March 4, 1952 D. C. AKERS 2,587,676

CONNECTOR CLAMP FOR COAXIAL ELECTRICAL CABLES

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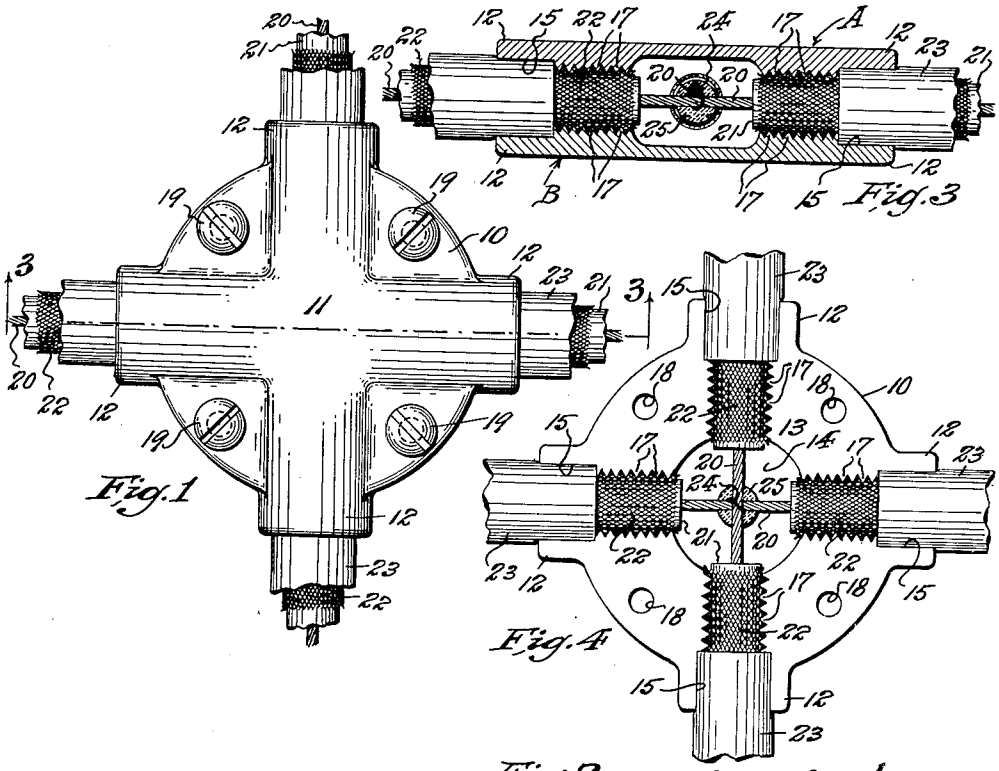


Fig. 1

Fig. 3

Fig. 4

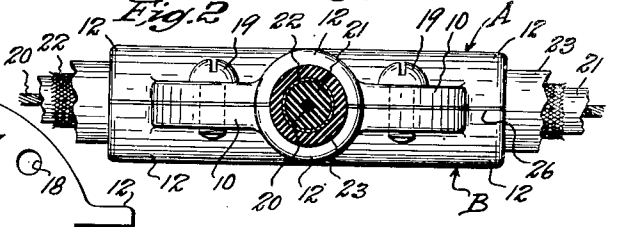


Fig. 2

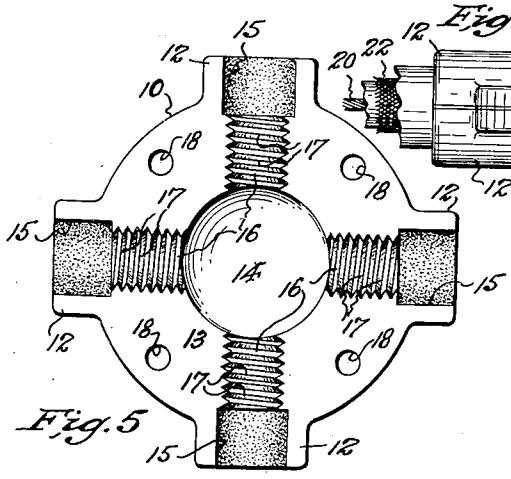


Fig. 5

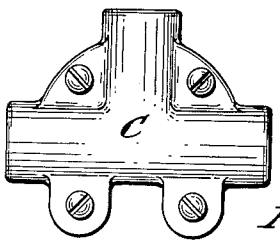


Fig. 6

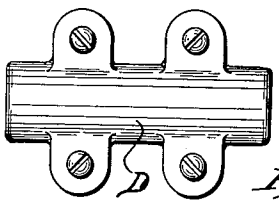


Fig. 7

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CONNECTOR CLAMP FOR COAXIAL ELECTRICAL CABLES

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3 Claims. (Cl. 174—21)

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This invention relates to a novel construction of connector clamp for joining a plurality of coaxial electrical cables in desired interconnected relation.

