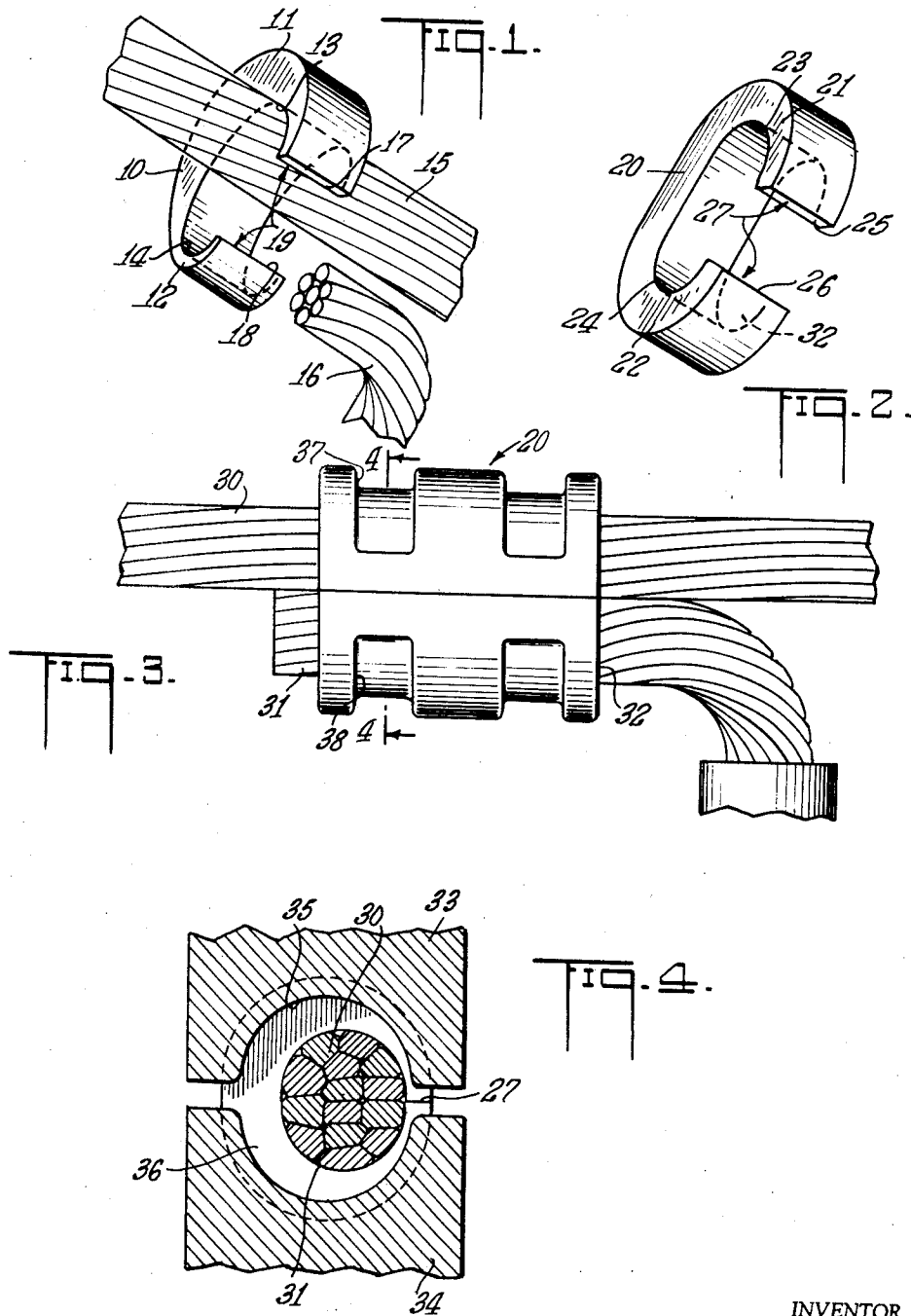


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HOOK TYPE RUN AND TAP CONNECTOR AND METHOD
OF MAKING A CONNECTION THEREWITH
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1

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HOOK TYPE RUN AND TAP CONNECTOR AND METHOD OF MAKING A CONNECTION THEREWITH

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1 Claim. (Cl. 29—155.55)

My invention relates to an electrical connector capable of being hooked over and supported on an endless or continuous run cable while a tap conductor is inserted into the connector prior to crimping the final connections.

