

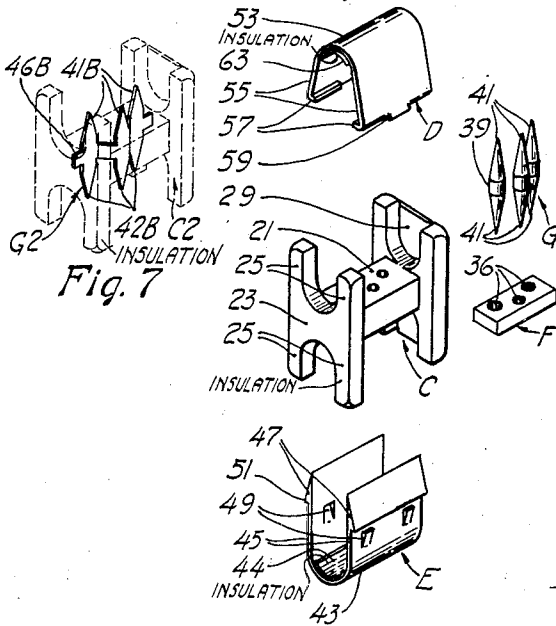
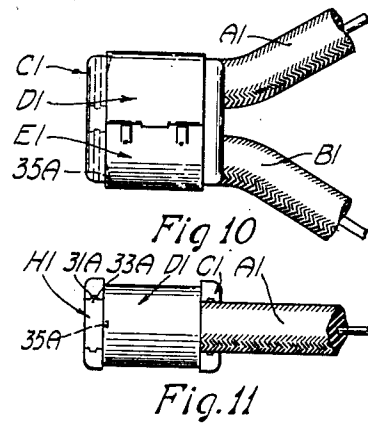
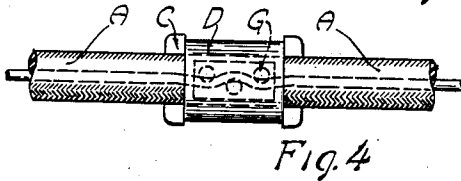
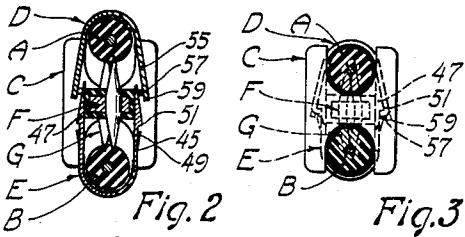
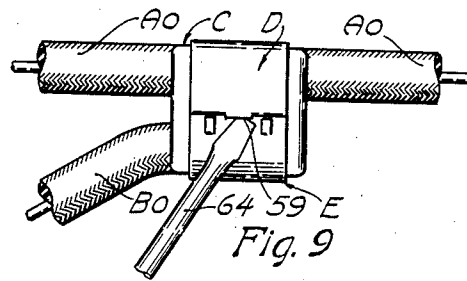
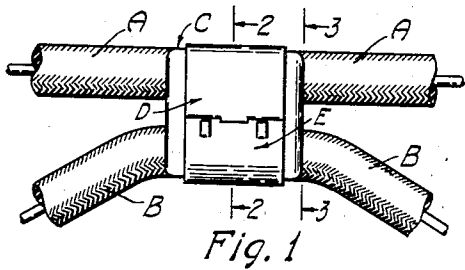
July 4, 1939.