The invention has for an object to provide a novel connector clamp structure comprising a pair of opposed clamp members which are adapted to mechanically join, and securely hold in joined relation, a plurality of coaxial cables with their conductors arranged in desired electrically interconnected relation; the clamp members being adapted to be easily and quickly applied to the coaxial cables with a minimum of labor and minimum requirement of soldering operations.

The invention has for a further object to provide a novel connector clamp comprising opposed clamp members having cable embracing portions of novel construction which include means to mechanically grip inserted coaxial cable portions, means to mechanically grip bared portions of the outer conductors thereof with strong electrical grounding contact without necessity for soldering, and means to house intersecting and joined bared portions of the inner conductors of the cables; the connector clamp being such that necessity for use of soldered electrical connections is avoided except at the intersection of the joined inner conductors of the cables.

The invention has for another object to provide a connector clamp of the kind and for the purposes stated, wherein crossed inner conductors of the cables need not be cut, and can be soldered together at the point of intersection thereof, whereby to assure a stronger joint, both mechanically and electrically.

The invention has for still another object to provide a connector clamp comprising opposed clamp members which, when joined together in face to face meeting relation around the coaxial cables served thereby, may be sealed against ingress of moisture in further protection of the bared conductors disposed within and between the same.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

Illustrative embodiments of the invention are shown in the accompanying drawings, in which:

Fig. 1 is a face view of the novel connector clamp as operatively applied to crossed coaxial cables desired to be interconnected; Fig. 2 is an edge elevational view thereof; Fig. 3 is a transverse vertical sectional view thereof, taken on line 3—3 in Fig. 1; Fig. 4 is an interior face view

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of one clamp member, the opposite clamp member having been removed, said view showing the crossed coaxial cables in operative assembled relation thereto; and Fig. 5 is a view similar to that of Fig. 4, but with the coaxial cables removed.

Fig. 6 is a face view of a modified form of the novel connector clamp as adapted for three way cable connection; and Fig. 7 is a face view of another modified form of the connector clamp as adapted for two way cable connection.

Similar characters of reference are employed in the hereinabove described views, to indicate corresponding parts.

In the embodiment of this invention as shown in Figs. 1 to 5 inclusive, the novel connector clamp is of a form adapted for application to crossed or four way extending coaxial cables, and comprises a pair of matching, opposed identical clamp members A and B adapted to be superposed and secured together in embracing relation to the coaxial cables to be joined thereby. Said clamp members are preferably made of cast metal.

Each clamp member comprises a body 10 of suitable peripheral shape and of suitable thickness. Integral with the body 10, to project from the outer face thereof, is a cross shaped boss 11 which provides a series of semi-cylindrical barrel portions 12 radial to the center of the body 10, and relatively spaced ninety degrees apart. Indenting the inner face 13 of the body 10 is a central cavity 14 of suitable peripheral shape and depth. Each barrel portion 12 is interiorly shaped to provide a semi-cylindrical outer bore section 15, which extends inwardly from the outer end portion thereof, and to additionally provide a semi-cylindrical inner bore section 16, which extends from the inner end of the outer bore section 15 to the central cavity 14. Said bore sections 15 and 16 are laterally open in the plane of the inner face 13 of the body 10. Each outer bore section 15 is of a diametric size slightly less than the external diameter of coaxial cable to be served by the connector clamp. Each inner bore section 16 is of a reduced diameter approximating the outside diameter of an outer conductor of coaxial cable to be served by the connector clamp. The surface of each inner bore section 16 is provided with transverse sharp edged V-section serrations or teeth 17, which are adapted to impress or indent a bared portion of an outer conductor of coaxial cable lodged therein with strong mechanical gripping and holding effect, and so as to make good electrical

grounding contact with the connector clamp. The serrations or teeth 17 project radially inward from the peripheral face of inner bore section 16 to an extent just sufficient to give said serrations or teeth a crest diametric size somewhat less than the diametric size of the outer conductor of a coaxial cable, whereby said conductor will be indented to a predetermined depth. If desired, the surfaces of the outer bore sections 15 may be slightly roughened to enhance the frictional gripping effect thereof upon cable embraced thereby. Such roughening may be provided by unmachined surfaces of metal from which the clamp members A and B are cast. When the clamp members A and B are superposed with their under faces 13 in meeting relation, the corresponding semi-cylindrical outer and inner bore sections will be opposed in alignment so as together to form complete cylindrical outer and inner cable embracing bores.