A tap connection is used to provide a branch current for supplying the local electrical needs from the main power cable which is large enough to handle the overall requirements of a large area.

To avoid cutting the main cable to enable one end to be pushed through the familiar spliced type of tubing, a U-shaped clamp has been hitherto used, the mouth of the U being closed by a bolt which tightens the two legs of the clamp about the end of the tap conductor and the continuous main contacting cable.

It is of prime importance that the continuous cable be tightly secured without reducing its net cross-section, otherwise its current carrying capacity will be reduced with the possibility of cable damage through overheating.

It is an object of the invention to provide a connector having a lateral opening large enough to enable the connector to be hooked sideways over the continuous run cable. In this position I have found that the connector is supported by the continuous run cable, thus freeing the hands to permit the end of the tap connector to be inserted therein and a crimping tool brought up to form the final connection.

Other objects are to provide a hook type connector which is boltless and solderless and which is soft enough to permit compression about the conductors without materially reducing the cross-section of the endless run conductor; which may be made hard enough to permit the compressed shape to be retained without relaxation; to provide a connector having a uniform cross-section to permit more economical manufacture by the extrusion process instead of conventional casting or forging; to provide the foregoing in a connection which is easy to make and which tends to seal the single lateral opening in the connector as well as any voids between conductors upon completion of the crimping operation, thus preventing corrosive elements from entering the connection and ultimately destroying the electric contact between the exposed run and tap conductors; to provide a secure electrical connection between the run and tap conductors that does not require twisting the cables as is shown in Patent No. 839,563, or brazing the connector as is shown in Patent No. 2,149,209, or widening a soldering slot after manufacture of the connector as would be required of the connector in U.S. Patent No. 1,631,719 and thus objectionably work harden the connector walls prior to crimping.

I accomplish these and other objects and obtain my new results as will be apparent from the device described in the following specification, particularly pointed out in the claim, and illustrated in the accompanying drawing wherein:

2

Fig. 1 is perspective view demonstrating the method of assembling my novel connection, whereby a connector is hooked over an endless run conductor and is supported thereon while the tap conductor is inserted prior to crimping the final connection.

Fig. 2 is a perspective view of another form of the connector.

Fig. 3 is a side elevation of a final connection made with the connector of Fig. 2.

Fig. 4 is a sectional view taken in the plane 4—4 of the connection of Fig. 3 during the crimping process.

In the drawing Fig. 1, reference numeral 10 designates one form of the connector body of my invention provided with two extending arms 11 and 12 each having individual conductor seats 13 and 14 respectively for seating differently sized conductors therein. The arms are of maximum thickness at the connector body 10 and gradually diminish in thickness towards their extremities 17 and 18. In addition, conductor seat 13, being designed to seat the endless run conductor 15 which is of greater diameter than tap conductor 16, the arm 11 is correspondingly thicker than arm 12. In run and tap conductors, this may be important as the run conductor supports the tap conductor as well as the hooked-on connection. The side opening 19 permits the continuous run conductor to be laterally inserted therethrough, which avoids cutting the run cable.

In Fig. 2, the connector 20 is provided with two extending arms 21 and 22 of equal size, having conductor seats 23 and 24 respectively for seating substantially similarly sized conductors thereon. The arms are of maximum thickness where they join each other, as is first described, and diminish in thickness to their extremities 25 and 26 respectively. The side opening 27 permits the endless run conductor to be laterally inserted therethrough without cutting the cable.

In Fig. 3, the connector 20 is crimped together with a tool 28 (as is shown in Fig. 4) which circumferentially grips the connector body and forms the opposing crimp marks 31 and 32. This type of indentation causes the conductor 33 to be securely positioned in contact with the run conductor 34. Any suitable crimping tool may be used which causes the connector to grip the conductors preferably in a substantially sealing contact.

The run and tap connector is especially devised to be crimped about contacting conductors to form an efficient electrical and mechanical connection. The connector is made of soft readily malleable metal such as commercially pure copper or aluminum adapted to cold flow under the crimping pressure. The metal after crimping must be capable of holding the conductors in secure electrical contact over a long period of time without relaxing its grip.

