Sept. 6, 1949. A. ANDERSON 2,480,895

ELECTRIC CABLE CONNECTOR

Filed Aug. 14, 1946

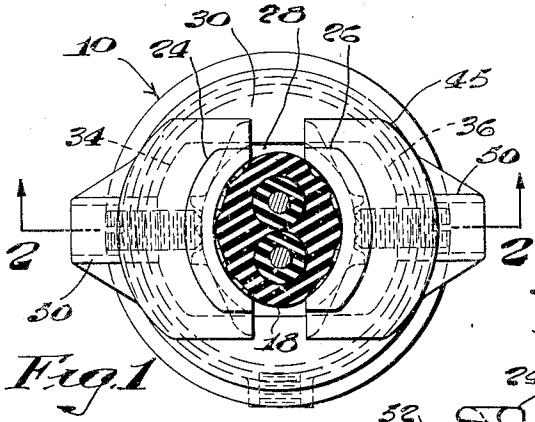


Fig. 1

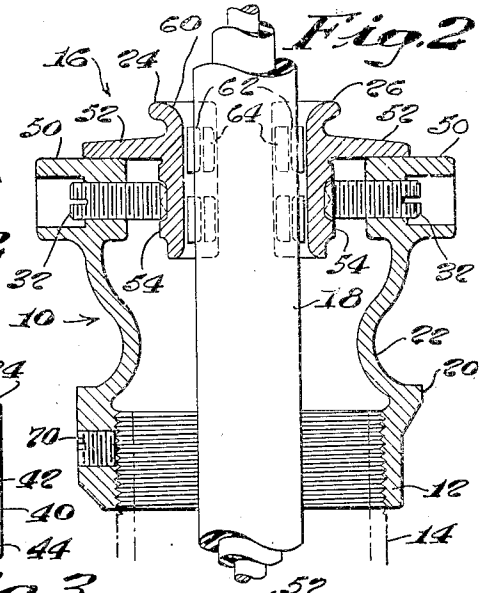


Fig. 2

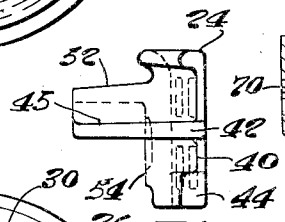


Fig. 3

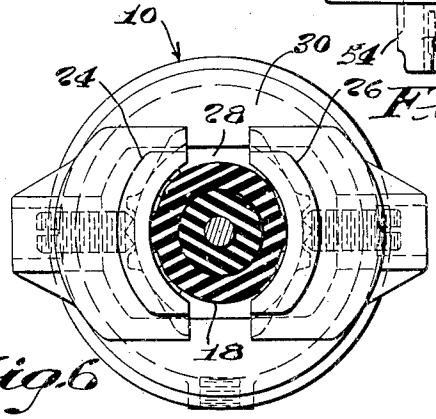


Fig. 6

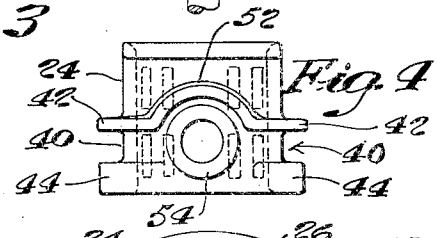


Fig. 4

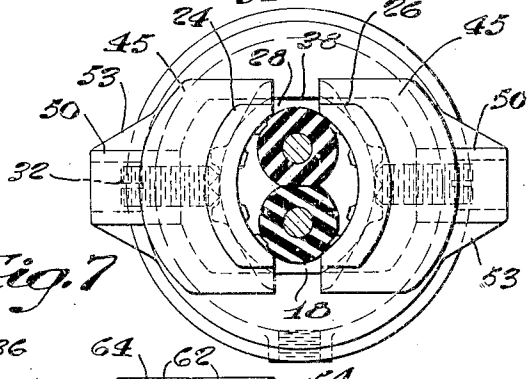


Fig. 7

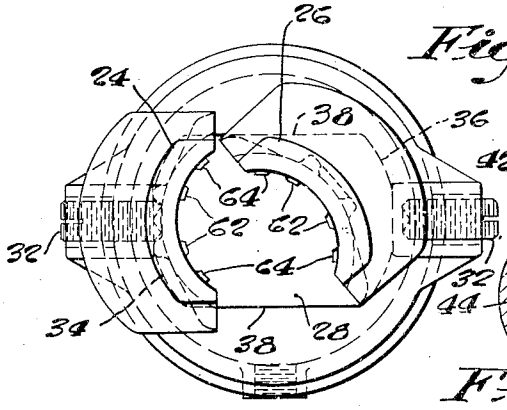


Fig. 8

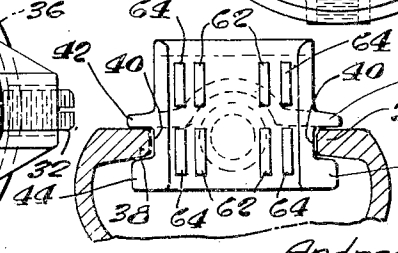


Fig. 5

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ELECTRIC CABLE CONNECTOR

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7 Claims. (Cl. 174—82)

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This invention relates to an electric cable connector and particularly to a connector embodying a cable clamp.

The invention has for one of its objects to provide a novel and improved electric cable connector of the type comprising a plug and receptacle, the plug member of which is provided with a detachable handle and in which provision is made for clamping the cable to the handle in a novel and superior manner.

A further object of the invention is to provide a novel cable connector embodying a handle and a clamp having provision whereby one or more cables may be clamped to the handle in an efficient and secure manner.

With these general objects in view, and such others as may hereinafter appear, the invention consists in the cable connector and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a plan view of the handle portion of a cable connector embodying the present invention; Fig. 2 is a cross-sectional view taken on the line 2—2 of Fig. 1; Fig. 3 is a side elevational detail view of one of the cable clamping members; Fig. 4 is a front elevational detail view of a cable clamp; Fig. 5 is a cross-sectional view of the upper portion of the connector handle showing the cable clamp as it appears at its cable engaging side; Figs. 6 and 7 are plan views similar to Fig. 1 showing the clamps adjusted for a single cable and for two cables respectively; and Fig. 8 is a plan view illustrating the manner in which the clamps may be assembled with the handle.

In general, the present invention contemplates an improved cable clamp particularly adapted for use with the handle portion of a cable connector of the plug and receptacle type. Usually such handle portion comprises an internally threaded member which may be screwed onto one end of the connector after the cable wires have been attached, the handle serving as a protective cover or cap for the end of the connector. It is the usual practice to provide a cable clamp about the insulated cable at the point where it