

[54] **COMBINATION CABLE ANCHORAGE AND GROUNDING ACCESSORY**

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[51] Int. Cl. **H01r 3/06**

[58] Field of Search **339/95 R, 95 A, 95 B, 95 D, 339/96, 97 R, 97 L, 97 P, 97 S, 97 T, 14 R, 14 L, 246, 250, 263 R, 263 B, 263 E, 263 L, 263 S, 264 R, 264 L, 266 R, 266 F, 266 G, 266 L, 270 R, 270 F, 273 R, 259 R, 259 F, 105, 107, 213; 24/125 R, 135 R, 135 A**

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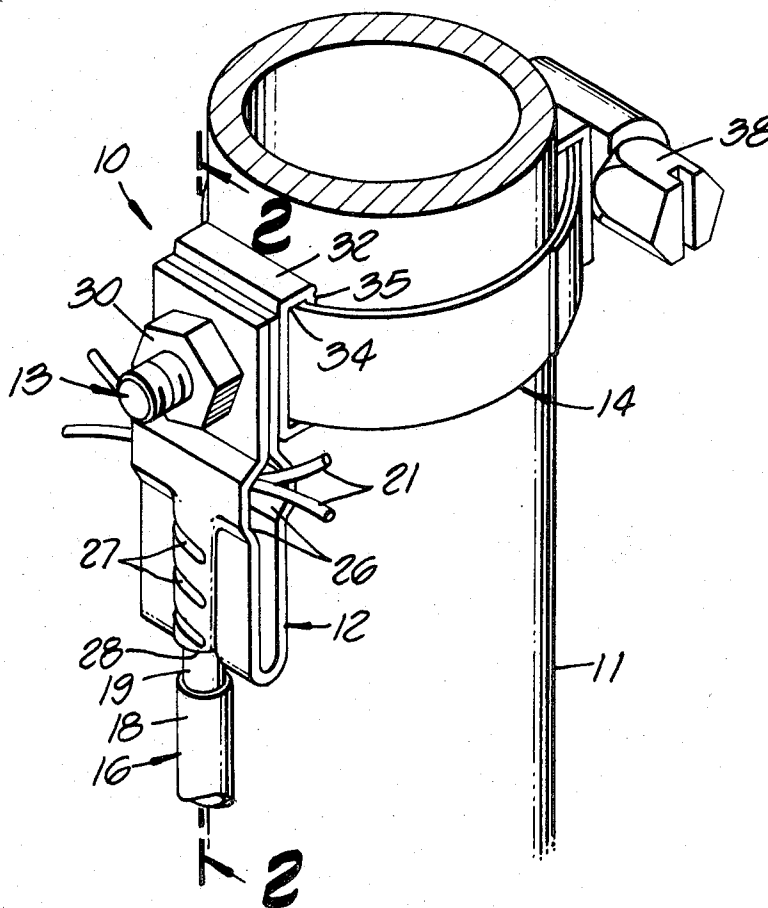
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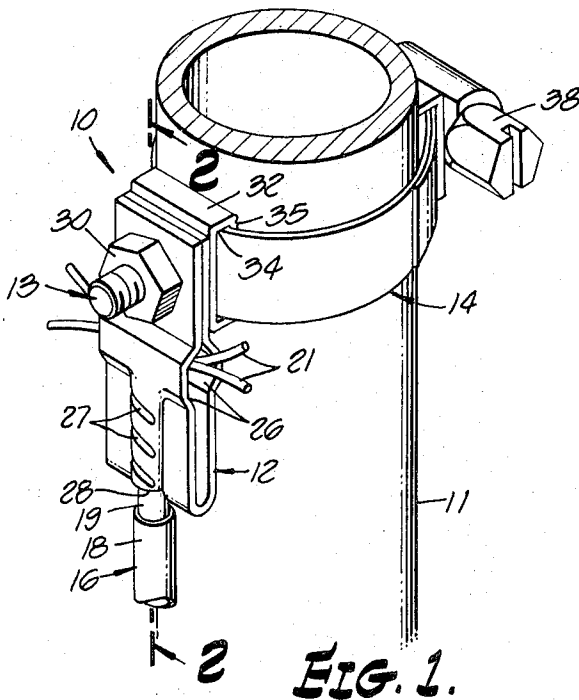
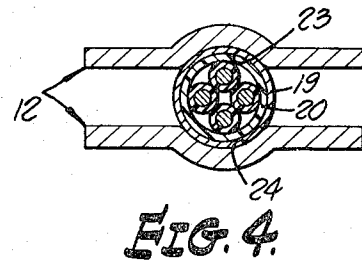
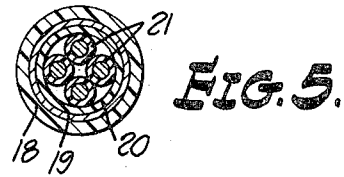
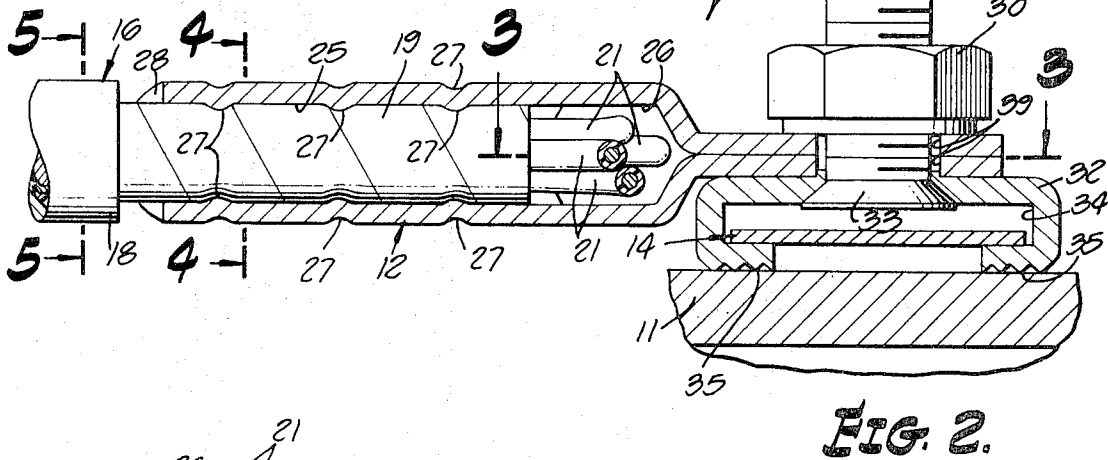
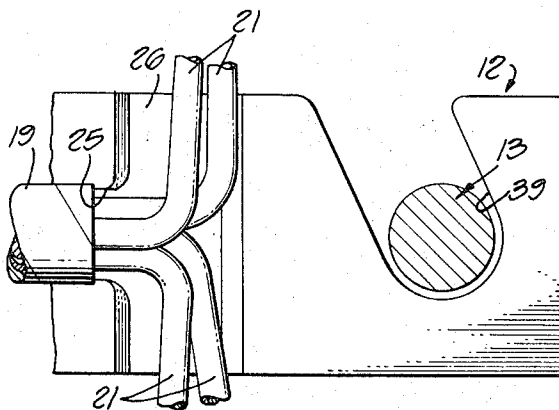
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ABSTRACT