The bodies 10 of the clamp members A and B are provided with matching openings 18, those of at least one said body being internally screw-threaded so that fastening screws 19 may be engaged through the superposed clamp members A and B, whereby to fasten the same together in operative assembled relation.

Coaxial cable, in connection with which the connector clamp is designed to be used, comprises an inner conductor 20, which is surrounded by an inner sleeve 21 of insulation material, and a tubular outer conductor 22 (usually of braided wire), which surrounds and is supported by said inner insulation sleeve 21, said outer conductor 22 being enveloped by an outer sleeve 23 of insulation material.

Preparatory to joining a pair of crossed coaxial cables by the novel connector clamp in electrically connected relation for four way extension, a section of the inner conductor 20 of each cable is bared by cutting away and stripping therefrom the contiguous portions of the inner insulation sleeve 21, outer conductor 22 and outer insulation sleeve 23. The lengths of the sections of inner conductors 20 thus bared should approximate but not exceed the diameter of the cavities 14 of the clamp members, when said sections are housed within said cavities upon application of the connector clamp to the cables. This having been done, the outer insulation sleeve 23 of each cable is cut away and stripped from sections of the outer conductor 22 adjacent to each end of the bared inner conductor 20, thus providing bared sections of said outer conductor 22 which approximate in length the length of inner bore sections 16 of the clamp members A and B.

To assemble the coaxial cables, when prepared in the manner above set forth, with the connector clamp so as to be joined by the latter, the fastening screws 19 of the connector clamp are removed to permit separation of the clamp members A and B. The coaxial cables are then applied in crossed relation to the interior of one of the clamp members, so that the bared sections of the inner conductor 20 are disposed to intersect in crossed relation within the cavity 14 of said clamp member, while the bared sections of outer conductors 22 are respectively lodged in respective inner bore sections 16, and adjacent end portions of the outer insulation sleeves 23 are respectively lodged in respective outer bore sections 15 of the clamp member (see Fig. 4). Either before or after the coaxial cables are thus assembled with one clamp member, the intersecting inner conductors 20 thereof are secured together in good electrical contact. This may be done by binding or holding said intersecting portions together by means of a twist of tie wire 24 applied around the same, and thereupon fixedly uniting the same by an application of solder to provide a solder joint 25 (see Figs. 3 and 4).

The coaxial cables having been applied to and assembled with one clamp member in the manner described, the other clamp member is thereupon superposed thereon so as to embrace the exposed portions of the cables in corresponding manner. This having been done, the superposed clamp members are tightly drawn together and mutually secured to one another by application of the fastening screws 19 thereto.

As the superposed clamp members are drawn together and secured, opposed and aligned outer and inner bore sections 15 and 16 will form complete cylindrical bores by which contiguous portions of the cables are enclosed. The serrations or teeth 17 of the inner bore sections 16 will be forcibly pressed against the contiguous bared sections of the outer conductors 22, and, since the latter are supported by the underlying inner insulation sleeves 21, said serrations or teeth 17 will indentingly impress and grip said bared sections of the outer conductors, and will thereby not only exert a strong mechanical clamping and holding effect thereupon, but will also produce a very positive, tight and strong electrically grounding contact between the connector clamp and said outer conductors of the cables, and in such efficient manner as to avoid all necessity for provision of soldered joints between the same. Since the outer bore sections 15 of the clamp members are of somewhat less diametric dimension than the outside diameter of the cables, the wall surfaces of said outer bore sections will squeeze against and around the outer insulation sleeve 23 of the cables so as to bind the latter to the connector clamp with strong clamping and holding effect.

From the above, it will be obvious that not only does the novel connector clamp provide, mechanically, a strong joining grip upon the coaxial cables, but also establishes, without necessity for soldering operations, a very efficient grounding electrical contact between the outer conductors of the cables and the connector clamp. The only soldering operation involved is the single one which is desirable for joining the inner conductors of the cables.

