Feb. 28, 1961 J. W. ANDERSON 2,973,404

ELECTRIC WIRE CONNECTOR

Original Filed Oct. 29, 1953

Fig. 2

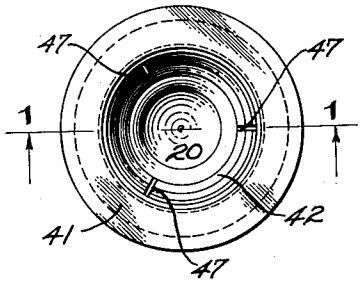


Fig. 1

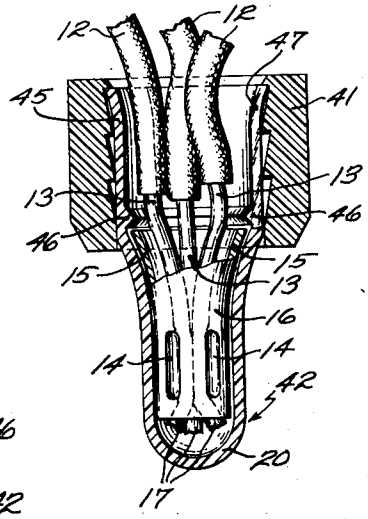


Fig. 3

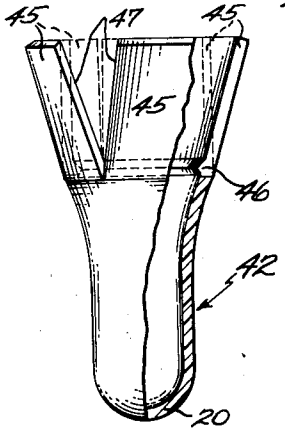
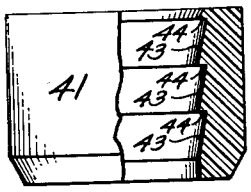


Fig. 4



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2,973,404

ELECTRIC WIRE CONNECTOR

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Original application Oct. 29, 1953, Ser. No. 388,969, now Patent No. 2,925,461, dated Feb. 16, 1960. Divided and this application Jan. 26, 1960, Ser. No. 4,698

5 Claims. (Cl. 174—87)

This invention relates to a composite connector for holding bound together in electrical contact and thoroughly insulated from surroundings the bared free end portions of a plurality of flexible electrical conductors. The present application is divisional from my copending application, Serial No. 388,969, filed October 29, 1953, now U.S. Patent No. 2,925,461.

In former practices of joining together the free bared end portions of insulated electric conductors, as within an outlet or junction box, it has been proposed, in place of the old fashioned method of soldering the wire ends together and then covering them with a winding of insulative tape, to bind the free wire end portions together in side by side relation with their ends flush by screwing thereon a cap nut, the same being a thimble type of connector usually comprising a thick walled insulative cup internally lined with hard screw threads. Satisfactory fastening together of electric wires by such means and without soldering necessitates a nice fit of the overall girth of the combined wire ends with the internal screw threaded hole in the connector. This in turn necessitates having at hand a variety of sizes of connectors so that a size can be chosen that properly fits the quantity and sizes of wires to be joined thereby.

Given a proper fit between the combined wires and a cap nut type of connector the latter when screwed onto the former must indent or cut its own thread in the bared surfaces of the wires. If the wires are of copper or other soft metal, and particularly if of the stranded type, the screwing on of the connector will tend to twist and may even sever individual fine strands of the wire.

It is an object of this invention to provide connectors of uniform size that will bind quickly and firmly together and insulate dependably from their surroundings the bared free end portions of a gang of insulated wires that may vary in number, kind and size, and without danger of breakage or impairment of the wires even if of the stranded type.

A contributory object is to provide a connector that comprises an easily applied insulative sheath made of separable parts that can be coupled together in less time than that required to screw a cap nut directly onto the wires as aforesaid and that demands less finger strength of the user.

A further object is to relieve the insulative parts of the connector, especially if made of molded plastic material, from the forceful stresses and strains that need be exerted for holding the wires mechanically bound together.

A still further object is to make the insulative sheath out of individual parts that are easily separable for reuse after assemblage.

The foregoing and related advantages of the invention will appear in greater detail from the following description of successful embodiments of the present improvements having reference to the accompanying drawings wherein:

Fig. 1 is a view taken on the plane 1—1 in Fig. 2 looking in the direction of the arrows showing on a scale larger than usual size an assemblage of wire terminals bound together and housed within a two-part insulative sheath in accordance with the invention.

Fig. 2 is a plan view of the assembled two-part sheath with the wires omitted.

Figs. 3 and 4 show respective details of the two parts of the insulative sheath before assemblage, with one side of their hollow structure broken away on the plane 1—1 in Fig. 2.

In the drawings three insulated electrical conductors 12 have side-by-side bared free wire end portions 13 locked in electrical contact with one another by the wire squeezing indentations at 14 in the tubular wall 15 of an open ended metallic binder or splicer sleeve 16 which encompasses the combined end portions 13 and has in its normal shape an outwardly flared rim portion at its larger open end. The extreme tips 17 of the bared wire end may or need not project from the opposite and smaller, open end of the binder 16.