W. T. BRADLEY  
ELECTRICAL CONNECTOR

2,164,381

Filed Feb. 21, 1936

2 Sheets-Sheet 1



INVENTOR.  
William T. Bradley

BY  
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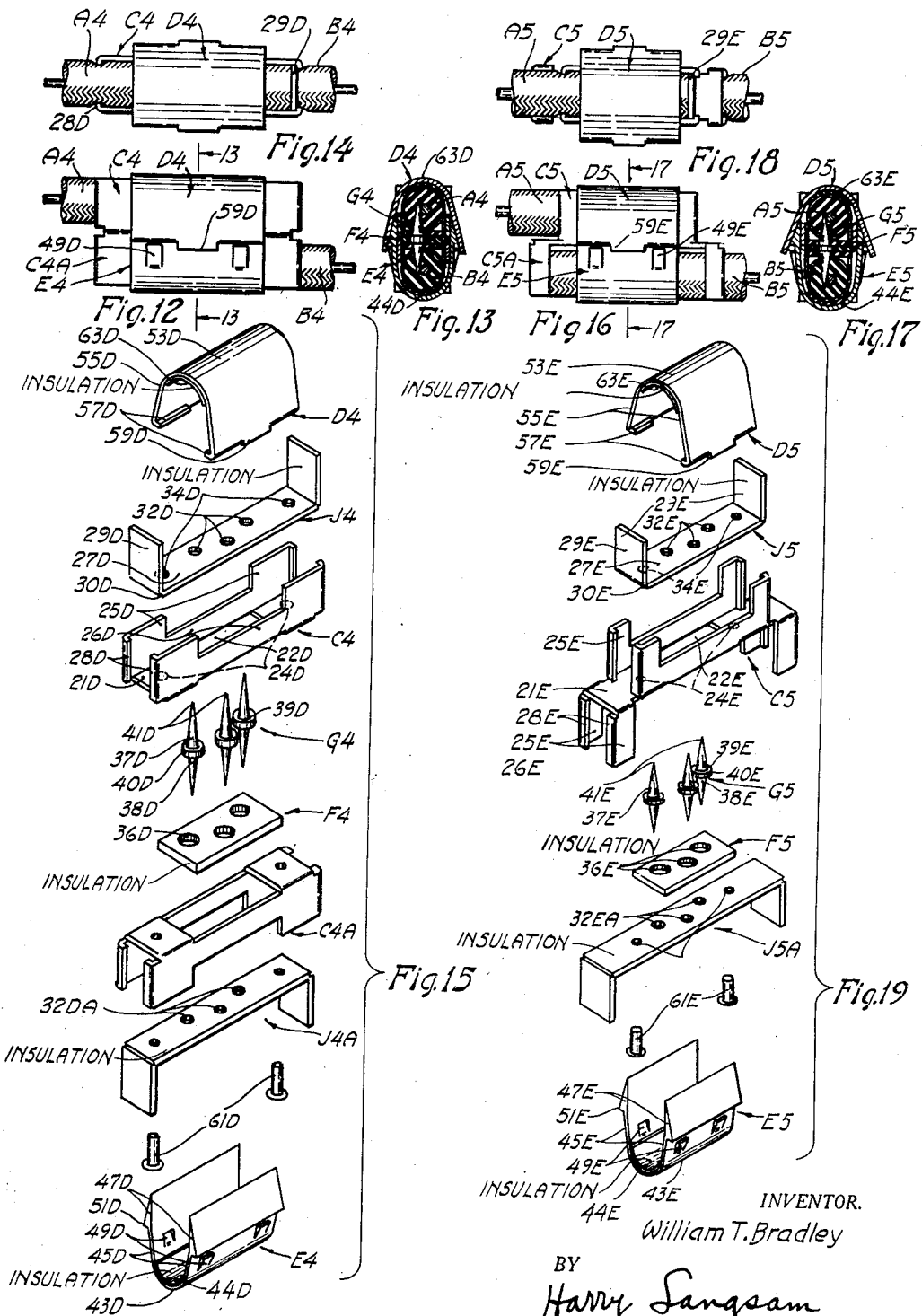
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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

2,164,381

## ELECTRICAL CONNECTOR

William T. Bradley, Philadelphia, Pa.

Application February 21, 1936, Serial No. 65,016

9 Claims. (Cl. 173—340)

My invention relates to an electrical wire connecting device, and relates particularly to an electrical wire connecting device for insulated electric wires of the solid or stranded type that have an insulating covering thereon.

Heretofore when making connections, splices or taps, in or to wires for conducting electricity, which have an insulating covering thereon, it has been necessary to strip the insulation from the wires, and twist the bare wires together, the wires being held together with solder or a clamping device. In cases of wires soldered together and certain types of clamp type connectors, it is necessary to cover the splice or tap, after it has been made, with insulating material. By utilizing the method of joining wires together set forth above, considerable time and effort is spent in stripping the insulation off the wires, making the connection, and insulating the latter. Also, in the event that the wires carry electricity, a certain amount of danger or injury from shock to the person making the connection is present. Where the soldered type of connection is used there is a fire hazard present in the torch or soldering iron used to melt the solder. Other prevailing connectors require that a line wire be cut before a connection can be made to it. This is objectionable, due to the fact that often there is not sufficient slack in the line wire, making it difficult to protect such a tap from strain in the line wire, a protection that is required by some of the local fire underwriters. A further objection to the prevailing wire connectors and connection methods is the cost of labor to install them. I overcome the foregoing objections by constructing a wire connector that wherein it is only necessary to press it into the insulation and wires to be connected together.

The object of my invention is to construct a wire connector of simple, durable, practical and inexpensive features.

Another object of my invention is to construct a connector whereby an electrical contact, may be formed between wires that have an insulating covering thereon.

Another object of my invention is to construct a connector for making an electrical connection, between insulated wires, which is provided with a contact making member, adapted to be forced through the insulating covering of the wires and engage the wires in electrical contact.

Another object of my invention is to construct a connector for making a single or double connection to an insulated line wire without cutting the line wire.

Another object of my invention is to construct a connector for electrically connecting wires that are carrying an electrical current. The connector being so constructed and applied, that the person making the application will not be shocked.