A cable anchorage and grounding accessory usable with cables generally and particularly with those having shield jackets to be grounded. The accessory includes a U-shaped clip provided with a channel having one end opening through its bight portion and sized to make a strong anti-twist mechanical and electrical connection to the exposed cable shield jacket as the free ends of the clip legs are clamped together. The channeled head of the clamping bolt is compressed against a grounded conductor by a clamping band and the clip is preferably formed with slots for assembly to a clamping bolt from one side of the bolt. In certain applications, as when anchoring a shielded cable to a fuse protector, the anchor clip is shrouded with a non-conductive strain relief protective sleeve.

22 Claims, 10 Drawing Figures





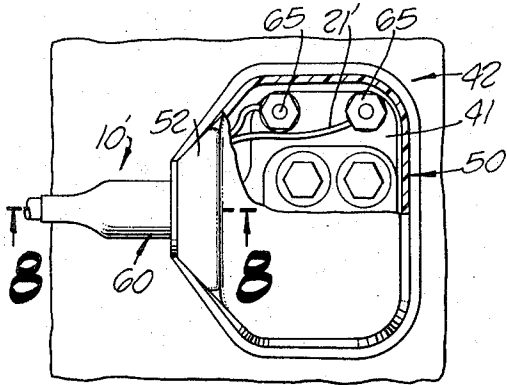


FIG. 6.

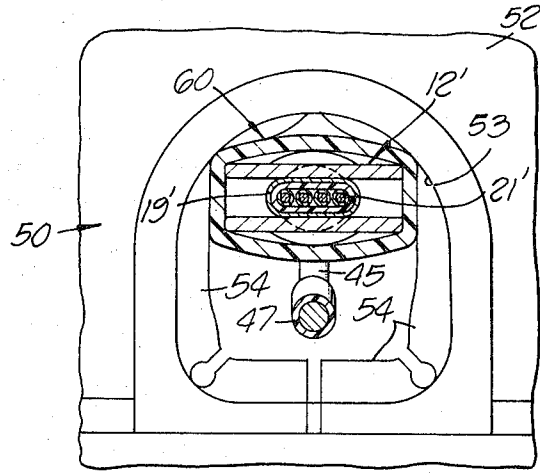


FIG. 10.

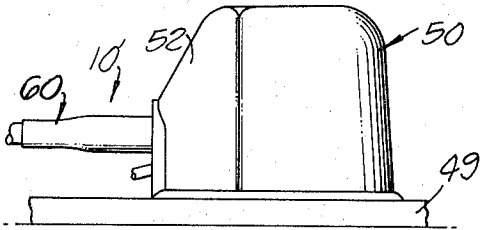


FIG. 7.

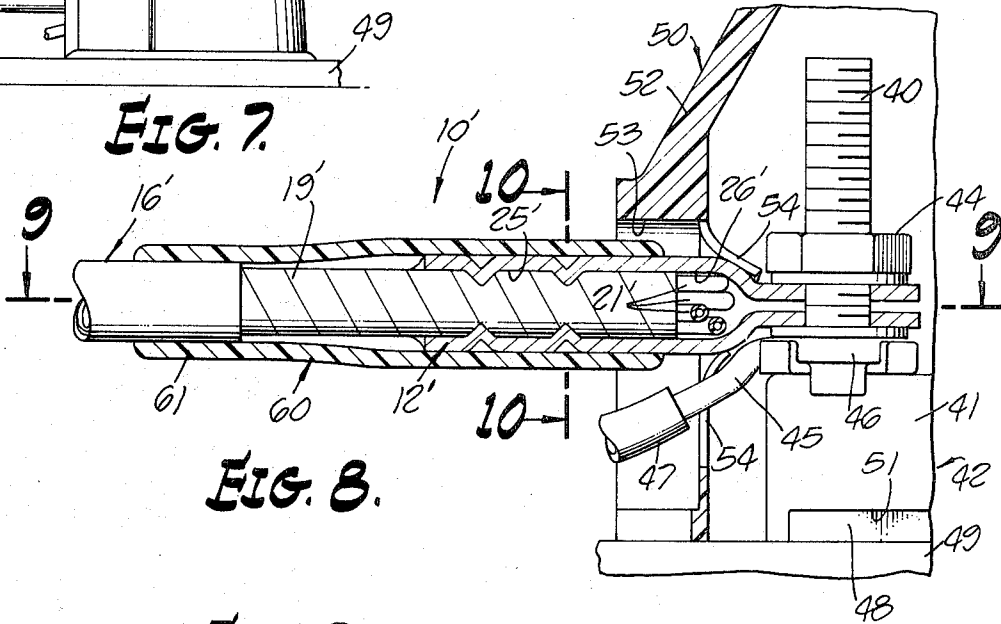


FIG. 8.

