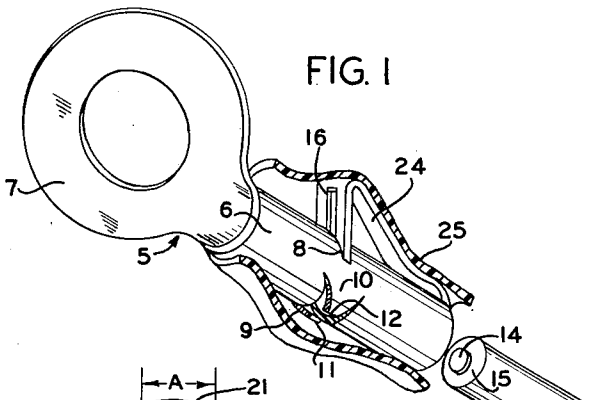
Oct. 9, 1962 C. E. MILLER 3,058,088

CONNECTOR

Filed Oct. 22, 1959

FIG. 1



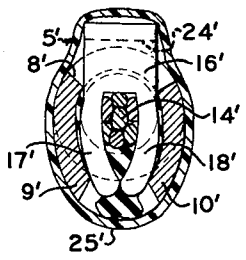


FIG. 5

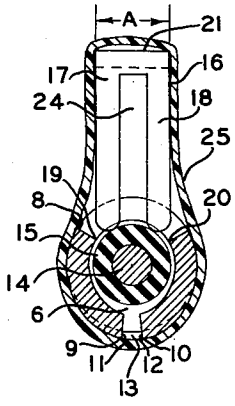


FIG. 2

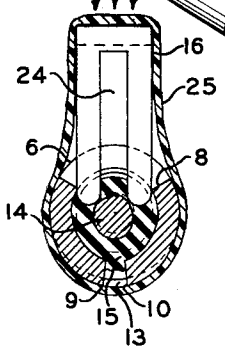


FIG. 3

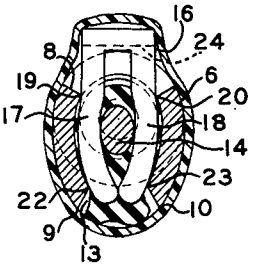


FIG. 4

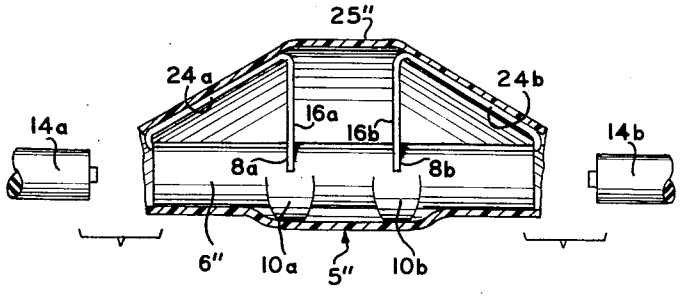


FIG. 6

INVENTOR.

CARDELL E. MILLER

BY

Carpenter Abbott Coulter & Kinney

ATTORNEYS

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CONNECTOR

Cardell E. Miller, Hudson, Wis., assignor to Minnesota Mining and Manufacturing Company, St. Paul, Minn., a corporation of Delaware

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This invention relates to improvements in solderless and more particularly to terminal connectors for bare or insulated wire conductors for example of aluminum or copper.

Connectors of the type with which the invention is concerned find particular utility in the computer and electronic equipment field and are well adapted for use with both solid and stranded wires without the necessity of removing insulation prior to attachment of the connector thereto. Moreover the improved connector at all times maintains a positive compressive force on the connection with the electrical conductor. As a result, the connection afforded is not loosened by repeated mechanical stresses, temperature or pressure changes, moisture or vibration. The improved connector maintains an initial low resistance connection permanently.