Another object of my invention is to construct a connector, for making an electrical connection between wires that have an insulating covering thereon, and wherein the feed wire of the wires connected is carrying an electrical current. The connector is applied to the wires without it being necessary to disconnect the feed wire from its source as a safeguard to the person making the application.

Another object of my invention is to construct a connector with means for making an electrical connection, that is thoroughly protected with insulation, between wires of the solid or stranded wire type and that have an insulating covering thereon.

With these, and other advantages of the invention, that will be apparent during the course of the following description, in view, the physical embodiments of the invention consist of the novel combination and arrangement of parts which will be fully set forth in the following specification, claims, and accompanying drawings, in which,

Figure 1 is a side view of one modification of a connector embodying the features of my invention, in which, the connector is employed to make an electrical connection between two wires that have an insulating covering thereon. The electrical connection, made by way of the contact member in the connector, being thoroughly protected by insulating material.

Figure 2 is a sectional view, taken on line 2—2 of Figure 1, modified to show the position of the connector parts and the insulated wires as they would be positioned before the connector is pressed together.

Figure 3 is an end view of the connector shown in Figure 1, taken on line 3—3, and shows the position of the connector parts and the insulated wires as they are positioned after the connector is pressed together.

Figure 4 is a top view of the connector as shown in Figure 1.

Figure 5 is an exploded isometric view of the connector as shown in Figures 1, 2, 3, and 4, and shows the component parts of the connector, the central or body portion being comprised of moulded insulating material, and showing the wire passages blocked with integrally moulded barriers,

that are to be broken out, when and as required, for the different applications of the connector.

Figure 6 is a fragmentary isometric view of a modified central or body portion, comprised of moulded insulating material, as shown in Figures 10 and 11, and shows a modified method of blocking the wire passages with movable inserts.

Figure 7 is an isometric view of a modification of the contact making feature of my connector, the contact making feature being comprised of pressed metal with teeth-like insulation piercing and contact making elements. A moulded body portion is shown dotted around the contact making feature to better show the relative position of the modified contact making feature in the combination.

Figure 8 is an isometric view of a modification of the contact making feature of the connector, the contact making feature being comprised of pressed metal with knife-like insulation piercing and contact making elements. A moulded body portion is shown dotted around the contact making feature to show the relative position of the modified contact making feature in the combination.

Figure 9 is a side view of the connector shown in Figure 1, and shows the connector as it would appear when being used to make a single tap connection to a line wire. Incorporated in this illustration is shown a fragmental view of a screw-driver, positioned as it would be positioned when being used as a pry, to remove the wire retaining members when it is desired to remove the connector from the wires.

Figure 10 is a side view of a connector similar to that shown in Figure 1, and shows the connector as it would appear when it is used to splice two wires together, modified to show a movable wire passage barrier.

Figure 11 is a top view of the connector shown in Figure 10, and shows the wire passages blocked with a movable wire passage barrier.

Figure 12 is a side view of a modified form of a connector, embodying the features of my invention, in which the wire positioning feature is made of formed metal, and is comprised of two units. The view shows the modified connector being used to splice two wires.

Figure 13 is a sectional view, taken on line 13—13 of Figure 12.

Figure 14 is a top view of the modified connector shown in Figure 12.

Figure 15 is an exploded isometric view of the modified connector shown in Figures 12, 13, and 14, and shows the component parts of the connector in this modified embodiment.

Figure 16 is a side view of a further modified form of a connector embodying the features of my invention, in which the wire positioning feature is made of one piece of formed metal.

Figure 17 is a sectional view, taken on line 17—17 of Figure 16.

Figure 18 is a top view of the modified connector as shown in Figure 16.

Figure 19 is an exploded isometric view of a connector as shown in Figures 16, 17, and 18 and shows the component parts of the connector in this modified form.

Referring in greater detail to the drawings, and, particularly to Figures 1, 2, 3, and 4, a line wire A, is shown as being electrically connected to a double tap or equalizer wire B, by way of my improved connector. The connector is comprised of a body portion, generally designated as C, which hereinafter will be fully described, which posi-

tions the wires before the connector has been pressed together, as shown in Figure 2, and holds the wires in position after the connector has been pressed together as shown in Figure 3. The body portion C also acts as a support for the contact making feature, generally designated G, hereinafter described, and as a guide for the wire retaining members, generally designated D and E, hereinafter described.

In Figure 5, an exploded isometric view of the connector as shown in Figures 1, 2, 3, and 4, attention is directed to the central or body portion, generally designated C, of the connector. In the embodiments, shown in Figures 1 to 5, this body portion C is comprised of moulded insulating material, the central part 21 of the body portion C is in the shape of a rectangular prism, and is moulded around the metal insert F, and the dual pointed pins G, hereinafter described. The rectangular prism 21 would also be molded around the contact members G2 or G3, Figures 7 and 8, hereinafter further described, in the event that either of these contact members G2 and G3 were substituted for members F and G in the combination.

