Aug. 9, 1966 H. A. ELLIOTT 3,266,008

ELECTRICAL TERMINAL AND METHOD OF APPLYING SAME TO CONDUCTORS

Filed Jan. 13, 1964

FIG. 1.

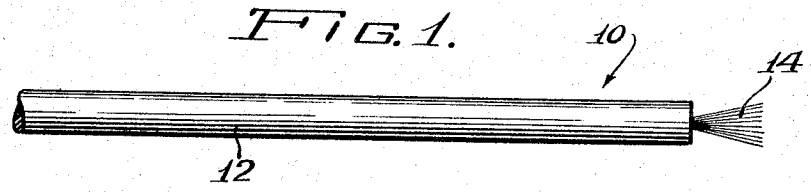


FIG. 2.

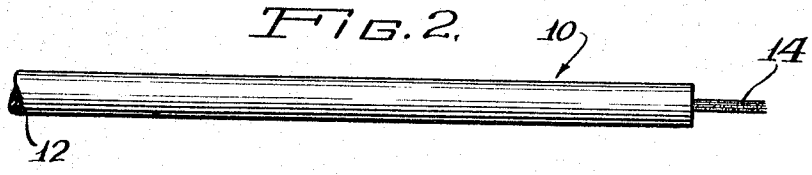


FIG. 3.

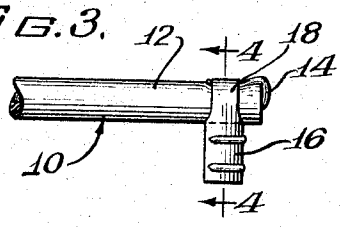


FIG. 4.

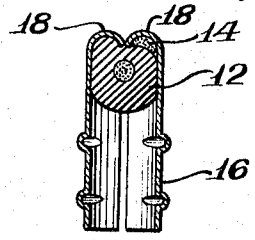


FIG. 5.

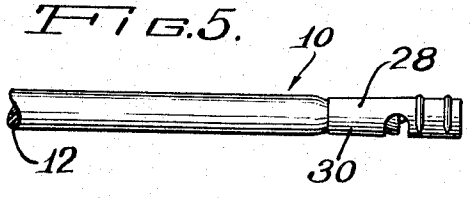


FIG. 6.

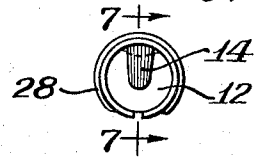


FIG. 7.

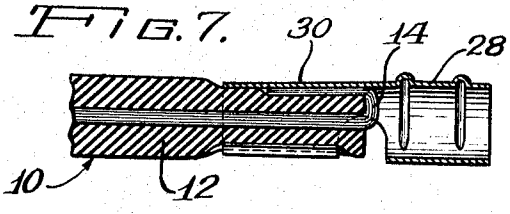


FIG. 8.

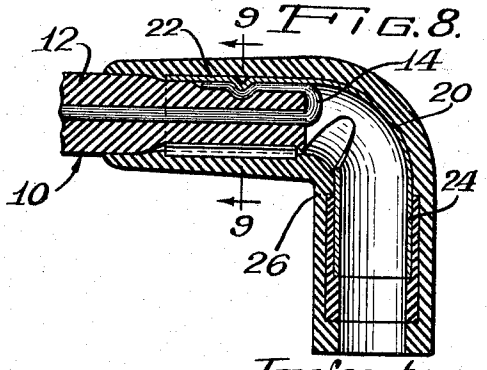
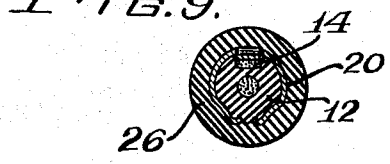


FIG. 9.



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3,266,008

ELECTRICAL TERMINAL AND METHOD OF APPLYING SAME TO CONDUCTORS

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2 Claims. (Cl. 339—223)

This invention relates to electrical terminals and to a method for applying them to electrical conductors, and it particularly relates to electrical terminations for non-metallic core conductors and to methods for terminating such conductors.

Today, non-metallic core cables, as stranded glass core cables, are commonly utilized for many applications, and they are frequently used as automotive ignition cables or the like. When a non-metallic or glass core conductor is terminating in a manner similar to that shown in my earlier U.S. Patent No. 2,553,083, that is, by folding the projecting end of the conductor against the outer surface of the insulation before mounting a terminal on the cable, it is often difficult to obtain a good electrical contact or connection between the terminal and the non-metallic conductor. Specifically, due to the poor electrical connection, sparking often occurs between the non-metallic conducting core and the electrical terminal or connector.

