

United States Patent

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[54] **SOLDERLESS CONNECTOR ASSEMBLY**
15 Claims, 4 Drawing Figs.

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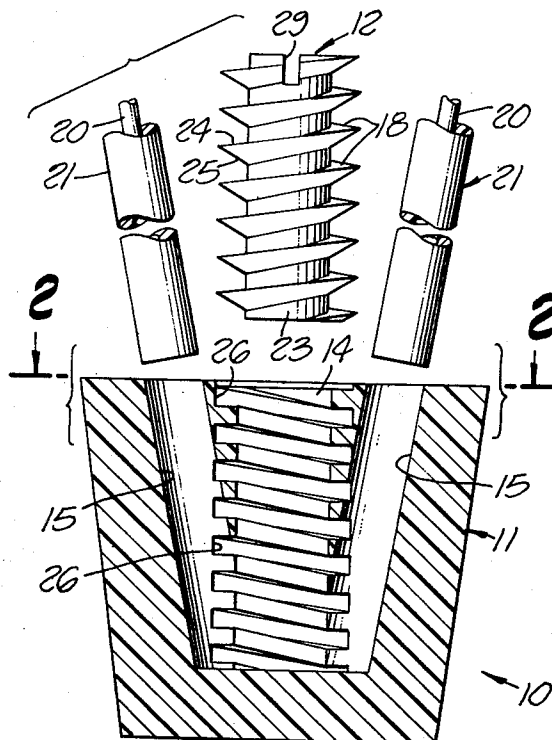
[50] Field of Search 339/95, 97,
98, 99, 247, 268, 270, 273, 274, 263; 24/125, 126
(L), 135, 136 (L), 81.35; 174/84, 87, 94.1

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ABSTRACT: A solderless connector having a main body of insulation formed with at least one pair of wells in side-by-side relation including a threaded well for a deeply threaded conductive member and a nonthreaded well snugly receiving a sheathed conductor with one side of the conductor positioned to intersect and traverse the thread crests of the threaded conductor. The threaded conductor may be shorter than the threaded well or it may have a protruding outer end usable as a terminal lug or as the male end of a service cord plug.



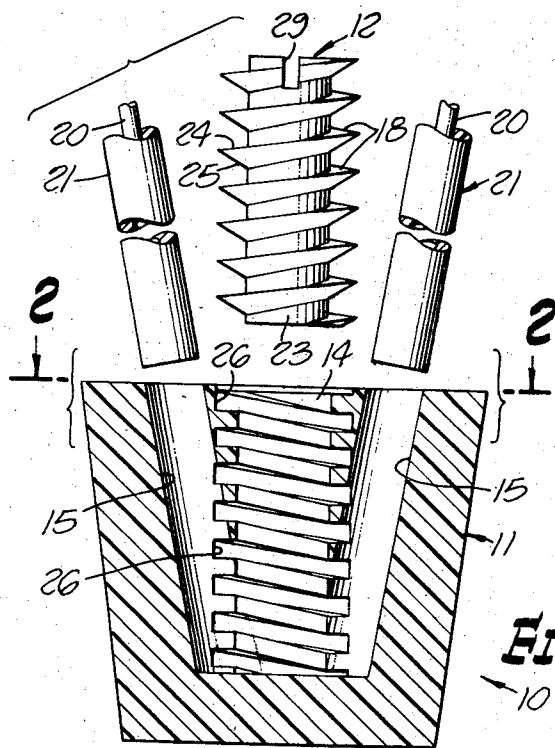


FIG. 1.

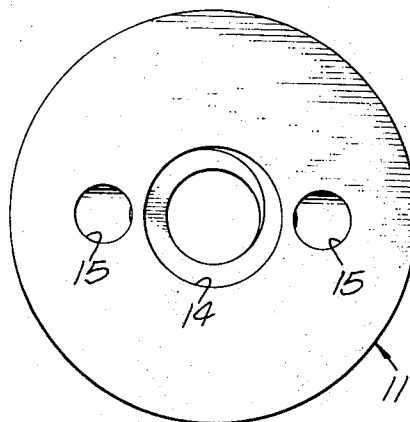


FIG. 2.

