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Pierzchala

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[54] **CLAMPING ARRANGEMENT AND METHOD**

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[52] **U.S. Cl.** ..... **339/14 R;** 29/628; 174/78; 339/177 R; 339/251

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

[58] **Field of Search** ..... 339/13, 14 R, 14 L, 177 R, 339/251; 174/78, 115; 29/628

[56] **References Cited**

UNITED STATES PATENTS

846,400	3/1907	Cox	339/251
1,368,083	2/1921	Windman	339/251
3,192,308	6/1965	Horssen et al.	339/177 R X
3,353,145	11/1967	Soddercand et al.	339/251 X
3,685,006	8/1972	Jones	339/177 R
3,707,595	12/1972	Plate	174/115
3,728,472	4/1973	Leuteritz	339/251 X
3,798,585	3/1974	Thompson et al.	339/14 L

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[57] **ABSTRACT**

A ground clamp arrangement for electrical cables of the type having neutral or ground potential wires concentrically surrounding the insulating jacket of the cable comprises a strip deformable into a collar for disposition radially between the jacket and the ground wires. A clamping ring encircles the ground wires and is tightened against the wires which are thereby pressed against the collar. The collar has interlocking overlapped ends that prevent diametral reduction of the collar so that reduction of the diameter of the cable jacket is prevented. The clamping ring has a terminal for attaching a wire to ground a telephone cable or the like. In the method the deformable member is inserted under several of the neutral wires, then bent around the cable, then pushed under all of the neutral wires to form the collar, after which the clamping ring is applied.

