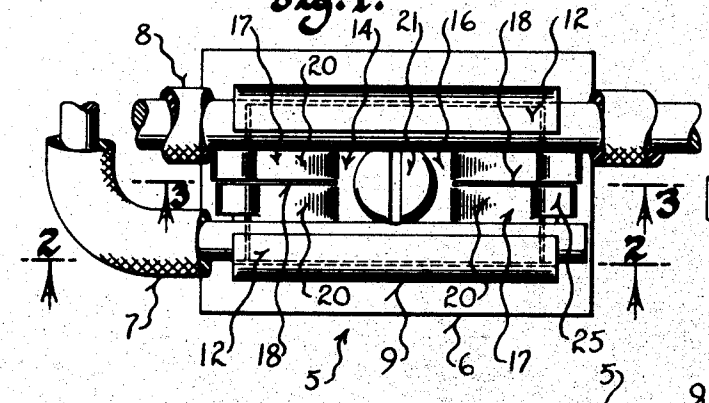


Fig. 6.

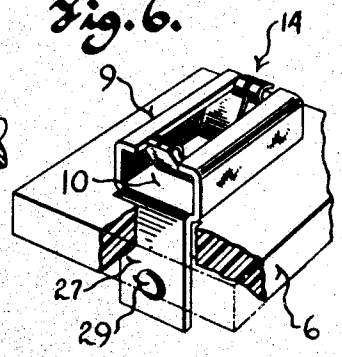


Fig. 2.

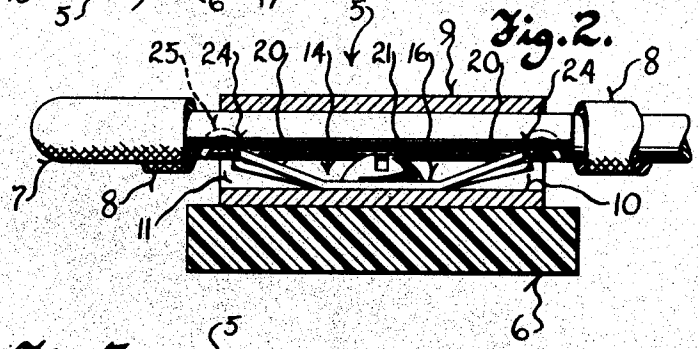


Fig. 3.

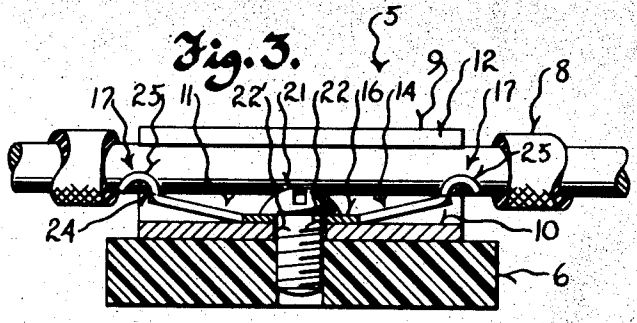


Fig. 4.

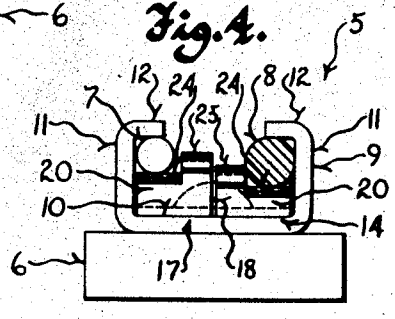
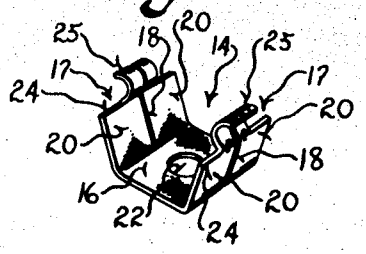


Fig. 5.



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CONNECTOR FOR ELECTRICAL CONDUCTORS

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Application March 30, 1949, Serial No. 84,403

5 Claims. (Cl. 173—273)

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This invention relates to electrical connectors and refers more particularly to connectors for securing electrical conductors to one another and/or to electrical instrumentalities.

