April 7, 1936. S. R. BARRETT 2,036,561

INSULATED WIRE CONNECTER

Filed Dec. 5, 1933

Fig. 1.

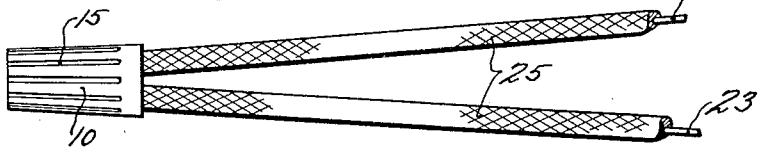


Fig. 2.

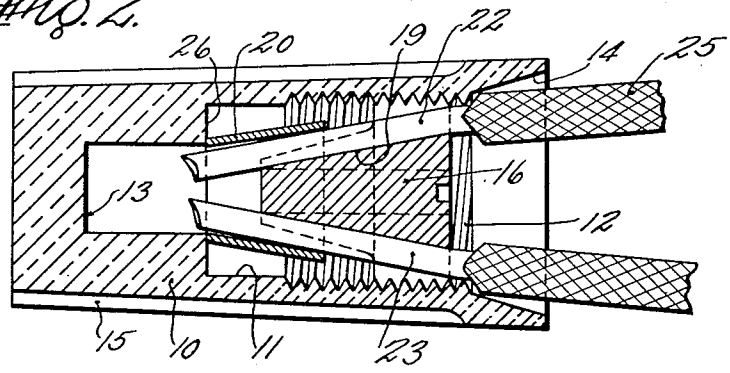


Fig. 3.

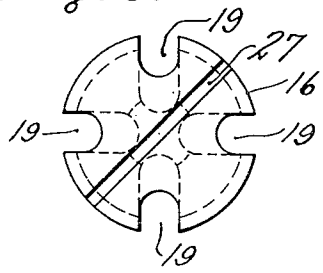


Fig. 5.

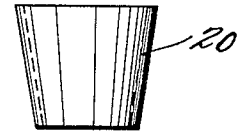


Fig. 6.

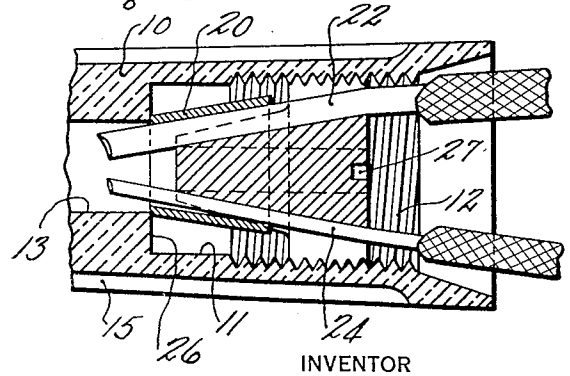
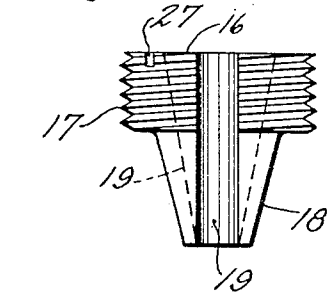


Fig. 4.



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UNITED STATES PATENT OFFICE

2,036,561

INSULATED WIRE CONNECTER

Sidney R. Barrett, Westfield, Mass.

Application December 5, 1933, Serial No. 701,020

8 Claims. (Cl. 173—263)

In electrical wiring systems there are numerous occasions where it is necessary to join wires together, generally the uninsulated ends of insulated wires. Such places occur in the various junction boxes, outlet boxes, switch boxes, etc., common in house wiring systems, and in practice this joining of the wires is accomplished by soldering and subsequent taping. Many proposals have been made to provide wire connecting devices capable of joining the ends of the wires electrically and avoiding the necessity of making separate soldered and taped joints. While some of these devices have been used commercially, their wide application has been impractical on account of certain inherent disadvantages of the forms developed up to the present time.

It is the object of the present invention to improve upon existing devices of this character in many particulars. One serious disadvantage of all of the prior devices has been that they could not be manufactured at a cost sufficiently low to permit their wide use. The present device is of extreme simplicity in manufacture and can be made cheaply enough so that it can enter into active competition with the soldering and taping methods now prevalent. A further object of the present invention is to improve devices of this general character by increasing the facility of their use. In particular, the present device is capable of at least initial application to the wires without the use of any tools; and in many instances, where the wires are sufficiently stiff, can be applied entirely without tools. A further object is to so design the insulating portion of the connecter that the strains incident to clamping of the wires will not tend to cause it to split. A further object is to improve the prior devices by making the insulating portion in a single piece which contains within it a simple wire clamping device completely concealed by the single piece insulator. By this means the necessity for a separate covering jacket is avoided and no exposed metal parts, joints, or relatively rotatable portions are exposed.