extends through the top of the handle so that a pull upon the cable will not impart a strain to the ends which are connected to the plug. Various expedients have been heretofore proposed for this purpose and it is the aim of the present invention to provide a cable clamp of novel structure adapted to eliminate various disadvantages and objections in the prior cable clamping devices, as will be described.

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One type of prior cable clamp which has been in extensive use for clamping the cable in the handle portion of a cable connector comprises a pair of half sections semi-circular in cross-section which may be placed about the cable and screwed together by bolts extended through lugs provided on both sides of the half sections. In such prior structures the connection to the handle is made by hooking the outwardly flared and curved portions, provided at one end of the half sections, under the edge of the cylindrical opening in the handle. With this type of clamp it is necessary to provide a different size of clamp for each different diameter of cable and the cable opening in the handle must also be of a size such as to receive the ends of the clamp members in hooking relationship. In accordance with one feature of the present invention, the cable clamp is made adjustable to receive different diameters of cables in clamping relationship, within the limits of the connector, thus providing a universal clamp for use with the handle of a cable connector.

Furthermore, in the use of the prior cable clamp above described, the half sections are of necessity detachable from the handle to permit the latter to be rotated to attach or detach the handle from the plug. In the present embodiment of the invention the clamping portions are at all times carried by the handle and may be loosened or adjusted to permit rotation of the handle for purposes of assembly or disassembly. Thus in practice the handle and clamp may be moved to a position along the cable remote from the plug to which the ends of the cable are connected to provide a new connection or when making changes or repairs in an old connection without having to remove the clamping members.

Another novel feature of the present invention comprises the provision of longitudinal beads or ribs in the clamping members for engagement with the cable to provide a firm grip on the cable, the beads being disposed in a position such as to urge the cable into a central position with relation to the handle and the clamping member. The present adjustable clamping unit also permits a plurality of cables to be received in clamping relationship, as will be hereinafter described.