Heretofore the connection of electrical conductors to one another or 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 permanently and securely connected to an electrical instrumentality, or with one another, without necessitating the use of any tools whatsoever in making the connection.

It is also an object of this invention to provide a connector for connecting electrical wires with one another or with an electrical instrumentality, which will permit extremely simple and rapid connection of such wires and will retain them permanently and securely, but will nevertheless enable them to be readily disconnected at any time.

Another object of this invention is to provide an electrical connector or terminal of the character described which will not require the use of solder or other bonding agents for securing electrical conductors thereto and which will require no tools to effect such securement but which will nevertheless provide a permanent connection having excellent electrical characteristics.

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 two simple stampings held together by a single bolt, rivet or bonding connection.

Another object of this invention is to provide an electrical connector of the character described which will insure an excellent electrical connection between the connector and a wire secured thereto by reason of the fact that a substantial length of the wire is pressed into firm engagement with a substantially flat surface on the connector.

Still another object of this invention resides in the provision of an extremely versatile electrical connector of the character described which can accommodate one or more electrical wires and which can serve either as a wire-to-wire connector or as a wire-to-terminal connector and which is adaptable to a wide range of wire sizes

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without requiring any adjustment of the connector.

A further object of this invention is to provide an extremely simple and compact terminal connector of the character described having a flat base to permit its being fastened to virtually any type of electrical instrumentality without requiring an excessive amount of space and in which a screw or other securing means holding the parts of the connector together may also serve to secure the connector to the electrical instrumentality and to conduct current from the connector to a terminal within the instrumentality.

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 substantially 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 drawing illustrates two complete examples of the physical embodiment 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 connector device of this invention with a pair of wire conductors of different sizes secured therein;

Figure 2 is a longitudinal sectional view taken along the line 2—2 in Figure 1;

Figure 3 is a longitudinal sectional view taken along the line 3—3 in Figure 1;

Figure 4 is an end view of the device of this invention with wire conductors installed therein;

Figure 5 is a perspective view of the spring locking member of the device of this invention; and

Figure 6 is a perspective view of a modified embodiment of the connector of this invention.

Referring now more particularly to the accompanying drawing 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 has a pair of electrical conductors 7 and 8 secured therein.

The body of the connector comprises a unitary substantially channel-shaped shell or housing 9 of electrically conductive material. The web 10 of the channel forms the base of the housing and is preferably flat so that the housing may be fastened flatwise to an insulative terminal plate or may be secured back-to-back with the body portion of another similar connector to thus pro-

vide a four-wire connector, as will be readily apparent from the following description.

Integral vertical flanges 11, extending upwardly at each side edge of the web 10, form the sides of the body or shell, and the top of each of these flanges is bent inwardly at right angles to provide a ledge 12 which overlies the base and is substantially parallel thereto. Each of the ledges is adapted to have a wire conductor 7, 8 of any of a wide range of sizes lie along its under surface so that the wire is tangent to the ledge throughout substantially the entire length of the latter to thus provide a good electrical connection between the ledge and the wire.

The wires are held in place against the undersides of their ledges by a substantially U-shaped leaf spring locking member 14, preferably formed as a unitary stamping of spring brass, phosphor-bronze or the like. It will be understood that it is not essential that the spring member be made of electrically conductive material since the housing is conductive and the engagement of the wires with their ledges 12 affords a very satisfactory electrical connection.

The spring member 14 comprises a flat base 16 having upwardly and outwardly angled wings 17 extending from a pair of opposite side edges of the base; and each of these wings has a vertical slit 18 along its entire length to divide it into two independently acting side-by-side spring arms 20. When the connector is assembled the base 16 of the spring member flatwise overlies the longitudinal center portion of the web 10 of the housing and is secured in place thereon by means of a screw 21 passing through aligned holes 22 and 22' in the base of the spring member and the housing, respectively, or by other suitable fastening means such as a rivet or a bonded connection. The screw 21 may of course be received in a threaded hole in the insulative base, to secure the connector thereto, or may extend through the base, if desired, to provide an electrical terminal at the side of the base opposite the center.