The metal of the connector is softer than the metal of the run conductor to prevent reduction of the cross section of the conductor. Thus the integrity of the run conductor as well as spaced apart seats 13, 14, and 23, 24 are preserved. The metal is extruded from the circumferential crimp marks 31 and 32 and caused to flow about the conductors filling all voids therearound, providing a good electrical contact between the conductors and a sound seal for the connection against deleterious atmospheric conditions which could cause corrosion with possible loss of electrical joint efficiency. The abutting faces such as 17 and 18 and 25 and 26 are, respectively, pressed to each other in the final connections. To make the final electrical connection with the connector 20, as shown in Fig. 3, the endless or continuous run cable 30 is passed through opening 27 between faces 25 and 26 of the connector which hooks the connector over the run cable. An unctuous substance such as petrolatum, mixed

with metal particles such as zinc, which are hard enough to penetrate the oxide skin of the aluminum conductors, may be coated about the contacting surfaces of the conductors and connector. The tap conductor 31 being naturally cut may be inserted endwise in the connector opening 32, if the opening 27 cannot accommodate the tap conductor with the run cable already seated. Suitable indenting dies 37 and 34 provided with substantially semi-cylindrically shaped members 35 and 36 are applied to open the connector and the connection shown in Fig. 3 is created. The faces 25 and 26 are caused to abut each other tightly. The crimping pressure forces the metal from the connector to be extruded filling up any empty space or pockets in the connection. The pressure from the semi-circular crimps 37 and 38 establishes a tight contact between conductors and provides a high degree of electrical joint efficiency. The metal which is extruded is work hardened and strengthens the connection against relaxation. Thus a commercially pure copper having a Rockwell hardness of H60 or H87 is hardened in the crimp marks. An encircling type of reinforcement is thus provided in the final connection to resist opening.

The described connection accomplishes the object of my invention. The cross section of the connector being uniform, the connector may be manufactured by the extrusion process which reduces the cost of fabrication substantially. The final connection is oval in cross section and not circular, as is obtained in ordinary spliced conductors which may be cut or reduced in cross section without damage. In my run and tap connector, the final connection must be made without substantially reducing the net cross section of the arm cable or a loss in current carrying capacity will result. The metal of the connector flows in the crimping process, to fill all voids thus sealing the connection against corrosion which would ultimately cause a loss in electrical efficiency. The metal which is soft to facilitate flow, to seal the connection and prevent damage to the run cable, is finally hardened to resist accidental loosening of the connection.

The final connection requires a single lateral slot, which is thus reinforced against opening. The connection eliminates welded or soldered seams. The final crimping operation work hardens the metal of the connector only during the process of making the final reinforced connection. The present invention eliminates the need for twisting the cables to secure the connection as has been sometimes previously required.

The connector may be hooked over the endless run cable to support the connection during and after crimping thus facilitating the assembly. Both hands may thus be free for the crimping operation.

I have thus described my invention, but I desire it understood that it is not confined to the particular forms or uses shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of my invention, and, therefore, I claim broadly the right to employ all

equivalent instrumentalities coming within the scope of the appended claim, and by means of which, objects of my invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to attain these objects and accomplish these results.

This application is a continuation-in-part of my application Serial No. 316,837 abandoned July 25, 1957.

I claim:

The method of joining an endless run conductor, a tap conductor and a generally tubular connector having a single lateral opening, said connector being made of a material softer than the run conductor to prevent reducing the net cross-section of the run conductor, said lateral opening being formed in said connector by a pair of integral arms extending substantially laterally from a thick body, said arms diminishing in thickness from the body to the ends of said arms, said arms terminating in flat planar surfaces adapted to completely abut each other when compressed, forming substantially a single plane of contact, said arms forming a pair of circular seats having their axes spaced transversely apart, comprising the steps of hooking said tubular connector over said run conductor through said lateral opening, positioning said run conductor within said connector in one of said pair of seats positioning said tap conductor within said connector in the other of said pair of seats to make contact with said run conductor and finally compressing the connector and conductors while said connector body and tap conductor are supported by the run conductor by applying opposing crimping forces in the plane in which the axes of the spaced apart conductor seats lie while laterally confining the connector walls until the lateral opening has been tightly shut and sufficient metal has been displaced from the connector body and extruded to fill all voids and spaces between the connector and the conductors to form a hardened reinforcement for the soft connector body resisting opening of the same and insuring a tight contact between conductors and sealing the conductors to the connector while maintaining the integrity of the circular spaced apart seats, said conductors being deformed to form a substantially oval cross-section connection, said seal preventing substantially the entry of corrosive elements between the conductors and the connector body.

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