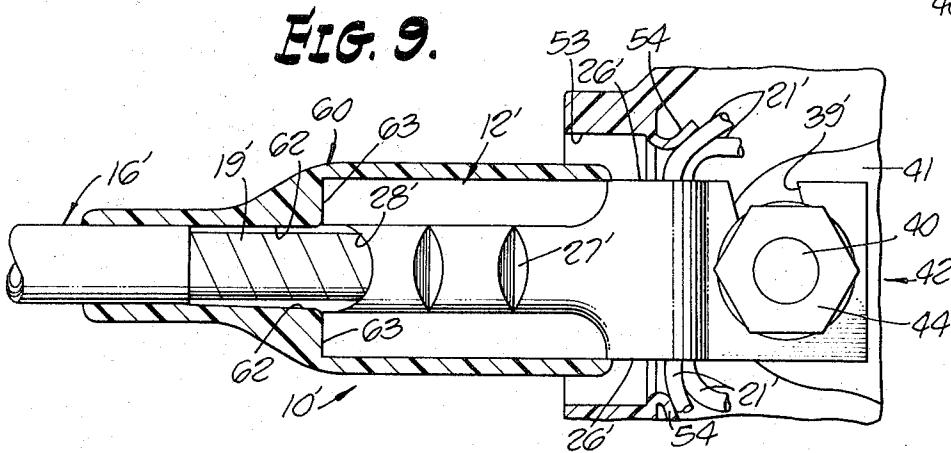


FIG. 9.

COMBINATION CABLE ANCHORAGE AND GROUNDING ACCESSORY

This application is a continuation-in-part of our application for United States Letters Patent Ser. No. 159,799 filed July 6, 1971, now abandoned.

This invention relates to deadman anchorages for cables, and more particularly to a unique combination cable anchorage and grounding accessory particularly suitable for use to anchor the end of a shielded customer service cable to an electrical component, grounded stake or other anchorage and providing a highly reliable grounding connection for the cable shield jacket.

There have been many proposals heretofore for anchoring the ends of electrical cables while leaving the free ends of the conductors available for connection to components and equipment being serviced. However, none of these are specially designed for use in providing a simple, rugged, highly reliable grounding connection to the shield jackets of small cables and are subject to various shortcomings and disadvantages sought to be avoided by the present invention.

The problem is particularly troublesome with respect to shielded cables in which special provision must be made for grounding the shield jacket of smaller cables as well as means for mechanically dead-ending or anchoring the cable itself to some rigid support structure. These objectives are achieved in a highly satisfactory, efficient and effective manner by the present invention utilizing a minimum number of simple, inexpensive and readily manipulated components. These include a U-shaped cable anchorage clip, a specially shaped clamping bolt and a clamping band by which this bolt may be rigidly secured to a grounded pipe, stake or other conductor. Desirably, the assembly also includes a non-conductive strain relief and protective sleeve. The anchorage clip is stamped to provide cooperating T-shaped channels lengthwise of its legs, the T-stem portion being sized to form a strong non-rotary mechanical and electrical anchorage with the exposed cable sheath, and the T-head portion opening through the opposite edges of the clip legs to accommodate branchout of the conductors. The clamping bolt for this clip is preferably provided with a channel crosswise thereof through which the accessory clamping band passes. The protective sleeve of pliant resilient elastomeric material snugly embraces the junction of the cable with the anchor clip and serves multiple functions.

Accordingly it is a primary object of the present invention to provide an improved simple, rugged, readily installed combination cable anchorage and grounding accessory.

Another object of the invention is the provision of means for dead-ending an electrical cable and for simultaneously grounding the shielding jacket thereof to a grounded conductor.

Another object of the invention is the provision of a simple, U-shaped clip adapted to be clamped over the end of a cable sheath and having its legs formed with T-shaped channels the stem portion of which opens through the clip bight and the T-head of which opens through the opposite sides of the clip legs.

Another object of the invention is the provision of a combination cable anchorage and grounding accessory using one adjustable connection to anchor the accessory to a support and a second adjustable fastener to

complete a mechanical and electrical anchorage to a cable shield jacket.

Another object of the invention is the provision of a solderless terminal clip designed for use in making a strong electrical and mechanical connection to the shield jacket of smaller cables without risk of damage to the shield or the conductors enclosed thereby and including provision for preventing rotation of the cable about its axis.