With the spring member so secured in the housing it will be seen that the arms 20 of the spring member extend outwardly and angularly upwardly toward the ends of the housing and toward the ledges 12. Since these arms are normally inclined at such an angle to the base that they must be forcibly depressed in the process of assembling the spring member into the housing to enable their free ends to pass under the ledges, it will be seen that the free ends of the arms are biased into firm engagement with the ledges and thus cooperate with the ledges in providing two pairs of clamp members or jaws adapted to securely grip a pair of electrical conductors.

The portion of the free end of each arm which lies immediately below the ledge is cut off squarely to provide a sharp edge 24 adapted to bite into the surface of a wire conductor to preclude axial displacement of the wire toward the longitudinal center of the housing. Since it is intended that the conductor is to be engaged by the sharp edges of a pair of opposite spring arms it will be readily apparent that the conductor, when properly inserted into the connector, will be restrained against axial displacement in both directions.

Projecting outwardly from the free end of each spring arm, at the inner end of the sharp edged portion, is a hook-like extension 25 which is curled downwardly but bent upwardly at its inner end with respect to the remainder of the arm so that the "bulge" of the extension projects

a substantial distance above the plane of the body of the arm. The purpose of this hook or extension is to preclude lateral inward displacement of a wire clamped against the ledge by the sharp edge portion at the free end of the arm, and it will also be seen that when the edge 24 of the arm is engaged with the under surface of the ledge the curled extension 25 extends above the ledge to enable the arm to be readily depressed for the insertion of a wire into the connector.

Thus, to insert a wire into the connector of this invention the insulation is removed from the wire along a length at least equal to the length of the housing and the bared portion of the wire is pressed down upon the curled extensions 25 of a pair of opposite spring arms to depress the same. As the spring arms yield, the sharp edged portions 24 at their free ends move downwardly away from the ledge to provide an opening thereunder into which the bared portion of the wire may be slid laterally. It will be seen that upon release of the curled portions the sharp edges of the free ends of the arms will bite into and firmly engage the wire by virtue of the bias upon the arms and will press it into good electrical contact with the ledge along substantially the entire length thereof. Moreover, the arms lie at such an angle with respect to the wire that one or the other of the sharp edges 24 will be caused to bite deeper into the wire during any attempt to pull the same lengthwise out of the connector, to thereby increase the effectiveness of the mechanical connection between the wire and the connector.

The spring arms will automatically accommodate themselves to wire of almost any size up to a diameter equal to the length of the sharp edge 24, so that no adjustment of the connector is necessary for connection of conductors of different sizes.

It will be readily apparent that either an end of a wire conductor, as 7, or a medial portion thereof, as at 8, may be satisfactorily received in the connector of this invention, so that either or both of the wires secured to it may also be connected to at least two other terminal points if desired.

Disconnection of a wire from the connector is readily accomplished by sufficiently depressing the extensions 25 of the arms which hold the wire to enable it to be moved laterally inwardly beyond the inner edge of the ledge 12.

In the embodiment of the invention shown in Figure 6 the web 10 of the housing is extended at one end, as at 27, and the extended portion is bent downwardly, substantially at right angles to the remainder thereof, to project through an insulative plate and provide a terminal post for a switch or the like. The downwardly bent terminal post portion of the housing is preferably provided with a suitable contact point, such as a silver or copper rivet 29.

Numerous other modifications of the device of this invention will readily occur to those skilled in the art since its versatility is such that it may be used in connection with a wide variety of electrical equipment and devices.

From the foregoing description taken together with the accompanying drawing it will be readily apparent that this invention provides an extremely simple, compact and versatile electrical connector whereby electrical conductors may be quickly and simply connected with one another or with an electrical instrumentality without the use of any tool, and which will permanently and

securely retain such conductors in place but will nevertheless permit them to be instantly disconnected therefrom at any time.