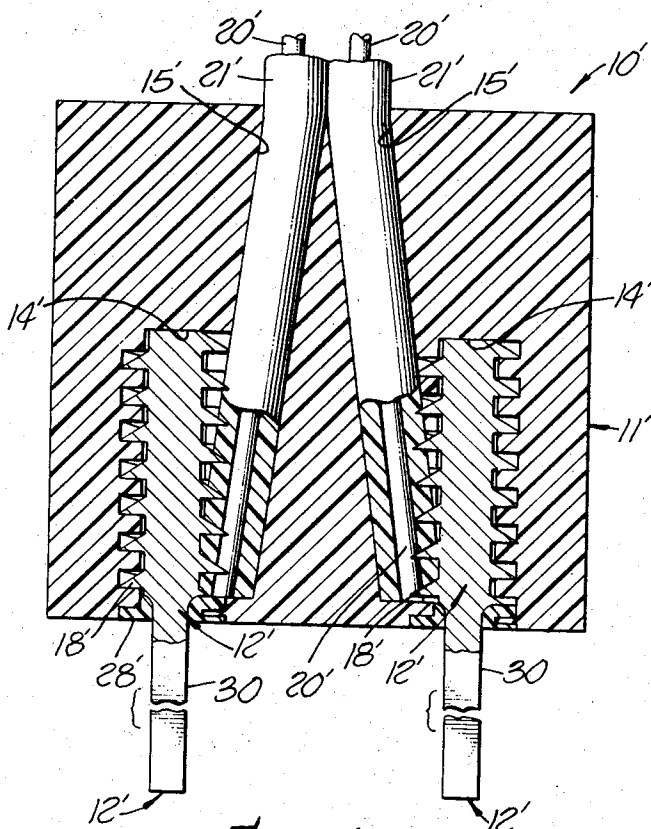


FIG. 4.

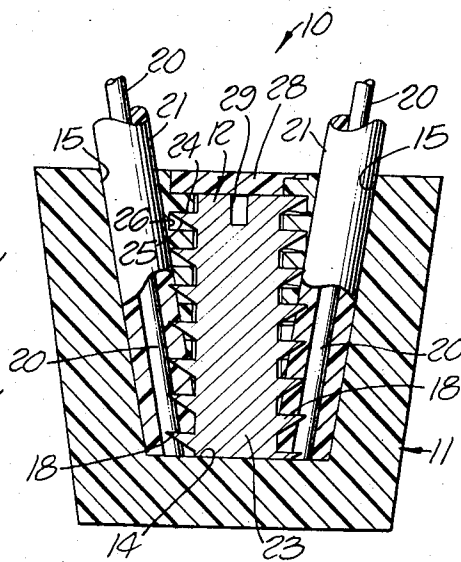
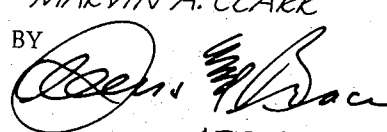


FIG. 3.

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SOLDERLESS CONNECTOR ASSEMBLY

This invention relates to solderless connectors, and more particularly to an improved inexpensive connector assembly of an unusually versatile character.

Various proposals have been made heretofore intended to provide a more facile and expeditious mode of forming electrical connections between two or more electrical conductors. These have been noteworthy for the need to strip and expose a portion of the conductor and additionally on reliance on connector means capable of crushing and deforming a portion of a conductor. The time required to strip and expose a proper length of the conductor is a time-consuming and costly operation and often results in damage to the conductor. Likewise, connectors of the type requiring mashing and crushing of the conductor as an incident to the application of high pressure require the use of connectors made of strong materials or the use of special tools to perform the crushing operation.

In order to avoid the foregoing and other shortcomings of prior solderless connectors, there is provided by this invention a simple connector having a main body of insulation material formed with two merging wells one of which is threaded to mate with a threaded connector component and the other of which snugly receives the sheathed end of a conductor and being so located that the threaded conductor automatically cuts through the insulation and into the other conductor as an incident to its assembly to the insulation. A single threaded conductor may be employed to interconnect two or more insulated conductors each having its own seating well and similarly located relative to the threaded conductor member. If desired, the threaded conductor may project beyond the body of insulation and serve as an electrical terminal, or it may be designed as the male member of a service plug coupling. Desirably, the threaded conductor has a cylindrical main body and a V-shaped helical thread having a radially disposed sidewall merging in a sharp edge with an acutely inclined sidewall.