In applying the connector to an insulated wire conductor, such as a plastic covered wire, an end of the wire is disposed within the bore of a metallic tubular or holding portion of the connector, and a U-shaped metal connector blade is inserted into a transverse opening in said tubular portion penetrating and displacing the plastic wire covering, and penetrating opposite surface portions of the wire while being deformed into tight compressive metal-to-metal engagement with the wire and with said tubular portion by a unique three-point engagement of each of the blade legs with the wire and the tubular portion. The improved connector completely eliminates the need for soldering or preliminary removal of insulation, and it can be rapidly affixed to a selected wire without special tools. The improved connector is simple in construction, inexpensive and easy to manufacture, and is otherwise well adapted for the purposes described.

The invention can best be understood by reference to the drawing accompanying and forming a part of this specification, and in which one complete embodiment of the preferred form of the invention is illustrated. In the drawing,

FIGURE 1 is a perspective view partly in section showing the components of one form of the improved connector prior to attachment thereof to an end portion of an insulated wire, the latter being shown fragmentarily;

FIGURE 2 is a transverse vertical sectional view showing the wire inserted coaxially within the tubular portion of the connector, and showing the U-shaped connector blade about to be pressed into operative position;

FIGURES 3 and 4 are views similar to FIGURE 2 showing respectively an intermediate stage in the insertion of the connector blade and disposition of said blade in operative position;

FIGURE 5 is a view similar to FIGURE 4 showing another form of the invention; and

FIGURE 6 is a side elevational view, partly in section, showing a form of the invention adapted for connection of two wires in end-to-end relation.

Referring to FIGURE 1, one form of the improved connector is indicated generally by the numeral 5 and is provided with a tubular body or holding portion 6. In the form of the invention illustrated, the connector 5 terminates at one end of the body portion 6 in an eye type lug 7. Any suitable means may be substituted for the lug 7, however, for example a spade type lug, a tapered pin, a soldering tab, or any other desired configuration.

The body portion 6 is formed with a transverse slot 8 extending radially through a wall portion thereof, and diametrically opposite the slot 8, said body portion is formed with a pair of deformable circumferentially extending cantilever tabs 9 and 10 pressed therefrom and formed with generally parallel end surfaces 11 and 12 defining an opening 13 opposite the slot 8 and having a transverse width less than that of said slot as shown in FIGURE 2. The slot 8 and opening 13 combine to form a transverse opening through the tubular portion 6. The member 5 is made of suitable electrically conductive material having resilient or spring like characteristics for example 70—30 or cartridge brass of either half hard or full hard type. As also shown in FIGURE 2 the tubular body portion 6 is adapted to receive a wire 14 to which the connector 5 is to be affixed. The wire 14 may be provided with insulation 15, for example plastic, rubber, or any other of the types of insulation in common use.

The connector 5 is affixed to and afforded low resistance electrical connection with the wire 14 by means of a U-shaped metallic connector member or blade 16 which may be conveniently formed as a flat metal stamping integral with the tubular portion and connected to one end thereof by a deformable strap or band portion 24. The blade 16 is preferably somewhat harder than the metal of the wire 14 and may be formed of the same metal as the member 5. The blade 16 preferably has a thickness somewhat less than the thickness of slot 8 and has a pair of generally parallel legs 17 and 18 spaced apart a distance less than the diameter of the wire 14. The width of the blade 16, between the outer edges thereof as indicated by the letter A in FIGURE 2 is preferably equal to or not substantially smaller than the transverse dimension of the slot 8 on the inner surface of the body portion 6, i.e. the transverse dimension between the shoulders 19 and 20 in FIGURE 2. The ends of the legs 17 and 18 are preferably rounded as shown. Snugly surrounding the tubular portion 6, blade 16 and band 24 is an insulating sleeve or cover 25 of flexible and resilient material, for example vinyl.

To attach the improved connector to the wire 14, an end of said wire is inserted into the bore of the tubular body portion 5 past the slot 8 and opening 13 therein. The U-shaped connector blade 16 is then forced transversely into the slot 8 by means of a suitable tool (not shown) engaging the sleeve 25 above the upper surface 21 of the blade 16. FIGURE 3 shows an intermediate position of insertion of the connector blade 16, and shows the end portions of the legs 17 and 18 displacing a portion of the wire insulation 15 into the opening 13 as said legs move into physical contact with the wire 14. Further insertion of the connector blade 16 causes the inner edges of the legs 17 and 18, because of their relatively hard character as compared to the wire 14, to penetrate opposite side portions of said wire respectively, said legs being simultaneously deflected outwardly into engagement with the inner surfaces of the tabs 9 and 10. Still further insertion of the connector blade 16, as the ends of the legs 17 and 18 move past the wire 14, results in simultaneous deformation of the blade leg ends toward each other and outward flexure of the resilient tabs 9 and 10 to the spread apart position shown in FIGURE 4.