The central member 21, of the body portion C, see Fig. 5, is of a width equal to the outside diameter of the wire on which the connector is to be placed. The central member 21 has end members 23 moulded integrally with it. Each end member 23 is comprised of four fingers 25, projecting in pairs at right angles to the upper and lower surfaces of the prism 21. Between the fingers 25, that constitute a pair of fingers, is a notch. The notch being of a width equal to the outside diameter of the wire on which the connector is to be placed, and the fingers being of a length equal to the outside diameter of the wire on which the connector is to be placed.

It is to be understood that the pairs of fingers that project at right angles to the upper surface of the prism 21, need not be of the same length as the pairs of fingers that project at right angles to the lower surface of the prism 21, nor the notch, defined by the pairs of fingers projecting at right angles to the upper surface of the prism 21, need not be of the same width and depth as the notch defined by the pairs of fingers projecting from the lower surface of the prism 21. This difference of length, width and depth would be the case were the connector used to connect wires of different sizes together.

Fingers 25 position the wire before the connector is pressed together, and hold the wires in position when the connector is being and after it has been pressed together as shown in Figures 2 and 3. Wire passage blocking barriers 29, moulded integrally with the body portion C and between the fingers 25, comprising a pair of fingers, are arranged so that they can be broken out when the connector is being used in a single or double wire connector as illustrated in Figures 1 and 9. The central member 21 of the body portion C is slightly longer than the wire retaining members D and E hereinafter described, thereby the end members 23, act as guides and retainers for the wire retaining members D and E.

A non-magnetic metal insert, generally designated as F, is located internally in the central member 21, of the body portion C or C1. This insert F is arranged to position and electrically connect the dual pointed pins G, hereinafter described, and is positioned when the body portion C is moulded. The insert F is arranged to reinforce the moulded insulation of the body por-

tion C, when the material of which the latter is comprised is too weak to withstand the force exerted on the pins G, when the connector is forced together. The insert F, also electrically connects the pins G, to allow for a transfer of electrical current from one pin to the others, should one or more of the pins fail to make electrical contact with the wires.

The insert F is in the shape of a rectangular prism, whose dimensions are less than the dimensions of the central rectangular prism 21 of the body portion C. The insert F is pierced with holes 36, the holes 36 interfit with a large diameter 39 of the pins G. The holes 36 in the insert F, are arranged to position the pins G, so that the pins G, engage alternate sides of the wires to be connected, thereby deforming the wires and causing pressure contact on the pins when the connector has been installed. See Figure 4.

Pins generally designated G, are of sufficient length to pass through the central rectangular prism 21 of the body portion C, and extend beyond the upper and lower surface of the central portion 21, a distance greater than one-half the diameter of the wires to be connected, the pins are dull pointed at each end 41-41. The pins G are dull pointed to prevent their digging into the metal of the wires, the intent being, to have the pins slide over the surface of the wire, thereby forcing the wire to one side and deforming it. Due to the fact that there are three pins arranged to engage alternate sides of the wires, the wires would be jammed between them and thereby a pressure contact would be exerted between the wires and pins. In addition to this feature the pins G are dull pointed to prevent their piercing the insulating liners 44 and 63 on the inner arcuous surfaces of the wire retaining members D and E, should the pins G, project through the outer side of the wires when the connector is being installed. The pins G taper from their point 41-41 to a large diameter 39 at their midpoint, the large diameter 39 tightly interfitting with the hole 36 in the insert F. When moulded material, sufficiently strong is used for the body portion C of the connector and it is found unnecessary to electrically connect the pins, the insert F shall be omitted from the combination.

A lower wire retaining member generally designated E, is comprised of a non-magnetic metal, and is of a length slightly less than the length of the prism 21 of the body portion C. A lower arcuous band 43, with an insulating liner 44, conforms to the radius of the wire on which the connector is to be placed. The arcuous band 43, has upwardly extending tangent sides 45. The sides 45, being a distance apart equal to the diameter of the wire on which the connector is to be placed, are wedge shaped on their upper ends, the wedge 47 having its larger end 51 a continuation of, and being thicker than the sides 45. The larger end 51 of the wedge 47 forms a ridge on the outer surface of the tangent sides 45. Projecting lugs 49 definitely spaced from the larger end 51, of the wedge 47, are formed in the tangent sides 45. The lugs thus formed act as stops for the upper wire retaining member D, when the connector is being forced together.