It is therefore a primary object of the present invention to provide an improved, inexpensive electrical connector for use in forming an electrical connection with the sheathed end of a conductor without need for removing any insulation therefrom.

Another object of the invention is the provision of an improved electrical connector having a threaded well for a metallic connector member and a nonthreaded well for the reception end of a fully sheathed conductor so arranged relative to one another that the threads of the metallic anchor member bite through the insulation and into the body of the conductor in a plurality of areas.

Another object of the invention is the provision of an improved solderless connector assembly wherein the solderless connector component proper is designed to function additionally as a terminal lug or as the male connector of a service plug.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated:

FIG. 1 is an exploded view partly in cross section of the components of one preferred embodiment of the invention;

FIG. 2 is an end view of the main body of the assembly taken along line 2-2 on FIG. 1;

FIG. 3 is a cross-sectional view through the FIG. 1 construction in fully assembled position; and

FIG. 4 is a cross-sectional view of an alternate construction designed for use as an electric service cord connector plug.

Referring initially to FIGS. 1-3, there is shown one illustrative embodiment of the invention connector assembly, designated generally 10, and here illustrated in one of its simplest forms. The two-part assembly includes a one-piece main body 11 of suitable high-strength insulation material of either the thermoplastic or thermosetting type and a metallic con-

ductor screw 12. Main body 11 is formed with at least one threaded well 14 and any number of conductor seating wells 15. As herein shown by way of example there are but two conductor wells 15, 15 located on diametrically opposed sides of threaded wells 14. It will be readily apparent that there is adequate room for a considerable number of additional wells 15 in case there is need for interconnecting a larger number of conductors together in a common assembly. In this event the wells are preferably equitably distributed about the rim of the threaded well.

As is best shown in FIGS. 1 and 3, the conductor seating wells 15 extend lengthwise of the threaded well and converge toward the inner end of the latter at an acute angle and in such manner that the crests of the screw thread 18 bite into conductor wire 20 of a sheathed conductor 21 as screw 12 approaches the lower end of well 14. Desirably, at least two and preferably more convolutions of thread 18 bite into the conductor and provide a wide area electrical and anchoring contact with the conductor.

The construction of screw 12 and of its thread 18 is important. Desirably, the screw 12 has a cylindrical and nontapering main body 23 and a low pitched helical thread 18 encircling its exterior from end to end thereof. Thread 18 is relatively deep and of V-shape in cross section with one sidewall 24 lying substantially normal to the axis of the screw and its other face or side 25 inclined acutely to the axis. The mating thread 26 in the sidewall of well 14, however, is square-cut and generally rectangular in cross section, as is made clear by FIGS. 1, 3 and 4. Hence only the radial side 24 of thread 18 has bearing contact with a sidewall of thread 26. The length of screw 12 is preferably sufficiently less than the depth of well 14 for the outer end to be located below the end surface of main body 11 when the screw is fully assembled, thereby leaving room for sealing compound 28 across the outer end of well 14.

The assembly and use of the described connector will be readily apparent from the foregoing description of its structure. Conductors 21 are simply telescoped into wells 15 without need for removing any of the insulation, the ends of the conductors being preferably square-cut as shown in FIG. 1, and each being firmly pressed into the full depth of a respective one of receiving wells 15. Thereafter the metallic connector screw 12 is threaded into well 14, use being made of a screwdriver and kerf 29 across the outer end of the screw. The user continues to drive screw 12 until its square-cut inner end bottoms against the inner end of well 14. This condition is readily sensed by the operator who is then assured that the parts are fully assembled and that the sharp edges of thread 18 have penetrated into each of conductors 20, 20 at a number of places therealong. A drop of hot sealing compound 28 may then be dropped against the outer end of the screw. However, this is not necessary in many instances because the presence of the conductors 20 about the rim edge of well 14 is highly effective in guarding against any possibility of contact between the head of screw 12 and any other object.