Prior to assembling the clamp members of the connector clamp with the cables, the meeting faces 13 of the clamp members are preferably coated with a suitable leak proofing substance, such e. g. as rubber cement or the like, so that, when the clamp members are drawn together in meeting relation and about the cables, the joint therebetween will be closed against ingress of moisture by a gasket-like formation 26 (see Fig. 2), and consequently all risk of shorting within the connector clamp is avoided. It will be understood that the gasket formation may be otherwise provided, as e. g. by a suitably formed separable gasket body.

It will be observed that in joining coaxial cables for four way extension, two cables may be utilized and provided with bared inner uncut conductor sections extending between oppositely projecting cable branches. This assures both stronger mechanical and electrical connection between the cable branches, while at the same time

simplifying the handling of the cables during the operations of application of the connector clamp thereto. It will be understood, however, that the novel connector clamp can be satisfactorily used for joining cut cables end to end; which in some cases would be desirable or necessary, as e. g. when joining cables for three way extension, or to provide any odd number of outwardly projecting cable branches.

While an illustrative form of the novel connector clamp adapted for four way cable extension has been above specifically described, it will be understood that the connector clamp may be furnished in various forms suitable to provide any desired reasonable number of cable branch extensions. Examples of other modified forms of the connector clamp are shown in Figs. 6 and 7, wherein a three way connector clamp C is shown in Fig. 6, and a two way connector clamp D is shown in Fig. 7. It will be understood that the modified forms of connector clamp shown in these views are provided with internal construction herein above described.

Having now described my invention, I claim:

1. A connector clamp for joining a plurality of coaxial cables having inner and outer conductors separated by an inner insulation sleeve and inclosed by an outer insulation sleeve, which said connector clamp comprises a pair of matching clamp members adapted to be assembled in opposed meeting relation, each clamp member having a central cavity indenting its inner face and semi-cylindrical bores radiating from said cavity, each said bore including a section of a diametric size approximating the outside diameter of the outer conductor of the coaxial cable, and transverse serrations provided on the peripheral surface of the said bore section for indenting engagement with the outer conductor of the coaxial cable being served when said outer conductor has been stripped of the outer insulation sleeve coextensive with said bore section, the extent of radial projection of the serrations from the peripheral surface of the said bore section being just sufficient to be of diametric crest size somewhat less than the diametric size of the outer conductor of the coaxial cable whereby to indentingly impress to a predetermined depth and grip said stripped outer conductor in a manner to afford an efficient solderless electrical grounded connection with the clamp.

2. A connector clamp for joining a plurality of coaxial cables having inner and outer conductors separated by an inner insulation sleeve and inclosed by an outer insulation sleeve, which said connector clamp comprises a pair of matching clamp members adapted to be assembled in opposed meeting relation, each clamp member having a central cavity indenting its inner face and semi-cylindrical bores radiating from said cavity, each said bore including a section of a diametric size approximating the outside diameter of the outer conductor of the coaxial cable, and transverse sharp edged V-section serrations provided on the peripheral surface of the said bore section for indenting engagement with the outer conductor of the coaxial cable being served when said outer conductor has been stripped of the outer insulation sleeve coextensive with said bore section, the extent of radial projection of the serrations from the peripheral surface of the said bore section being just sufficient to be of diametrical crest size somewhat less than the diametric size of the outer conductor of the coaxial cable whereby to indentingly impress to a predetermined depth and grip said stripped outer conductor in a manner to afford an efficient solderless electrical grounded connection with the clamp.

3. A connector clamp for joining a plurality of coaxial cables having inner and outer conductors separated by an inner insulation sleeve and inclosed by an outer insulation sleeve, which said connector clamp comprises a pair of matching clamp members adapted to be assembled in opposed meeting relation, each clamp member having a central cavity indenting its inner face and semi-cylindrical bores radiating from said cavity, each said bore including axially aligned outer and inner sections, the diameter of the said outer bore section being of a diametric size slightly less than the external diameter of the outer insulation sleeve of the coaxial cable to be served and each said inner bore section being of a diametric size reduced below that of the outer bore section and approximating the outside diameter of the outer conductor of the coaxial cable, and transverse sharp edged V-section serrations provided on the peripheral surface of the inner bore section for indenting engagement with the outer conductor of the coaxial cable being served when said outer conductor has been stripped of the outer insulation sleeve coextensive with said inner bore section, the extent of radial projection of the serrations from the peripheral surface of the said bore section being just sufficient to be of diametrical crest size somewhat less than the diametric size of the outer conductor of the coaxial cable whereby to indentingly impress to a predetermined depth and grip said stripped outer conductor in a manner to afford an efficient solderless electrical grounded connection with the clamp.

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