Referring now to the drawings, 10 represents the handle or cap portion of an electrical connector having an internally threaded portion 12 at one end for attachment to the plug 14 of a plug and receptacle connector, and having an adjustable clamping unit, indicated generally at 16, at

its other end for clamping engagement with the cable 18. The handle may be generally cylindrical in form and may and preferably will be provided with a shouldered portion 20 and an inwardly curved or concave portion 22 intermediate its ends to form a convenient hand grip for connecting or disconnecting the plug from the receptacle.

As illustrated in Figs. 1 and 2, the clamping unit 16 includes a pair of opposed clamping members 24, 26 comprising cooperating arcuately shaped half sections mounted for movement toward or away from each other for clamping engagement with different sizes of cables 18. As herein shown, the cooperating clamping members 24, 26 are slidingly received in an opening 28 in the end wall 30 of the handle 10, and the clamping members are arranged to be tightened about the cable 18 by a pair of opposed screws 32 mounted in the handle and arranged to engage the outer surfaces of the half sections as illustrated.

The opening 28 in the end wall of the handle 10, as illustrated in Fig. 1, is generally oblong in form, being arcuately cut at both ends, as indicated at 34, 36, to conform generally to the arcuate shape of the half sections 24, 26, and is provided with opposed parallel edges forming tongues 38 arranged to fit into grooves 40 formed by upper and lower laterally projecting portions 42, 44, respectively, of the clamping members, as best shown in Fig. 5. In order to assemble the clamping members 24, 26 in operative position in the handle opening 28, the clamping screws 32 are first retracted to their full extent so that the ends of the screws are beyond the arcuate edges 34, 36. A clamping member may then be inserted by holding it in a diagonal position with respect to the opening and lowering the member within the opening until the grooves 40 are in the same plane as the tongues 38. The clamping member may then be rotated to a position transversely of the opening to engage the projections 42, 44 with the upper and lower surfaces of the end wall of the handle. The assembled clamping member may then be moved back to its maximum opened or retracted position adjacent one of the arcuately formed edges of the opening 28 and the cooperating half section may be inserted in the same manner, the clearances adjacent the edges of the opening being just sufficient to permit lowering of the clamping member in a diagonal position, as shown in Fig. 8. The screws 32 may then be rotated to project the ends thereof slightly beyond the arcuate edges 34, 36 so that angular displacement of the clamping members cannot occur. As illustrated in Figs. 3 and 4, the upper projections 42 of the half sections comprise the edges of a laterally extended portion 45 arranged to rest upon the upper surface of the end wall and in sliding relation therewith. With this construction it will be seen that the clamping members 24, 26 are held between the edges of the opening 28 for movement toward and from each other and that displacement of the clamping members longitudinally of the handle is prevented.

As illustrated in Figs. 2 and 4, the screws 32 are carried by opposed hub portions 50 formed in the handle 10, the center of the hub being substantially in alignment with the upper surface of the end wall so that about one half of the hub extends above the end wall of the handle. The hub portions are also extended outwardly beyond the diameter of the body portion of the handle to permit a wide range of adjustment and the screw opening is counterbored at its outer end so as to provide a protective sleeve about the outer end of the screw when in a position of normal maximum outward adjustment. As shown in Fig. 4, the laterally extended portion 45 of each clamping member is continued over the top of the adjacent hub portion 50 and is formed with a semi-circular portion 52 concentric with the hub to afford clearance for the same during adjustment. The laterally extended portions 45 thus form a closure or covering for the ends of the opening 28 in all positions of adjustment. The end wall of the handle may also be extended laterally by ribs 53 extending to the outer ends of the hubs 50 to form a shelf upon which the portions 45 of the clamping members may slide in their outwardly extended position of adjustment. The curved portion 52 may and preferably will slidingly engage the hub portion 50 so that the hub forms a guide to centralize the clamping member with respect to the handle and thus prevent lateral displacement of the clamping member.