6 Claims, 7 Drawing Figures

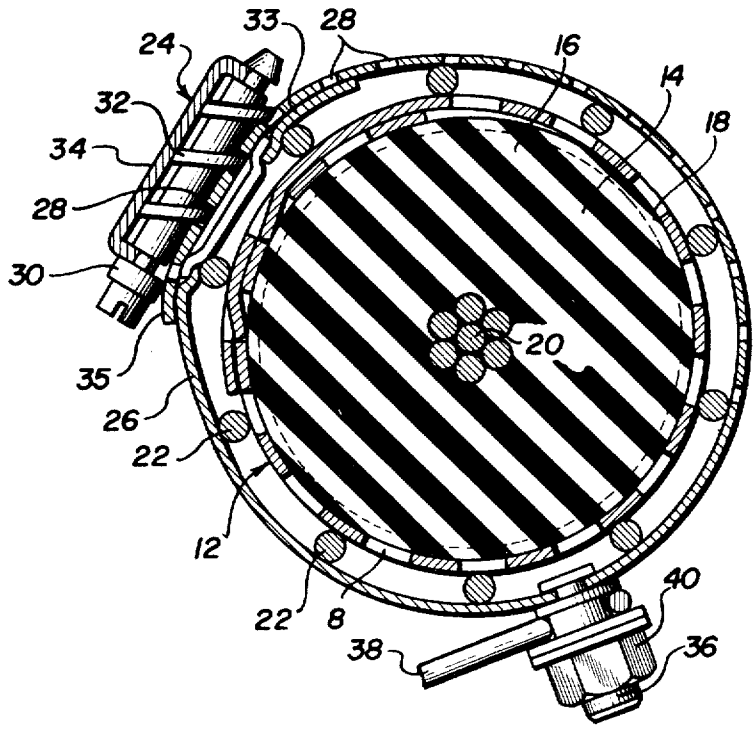


FIG.1

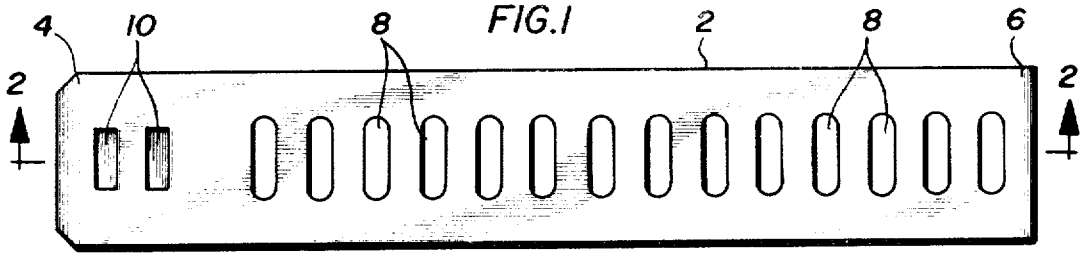


FIG.2

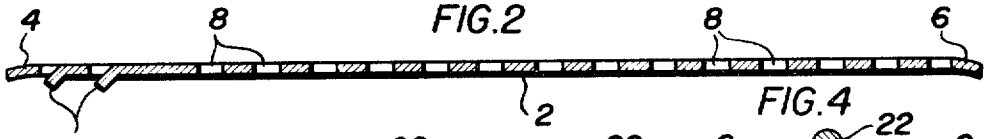


FIG.3

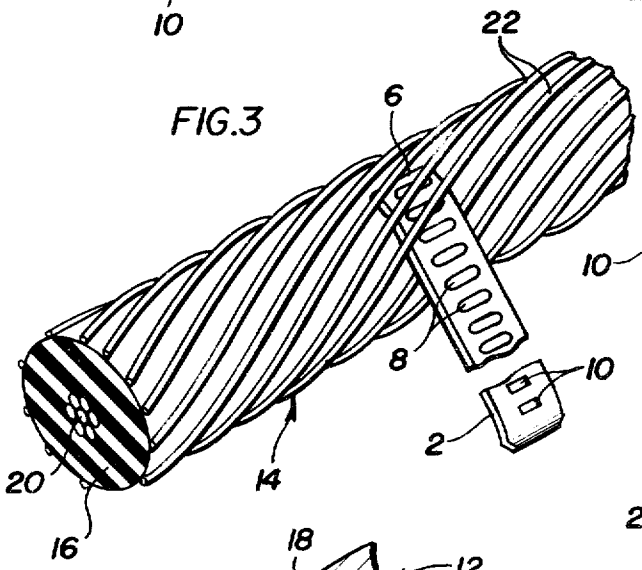


FIG.4

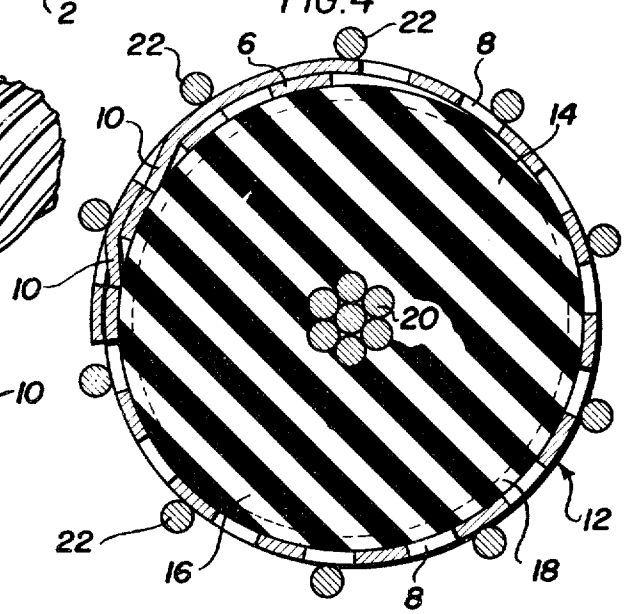


FIG.5

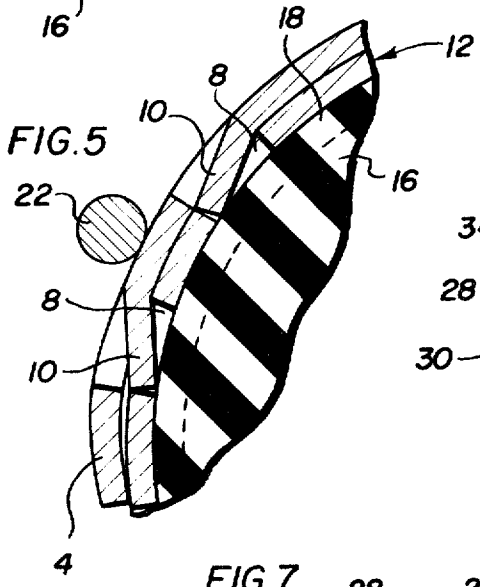


FIG.6

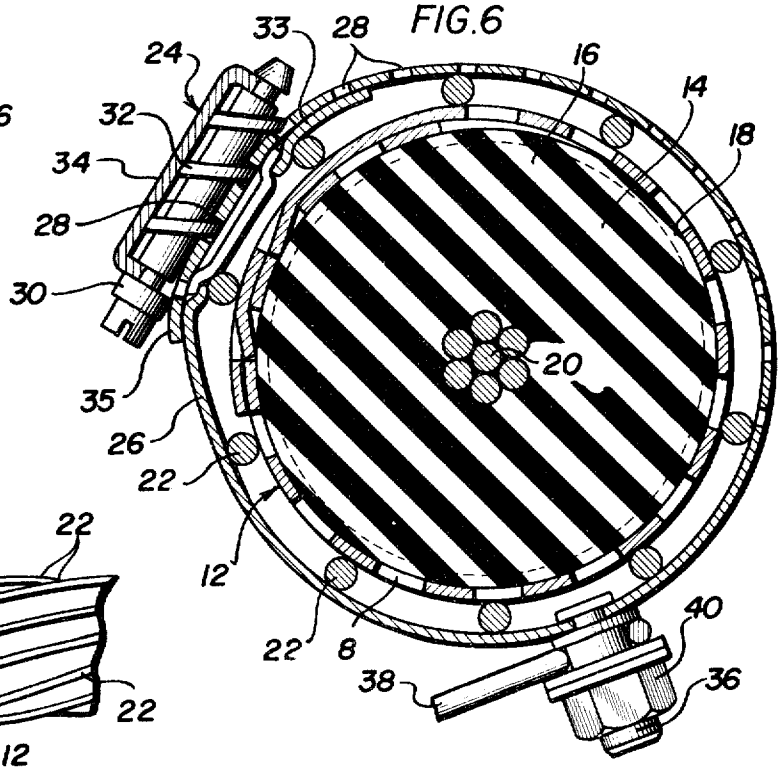
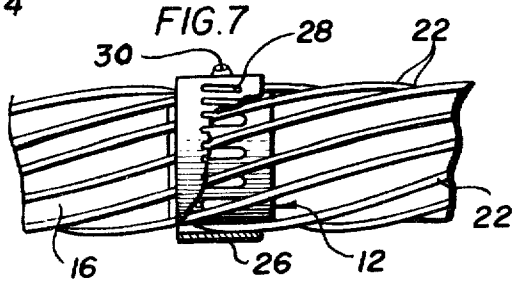


FIG.7



CLAMPING ARRANGEMENT AND METHOD

BACKGROUND OF THE INVENTION

This invention relates to improvements in ground clamping arrangements for use on electric power cables of the type having a conductive core, a surround-jacket of insulating material, and a series of grounding wires helically disposed over the insulating jacket in substantially concentric relationship therewith. Electric power cables of this type may be constructed with a stranded or solid core and an insulating jacket of plastic material that includes a semi-conductive outer layer or skin. This outer semi-conductive layer need not be visibly discrete when the cable is examined in cross section.

Since the helical neutral or ground wires of cables of the foregoing type are readily accessible, it is a common practice to ground telephone cables and the like thereto. This may be done when the telephone cables are laid in trenches at random with the power cables. To effect such a ground connection, it has been proposed to use a clamping ring, such as a hose-type clamp, that encircles the cable and is tightened down to grip tightly the concentric ground wires.