Thus, it is an important object of this invention to provide an electrical connection between a non-metallic conductor and an electrical terminal wherein disadvantages of such previous terminations are substantially avoided.

It is also an object of this invention to provide an improved electrical termination for a stranded non-metallic conductor by applying an electrically conductive medium to the projecting end of the conductor, prior to folding the projecting end of the conductor against the insulation and mounting the electrical terminal member on the cable.

It is a further object of this invention to provide a method for terminating a glass core conductor, wherein a superior electrical connection is provided between the glass core and the terminal which is mounted on the cable.

It is another object of this invention to provide a method for terminating a stranded glass core electrical conductor wherein a conductive medium, having carbon particles therein, is applied to the projecting portion of a stranded glass conductor to provide a unitary bundle of strands, after which the end of the conductor is folded against the insulation and an electrical terminal is mounted thereon.

It is still another object of this invention to provide an improved electrical termination for a glass core conductor, wherein the method is characterized by its simplicity and economy.

Further purposes and objects of this invention will appear as the specification proceeds.

Particular embodiments of the present invention are illustrated in the accompanying drawings wherein:

FIGURE 1 is a plan view of a glass core conductor;

FIGURE 2 is a view similar to FIGURE 1, except that an electrically conductive medium has been applied to the stranded end of the glass core;

FIGURE 3 is a plan view of the end of the electrical conductor of FIGURES 1 and 2, following the mounting of an electrical terminal on the insulation;

FIGURE 4 is an enlarged sectional view taken along the line 4—4 of FIGURE 3;

FIGURE 5 is a plan view of my improved electrical termination, utilizing an alternate electrical terminal;

FIGURE 6 is an end view of the embodiment of FIGURE 5;

FIGURE 7 is a sectional view, taken along the line 7—7 of FIGURE 6;

FIGURE 8 is a sectional view through my improved electrical termination, when utilizing a molded type electrical terminal; and

FIGURE 9 is a sectional view taken along the line 9—9 of FIGURE 8.

Referring to the drawings, there is shown an electrical cable 10 having insulation 12 surrounding a non-metallic conductor 14. The conductor 14 is comprised of a multiplicity of electrically conductive fibers or strands; advantageously, the conductor 14 is glass, but may also be made of other conductive materials, as linen, rayon, etc. Due to the physical properties of the conductor 14, it is difficult to provide a good electrical connection between an electrical terminal or connector 16 and the conductor 14, particularly when using the type of electrical connection shown in FIGURE 3.

In FIGURE 3, the conductor 14 is folded against the insulation 12 and a terminal 16 is crimped or mounted on the insulation 12 to thereby provide electrical connection between the conductor 14 and the terminal 16. In order to provide a proper connection between the terminal 16 and the glass conductor 14, the stranded end of the conductor 14 is treated with a fluid medium having electrical conductive properties. This medium not only conducts electrical current but is adapted to adhesively bind the fibers or strands of the conductor 14 together, whereby as the terminal 16 is crimped to the insulation 12, one or both of the attaching fingers 18 of the terminal 16 are adapted to encompass the bundle of strands, as shown in FIGURE 4; this connection provides a good electrical contact between the conductor 14 and the terminal 16.

Referring to FIGURES 5–7, my electrical termination is shown with an alternate type of electrical terminal 28. The terminal 28 is of the straight type, rather than of the elbow type of FIGURES 3 and 4. Again, with the terminal 28, the conductive, adhesive medium is applied to the projecting strands of the conductor 14 prior to mounting the terminal 28 to the cable 10, while trapping the conductor 14 between the barrel 30 and the insulation 12.

With reference to FIGURES 8 and 9, there is shown another alternate type of terminal 20, which is provided with molded insulation 26. Generally, the terminal 20 includes a conductor receiving leg 22 and an electrode receiving leg 24. The insulation 26 surrounds the metallic legs 22 and 24 to thus provide an insulated terminal. As with the previously described embodiments, the projecting end of the glass conductor is folded against the insulation after receiving an application of the conductive medium. Since there is a problem of the insulation material 26 flowing between the terminal 20 and the cable insulation 12 during the molding operation, the terminal 20 also receives a coating of the conductive medium prior to mounting it to the cable 10; thus, when the insulation 26 is molded in place, a good electrical connection is maintained, thereby substantially avoiding a disturbance of the connection between the terminal 20 and the conductor 14.