The invention will now be described in connection with the accompanying drawing in which:

Fig. 1 is a view of two wires having their ends joined by my improved device;

Fig. 2 is a longitudinal section through the device on an enlarged scale;

Fig. 3 is an end view of the plug element of the wire clamping device;

Fig. 4 is a side view of the plug shown in Fig. 3;

Fig. 5 is a side view of a wire binding washer; and

Fig. 6 is a view similar to Fig. 2 showing the application of the device to the clamping of wires of unequal diameters.

The body 10 of the device is molded or otherwise formed from insulating material such as "Bakelite" or other condensation product. In order to reduce the bulk of the device, it is preferably made somewhat tapered with the entry point of the wires at its larger end. Within the member 10 is formed a bore 11 having internal screw threads 12 near but preferably spaced from the larger end of the device. When the device is adapted for coupling the ends of a plurality of wires, the bore 11 is preferably blind; that is, it does not extend all the way through the body 10. In the case shown, it ends in a reduced terminal bore 13. Adjacent the open end of the bore the latter is preferably flared outwardly as at 14 in order to provide an easy entrance for the insulated portion of the wires. Externally the body 10 is preferably roughened as by the provision of flutes 15 so as to facilitate holding it tightly or rotating it relative to the wires.

A plug 16 shown in detail in Figs. 3 and 4 is threaded at 17 to engage the screw-threaded portion 12 of the bore. The inner end of the plug is shaped so as to cause the wires to assume a conical form, this being preferably accomplished by forming the inner end of the plug itself tapering or conical. Along the outside of the plug are a plurality of longitudinal passages, preferably in the form of grooves 19, the number of these grooves corresponding to the maximum number of wires for which the device is designed. The depth of the passages in the screw-threaded portion of the plug is sufficient to permit the wires to lie entirely below the threads, while at the inner or reduced end of the plug the depth of the grooves is less than the diameter of the wires so that the latter will be exposed.

This plug comprises one element of a wire clamping device, the second element of which is a wire binding member adapted to encircle the exposed portions of the wire. This member is constructed and arranged so as to embrace the wires tightly irrespective of whether or not they are all of the same size. In the form of this member at present preferred, it is made as a conical sleeve or washer 20 of a distortable and electrically conducting material such as copper. This washer fits over the exposed ends of the wires and when these wires are of even diameter as at 22 and 23 in Fig. 2, the washer will be centrally disposed in the bore. When these wires are uneven as at 22 and 24 in Fig. 6, the washer will be shifted lat-

erally to correspond to the eccentricity of the wire group. The inner surface of the bore 11 is shaped to limit the movement of the washer in a direction away from the open end of the device, so that it will offer a resistance to the advancing movement of the plug and will therefore serve as a clamping means for the wires. At the same time the washer is allowed a certain lateral freedom of movement so that it can vary its alinement with the axis of the body 10, either by tilting or by shifting bodily. In the illustrated form of the device, this restriction of longitudinal motion together with the freedom of lateral movement is very simply attained by making the terminal bore 13 slightly smaller in diameter than the smaller end of the washer, thereby forming a ledge 26 against which the washer abuts.

In operation, the plug 16 is slightly unscrewed in the bore, preferably without removing it entirely. The ends of the wires are cleared of their insulation 25 and each wire is passed down one of the grooves 19. They are easily caused to enter between the grooves and the conical washer 20. It will be observed that the flared open end of the bore receives the insulated portions of the wires so that all possibility of contact of the exposed ends of the wires with surrounding objects is avoided. The body is then rotated relative to the bunch of wires, as by holding the wires in one hand and rotating the body with the other. Since the wires pass down the longitudinal grooves 19 they act as a convenient gripping means for the plug, holding the latter stationary while the body 10 is screwed upon it. If the wires are relatively stiff a sufficient clamping pressure can be obtained by this means alone. If they have not much rigidity of their own, as in the case of stranded wire, it may be desirable to hold the plug with a screw driver and a slot 27 has been provided for this purpose. When the plug has been screwed home, it will be observed that the wires are clamped firmly between it and the washer 20 without exerting any strain on the insulating body 10 other than the longitudinal strain between the screw threads and the ledge 26. All expanding and wedging action is taken up by the washer itself and is not transmitted to the body. To make the electrical connection between the wires, either the plug or the washer, and preferably both, are made of metallic material such as brass or copper. The shifting or tilting action of the washer 20, together with its tendency to distort slightly as the wires are pressed against it, causes a very tight clamping action whether or not the several wires are uniform in size.

It will be obvious that numerous changes may be made in the specific form of the parts, some of these changes having been indicated above.

What I claim is:

1. A wire connecter comprising an insulating body having an internal bore provided with screw threads, a metallic plug threaded into the bore, tapered on its inner end and provided with a plurality of longitudinal wire receiving grooves, and a conical metallic sleeve surrounding the tapered portion of the plug, the bore being formed to contact locally with the sleeve and thus to resist longitudinal movement of the sleeve while permitting it to vary its alinement with the bore as the plug is screwed down in the bore to bring the wires into tight contact with the sleeve.