Another object of the invention is the provision of a one-piece solderless terminal clip having slotted openings for fast action assembly about the shank of a clamping bolt from the side of the latter thereby avoiding the need for the removal and reassembly of the clamping nut.

Another object of the invention is the provision of a combined cable anchorage and solderless connection between the cable shield jacket and a grounded conductor.

Another object of the invention is the provision of solderless connector means for dead-ending a shielded cable on a grounded stud of an electrical component and including a non-conductive resilient protective sleeve for the connector means.

Another object is the provision of a simple highly effective solderless connector for anchoring a shielded cable to a fuse protector or the like with the connector grounded and enclosed in major part by a combined strain relief and protective cover.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated:

FIG. 1 is a perspective view showing an illustrative embodiment of the invention anchorage assembly installed to a grounded conduit;

FIG. 2 is an enlarged cross sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is fragmentary cross sectional view taken along line 3—3 on FIG. 2; and

FIGS. 4 and 5 are cross sectional views taken along line 4—4 and 5—5 respectively on FIG. 2;

FIG. 6 is a top plan view with portions broken away showing the invention connector assembled to a conventional fuse protector;

FIG. 7 is a side elevational view of FIG. 6;

FIG. 8 is a fragmentary sectional view on an enlarged scale taken along line 8—8 on FIG. 7;

FIG. 9 is a fragmentary sectional view taken along line 9—9 on FIG. 8; and

FIG. 10 is a cross sectional view taken along line 10—10 on FIG. 8.

Referring more particularly to FIG. 1, there is shown a typical embodiment of the invention accessory designated generally 10 installed on a grounded conduit 11. The accessory comprises as its principal components a U-shaped grounding and solderless dead end clip 12, a clamping bolt 13, and a clamping band 14.

Cable terminal anchorage 10 is shown assembled to a conventional shielded electrical cable 16 of a type widely used by public utilities in providing service connections between a main cable and the premises of one of its customers. Cables of this type customarily include a tough outer sheath 18 (FIG. 5) and an underlying thin electrical shield jacket 19 embracing a second sheath

or tube of insulating material 20 enclosing a plurality of insulated conductors 21.

Dead-end clamp 12 is formed of heavy gauge tempered metal of excellent conductive properties. Before being bent into a U-shape the legs are formed with oppositely facing T-shaped channels 23, 24 disposed as shown in the drawing. The T-stem 25 extends centrally along each leg and opens through the bight portion in an opening 28 sufficiently large to readily accommodate the portion of the cable end to be gripped. T-head portion 26 extends cross-wise of each leg and opens through the opposite edges of these legs in the manner best shown in FIGS. 1 and 3. The free ends of the clip legs are preferably left flat and are disposed to bottom out against one another as clamping bolt 13 is tightened to press the legs together at their ends as the cable sheath is properly gripped for firm anchorage. In other words, the contacting surfaces of these ends lie substantially in the plane of the longitudinal bisector of the clip when closed. Since the cable 16 being anchored includes a shield jacket 19, T-stem portion 25 of the anchoring channel is sized to firmly grip this jacket as the clamping nut 30 is firmly tightened. In other applications of the invention clip 12 would be employed to grip the cable sheath proper in which case the clamping channel 25 of the clip would be of appropriate size for use with a particular size cable.

An important feature is the provision of sharp created indentations 27 formed crosswise of channels 24, 26 and inclined in opposite directions in the respective channels. The sharp edged crests of these indentations deform the shield jacket 19 without rupturing it and, being inclined in opposite directions along channels 24 and 26, these crests are highly effective in preventing rotation of the cable about its axis within the clip channels as well as relative axial movement.

Referring now more particularly to FIG. 2, it will be noted that clamping bolt 13 has its threaded shank staked or otherwise permanently assembled to the bolt head 32. As there shown, the bolt shank has a small frusto-conical head 33 permanently staked to an opening in the C-shaped head member 32. The latter is provided with a transverse passageway 34 sized to receive the clamping band 14. The exterior surface of bolt head 32 remote from its threaded shank is preferably provided with a multiplicity of sharp-edged ribs 35 which are tempered and highly effective in biting into and making excellent electrical contact with grounding conductor 11. The clamping band is of any suitable adjustable type having adjustable bolt means 38 for clamping it to conduit 11.