Referring now to Figs. 2 and 4, the upper edges of the arcuately formed half sections 24, 26 may and preferably will be flared outwardly, as shown at 60, and the lower edges may also be curved as shown to facilitate insertion of the cable 18 between the clamps and through the handle. In order to provide a firm and efficient grip of the clamping members upon the cable, the interior surfaces of the half sections 24, 26 are provided with a plurality of raised portions or beads extending in a direction longitudinally of the cable to be clamped. As herein shown, the beads may and preferably will be radially spaced about the interior surfaces of the arcuate half sections in a manner such as to provide self-centering gripping surfaces to dispose the clamped cable substantially in the center of the handle, and in practice it has been found that at least four beads, comprising an inner pair 62 and an outer pair 64 for each half section, form an efficient gripping medium. In the illustrated embodiment of the invention the beads are preferably spaced or proportioned so that the inner pair of beads 62 are spaced approximately 40° apart in a circle having a radius of the interior of the arcuate section, each bead being disposed approximately 20° each side of a transverse center line passing through the center of the handle or cable and parallel to the line of adjustable movement of the clamping members. The outer pair of beads 64 are preferably spaced approximately 25° outwardly from the inner beads 62, or 45° each side of said center line. The beads may and preferably will be relatively small, those illustrated being approximately $\frac{3}{32}$'' wide and $\frac{3}{64}$'' high. It will be noted that no beads occur in alignment with the center line of adjustment, thus providing gripping surfaces on either side of the center line which tend to urge the cable to be clamped toward the center of the handle and providing a self-centering gripping unit. The beads may be made in any suitable or convenient length, and as herein shown may and preferably will be spaced longitudinally to provide a series of radially spaced beads disposed in the upper portion of the half sections and a second series of beads in alignment with the first series disposed in the lower portion of each half section.

As thus spaced and proportioned the beads are disposed in a position to efficiently grip any size, shape or number of cables, as indicated in the

drawings. As illustrated in Fig. 1, an oval cable is gripped evenly by each bead, the outer surface of the cable being deformed but slightly where engaged by the beads and those portions of the outer surface between the beads bearing against the inner surface of the half sections. In Fig. 6 the manner of gripping or clamping a round cable is illustrated wherein the inner pairs of beads **62** are arranged to engage the cable in gripping relationship, the radially spaced disposition of the beads tending to urge the cable into a central position with relation to the handle. A cable of the size illustrated in Fig. 6, wherein the diameter of the cable is not concentric with the curvature of the arcuate surface of the half section, the outer surface of the cable may be deformed slightly by the inner beads **62** with the outer beads **64** merely bearing against the outer surface of the cable, as shown. In a smaller diameter cable than that shown the outer beads **64** may not engage the cable at all.

Fig. 7 illustrates the adjustment of the clamping members for gripping engagement with two cables, wherein the outer pairs of beads **64** alone perform the gripping action, the spaced disposition of the beads being such as to urge the cables toward the center and against each other upon inward clamping movement of the clamping members.

It will thus be seen that a wide range of sizes of cable may be efficiently clamped by the present cable clamp and that a plurality of cables may likewise be clamped, the disposition of the upraised beads being such as to engage and urge the cable or cables into a central position with relation to the handle and the parallel relation of the gripping surfaces with the cable, providing a firm grip and preventing rotation of the cable in the handle. While the gripping surfaces are herein defined as beads, it will be obvious that the spaces between the beads form depressed portions or grooves in the inner surfaces of the clamping members for engagement with the cable. Thus the invention includes a modification of the illustrated gripping surfaces which may comprise grooves formed in the inner surfaces of the clamps disposed in a similar relationship. Various modifications in the size and shape of the gripping elements are also contemplated so as to provide T-shape or I-shape gripping surfaces which may and preferably will form extensions of the parallel beads or grooves described. Another modification may comprise a bushing having the desired gripping surfaces and arranged to be inserted between the clamping members and the cable.