What I claim as my invention is:

1. In a wire connector of the character described: a substantially channel-shaped body member of conductive material having upwardly turned flanges; an inwardly turned ledge extending along the upper extremity of each of said flanges; and two pairs of independently acting spring arms, each arm being secured at its inner end to the longitudinal center of the web portion of the body member, said pairs of arms extending in opposite directions toward the ends of the body member and having their outer free ends biased toward engagement with said ledges on the flanges of the body member, the free end of each of said arms having a sharp edged portion adapted to bite into a wire to preclude endwise displacement of the wire in at least one direction and to press it into firm engagement with the adjacent ledge of the body member, and another portion, extending above the sharp edged portion and adapted to preclude inward displacement of the wire out of its position of engagement with said ledge.

2. In a wire connector of the character described: a substantially channel-shaped body member, the web of the channel comprising the base of the body member and each of the upwardly directed flanges of the channel having an inwardly turned ledge along its upper edge; independently acting arms having their free ends biased toward engagement with said ledges and depressible toward the base to provide an opening under each ledge into which a wire may be laterally inserted to be clamped against the ledge by the free ends of said arms, each of said arms having a sharp edged portion at its free end, beneath the ledge, adapted to bite into the surface of the wire to substantially preclude endwise displacement of the wire; and each of said arms also having an extension at its free end portion inwardly of said sharp edged portion to preclude lateral inward displacement of the wire from under the ledge.

3. In a wire connector of the character described: a base; an upright wall fixed with respect to the base and extending a distance thereabove; a ledge overlying the base in spaced relation thereto; a cantilever connection between said wall and the ledge whereby the underside of the ledge is accessible from the outer projecting portion of the ledge; a spring loaded arm connected with the base, said arm having a free end portion extending angularly upwardly from the base under said ledge and biased toward engagement with the underside thereof, but being depressible away from the ledge to enable a wire conductor held laterally adjacent to said outer portion of the ledge to be passed sidewise thereunder and over the free end portion of the spring loaded arm; means on the free end portion of the arm beneath the ledge defining a relatively sharp knife edge facing the underside of the ledge and adapted to bite into the underside of a wire conductor in position under the ledge to firmly press the conductor against the underside thereof and to preclude endwise displacement of the conductor in one direction; and means fixed on the free end portion of the arm adjacent to said outer portion of the ledge cooperable with said wall to preclude lateral displacement of a wire conductor from under the ledge, said means normally blocking lateral insertion of a wire conductor to said position beneath the ledge but being depressible bodily with the free end portion of the arm to a position spaced from the outer portion of the ledge to enable the wire to be passed laterally under the ledge.

4. In a wire connector of the character described: a substantially horizontal base; a flange extending upwardly from said base at one side thereof; a ledge on said flange overlying the base in substantially spaced parallel relation thereto, said ledge extending from the flange in cantilever fashion to enable a wire conductor to be passed laterally under the outer portion of the ledge remote from said flange; an elongated spring arm extending alongside said flange under the ledge with one of its end attached to the base and its other free end biased toward engagement with said ledge; a sharp edge on the free end of said arm adapted to clamp a wire conductor against the underside of the ledge and to bite into the underside of the wire to preclude endwise displacement thereof in one direction; and means fixed on the arm for precluding sideward displacement of said wire conductor out of its position clamped against the underside of the ledge, said means being movable bodily with the arm from a position normally blocking sidewise passage of a wire conductor under the outer portion of the ledge to a depressed position allowing such passage of the wire to a position under the ledge.

5. In a wire connector of the character described: an electrically conductive part having a surface against which a wire conductor is adapted to be placed to lie therealong in contacting engagement therewith, said part having a free marginal edge under which the wire is adapted to be passed laterally sidewise for engagement with said surface; yieldable means biased toward said surface for holding a wire conductor in engagement therewith; cooperating abutment means between which the wire is adapted to be received for precluding lateral displacement of the wire from said surface, said abutment means comprising an abutment on said yieldable means normally positioned alongside the free marginal edge of said part but movable bodily with said yieldable means away from said surface to enable sidewise insertion of the wire under the free marginal edge of said part, and another abutment fixed with respect to said part and substantially opposite the first designated abutment; and means on said yieldable means defining a relatively sharp knife edge facing said surface and adapted to bite into a wire lying thereagainst to preclude endwise displacement of the wire in one direction.

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