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Schumacher

[11] **3,828,298**

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[54] **ELECTRICAL TERMINAL FOR A BRAIDED SHIELD ON A COAXIAL CABLE**

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[52] **U.S. Cl.** ..... **339/14 R,** 339/95 R, 339/223 R, 174/75 C

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

[58] **Field of Search** ..... 339/95, 96, 97, 223; 174/75 C, 78

[56] **References Cited**

UNITED STATES PATENTS

838,729	12/1906	Lockwood	339/223 R
1,608,578	11/1926	Buchenberg	339/223 R
2,783,447	2/1957	Watts	339/97 C
3,794,877	7/1965	Collier	174/75 C

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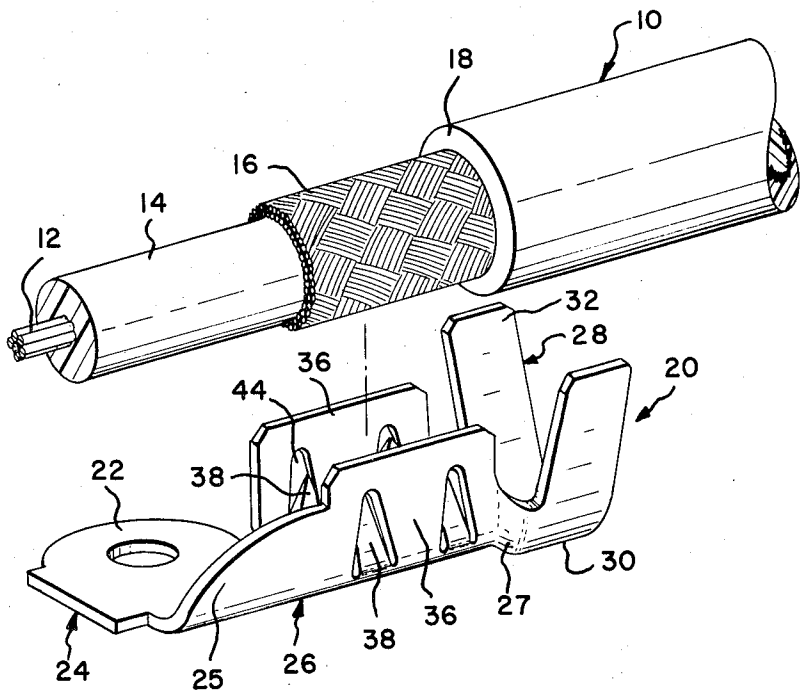
[57] **ABSTRACT**

The present invention discloses an electrical terminal for grounding the braided shield on a coaxial cable. The terminal has beveled, inwardly projecting lances on each sidewall of the ferrule forming portion which separates the strands of and slides behind the braided shield so as to lace the shield between the sidewalls and lances to provide mechanical support and electrical contact.