Prior to installation, it will be understood that the legs of the U-shaped clip 12 flare apart V-fashion in which condition the exposed portion of the cable shield 19 and the ends of conductors 21 are readily insertable through the inlet 28 at the entrance end of the T-shaped channels 25. The ends of the conductors are then bent outwardly in the manner shown in FIG. 3 following which the free ends of the clip legs are shifted laterally of the shank of bolt 13 allowing the bolt shank to enter slots 39 and seat at their inner ends. Thereafter nut 30 is tightened until the leg ends are clamped snugly together. In this connection it will be understood that the outer free end portions of the clip legs are offset inwardly from and parallel to the plane of the legs disposed to either side of the T-stem portions of channels 25. This detail is best shown in FIGS. 2 and 4, it

being noted from these showings that the flat portions of the legs along the T-stem of channels 25 are spaced substantially from one another whereas the free end portions are clamped firmly together in the assembled condition of the grounding accessory. This gap along either side of the clamped cable end provides for limited lateral expansion of the cable if necessary to avoid damage to the conductors and shield.

Tightening or clamping nut 30 may be carried out either before or after assembly of clamping band 14 to conduit 11. Since the clip is specially sized for use with a particular size of cable, the installer is assured that he can tighten nut 30 until the legs of the clip bottom out against one another. At this time he is assured that T-stem channels 25 and the criss-crossing indentations 27 have made a firm mechanical and electrical anchorage to the cable shield 19 without risking injury to the shield or to conductors 21. The assembly is completed by assembling the split clamping band 14 through passageway 34 of the bolt head, placing it about conduit 11 and tightening its clamping bolt 38. As this occurs the sharp-edged ribs 35 are forced to bite into the grounded conductor to anchor the assembly rigidly and immovably thereto without however interfering with the clamped condition of clip 12.

Usually the installation is made with clip 12 extending lengthwise of conduit 11 thereby providing additional protection for both the clip and the adjacent portion of cable 16 and leaving conductors 21 conveniently accessible for connection to the equipment being serviced.

Referring now to FIGS. 6-10, there is shown another illustrative application of the invention, the same or similar parts being designated by the same reference characters as in the FIGS. 1-5 but distinguished therefrom by the application of a prime. In FIGS. 6-10 the solderless connector 12' will be understood as having the same construction described above but being shown in use to dead end a multiple conductor shielded cable 16' to the grounded stud and anchor post 40 projecting upwardly from the non-conductive base 41 of a conventional fuse protector 42. For this purpose an anchor stud 40 having one end embedded in base 41 is equipped with a clamping nut 44 assembled outboard of the outermost leg of the U-shaped connector 12'. Underlying the inner leg of clip 12' is a heavy gauge grounded wire 45 formed with an eyelet 46 and preferably having the remainder of its length encased in insulation material 47.

It will be understood that the fuse protector 42 is merely illustrative of any one of numerous electrical components, terminal strips and the like, to which the conductor 21' of cable 16' might be connected. Base 41 of this protector has a number of feet 48 (FIG. 8) projecting downwardly from its lower surface 51 thereby leaving the remainder of its periphery spaced vertically from a supporting plaque 49 for the protector. In consequence, it will be understood that inwardly projecting tangs, not shown, molded integral with the pliant elastomeric cover 50 for the protector extend inwardly from the lower rim edge of cover 50 into engagement with surface 51 of base 41. The resiliency of the cover material permits the expansion of its lower edge as necessary for the attachment and detachment of cover 50.

One sidewall of the cover is provided with a bulge 52 having an opening 53 directly opposite the threaded

stud 40 to which the grounding connector 12' for cable 16' can be anchored. Flexible flaps 54 project radially inwardly across the inner end of opening 53 and are readily distended as necessary to permit entry of the connector in the manner made clear by FIGS. 8 and 9.