Although my method for providing an improved electrical termination should be clear from the foregoing, briefly in providing the termination of FIGURES 3–7, the insulation 12 is first stripped from the end of the cable 10 to thereby provide a projecting portion of a stranded conductor 14. The projecting end of the conductor 14 is then treated with a conductive medium or paste. Desirably, the medium is a dispersion of carbon particles in a resinous base; the material is adapted to bind the strands of the conductor 14 together to provide a unitary bundle of strands. Preferred materials for the conductive paste are dispersions of colloidal graphite, similar to those available under the "Dag" trademark. Specific materials

which have been found to be satisfactory are a dispersion of graphite in an alkyd resin-naphtha vehicle, a dispersion of graphite in an epoxy resin solution, and a dispersion of graphite in ethyl alcohol. Following the application of the conductive paste or medium to the glass core **14**, it is folded against the outer surface of the insulation **12**; the electrical terminal is then applied to the cable **10**, by utilizing conventional procedures, as crimping, before the paste is allowed to dry.

If the embodiment of FIGURES 8 and 9 is utilized, the same type of conductive paste is applied to the terminal **20** and is dried before the terminal **20** is crimped to the insulation, trapping the glass core against the insulation. The application of the conductive paste to the terminal **20** prevents the sleeve insulating material **26** from flowing between the terminal and the cable insulation, which would be likely to disturb the connection between the core **14** and the terminal **20**. Other than the application of the conductive paste to the terminal **20**, followed by drying, the terminating procedure is substantially the same as the above-discussed procedure.

My improved termination thus provides excellent electrical connection between an electrical terminal and a non-metallic conductor; the connection provided substantially prevents sparking between the cable and the terminal. Furthermore, the termination is durable and utilizes simple and economical manufacturing procedures.

While in the foregoing, there has been provided a detailed description of particular embodiments of the present invention, it is to be understood that all equivalents obvious to those having skill in the art are to be included within the scope of the invention as claimed.

What I claim and desire to secure by Letters Patent is:

1. The method of making an electrical connection to an ignition cable, having an outer sheath of electrical insulation material and an inner core of non-metallic fibrous strands coated with an electrically conductive carbonaceous material comprising the steps of:

removing a portion of said sheath from one end of said cable to bare an end portion of said core;

applying to said end bared portion of said core a conductive medium comprising a dispersion of carbon particles in a resinous base;

folding said end portion of the core over said one end of the sheath after application of said conductive medium;

forming an electrical terminal with a tubular ferrule portion of sheet metal;

placing said ferrule portion around said one end of said sheath and said end portion of said core such that said end portion is sandwiched between said sheath and said ferrule portion of said terminal; and

tightly crimping said ferrule portion around said sheath and said folded end portion of the core to produce a secure conductive connection between said terminal and said core.

2. In combination,

an ignition cable having an outer sheath of electrical insulation material and an inner core of non-metallic fibrous strands coated with an electrically conductive carbonaceous material; said core having an end portion thereof extending beyond one end of said sheath and folded over said one end of said sheath;

said end portion of said core being impregnated with a conductive medium comprising a dispersion of carbon particles in a resinous base for binding the strands of said end portion of said core together, and

an electrical terminal having a ferrule portion of sheet metal extending around and tightly crimped onto said end of said sheath and the impregnated end portion of said core with said ferrule portion in electrically conductive engagement with said impregnated core.

References Cited by the Examiner

UNITED STATES PATENTS

1,394,055	10/1921	White	338—332
1,946,713	2/1934	Rowley	339—223
2,423,290	7/1947	Bonwitt	339—115
2,714,623	8/1955	Wolcott	174—120
2,745,075	5/1956	Simpkins et al.	339—26
2,869,103	1/1959	Wells	339—115
3,109,881	11/1963	Publow	174—121 X

FOREIGN PATENTS

239,216	12/1926	Great Britain.
440,762	12/1936	Great Britain.

EDWARD C. ALLEN, *Primary Examiner.*

Disclaimer

3,266,008.—*Howard A. Elliott*, Detroit, Mich. ELECTRICAL TERMINAL AND METHOD OF APPLYING SAME TO CONDUCTORS. Patent dated Aug. 9, 1966. Disclaimer filed June 20, 1974, by the assignee, *Essex International, Inc.*

Hereby enters this disclaimer to claim 2 of said patent.

[*Official Gazette May 20, 1975.*]