2 Claims, 7 Drawing Figures



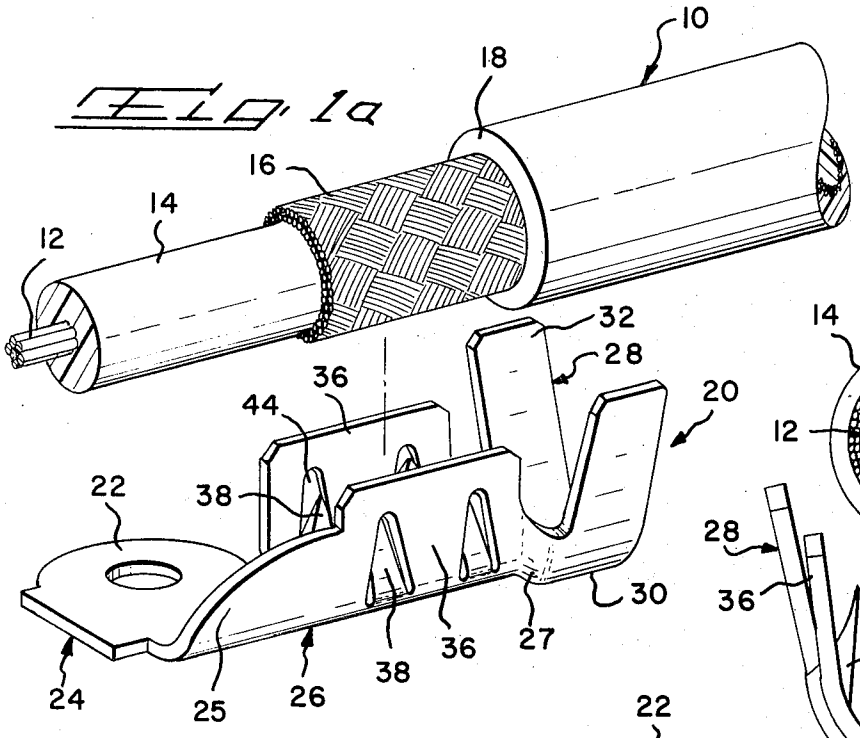


Fig. 1a

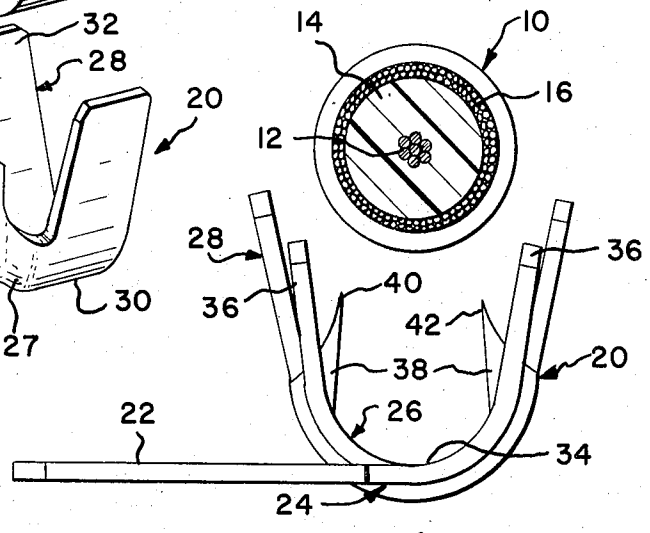


Fig. 1b

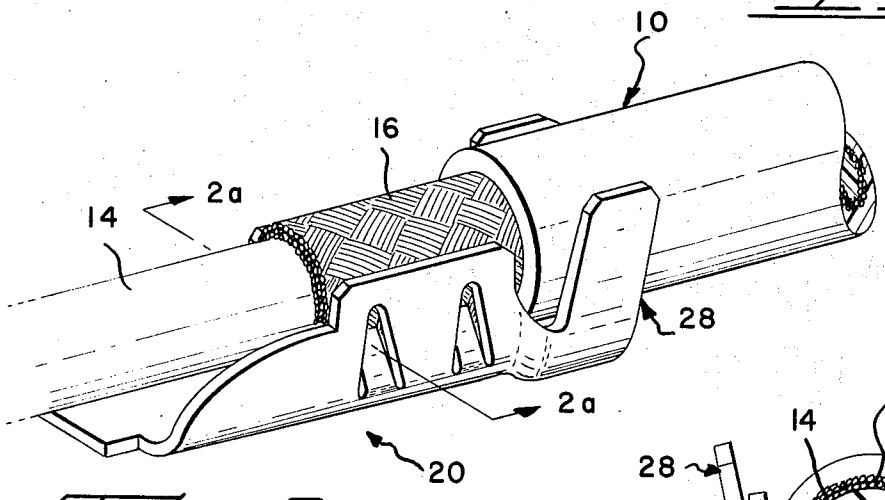


Fig. 2a

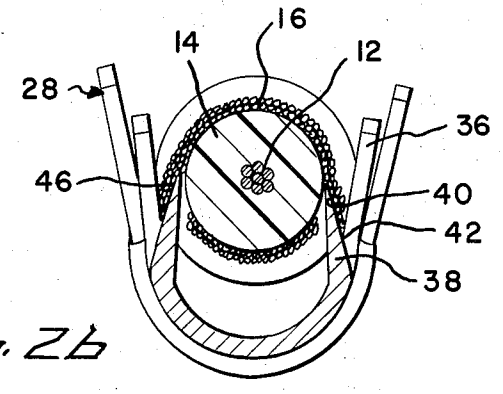


Fig. 2b

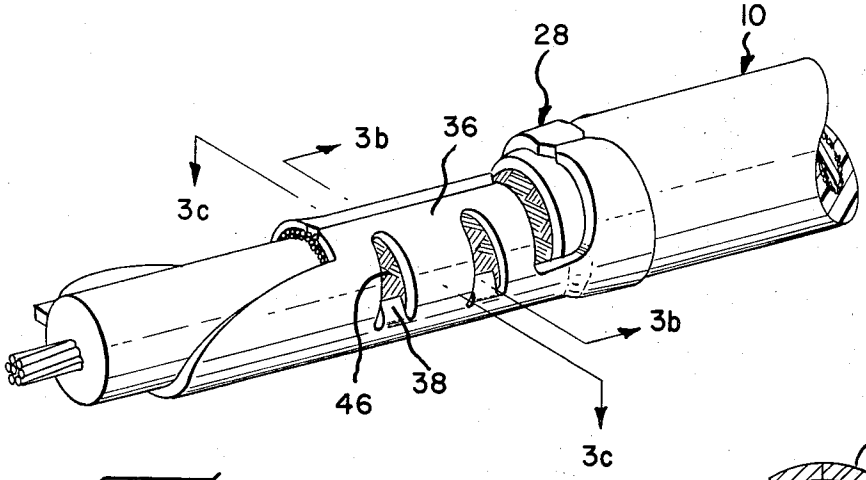


Fig. 3a

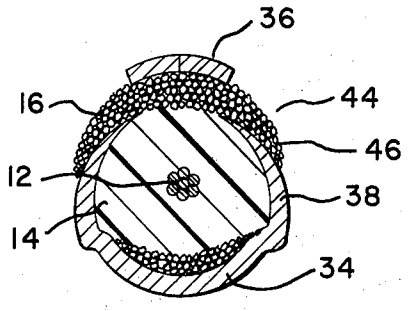


Fig. 3b

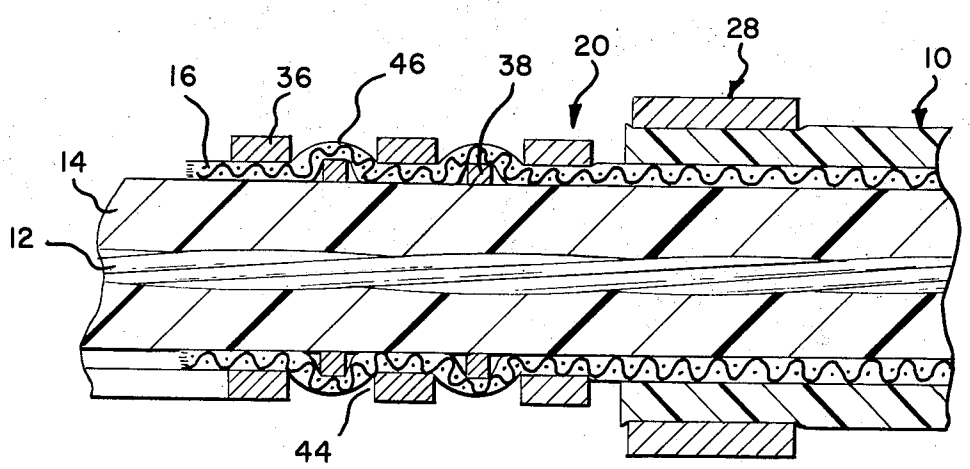


Fig. 3c

ELECTRICAL TERMINAL FOR A BRAIDED SHIELD ON A COAXIAL CABLE

BACKGROUND OF THE INVENTION

In various applications and particularly in some radio frequency applications it is necessary to terminate the outer conductive braided shield of a coaxial cable to a ground. In these applications it is desirable to terminate the braided shield without interrupting the center conductor and dielectric surrounding it.

Some of the known prior art provides electrical connectors or terminals for connecting the braided shield to an electrical lead which is in turn attached to a ground. For example, U.S. Pat. Nos. 3,194,877 and 3,549,787 disclose terminals of this nature.

U.S. Pat. No. 3,435,126 teaches a metal band having a plurality of prongs which bit into the braided shield. The metal band is directly attached to a ground by means of a hose clamp which is threaded through slots in the ground.

Whereas the above cited patents and others in the art provide means for adequately grounding the braided shield, they either require a separate electrical lead, a number of components or detailed preparation of the cable to be grounded.