2. A wire connecter comprising an insulating body having an internal bore provided with screw threads, and a wire clamping device within the bore comprising a plug threaded into the bore, tapered on its inner end, and provided with a plurality of longitudinal wire receiving grooves, and a wire binding member surrounding the tapered portion of the plug, the more being formed to contact locally with the member and to permit it a limited shifting movement within the bore as the wires are wedged into contact with it by the screwing down of the plug, at least one of the elements of the wire clamping device being electrically conducting so as to unite the wires electrically when the plug is screwed in place.

3. A wire connecter comprising an insulating body having an internal blind bore provided with screw threads and sufficiently large at its open end to receive the insulated portions of a plurality of wires, and a wire clamping device within the bore comprising a plug threaded into the bore and spaced from the open end of the bore when screwed in place a sufficient distance so that the bore will enclose a sufficient length of the insulated portions of the wires to make taping unnecessary, said plug having longitudinal wire receiving grooves and being shaped at its inner end to cause the uninsulated ends of the wires to assume a generally conical form, and a wire binding member adjacent the inner end of the plug and mounted for limited shifting movement within the bore as the wires are wedged into contact with it by the screwing down of the plug, at least one of the elements of the wire clamping device being electrically conducting so as to unite the wires electrically when the plug is screwed in place.

4. A wire connecter comprising an insulating body having an internal blind bore provided with screw threads and sufficiently large at its open end to receive the insulated portions of a plurality of wires, and a wire clamping device within the bore comprising a plug threaded into the bore and spaced from the open end of the bore when screwed in place so that said open end of the bore may enclose a sufficient length of the insulated portions of the wires to make taping unnecessary, said plug having longitudinal wire receiving grooves and being shaped at its inner end to cause the uninsulated ends of the wires to assume a generally conical form, and a wire binding member adjacent the inner end of the plug and mounted for limited shifting movement within the bore as the wires are wedged into contact with it by the screwing down of the plug, at least one of the elements of said wire clamping device being electrically conducting so as to unite the wires electrically when the plug is screwed in place, said grooves and the wire binding member being so disposed as to permit the insertion of the wires down the grooves and between the plug and the member when the plug is but partially unscrewed and to permit the wires to serve as a means for rotating the plug without the use of tools.

5. A wire connecter comprising an insulating body having an internal blind bore reduced in diameter at an intermediate point to provide a shoulder, the portion of the bore of larger diameter being provided with screw threads separated from the end of the bore by an outwardly flaring portion of the bore, a metallic plug threaded into the bore, tapered on its inner end and provided with a plurality of longitudinal wire receiving grooves extending through the screw threaded portion of the plug to a greater depth than

the diameter of the wires, and a conical metallic sleeve surrounding the tapered portion of the plug with its smaller end adjacent the shoulder in the bore but otherwise free from contact with the walls of the bore, said sleeve operating to embrace tightly the uninsulated ends of such wires as are passed down the grooves in the plug and to shift laterally within the bore and to become distorted as the plug is screwed down in the bore to bring the wires into tight contact with the sleeve.

6. A wire connecter comprising, an insulating body having an internal bore provided with screw threads, a plug threaded into the bore, the plug being provided with a plurality of longitudinal wire receiving grooves, and shaped on its inner end to support the uninsulated portions of the wires in generally conical form, a distortable wire binding member carried by the insulating body in position to be engaged by the inner end of the plug by the screwing of the latter into the body, and means mounted on the body for holding the said member against the thrust of the plug so that the member will be distorted by contact of the wires with it, at least one of the elements contained within the body being metallic so as to unite the wires electrically when the plug is screwed in place.

7. A wire connecter comprising an insulating body having an internal blind bore, said bore being provided with screw threads separated from the end of the bore by an outwardly flaring portion thereof, a metallic plug threaded into the bore, tapered on its inner end and provided with a plurality of longitudinal wire receiving grooves, and a conical metallic sleeve surrounding the tapered portion of the plug, the bore being formed so as to contact locally with the sleeve and thus to restrict longitudinal movement of the sleeve while permitting it to vary its alinement with the bore as the plug is screwed down in the bore to bring the wires into tight contact with the sleeve.

8. A wire connecter comprising an insulating body formed with an internal bore having an open end and provided with screw threads, and a wire clamping device located within the bore comprising a plug threaded into the bore, provided with a plurality of longitudinal wire receiving passages, and shaped on its inner end to support the uninsulated portions of the wires in generally conical form, and a wire binding member mounted within the bore in position to be engaged by the wires as the plug is screwed into the insulating body, the bore being shaped to engage the member locally only so that the member is free to accommodate itself to embrace snugly a plurality of wires irrespective of their diameters within the physical limits of the device, at least one of the elements of the wire clamping device being electrically conducting so as to make electrical contact between the wires as the plug is screwed down.

SIDNEY R. BARRETT.

CERTIFICATE OF CORRECTION.

Patent No. 2,036,561. April 7, 1936.

SIDNEY R. BARRETT.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 6, for "more" read bore; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of May, A. D. 1936.

Leslie Frazer

(Seal) Acting Commissioner of Patents.

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