In FIGURE 4 the connector blade 16 is shown in operative position securely affixing the connector 5 to the wire 14 in a low resistance electrical connection. It will be observed that the ends of the legs 17 and 18 project into the opening 13 which is substantially enlarged thereby due to the spreading of the tabs 9 and 10, and that the corners or shoulders 22 and 23 of the tabs 9 and 10 firmly and compressively engage the outer

edges of said connector legs. It will also be observed that the shoulders or corners 19 and 20 at the ends of the slot 8 engage the outer edges of the blade legs 17 and 18 so that the legs 17 and 18 are in effect clamping jaws deformed into penetrating clamping engagement with opposite sides of the wire 14 by the shoulders 19, 20, 21 and 22, such action causing said wire to assume a generally elliptical cross-section shape intermediate the legs 17 and 18 as shown. It will be observed that the blades 17 and 18, when in operative position, engage the wire 14 intermediate their length and engage the shoulders 19, 22 and 20, 23 adjacent the end portions of said legs to afford a unique three point engagement locking the blade 16, member 6 and wire 14 in a low resistance connection.

FIGURE 5 shows a form of the invention particularly well adapted for use in making electrical connection with a stranded wire. In FIGURE 5 the blade 16' has substantially the same length as the blade 16 of FIGURES 1 to 4, but the leg portions 17' and 18' thereof are somewhat shorter. This structure affords compact bundling of the wire strands insuring a permanent low resistance connection of the connector 5' to the stranded wire 14' without requiring actual penetration of the strands by the blade legs. In this form of the invention the transverse restraint afforded by the shoulders 19 and 20 in FIGURES 1 to 4 is provided by the additional stock in the base of the blade 16' at the roots of the legs 17' and 18'.

FIGURE 6 illustrates a connector 5'' adapted for connection of two wires in end to end relation. In this form of the invention the eye lug 7 of FIGURE 1 is omitted and the tubular body 6'' is provided with slots 8*a* and 8*b* and corresponding oppositely disposed cantilever tabs 10*a* and 10*b*. Integral U-shaped blade members 16*a* and 16*b* are disposed in slots 8*a* and 8*b*, respectively. The connector 5'' is adapted to have a wire 14*a* inserted into one end of the tubular member 6'' and a wire 14*b* inserted into the other end of said member. The blades 16*a* and 16*b* are adapted to respectively effect a permanent low resistance connection between the wires 14*a* and 14*b* and connector 5'' in the same manner that the connector 5 is affixed to the wire 14 in FIGURES 1 to 4.

The invention is capable of receiving a variety of mechanical expressions, and it is to be expressly understood that the illustrated form of the invention was selected to facilitate the disclosure of the invention and is not to be construed as a definition of the limits or scope of the invention, or to confine the patented invention to a particular use, reference being had to the appended claims for that purpose. Various modifications, adaptations and alterations may be applied to the specific form shown to meet the requirements of practice, without in any manner departing from the spirit or scope of the present invention, and all of such modifications, adaptations and alterations are contemplated, as may come within the scope of the appended claims.

What is claimed as the invention is:

1. A solderless connector for making positive permanent electrical connection to a wire conductor or the like, comprising a tubular conductor-receiving and holding member formed with a pair of diametrically opposite apertures extending radially therethrough and having a pair of deformable spring portions, and a U-shaped connector member having a pair of spaced deformable wire-engaging jaw portions having hard, narrow wire-engaging surfaces and adapted to be positioned in the apertures of said tubular member, at least said spring portions of said tubular member being adapted to engage said U-shaped connector member to deform said jaw portions around and into tight frictional engagement with a conductor coaxially received within said tubular member, said engagement deforming said spring portions such that the tendency of said spring portions to return to their undeformed state biases said jaw portions toward each other and into engagement with said conductor.