The nature of the mechanical hold of the binder upon the wire ends produced by indenting the metallic tubular walls 15 is such that a considerable variety of the numbers, kinds and sizes of wires can thus be held together by the use of a uniform size of binder or splicer sleeve. Also the mechanical holding together of the wires by means of such binder does not inflict any stress or strain on plastic housing parts that may be of brittle or deformable nature such as can constitute the two-piece insulating sheath next to be described.

This sheath comprises a boot 42 of strong, tough and resilient plastic material such as molded nylon whose normal structural form is shown in Fig. 3. Boot 42 has a relatively small closed end 20 and a relatively large opposite open end which is castellated to afford three resilient fastening prongs 45 capable of flexing between their full line and broken line positions in Fig. 3. The open flaring end of boot 42 can be contracted by squeezing it radially inward within the elastic limit of its resilient material, which may be molded nylon.

A collar 41 of rigid insulating material is then provided having a series of conical counterbores 43 which produce step-like shoulders 44 therebetween internally of the collar. Both the maximum and minimum diameters of the bores 43 at the shoulders 44 are of smaller girth than the normal unsprung overall spread of boot prongs 45. These prongs normally assume their relatively flaring relation shown in Fig. 3 and are separated by three V-shaped notches 47. At the base of prongs 45 internally of the boot there is an annular bead 46 that reduces the girth of the boot at this point in its length to a smaller size than the overall size of the flared end of binder 16. The difference in size however is so slight as to permit the flared open end of the binder to be snapped past the bead 46 when the former has entered into full occupancy of the boot. This imprisons the binder within the boot. Retaining collar 41 may then be slipped over the smaller closed end of the boot and as the collar passes into engagement with the resilient flared prongs 45 of the boot it cams them radially inward simultaneously until the extremities of arms 45 pass the top or first one of the shoulders 44. Thereupon the prong extremities spring outward into locking engagement with the conical counterbore 43 as shown in Fig. 1. The user then has the choice of telescoping the collar 41 into the boot to a farther extent than shown in Fig. 1 because the collar can be forced a greater distance toward the open end of the boot so that the prongs 45 engage any desired one of the conical counterbores 43 thus increasing the overall length of the sheath as a whole. This is sometimes desirable when one or more of the insulated conductors have an unnecessary length of their wire or wires laid

bare, needing a greater length of insulative protection by the collar 41.

As a guide to successful relationships of wall thickness and to other dimensions in a preferred embodiment of the invention, the tubular metallic binder if made of brass or copper and approximately .185 inch in minimum outside diameter may appropriately have a wall thickness of .015 inch. The boot 42 in Fig. 3 if made of molded nylon and approximately .265 inch in minimum inside diameter may have a wall thickness of .018 inch preferably thickened to .030 inch in the closed end of the boot.

The foregoing are not limiting dimensions and since the principles underlying these improvements are susceptible of embodiment in many variations of the exact shapes and relationships of parts herein disclosed, the appended claims are directed to and intended to cover all equivalents which come within a broad interpretation of the terminology of the claims.

I claim:

1. A compound connector for holding together in electrical contact and insulated from their surroundings side-by-side wire terminals of electrical conductors, comprising in combination with electrical conductors having bared wire terminals, a metallic binder having a tubular wall sleeved over said wire terminals in a manner to hold them fixedly together and having an outwardly extending rim portion, an elongate boot of insulative material housing said binder and said wire terminals having an open end encompassing said conductors castellated to form more than two axially extending locking prongs flexible and springable in angularly divergent directions, and a collar encompassing said conductors having detentive shoulders at least one of which is interlockably engaged by at least one of said prongs in a releasable manner while said binder occupies said boot, said boot presenting internally a thrust receiving stop lug encountering said outwardly extended rim portion of said binder in a manner positively to prevent withdrawal of said binder and said wire terminals from within said boot when said members are locked together by said prongs.

2. A compound connector as defined in claim 1, in which the said collar has at least one internal conical groove bordering at least one of the said detentive shoulders and slightly smaller in minimum girth than the maximum compass of the said prongs, whereby the latter are caused to spring inward in moving axially past said shoulder into detentive nested relation to said groove.

3. A compound connector as defined in claim 2, in which there is an axially extending series of the said conical grooves each bordering one of the said detentive shoulders and engageable selectively by the said prongs.

4. A compound connector as defined in claim 2, in which the said thrust receiving stop lug comprises an internal annular bead near the root ends of the said prongs of the said boot and whose minimum diameter is so little smaller than the maximum girth of the said metallic binder that the latter can be forced in an axial direction past said bead fully into said boot and be thereafter positively imprisoned by the said inward springing of the said locking prongs.

5. A compound connector for holding together in electrical contact and insulated from their surroundings side-by-side wire terminals of electrical conductors, comprising in combination with electrical conductors having bared wire terminals, a metallic binder having a tubular wall sleeved over said wire terminals in a manner to hold them fixedly together and having an outwardly extending rim portion, an elongate boot of insulative material housing said binder and said wire terminals having an open end encompassing said conductors castellated to form more than two axially extending locking prongs flexible and springable in lateral directions, and a collar encompassing said conductors having detentive shoulders at least one of which is interlockably engaged by at least one of said prongs in a releasable manner while said binder occupies said boot, said boot presenting internally a thrust receiving stop lug encountering said outwardly extended rim portion of said binder in a manner positively to prevent withdrawal of said binder and said wire terminals from within said boot when said members are locked together by said prongs.

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