Accordingly it is an object of the present invention to provide a low cost, stamped and formed electrical terminal for grounding the braided shield on a coaxial cable quickly and simply and which provides good mechanical and electrical properties.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1*a* is a perspective view of the terminal constructed in accordance to the present invention and a prepared coaxial cable to be terminated;

FIG. 1*b* is a transverse cross-sectional view of the terminal and cable of FIG. 1*a*;

FIG. 2*a* is a perspective view of the cable partially pressed into the terminal of FIG. 1*a*.

FIG. 2*b* is a transverse cross-sectional view of the terminal and cable taken along lines 2*b*—2*b* of FIG. 2*a*;

FIG. 3*a* is a perspective view of the completed termination of the cable into the terminal of FIG. 1*a*;

FIG. 3*b* is a transverse cross-sectional view taken along lines 3*b*—3*b* of FIG. 3*a*; and

FIG. 3*c* is an axial cross-sectional view taken along lines 3*c*—3*c* of FIG. 3*a*.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the accompanying drawings, the number **10** designates generally a length of a coaxial cable comprising from the center outwardly, a primary conductor **12**, a conductor insulation or dielectric **14**, an outer conductive braided shield **16** and lastly the outer insulation jacket **18.** Braided shield **16** is commonly made of one or more layers each of which contain many strands of fine wire braided together. Cable **10** is prepared for termination to a terminal by stripping away a portion of the outer jacket **18** so as to expose shield **16.** Where center conductor **12** is to be terminated also, a portion of shield **16** and dielectric **14** is removed.

Referring now specifically to FIGS. **1**a and **1**b, an electrical terminal **20** constructed in accordance with the present invention is shown. The terminal is made from electrically conductive sheet metal such as phosphor bronze or brass, and is blanked and formed by

conventional metal-stamping and metal-forming techniques.

At the front end of terminal **20,** an offset ring tongue **22** on connector portion **24** provides the means to attach electrical terminal **20** to a suitable ground or the like (not shown). As is well known to those skilled in the art, terminal **20** may be made with other forms of tongues (not shown) other than ring tongue **22.** Connector portion **24** also includes an upstanding member **25** extending from one side thereof to provide structural strength to ring tongue **22.**

Behind connector portion **24** and integral therewith is a generally U-shaped braided shield ferrule-forming portion **26.**

A U-shaped insulation-support wire barrel **28** extends from and is integrally connected to ferrule-forming portion **26** by offset portion **27** which displaces wire barrel **28** downwardly relative to ferrule-forming portion **26** by a distance substantially equal to the thickness of insulating jacket **18.**

Wire barrel **28** includes a base portion **30** and a pair of upstanding sidewalls **32—32** extending from opposite sides of base portion **30.** The inside surfaces of base portion **30** and sidewalls **32—32** are generally smooth but may be ridged (not shown) or otherwise roughened to enhance the retention of cable **10** therein.

The U-shaped braided shield ferrule-forming portion **26** includes the bight or base portion **34** and a pair of upstanding sidewalls **36—36** extending upwardly from opposite sides of base portion **34.** As FIG. **1**b indicates, sidewalls **36** are initially formed so that they are spread outwardly; i.e., away from each other, a few degrees from the vertical. This spreading provides a larger opening into ferrule-forming portion **26** for cable **10.**

A pair of lances **38—38** are stamped out of each of the two sidewalls **36** and are integral with base portion **34.** Each lance **38** is formed to project inwardly and extend upwardly parallel to sidewalls **36** and is also swaged to provide a sharp inwardly-disposed tip **40** and an outwardly-disposed beveled portion **42.** The height of lances **38** preferably is equal to about three-fourths the diameter of cable **10** without jacket **18.**

The distance or spread between lances **38** on opposite sidewalls **36** is substantially equal to the diameter of dielectric **14** of cable **10.**

Transverse openings **44** which result from the stamping and forming of lances **38** provide means for visual inspection of the assembled termination of FIGS. **3***a*, *b*, and *c*.

METHOD OF TERMINATING A COAXIAL CABLE HAVING A BRAIDED SHIELD ONTO THE PREFERRED EMBODIMENT

A coaxial cable **10,** previously prepared in the manner described above, is aligned over terminal **20** so that the exposed braided shield **16** is directly over ferrule-forming portion **26.** The axial length of exposed shield **16** substantially equals the axial length of ferrule-forming portion **26** and insulating jacket **18** terminates in the immediate vicinity of offset portion **27**; i.e. adjacent to ferrule-forming portion **26.** This alignment is illustrated in FIGS. **1**a and **1**b.