2. A solderless connector according to claim 1 wherein there is a flexible insulating cover surrounding said conductor-receiving and U-shaped members.

3. A solderless connector for making positive permanent electrical connection to a wire conductor or the like comprising a tubular conductor-receiving and holding member formed with a pair of diametrically opposite apertures extending radially therethrough and having a pair of deformable spring portions, and a U-shaped connector member integral with said tubular member and having a pair of spaced deformable wire-engaging jaw portions having hard narrow wire-engaging surfaces and adapted to be positioned in the apertures of said tubular member, at least said spring portions of said tubular member being adapted to engage said U-shaped connector member to deform said jaw portions around and into tight penetrating frictional engagement with a conductor coaxially received within said tubular member, said engagement deforming said spring portions such that the tendency of said spring portions to return to their undeformed state biases said jaw portions toward each other and into engagement with said conductor.

4. A solderless connector for making positive permanent electrical connection to a wire conductor or the like comprising a tubular conductor-receiving and holding member formed with diametrically opposite first and second openings extending radially therethrough, said member having a pair of deformable spring portions at said second opening, and a U-shaped connector member having a pair of spaced deformable wire-engaging jaw portions, said connector member being adapted to be disposed with both of said jaw portions extending through said first and second openings and respectively on opposite sides of a conductor coaxially received within said tubular member, at least said spring portions of said tubular member being adapted to engage said connector member to deform said jaw portions around and into tight frictional engagement with said conductor, said engagement deforming said spring portions such that the tendency of said spring portions to return to their undeformed state biases said jaw portions toward each other and into engagement with said conductor.

5. A connector in accordance with claim 4 wherein said first opening has a dimension transverse to said tubular member which is substantially equal to the width of said U-shaped member, and said spring portions define a similar transverse dimension of said second opening which is less than the width of said U-shaped member.

6. A solderless connector for making positive permanent electrical connection to a wire conductor or the like comprising a tubular metallic member adapted to receive a wire, said tubular member being formed with a transverse slot therethrough, said tubular member also being formed diametrically opposite said slot with a pair of deformable resilient circumferential cantilever type tabs pressed therefrom and having juxtaposed free end portions defining an opening opposite said slot and smaller than the latter in the direction transverse to said tubular member, and a metallic U-shaped connector having a pair of spaced deformable wire engaging legs each having a hard wire engaging inner surface, said connector being adapted to have the legs thereof inserted through said slot into tight engagement with opposite side portions of a wire disposed within said tubular member and to be pressed into spreading engagement with the free end portions of said tabs, such engagement effecting deformation of said legs around said wire.

7. A solderless connector for making positive permanent electrical connection to a wire conductor or the like comprising a tubular metallic member adapted to receive a wire, said tubular member being formed with a transverse slot therethrough, said tubular member also being formed diametrically opposite said slot with a pair of de-

formable resilient circumferential cantilever type tabs pressed therefrom and having juxtaposed free ends portions defining an opening opposite said slot and smaller than the latter in the direction transverse to said tubular member, and a metallic U-shaped connector integral with said tubular member and having a pair of spaced deformable wire engaging legs each having a hard wire engaging inner surface, said connector being adapted to have the legs thereof inserted through said slot into tight engagement with opposite side portions of a wire disposed within said tubular member and to be pressed into spreading engagement with the free end portions of said tabs, such engagement effecting deformation of said legs around said wire.

8. A solderless connector for making positive permanent electrical connection to a wire conductor or the like comprising a tubular metallic member adapted to receive a wire, said tubular member being formed with a transverse slot therethrough, said tubular member also being formed diametrically opposite said slot with a pair of deformable resilient circumferential cantilever type tabs pressed therefrom and having juxtaposed free end portions defining an opening opposite said slot and smaller than the latter in the direction transverse to said tubular member, a metallic U-shaped connector having a pair of spaced deformable wire engaging legs each having a hard wire engaging inner surface, said connector being adapted to have the legs thereof inserted through said slot into tight engagement with opposite side portions of a wire disposed within said tubular member and to be pressed into spreading engagement with the free end portions of said tabs, such engagement effecting deformation of said legs around said wire, and a flexible insulating cover surrounding said tubular and U-shaped members.