Returning now to FIG. 4, there is shown another embodiment, designated generally 10', and wherein the same or similar components are designated by the same reference characters distinguished by the addition of a prime. The principal differences reside in the fact that insulation 11' is contoured somewhat differently and each conductor receiving bores 15', 15' is associated with a different well 14'. The latter wells are so spaced that the noncircular projecting lug ends 30, 30 of screws 12', 12' can be used as the male connectors of a service cord plug. It will be observed that bores 15', 15' are on the adjacent sides of wells 14' and merge with one another at their exit ends. It will also be noted that the inner ends of wells 15' terminate close to the outer ends of wells 14'. However, in each embodiment it will be observed that the inner ends of the conductor seating wells are so arranged that the conductor proper traverses and intersects the path of the crest of thread 18 or 18'.

The assembly mode for the FIG. 4 components will be readily apparent from the foregoing. A suitable tool is applied

to the flat or noncircular lug portions 30 of the screws and employed to rotate them into their fully assembled position. As is true of the first described embodiment, the seating of screws 12', 12' against the bottoms of wells 14' assures anchorage of the conductors 21' rigidly within the wells as well as excellent electrical connection with the associated conductor wire.

While the particular solderless connector assembly herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention.

I claim:

1. A solderless connector for insulation-covered conductors, said connector comprising a main body of tough insulation having a first well opening through one side thereof and formed with a helical thread, a second well closely beside said first well sized to snugly receive the insulation-sheathed end of a single conductor and having its axis extending lengthwise of said first well and so located relative to the threads thereof that said threads overlap with and are intersected by the adjacent side of the metallic body of the single conductor when located in said second well, and a metallic conductor formed with a sharp-edged helical thread mating with the threads of said first well, and said metallic conductor threaded into said first well with said thread extending a sufficient distance into said second well to cut through said insulation sheath and bite into the metallic body of said single conductor when positioned in said second well to make a plurality of contacts therewith and to anchor the same immovably in place in said second well.

2. A solderless connector as defined in claim 1 characterized in that said threaded conductor includes a lug projecting axially beyond one end of the thread thereon and outwardly beyond the adjacent side of said main body of insulation.

3. A solderless connector as defined in claim 2 characterized in that said projecting lug is noncircular in cross section and adapted to seat a tool while being screwed into assembled position in said first well.

4. A solderless connector as defined in claim 2 characterized in that said main body of insulation material includes a plurality of said first and second wells each provided with a threaded metallic connector spaced laterally of and parallel to one another.

5. A solderless connector as defined in claim 4 characterized in that said outwardly projecting lugs of said threaded

conductors are adapted for use as the male portion of a service cord connector plug.

6. A solderless connector as defined in claim 5 characterized in that said second wells are located adjacent one another in the near sides of the respective first wells.

7. A solderless connector as defined in claim 6 characterized in that said second wells converge toward and merge with one another at their outer ends.

8. A solderless connector as defined in claim 2 characterized in that the threaded end of said metallic conductor has a generally cylindrical nontapering main body and is adapted to be screwed during assembly to said main body until it bottoms on the inner end of said first well.

9. A solderless connector as defined in claim 1 characterized in that said connector screw has a helical thread of V-shape in cross section one side of which is normal to the screw axis and the other side of which is inclined acutely to said one side and merging therewith in a sharp helical cutting edge.

10. A solderless connector as defined in claim 1 characterized in the provision of a plurality of said second wells disposed about said first well with the axes thereof converging similarly inwardly slightly toward the inner end of said first well.

11. A solderless connector as defined in claim 10 characterized in that said connector screw has a length less than the depth of said threaded well whereby the outer end thereof is adapted to be located inwardly of the outer end of said threaded well in the fully assembled position thereof.

12. A solderless connector as defined in claim 10 characterized in that said connector screw has a substantially nontapering cylindrical body.

13. A solderless connector as defined in claim 10 characterized in that said screw is of uniform diameter throughout substantially the length thereof whereby the same is adapted to be screwed into said first well until the advance end thereof bottoms on the inner end of the well thereby providing assurance that the thread thereof is properly seated in and anchored to the respective conductors present in said conductor receiving second wells.

14. A solderless connector as defined in claim 10 characterized in that said conductor receiving second wells are disposed in pairs on the opposite sides of said threaded first well.

15. A solderless connector as defined in claim 1 characterized in that the thread in the sidewall of said threaded well is generally rectangular in cross section.

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