FIGS. **2***a* and **2***b* illustrate how lances **38** pierce braided shield **16** as cable **10** is being pressed into terminal **20.** As tips **40** move in under braided shield **16,** a portion thereof is being forced down the outside bev-

eled portion **42.** Such portion is hereinafter designated as the outboard portion **46** of braided shield **16.**

Termination of coaxial cable **10** is completed when it has been pressed down completely into terminal **20** with sidewalls **32** being crimped around insulating jacket **18** and sidewalls **36** being crimped around braided shield **16** in the manner shown in FIGS. *3a* and *3b*. As the crimping dies used (not shown) are conventional and well known in the art and do not form part of the instant invention, further detail thereof is unnecessary.

As seen in FIGS. *3a*, *3b* and more particularly in FIG. *3c*, outboard portions **46** are laced through and thereby trapped between lances **38** and sidewalls **36.**

Lances **38** retain a residual force in an outwardly direction; i.e. toward transverse openings **44.** Thus should sidewalls **36** relax away from the crimped position seen in FIGS. *3a* and *3b*, lances **38** will follow thereby maintaining electrical pressure contact between terminal **20** and braided shield **16.**

Another novel feature in the present invention is that the lances **38** do not penetrate dielectric **14** nor jacket **18** and thus trap this material in the electrical connection. The termination is thus free of matter that is subject to creep or flow. The termination may be subject to stresses such as tension and temperature changes without destroying the mechanical or electrical termination.

Although the preferred embodiment of the present invention utilizes four lances **38,** it is apparent that one lance **38** will also provide the same mechanical advantages but not to the degree as achieved using four or more.

It should be noted that terminal **20** may be used at any point along coaxial cable **10** and not necessarily adjacent the cable end. The amount of insulating jacket **18** that needs to be removed is only the axial length of braided shield ferrule-forming portion **26.**

As is apparent to those skilled in the art, wire barrel **28** may be cut away from terminal **20** and not used.

As is also apparent to those skilled in the art, ring tongue **22** may have the form of a tab, spring contact, be the outer shell of a coaxial contact or any other convenient means of making a ground connection.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, as some modifications will be obvious to those skilled in the art.

What is claimed is:

1. A sheet metal electrical terminal for terminating the braided shield on a coaxial cable, comprising:

a. a generally U-shaped ferrule having a base portion and a pair of sidewalls connected to and extending upwardly from opposite sides of the base portion;

b. a pair of lances extending from each sidewall, said lances attached at one end to each sidewall with the other end extending upwardly from the base portion and inwardly toward the opposite sidewall, each lance being formed into a generally four sided pyramid, the free end being pointed, said lances adapted to pierce and slide in behind portions of the braided shield of a coaxial cable which may be pressed into the ferrule; and

c. a pair of openings on each sidewall in alignment with said lances so that as the lances slide in behind portions of the braided shield, such portions may project into the openings.

2. A stamped and formed sheet metal electrical terminal for grounding the braided shield on a coaxial cable, which comprises:

a. a U-shaped ferrule-forming portion having a base portion and a pair of upstanding sidewalls extending from opposite sides of said base portion, said sidewalls adapted to be crimped into encompassing engagement with said braided shield, said ferrule-forming portion further having two pair of adjacent, upwardly extending lances with each pair on either side of said base portion and positioned internally of said sidewalls, (with each lance in each pair beind adjacent to the other), said lances having a beveled outwardly-facing sides and sharp tips on the free end thereof, said lances adapted to pierce and slide inbehind said braided shield so that a portion of said shield becomes laced between said lances and said sidewalls;

b. connector means integrally attached to one end of said ferrule-forming portion, said connector means comprising a flat portion being coplanar with said base portion of said ferrule-forming portion and an upstanding member integral with said flat portion and adapted to structurally support said flat portion, said connector means adapted for being attached to a ground;

c. a U-shaped insulation-support wire barrel having a base portion and a pair of upstanding sidewalls extending from opposite sides of said base portion, said sidewalls adapted to be crimped into encompassing engagement with said coaxial cable; and

d. connecting means for connecting said wire barrel to another end of said ferrule-forming portion whereby said base portion of said wire barrel is displaced downwardly from said base portion of said ferrule-forming portion.

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