The upper wire retaining member, generally designated D, is comprised of metal that is springy in nature and is of a length slightly less than the length of the prism 21 of the body portion C. An upper arcuous band 53, with an insulating liner 63, conforms to the radius of the wire on which the connector is to be placed. The

arcuous band 53 has downwardly extending tangent sides 55. A lower portion 57, of the sides 55, turns inwardly and engages the ridge formed by the large end 51, of the wedge 47, on the sides of the lower wire retaining member E, when the connector is pressed together, see Figure 3, intumed portion 57 on the sides 55 further impinges on the lugs 49, of the lower wire retaining member E, and prevents the wire retaining members D and E from compressing the wires to the extent that the points 41, of the pins G, would project through the outer surface of the wires and come in contact with the wire retaining members D and E, thereby lessening the insulating value of the connector. The portion of the sides 55, of the upper wire retaining member, that are not bent inwardly, form a lip 59, under which a pry 64 comprising a screw driver or other instrument, can be inserted, and, using the side 45 of the lower wire retaining member E, as a fulcrum, see Figure 9, the upper wire retaining member D, can be forced off and the connector removed from the wires should it be desired.

In Figure 6, a fragmental isometric view of the body portion C1 of my improved connector, is shown a modification of the wire passage blocking member, wherein a removable barrier generally designated H1, with an extending rib 31A interfits with a groove 33A, moulded in the figures 25A of the body portion C1. With this arrangement one or more wire passage blocking barriers H1 would be supplied with each connector, to be placed as required, or discarded, when the application of the connector on the wire is being made. The movable barriers H1 would be temporarily held in place by a light film of grease on the rib 31A and the groove 33A, the barriers H1 would be further held in place, after the application of the connector on the wires by reason of the extending lug 35A projecting under the wire retaining members D1 and E1 when the wire retaining members are in place, see Figures 10 and 11.

In Figure 7 is shown an isometric view of a modified form of contact making member, generally designated G2. This member would replace the members F and G in the combination shown in Figure 5, should it prove desirable. The contact member G2 is comprised of formed metal with three upwardly extending teeth 41B and three downwardly extending teeth 42B. The metal comprising the contact member G2 is formed in such a way that after piercing the insulation of the wire, the alternate teeth engage the same side of the wire to be connected. With this arrangement, the wire is distorted and pressure contact between the teeth and the wire is formed. Lugs 46B formed on the contact making member G3 are arranged to be embedded in the formed insulating material of the body portion C2. In Fig. 7, a body portion C2 has been dotted around the contact making member G2 to show the relative positions of the two.

In Figure 8, is shown a modified form of a contact making member, generally designated G3. This member would replace the members F, and G in the combination shown in Figure 5 should it prove desirable. The contact member G3 is comprised of formed metal with three upwardly extending knife-like members 41C, and three downwardly extending knife-like members 42C.

The metal, comprising the contact making member G3, is formed in such a way that alternate knife-like members 41C and 42C after piercing the insulation of the wire, engage the

same side of the wire to be connected. With this arrangement the wire is distorted and pressure contact between the knife-like members and the wire is formed. Lugs 46C formed on the contact making member G3, are arranged to be embedded in the formed insulating material of the body portion G3. In Figure 8 a body portion C3, has been dotted around the contact making member G3, to show the relative position of the two.

In Figure 9 is illustrated an application of my improved connector which shows a line wire A<sub>o</sub> connected to a single tap wire B<sub>o</sub> by way of my connector.

In Figures 10 and 11 is illustrated an application of my improved connector, which shows a wire A<sub>1</sub> spliced to a second wire B<sub>1</sub> by way of my improved connector.

In Figure 12 is illustrated a modified form of a connector embodying the features of my invention. The illustration shows the connector used to splice a wire A<sub>4</sub> to a wire B<sub>4</sub>. This connector, however, is adaptable to all the combinations shown for the connector illustrated in Figures 1 to 4. In this modified form the body portion of the connector is comprised of metal and sheet insulating material, hereinafter described. The wire retaining members are similar to those used with the connector illustrated in Figures 1 to 4. The contact making members are similar to those shown in Figure 5, and the modifications of the contact members as shown in Figures 7 and 8 would be applicable with modifications to this modified form of connector.

In Figure 13 is shown a sectional view of the connector as shown in Figure 12, showing the connector as it would appear when pressed together. The sectional view is taken on line 13-13.

In Figure 14 is shown a top view of the connector as shown in Figure 12.