A problem with using a clamping ring of the foregoing type lies in the fact that the constricting pressure of the ring tends to urge the concentric neutral wires into the insulating jacket, thereby reducing the distance between the conductive core of the cable and one or more of the grounding wires. In some instances the insulating jacket may be severely depressed in localized areas or even possibly partially ruptured. In any event, the effective insulated radial distance between the conductive core and one or more of the ground wires may be reduced to the point where arcing or corona problems may arise.

OBJECTS AND SUMMARY OF THE INVENTION

An object of this invention is to provide a ground clamping arrangement for high voltage cables of the type in which the grounding or neutral wires are disposed concentrically over the insulating jacket, and wherein the diametral reduction of the insulating jacket is prevented so as to insure adequate dielectric strength between the conductive core of the cable and the concentric ground wires.

A further object of this invention is to provide a ground clamping arrangement of the type and for the purpose stated which can be easily installed onto the cable without the use of special tools.

A still further object of this invention is to provide a method of making a ground connection to cables of the foregoing type utilizing a conventional hose type clamp together with a strip that can be formed readily into an underlying collar disposed between the insulating jacket and the ground wires.

Another object of this invention is to provide an arrangement of the type stated that may be used for grounding telephone cables or for restoring the continuity of the semi-conductive outer skin of the cable where a splice in the cable has been made.