An important feature of the anchorage and grounding connector shown in FIGS. 6-10 is the provision of a combination strain relief and protective sleeve 60. This sleeve is molded or otherwise formed of suitable flexible resilient elastomeric material contoured as generally shown in the drawing and having a smaller end 61 sized to have a snug fit with the sheath jacket of cable 16'. The larger end is sized and contoured to have a snug fit with the connector clip 12' after the latter has been clamped to the anchor stud 40.

Referring to FIG. 9, it will be noted that sleeve 60 preferably is provided with a pair of lugs 62, 62 projecting toward one another with their surfaces 63, 63 positioned to seat against the bight portion of clip 12' in the fully assembled position of the sleeve along the clip legs. Surfaces 63 then cooperate with the end of the clip in restraining flexing of the cable and possible rupture or damage to cable shield 19'. The tapering thickness of the lugs is also a factor of importance.

Sleeve 60 is telescoped over the end of the cable prior to the insertion of the conductors through the opening in the bight portion of the clip and between the clip legs. Accordingly, during the assembly operation the sleeve is slid rearwardly along the cable sufficiently to provide free access to the remainder of the assembly until the legs have been fully assembled to the anchor stud 40. This having been accomplished, cover 50 for the fuse protector is installed over the protector base 41. Thereafter the strain relief protector sleeve 60 is slid forwardly along the cable and its larger end is telescoped along clip 12' until lugs 62, 62 are pressed snugly against the bight portion of clip 12'. At that time its forward end will be located within opening 53 of cover 50. The relatively thick walled tapering rear end of protector 60 will therefore be understood as most effective in providing highly effective strain relief for the cable and avoiding risk of rupture and injury to shield jacket 19'.

It will be understood that cable conductors 21' exit through the T-head shaped portions 26' of the cable seating and clamping channels formed in the legs of clip 12'. The terminal ends of these wires are connected in known manner to the binding posts 65 (FIG. 6) of the fuse protector or to any other facility to which the cable may be anchored by the invention grounding anchor assembly.

While the particular combination cable anchorage and grounding accessory herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the detail of construction or design herein shown other than as defined in the appended claims.

We claim:

1. A combination anchorage and grounding accessory for shielded subscriber service and the like cables comprising a U-shaped spring clip having the major length of the legs thereof arched crosswise thereof and in opposite directions to form an elongated channel

shaped to snugly embrace an exposed length of a cable shielding jacket extending therealong through an opening in the bight portion of said clip, said channel opening outwardly through the lateral edges of said legs in an area remote from said bight portion thereby forming an exit passage for the free ends of the cable conductors, and means for clamping the free ends of the clip legs toward one another to form a strong electrical and mechanical connection between said clip and the shield jacket of a cable positioned there-between.

2. An accessory as defined in claim 1 characterized in that said clamping means includes means for clamping said clip to a grounded conductive member.

3. An accessory as defined in claim 1 characterized in that said elongated channel is generally T-shaped with its long T-stem portion opening at one end through the bight portion of said clip and the ends of its T-head portion opening outwardly from the opposite sides of the clip legs.

4. An accessory as defined in claim 3 characterized in that the T-head portion of said channel is substantially larger in cross section than the cable conductors to avoid risk of damage thereto in the assembled clamped condition of the clip legs.

5. An accessory as defined in claim 2 characterized in that said means for clamping said clip to a grounded conductive member includes a bolt passing through the outer ends of the clip legs and having a passageway through the head thereof accommodating a clamping band securable about said grounded member and effective as said band is tightened to clamp said bolt head in pressurized electrical contact with the surface of said grounded member.

6. An accessory as defined in claim 5 characterized in that said clip is clamped to said grounded member with the clip legs lying lengthwise of and closely beside said grounded member.

7. An accessory as defined in claim 5 characterized in that said bolt and said band are firmly clampable to said grounded member before assembly of said clip over the outer end of said bolt, and said bolt having nut means for holding said clip legs tightened snugly against a cable shield jacket located therebetween.

8. An accessory as defined in claim 1 characterized in that said channel is sized to provide a strong mechanical and electrical anchorage to the exposed shield jacket of a particular size shielded cable as the free ends of said clip legs are compressed into firm contact with one another by the tightening of a clamping bolt passing therethrough.