In Figure 15 is shown an exploded view of the modified connector shown in Figures 12, 13 and 14, in which the body portion of the connector is comprised of two units generally designated C<sub>4</sub> and C<sub>4A</sub>. As both units C<sub>4</sub> and C<sub>4A</sub> are similar, the description of one unit C<sub>4</sub> will suffice. The body portion unit C<sub>4</sub> is comprised of non-magnetic metal and has a base member 21D through which a rectangular hole 22D is formed. The rectangular hole 22D interfits with the pin retaining member F<sub>4</sub>, hereinafter described. The base member 21D is also pierced with circular holes 24D, arranged to interfit with shank of the rivets 61D, hereinafter described, when the body portion unit is assembled. Extending upwardly from the sides of the base member 21D, and at right angles to the latter are sides 26D and fingers 25D. The fingers 25D are in pairs at each end of the base member 21D and are spaced apart a distance equal to the diameter of the wire on which the connector is to be placed. The fingers 25D, align the wire before the connector is pressed together, and hold the wire in position when the connector is being, and after it has been pressed together. Inturning sides 28D of the fingers 25D are arranged to retain the wire passage blocking barrier 29D formed on the insulating member J<sub>4</sub>, hereinafter described, in position. The inturning sides 28D, also tend to grip the wire and assist in holding the latter in place in the connector, as illustrated in Figure 14.

The insulating members, generally designated J<sub>4</sub> and J<sub>4A</sub> of the connector body, are similar, and the description of one member J<sub>4</sub> will suffice. The insulating member J<sub>4</sub> is comprised of sheet

insulating material and is the same width and length as the base 21D of the body portion unit C<sub>4</sub>. Ends 29D, of the same width as the flat portion 27D of the insulating member J<sub>4</sub>, are formed on the ends of the flat portion 27D and extend upwardly at right angles to the flat portion. The ends 29D are retained in position by the fingers 25D, and associated inturned sides 28D, of the body portion unit C<sub>4</sub>. At the angle junction of the flat portion 27D, and upturned ends 29D of the insulating members, the sheet insulation is grooved. This groove, 30D is arranged to provide a definite breaking point, so that the end members 29D can be broken off and removed as required when placing the connector on the wires to be connected. The insulating member J<sub>4</sub> is pierced with holes 32D. The holes 32D are arranged to definitely space and position the pins G<sub>4</sub>, hereinafter described. Other holes 34D in the member J<sub>4</sub> are arranged to interfit with the rivets 61D-61D, when the connector body portion is assembled.

Insulation piercing and contact making pins, generally designated G<sub>4</sub>, are dull pointed at both ends 41D-41D, and taper to a large diameter 39D, at their mid-point. Their mid-point is further enlarged by a flange 40D, the flange 40D being the same thickness as the pin retaining member F<sub>4</sub>, hereinafter described. The upper taper 37D, and the upper surface of the flange 40D, of the pins G<sub>4</sub>, interfit with the holes 32D in the insulating member J<sub>4</sub>. The lower taper 38D, and the lower surface of the flange 40D interfit with holes 32DA in the insulating member J<sub>4A</sub>.

The pin retaining member generally designated, F<sub>4</sub>, is comprised of sheet insulating material and is rectangular in shape. It is equal in size, and interfits with the hole 22D in the body portion unit C<sub>4</sub>. The pin retaining member is pierced with holes 36D. The holes 36D interfit with the outside diameter of the flange 40D on the pins G<sub>4</sub>.

The rivets 61D, 61D with a shank diameter equal to the diameter of the holes 24D in the units C<sub>4</sub> and C<sub>4A</sub>, and the holes 34D in the insulating members J<sub>4</sub> and J<sub>4A</sub>, are arranged to pass through these holes and be riveted over, thereby holding the body portion units C<sub>4</sub>, C<sub>4A</sub>, the insulating units J<sub>4</sub> and J<sub>4A</sub>, the pin retaining member F<sub>4</sub> and the pins G<sub>4</sub> in alignment and together.

The upper wire retaining member, generally designated D<sub>4</sub>, is similar in construction and application to the upper wire retaining member D of the wire connector illustrated in Figures 1 to 5 inclusive, has been fully disclosed above, and which description will suffice for the description of member D<sub>4</sub>.

The elements comprising the upper wire retaining member D<sub>4</sub>, have the same numerical designations on the drawings as the elements comprising the upper wire retaining member D, with the suffix D added.

The lower wire retaining member generally designated E<sub>4</sub> is similar in construction and application to the lower wire retaining member E of the wire connector illustrated in Figures 1 to 5 inclusive, which has been fully described above, and which description will suffice for member E<sub>4</sub>.

The elements comprising the lower wire retaining member E<sub>4</sub>, have the same numerical designations on the drawings as the elements

comprising the upper wire retaining member E, with the suffix D added.

In Figure 16 is shown a modified form of a connector embodying the features of my invention. The illustration shows the connector used to splice a wire A5 to another wire B5. However, this connector is adapted to all the combinations shown for the connector illustrated in Figures 1 to 4. In this modified form, the connector body portion is comprised of metal and sheet insulating material, hereinafter described. The wire retaining members are similar to those used with the connector illustrated in Figures 1 to 5. The contact making members are similar to those shown in Figure 5, and the modifications of the contact members as shown in Figures 7 and 8 would be applicable with modifications to this modified form of connector.