In accordance with the foregoing objects the invention contemplates a member deformable into a collar that is radially interposed between the insulating jacket of the cable and the concentric neutral or grounding wires. A clamp having a ring envelopes the wires in the region of the collar and includes means for constricting

the ring to apply pressure against the wires and cause the wires to impinge snugly upon the collar. The collar includes means preventing diametral constriction of the collar under radially inward pressure from the clamping ring whereby the collar prevents diametral reduction of the insulating jacket but yet permits the clamping ring to apply firm pressure to the ground wires.

The method of the invention comprises inserting a strip radially between the ground wires and the insulating jacket of the cable, and shaping the strip to provide the collar that surrounds the jacket and with the strip having end portions overlapping a part of the circumference of the collar thus formed. The overlapped portions are interlocked such that the collar remains substantially at a fixed diameter corresponding substantially to the outer diameter of the jacket. Thereafter, the clamping ring is applied over the neutral or grounding wires in the region of the collar to impose constricting pressure on the wires to urge them against the collar while the collar substantially prevents reduction of the diameter of the insulating jacket.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a top plan view of a liner or strip that is adapted to be installed on the cable to form a collar thereon;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a fragmentary perspective view showing a step in the manner of installing the strip onto the cable preparatory to forming the collar;

FIG. 4 is a transverse sectional view of the cable with the collar installed thereon;

FIG. 5 is an enlarged fragmentary portion of FIG. 4;

FIG. 6 is a transverse sectional view of the cable and showing the cable clamp and collar installed on the cable; and

FIG. 7 is a fragmentary side elevational view of the arrangement of FIG. 6 but on a smaller scale and partially broken away and in section.

DETAILED DESCRIPTION

Referring now in more detail to the drawing, FIGS. 1 and 2 show an elongated sheet metal strip 2 of generally rectangular shape and being generally flat although its extremities 4, 6 may be slightly curved. The strip 2 is formed with a number of oblong openings or notches 8 which run generally transversely of the strip 2 and which are equally spaced along a substantial length of the strip as is clear from FIG. 1. At the end portion of the strip 2 that is adjacent to the extremity 4, the strip has generally rectangualr protrusions 10, 10 which are outwardly struck from the body of the strip to lie at an angle thereto, as best seen in FIG. 2. The protrusions 10, 10 extend generally in the direction of the radius of curvature of the extremity 4 and are spaced apart approximately a distance equal to the spacing between the notches 8. In the form of the invention herein shown, two protrusions 10, 10 are shown by way of illustration and not of limitation. The strip 2 may be formed of a flexible stainless steel.

The strip 2 is adapted to be bent into a collar, designated at 12 in FIGS. 4–7, and disposed between the ground or neutral wires of the cable and the insulating jacket thereof. More particularly, the cable 14 comprises an insulating jacket 16 of rubber, plastic or other

suitable material of high dielectric strength. Conventionally, the outer skin **18** of the jacket **16** is semi-conductive. The conductive core **20**, generally coaxially with the insulating jacket **16**, may be made up of one or more of wires. The neutral or ground potential wires **22** are circumferentially spaced apart and are helically disposed over the outer surface of the jacket **16** in substantially concentric relationship therewith. These ground wires **22** extend throughout the full length of the cable **14**, cooperating with the semi-conductive skin **18**, to form a ground potential along the full length of the cable.

To install the strip **2** on the cable, the end portion of the strip having the extremity **6** is fed under several (e.g. two) of the wires **22**, as shown in FIG. **3**, after which the strip **2** is deformed into an arcuate shape by bending around the cable over the wires **22**. The wires **22** are capable of limited movement to permit insertion of the strip thereunder. Thereafter, the strip is pushed under all of the other wires **22** by movement in the direction of the extremity **6** (FIG. **3**) until the opposite portions of the strip overlap and the protrusions **10,10** overlie and engage two adjacent notch openings **8,8**, as best shown in FIGS. **4–7**. The collar **12** is now completely formed under all of the wires **22** and with overlapped end portions.

The notches **8,8** that should be engaged by the protuberances **10,10** are those that result in the now formed collar **12** fitting over the jacket **16** but without constricting the jacket **16**. In general, the two selected notches **8,8** that are engaged by the protrusions **10,10** should be those that provide that minimum internal collar diameter which is greater than the outer diameter of the jacket **16**. The presence of a number of notches **8,8** along the length of the strip enables the collar to be formed completely under the concentric wires **22** on cables of varying diameters.