9. A solderless connector for making positive permanent electrical connection to a wire conductor or the like comprising a tubular metallic member adapted to receive a wire, said tubular member being formed with a transverse slot therethrough, said tubular member also being formed diametrically opposite said slot with a pair of deformable resilient circumferential cantilever type tabs pressed therefrom and having juxtaposed free end portions defining an opening opposite said slot and smaller than the latter in the direction transverse to said tubular member, a metallic U-shaped connector integral with said tubular member and having a pair of spaced deformable wire engaging legs each having a hard wire engaging inner surface, said connector being adapted to have the legs thereof inserted through said slot into tight engagement with opposite side portions of a wire disposed within said tubular member and to be pressed into spreading engagement with the free end portions of said tabs, such engagement effecting deformation of said legs around said wire, and a flexible insulating cover surrounding said tubular and U-shaped members.

10. A solderless connector for making positive permanent electrical connection to a wire conductor or the like comprising a tubular metallic member adapted to receive a wire, said tubular member being formed with a transverse slot therethrough, said tubular member also being formed diametrically opposite said slot with a pair of deformable resilient circumferential cantilever type tabs pressed therefrom and having juxtaposed free end portions defining an opening opposite said slot and smaller than the latter in the direction transverse to said tubular member, and a metallic U-shaped connector having a pair of generally parallel deformable wire engaging legs having hard wire engaging inner surfaces spaced apart a distance less than the diameter of a wire acommodatable within said tubular member, said connector being adapted to have the legs thereof inserted through said slot into

tight penetrating engagement with opposite side portions of said wire when the latter is disposed within said tubular member and to be pressed into spreading engagement with the free end portions of said tabs, such engagement also effecting deformation of said legs around said wire.

11. A solderless connector for making positive permanent electrical connection to a wire conductor or the like comprising a tubular metallic member adapted to receive a wire, said tubular member being formed with a transverse slot therethrough, said tubular member also being formed diametrically opposite said slot with a pair of deformable resilient circumferential cantilever type tabs pressed therefrom and having juxtaposed free end portions defining an opening opposite said slot and smaller than the latter in the direction transverse to said tubular member, and a metallic U-shaped connector having a width between outer edges not substantially smaller than said transverse dimension of said slot and having a pair of spaced deformable wire engaging legs each having a hard wire engaging inner surface, said connector being adapted to have the legs thereof inserted through said slot into tight engagement with opposite side portions of a wire disposed within said tubular member and to be pressed into operative position in spreading engagement with the free end portions of said tabs, such engagement effecting deformation of said legs around said wire, disposition of said connector in said operative position causing the outer edges of each of said connector legs to at one end engage one end of said slot and at the other end engage one of said tabs, and causing intermediate portions of the inner edges of said connector legs to respectively engage opposite side portions of said wire.

12. A solderless connector for making positive permanent electrical connection to a wire conductor or the like comprising a tubular metallic member adapted to receive a wire, said tubular member being formed with a transverse slot therethrough, said tubular member also being formed diametrically opposite said slot with a pair of deformable circumferential tabs pressed therefrom and having juxtaposed free end portions defining an opening opposite said slot and smaller than the latter in the direction transverse to said tubular member, and a metallic U-shaped connector having a width between outer edges not substantially smaller than said transverse dimension of said slot and having a pair of generally parallel deformable wire engaging legs each having hard wire engaging inner surfaces spaced apart a distance less than the diameter of a wire accommodatable within said tubular member, said connector being adapted to have the legs thereof inserted through said slot into tight penetrating engagement with opposite side portions of said wire when the latter is disposed within said tubular member and to be pressed into operative position in spreading enagement with the free end portions of said tabs, such engagement also effecting deformation of said legs around said wire, disposition of said connector in said operative position causing the outer edges of each of said connector legs to at one end engage one end of said slot and at the other end engage one of said tabs, and causing intermediate portions of the inner edges of said connector legs to respectively penetratingly engage opposite side portions of said wire.

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