In Figure 17 is shown a cross section of the modified connector shown in Figure 16, the cross section being taken on line 17—17, and shows the modified connector as it would appear after it has been applied to the wires.

In Figure 18 is shown a top view of the modified connector shown in Figure 16.

In Figure 19 is shown an exploded view of the modified connector shown in Figure 16, in which the body portion of the connector is comprised of one metal unit, generally designated C5. This body portion unit is formed of non-magnetic metal, and has a base portion 21E. The base portion 21E is rectangular in shape and is pierced with a rectangular hole 22E, that interfits with the pin retaining member F5, hereinafter described. The base 21E is also pierced with holes 24E that interfit with the rivets 61E when the body portion is assembled. Extending upwardly and downwardly from the sides and at right angles to the base portion, are sides 26E and fingers 25E, the fingers 25E located near and at the ends of the base portion 21E. The fingers are arranged in pairs, the distance between the fingers of a pair being equal to the diameter of the wire on which the connector is to be placed. The fingers 25E align the wire before the connector is pressed together and hold the wires in position when the connector is being, and after it has been pressed together. Inturning sides 28E, of the fingers 25E, are arranged to retain the wire passage blocking barriers 29E formed on the insulating members J5 and J5A, hereinafter described, in place.

The insulating members, generally designated J5 and J5A of the connector body, are similar except for length, and the description of the member J5 will suffice for the two. The member J5 is comprised of insulating material and is the same width as the base member 21E of the body portion C5. Upturned ends 29E extending at right angles to the flat portion 27E, of the insulating member J5, are retained in place by the fingers 25E and associated inturned edges 28E of the fingers 25E. At the angle junction of the flat portion 27E and the upturned ends 29E, of the insulating member, the sheet insulation is grooved. This groove 30E is arranged to provide a definite breaking point, so that the end members 29E can be broken off and removed as required when placing the connector on the wires to be connected. The insulating member J5 is pierced with holes 32E. The holes 32E are arranged to definitely space and align the pins G5, hereinafter described. Other holes 34E, are arranged to interfit with the shanks of the rivets

61E—61E, when the connector body portion is assembled.

The insulation piercing and contact making pins, generally designated as G5, are dull pointed at both ends 41E, 41E and taper to a large diameter 39E at their mid-section. Their mid-section is further enlarged by a flange 40E, the flange 40E being the same thickness as the pin retaining member F5, hereinafter described. The upper taper 37E and the upper surface of the flange 40E of the pins G5, interfit with holes 32E located in the insulating member J5. Lower taper 38E, and the lower surface of the flange 40E, interfit with the hole 32E in the insulating member J5. The lower taper 38E, and the lower surface of the flange 40E, interfit with the hole 32EA on the insulating member J5A.

The pin retaining member F5, of sheet insulating material, is rectangular in shape and equal in size to the opening 22E in the body portion C5, and is of the same thickness as the metal comprising the base 21E of the body portion C5. The pin retaining member F5, is pierced with holes 36E, that interfit with the outside diameter of the flange 40E, on the pins G5.

The rivets 61E with a shank diameter equal to the diameter of the holes 24E of the body portion C5 and the holes 34E in the insulating member J5 and J5A, are arranged to pass through these members and be riveted over, thereby holding the body portion unit C5, the insulating units J5 and J5A, the pin retaining member F5, and the pins G5 in alignment and together.

The upper wire retaining member, generally designated D5 is similar in construction and application to the upper wire retaining member D of the wire connector illustrated in Figures 1 to 5 inclusive, which has been fully described above, and which description will suffice for member D5.

The elements comprising the upper wire retaining member D5, have the same numerical designations on the drawings as the elements comprising the upper wire retaining member D, with the suffix E added.

The lower wire retaining member generally designated E5 is similar in construction and application to the lower wire retaining member E of the connector illustrated in Figures 1 to 5 inclusive, which has been fully described above, and which description will suffice for member E5.

The elements comprising the lower wire retaining member E5 have the same numerical designations on the drawings as the elements comprising the lower wire retaining member E, with the suffix E added.