A conventional clamp **24** may be applied to the cable in the region of the collar **12** in a manner shown in FIGS. **6** and **7**. Suffice it to say that the clamp **24** comprises a clamping ring **26** that envelopes the ground wires **22** and has a number of slots **28** along the length thereof. The ring **26** may be approximately as wide as the collar **12**. A screw **30** having a helical thread **32** is rotatable in a housing **34** that is mounted on one end **33** of the ring **26**. The housing **34** is open at its opposite ends and receives the other or free end **35** of the ring **26**. The screw thread **32** engages the slots **28** so that rotation of the screw **30** in one direction will decrease the diameter of the ring **26**. Clamps of this type are known and need not be described in further detail.

As the clamp **24** is tightened, the ring **26** becomes constricted about the wires **22** causing the wires **22** to apply radially inward pressure against the collar **12**. However, the interlocking engagement of the protrusions **10, 10** with those notches **8, 8** in which those protrusions are located prevents constriction of the collar **12** under the clamping pressure from the ring **26**. As a result, diametral reduction of the jacket **16** is prevented and the dielectric integrity of the jacket is maintained.

The clamping ring **26** may have a stud **36** or other suitable terminal mounted thereon for receiving a ground wire **38** and by which a ground connection may be established from another cable (e.g. a telephone cable) or conductor to the ground wires **22**. The ground wire **38** may be conventionally held in place by a nut and washer assembly **40**.

Where a cable **14** of the foregoing type is spliced the arrangement of this invention provides for restoration or continuity of the semi-conductive skin **18** across the splice. Thus, for example, a semi-conductive tape may be used to bridge the splice and two clamping arrangements of the type herein can be provided at either end of the splice. The ground wires **22** at the splice may be respectively joined together in a known manner. However, the collars **12** lie against the semi-conductive tape at the splice and serve to keep the tape against the cable. This aids in preserving continuity between the tape and the skin **18** of the cable jacket.

The invention is claimed as follows:

1. A ground clamping arrangement for forming a conductive connection with an electrical cable having a conductive core, a surrounding jacket of insulating material, and a series of grounding wires helically disposed over said insulating jacket in substantially concentric relation therewith and with the wires being circumferentially spaced apart, said arrangement being remote from a cable splice or termination and comprising a member deformable into a collar radially interposed between the jacket and the grounding wires, and a clamp having an electrically conductive ring for enveloping said wires in the region of said collar and including means for constricting said ring to apply radially inward pressure against said wires and cause said wires to impinge snugly upon said collar, and means preventing constriction of said collar under pressure from said ring, thereby to prevent diametral reduction of said jacket, said grounding wires being continuous and maintaining their helical lay across the width of said collar and for substantial distances on opposite sides of said arrangement.

2. A ground clamp arrangement according to claim **1** in which the means preventing construction of said collar comprises overlapping parts of the deformable member with one of the parts having a protrusion that fits into an opening in the other part.

3. A ground clamp arrangement according to claim **1** in which said deformable member comprises an elongated strip having notches spaced along the length thereof, and at least one protrusion at one end portion of the strip for engagement with a notch upon said deforming into said collar with said end portion overlapping at least one notch.

4. A ground clamp arrangement according to claim **1** in which said clamp has means for securing an electrical conductor thereto so that the conductor may be grounded by said grounding wires.

5. A method of providing a ground connection to the ground wires of an electrical cable in which the ground wires surround an insulating jacket of the cable in substantially concentric relationship therewith and wherein the jacket encloses a conductive core, said method comprising inserting a strip radially between the ground wires and the jacket and shaping the strip to provide a collar that surrounds the jacket and with the strip having portions overlapping over a part of the circumference of the collar thus formed, interlocking said overlapped portions such that the collar remains substantially at a fixed diameter which is at least as great as the outer diameter of the jacket, and applying a clamping ring over said wires in the region of said collar to impose constricting pressure on said wires to urge them against said collar while said collar substantially prevents reduction of diameter of said jacket.

6. A method according to claim **5** in which a part of the strip is inserted between a plurality of said wires and said jacket, thereafter the strip is bent around the cable, and then the bent strip is further fed between the wires and jacket until the said portions overlap and the collar is substantially fully formed under said wires.

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