From the above description it will be seen that, in practice, the cable **18** may be extended through the handle and clamp portion thereof and upon attachment of the end of the cable to the connector, the cap or handle **10** may be screwed onto the end of the plug and locked in position by a set screw **70**. Thereafter, the clamping members **24**, **26** are adjusted into clamping position by turning the clamping screws **32**. Conversely, when it is desired to remove the cap for any purpose, it is merely necessary to loosen the clamping members to permit rotation of the cap, the clamping members being retained in the handle at all times.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1.In a cable connector, a handle forming a closure for one end of the connector, said handle having an end wall provided with an opening through which a cable may be extended, said wall opening being transversely elongated and provided with two parallel opposed edges forming tongues in the end wall, a cable clamp comprising a pair of opposed arcuately shaped half sections provided with grooved portions arranged to cooperate with said tongues to permit transverse adjustment of the latter toward and from each other to clamp the cable, and separate means carried by said handle and engageable with each of said half sections for selectively moving either one or the other of said half sections into a position to clamp the cable between them.

2. A cable clamp comprising a pair of opposed arcuately shaped half sections adapted to engage and grip a cable, means for supporting said half sections for movement toward and from each other, and separate means carried by said supporting means and engageable with each of said half sections for independently urging each of the half sections into clamping engagement, said arcuately shaped half sections being provided with a plurality of circumferentially spaced beads on their cable engaging surfaces extending in a direction longitudinally of the cable to be clamped, said beads being also spaced longitudinally to provide at least two circumferentially spaced rows in substantially longitudinal alignment.

3. A cable clamp comprising a pair of opposed arcuately shaped half sections adapted to engage and grip a cable, means for supporting said half sections for movement toward and from each other, and separate means carried by said supporting means and engageable with each of said half sections for independently urging each of the half sections into clamping engagement, said arcuately shaped half sections being provided with a plurality of circumferentially spaced elongated beads on their cable engaging surfaces extending in a direction longitudinally of the cable to be clamped, each of said half sections having at least two pairs of beads comprising an inner pair equidistantly spaced from the transverse center of adjustment and arranged for clamping engagement with a relatively small diameter cable, and an outer pair also equidistantly spaced from said center and arranged for clamping engagement with a relatively large diameter cable, said beads being effective to urge the cable into a central position upon transverse clamping movement of the half sections.

4. In a cable connector, a handle forming a closure for one end of the connector, said handle having an end wall provided with an opening through which a cable may be extended, said wall opening being transversely elongated and provided with two parallel opposed edges forming tongues in the end wall, a cable clamp comprising a pair of opposed arcuately shaped half sections provided with grooved portions arranged to cooperate with said tongues to permit transverse adjustment of the latter toward and from each other to clamp the cable, and separate means carried by said handle and engageable with each of said half sections for independently urging each of the half sections into clamping engagement, said arcuately shaped half sections being provided with a plurality of circumferentially spaced elongated beads on their cable en-

gaging surfaces extending in a direction longitudinally of the cable to be clamped.

5. In a cable connector, a handle forming a closure for one end of the connector, said handle having an end wall provided with an opening through which a cable may be extended, said wall opening being transversely elongated and provided with two parallel opposed edges forming tongues in the end wall, a cable clamp comprising a pair of opposed arcuately shaped half sections provided with grooved portions arranged to cooperate with said tongues to permit transverse adjustment of the latter toward and from each other to clamp the cable, and separate means carried by said handle and engageable with each of said half sections for independently urging each of the half sections into clamping engagement, said arcuately shaped half sections being provided with gripping surfaces arranged to engage and urge the cable into a central position with relation to the handle upon inward clamping movement.

6. A cable clamp comprising a pair of opposed arcuately shaped half sections adapted to engage a cable, means for supporting said half sections for movement toward and from each other, said supporting means having an end wall provided with an opening through which a cable may be extended, said opening being defined by two parallel opposed edges forming tongues, said half sections being provided with grooved portions arranged to cooperate with said tongues, and separate means carried by said supporting means and engageable with each of said half sections for independently urging each of the half sections into clamping engagement.

7. In a cable connector, a handle forming a closure for one end of the connector, said handle having an end wall provided with an opening through which a cable may be extended, said wall opening being transversely elongated and provided with two parallel opposed edges forming tongues in the end wall, a cable clamp comprising a pair of opposed arcuately shaped half sections provided with grooved portions arranged to cooperate with said tongues to permit transverse adjustment of the latter toward and from each other to clamp the cable, and separate means carried by said handle and engageable with each of said half sections for independently urging each of the half sections into clamping engagement, and guide means formed in said end wall and cooperating with said half sections for maintaining the latter in alignment with said opening.

ANDREAS ANDERSON.

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