The application and operation of my improved connector is clearly shown in Figures 1, 2, 3, and 4. In making the application, the wires to be connected are placed so that they are engaged by the fingers extending from the body portion, after which the wire retaining members D and E are placed over the wires. The wire retaining members are so constructed that they will engage one another in this initial position, as clearly shown in Figure 2, and due to the fact that they do engage each other, the component parts of the wire connector are held in position in this initial position. After the wires and the connector are assembled as noted above, pressure is applied to the wire retaining members. This can be by way of the fingers of your hand, or by use of pliers, hammer, or vise. The pressure exerted on the wire retaining members forces the contact making members through the insulating covering of the wires and into electrical contact with the wires as illustrated

in Fig. 3. When the contact making members engage the wires within the insulating covering they distort the wire and cause pressure contact between the wire and the contact making member, as illustrated in Figure 4. It will be readily seen that this arrangement gives a substantial electrical connection between the wires to be connected, and that at all times the electrical connection is thoroughly protected with insulation, so that, either an experienced or an inexperienced person can make an electrical connection between electrical wires that have an insulating covering thereon, whether the wires are carrying an electrical current or not. The time required to make this connection would be very short, as it would only be necessary to assemble the units C, D and E together with the wire and press them together.

It will be understood that some changes may be made in the construction and arrangement of the parts, without departing from the spirit of my invention, and it is my intention to include in this application all such changes as may be included within the scope of the claims.

I claim as my invention:

1. A wire connecting device comprising a body portion, a plurality of projecting contact means in said body portion, a plurality of projecting wire positioning members on said body portion, said wire positioning members arranged to act as guides for a lower wire retaining member and an upper wire retaining member, a plurality of projecting lugs on said lower wire retaining member, said projecting lugs arranged to engage a portion of said upper wire retaining member, thereby preventing the upper wire retaining member and said lower wire retaining member from being pressed on each other further than a predetermined position.

2. A wire connecting device arranged to electrically connect wires together that have an insulating covering thereon comprising a single unit body portion, with a plurality of projecting contact elements therein, a plurality of integrally formed wire end insulating members in said body portion as well as a plurality of wire positioning members, said wire end insulating members being arranged to completely insulate the ends of the wires that terminate in said wire connecting device as well as to be broken out as required for varied application of said wire connecting device, and a plurality of wire retaining members.

3. A wire connecting device arranged to electrically connect wires together that have an insulating covering thereon comprising a moulded single unit body portion with a plurality of projecting contact elements therein, a plurality of interfitting wire retaining members, and a plurality of moulded movable wire end insulating members, said moulded body portion and said moulded wire end insulating members interfitting and arranged to permit the placing of said wire end insulating members in said body portion as required for varied applications of said wire connecting device.

4. A wire connecting device arranged to connect wires together that have an insulating covering thereon comprising a single unit body portion of insulating material, a plurality of metal contact members embedded in said body portion, said contact members extending in opposite directions from said body portion, said contact members extending in a plurality of groups in a definite spaced and positioned arrangement, said contact member groups together with wire posi-

tioning members extending from said body portion arranged to engage alternate sides of the wires to be connected and causing angular distortion of said wires thereby causing pressure contact between said contact members and said wires, and a plurality of interlocking wire retaining members.

5. A wire connecting device arranged to electrically connect a plurality of wires together that have an insulating covering thereon comprising a single unit body portion of insulating material with projecting contact means secured therein, a plurality of wire retaining members, said wire retaining members interfitting by way of a plurality of wedges and catches, said wire retaining members securely holding the wires connected on said projecting contact means of said body portion and thereby assisting in consummating the electrical connection between said wires by way of said contact means.

6. A wire connecting device arranged to electrically connect a plurality of wires together that have an insulating covering thereon comprising a single unit body portion of insulating material with projecting contact members secured therein, a plurality of metal interfitting wire retaining members, liners of insulating material in said wire retaining members whereby said projecting contact members of said body portion are prevented from coming in contact with the metal of said wire retaining members.

7. A wire connecting device arranged to electrically connect wires together that have an insulating covering thereon comprising a single unit body portion of metal and insulating material, a metal insert retained within and insulated from said body portion, a plurality of contact members projecting from said metal insert, said contact members arranged to engage said wires and electrically connect them together, and a plurality of wire retaining members arranged to securely hold said wires on said contact members.

8. In a wire connecting device arranged to electrically connect wires together, a single unit body portion of insulating material surrounding a plurality of projecting contact elements, a plurality of wire positioning members with interfitting wire end insulating units of insulating material on said body portion, means whereby a completely insulated connection can be formed between a plurality of wires that have an insulating covering thereon by way of said contact elements in said body portion, said connecting device arranged for varied applications on the wires connected by arranging said wire end insulating units in the required position, and a plurality of wire retaining members arranged to hold said wires in position.

9. A wire connecting device arranged to electrically connect wires together that have an insulating covering thereon comprising a single unit body portion surrounding a plurality of projecting contact elements, a plurality of projecting wire positioning members on said body portion, a plurality of wire end insulating units interfitting with said wire positioning members, and a plurality of interfitting insulated wire retaining members, the combination providing means whereby a completely insulated electrical connection can be made to a charged wire without subjecting the person making the application to shock.

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