9. A cable terminal anchorage comprising a U-shaped clip formed from a long strip of metal, said strip having an opening centrally of the bight portion thereof, each leg of said clip having a T-shaped channel formed therein with the end of its T-stem terminating at said opening and the ends of its T-head opening laterally through the opposite edges of the clip legs, and means at the free ends of said legs for clamping said legs toward one another.

10. A cable anchorage as defined in claim 9 characterized in that the T-head portion of said channel is located inwardly from the free ends of said legs, and aligned openings through the free ends of said legs to accommodate clamping bolt means for said legs.

11. A cable anchorage as defined in claim 10 characterized in that the T-stem portion of said channel is sized to firmly grip a cable extending through said

opening and along said T-stem as the free ends of said legs are clamped together, and said T-head portion of the channel accommodating the terminal ends of the cable conductors.

12. A cable anchorage as defined in claim 10 characterized in that the head of said clamping bolt means is formed with sharp edged ribs facing away from the bolt shank.

13. A cable anchorage as defined in claim 12 characterized in that said bolt head has a wide shallow passageway therethrough to accommodate a clamping band.

14. A combination anchorage and grounding accessory for use with smaller sizes of shielded cables enclosing a plurality of insulated conductors and designed to provide a highly effective mechanical and solderless electrical connection to the cable shield without risk of damage to the conductors or the shield, said accessory comprising a tempered U-shaped clip having a bight and parallel leg portions and formed of strip material, said parallel leg portions having their free end portions offset toward one another to bottom out flush against one another to avoid risk of damage to the insulated conductors of a shielded cable and lying in a plane parallel to the planar lateral edge portions of the clip legs, the bight portion of said clip having a central portion opening freely accommodating the exposed shield of a cable sized to be clamped between said legs, each said leg portion being shaped to include a long round-bottomed shallow substantially smooth channel, said channels faced toward one another lengthwise of said legs and having one end of each in communication with said opening, the bottoms of said channel snugly embracing a cable shield inserted thereinto through said opening, and means for clamping the free ends of said legs firmly against one another.

15. An accessory as defined in claim 14 characterized in that the ends of said channels remote from the bight portion of said clip open laterally through at least one edge of said clip legs to provide a passage accommodating branchout conductors from a cable clamped between the legs of said clip.

16. An accessory as defined in claim 15 characterized in that said remote channel ends open laterally from both sides of said clip in an area adjacent said

clamping means.

17. An accessory as defined in claim 14 characterized in that the free ends of said clip have aligned slots extending through a lateral edge portion thereof and adapted to seat a clamping bolt at the inner ends of said slots.

18. An accessory as defined in claim 17 characterized in that the outer end portion of said slots are inclined to the longitudinal axis of said clip legs and toward the bight portion of said clip.

19. An accessory as defined in claim 14 characterized in that the bottoms of said channels are deformed in opposite directions crosswise thereof to provide indentations projecting toward one another and cooperating with the soft material of a cable shield jacket to resist axial and rotary movement of a shielded cable clamped between the clip legs.

20. An accessory as defined in claim 14 characterized in the provision of a resilient non-conductive strain-relief sleeve having one end sized to snugly embrace the sheath of a shielded cable to be anchored by said accessory and its other end sized to have a snug telescopic fit over the bight end of said U-shaped clip and along a major portion of its legs, said sleeve cooperating with the bight end of said clip in restraining flexing of a shielded cable clamped between said clip legs thereby minimizing the risk of damage to the cable shield and the conductors embraced thereby.

21. An accessory as defined in claim 20 characterized in that the portion of said sleeve immediately rearward of the bight portion of said clip is provided with inwardly projecting lugs shaped to seat against said bight portion and against the adjacent sides of a cable thereby to reinforce and resist flexing of the cable at its point of entry between the clip legs.

22. An accessory as defined in claim 20 characterized in that the wall of said sleeve is provided with a pair of lugs projecting toward one another from the interior thereof in an area between the opposite ends of said sleeve, said lugs having a pair of radially aligned surfaces positioned to abut the bight portion of said clip when said sleeve is fully assembled thereon and being effective to resist flexing of a cable at its point of entry between the clip legs.

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