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METHOD AND APPARATUS FOR CLEANING ENDS OF INSULATED ELECTRIC WIRES

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Fig. 1

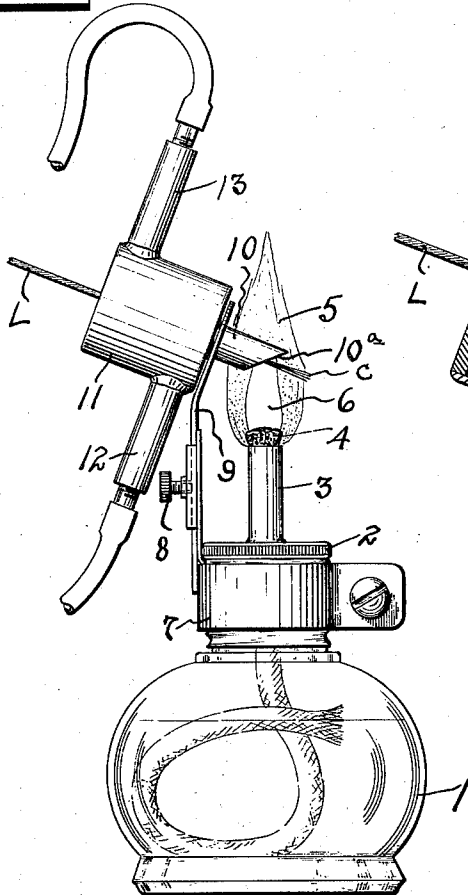
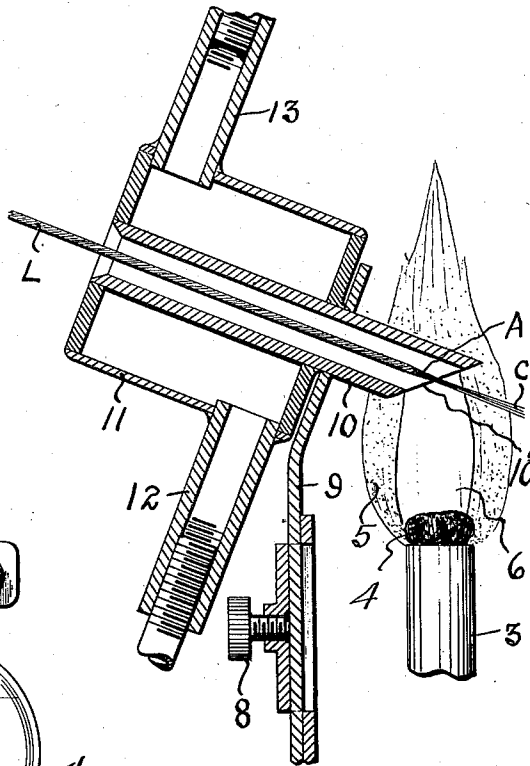


Fig. 2



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METHOD AND APPARATUS FOR CLEANING
ENDS OF INSULATED ELECTRIC WIRESRobert M. Akin, Jr., Sleepy Hollow Manor, North
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15 Claims. (Cl. 148-4)

This invention relates to a method and apparatus by means of which the insulation on electric conductors may be rapidly and easily removed from the ends thereof and the conductor thoroughly cleaned at the exposed end to facilitate making soldered connections thereto.

More specifically the invention is concerned with the removal of insulation and the cleaning of the ends of Litz wire which is commonly made today commercially so as to comprise a plurality of individual copper strands each provided with an insulating coating of enamel, all twisted together and enclosed in an outer insulating cover such as braided cotton and the like.

A further object of the invention is the provision of a simple apparatus by means of which the operations comprising the method of this invention may be carried out practically.

This invention resides substantially in the combination, construction, arrangement, relative location of parts, steps and series of steps, as described below.

In the accompanying drawing,

Figure 1 is a side elevational view of the apparatus of this invention; and

Figure 2 is an enlarged cross-sectional view partly in elevation of a portion thereof.

In a general sense Litz wire, which is well known, consists of a plurality of individual strands of copper or other wire twisted together and enclosed within an insulating covering. In a specific form of Litz wire, as is very extensively used today in the radio arts, the individual copper strands which are in many cases extremely fine, are enclosed within an enameled coating, twisted together and enclosed within an outer covering such as braided cotton. This wire, as is well known, is particularly efficient in the transmission of high frequency currents because of the increased surface area resulting from the use of a plurality of individual conductors. As employed in modern radio circuits Litz wire of this type frequently is made up of extremely fine copper conductors. For example, one specific size of Litz wire commonly employed is composed of sixteen individual copper wires, so fine that the combined cross-sectional area of the sixteen wires is equal to the cross-sectional area of a human hair. Each of these almost invisible conductors is enameled and then enclosed in a cotton braid. When it is desired to make a circuit connection with such a wire by soldering it becomes necessary to remove the cotton braid and the enameled coating on each of the individual conductors at the end and to provide a bright clean surface to facilitate soldering. With wires as fine as this and even much heavier, it is apparent that it is extremely difficult to remove the insulation, and particularly the enamel. At the present time it is removed by unraveling the braid and removing

the enamel as best can be done by sandpaper. It is extremely difficult to remove all of the enamel with the result that when an attempt is made to solder the wire the enamel melts and prevents a good joint. Frequently one or more of the conductors is broken off, reducing the area of the complete conductor by a substantial portion because all conductors are insulated from each other. For example, in the case of a ten strand Litz wire, if one of the strands is broken off during cleaning, the area of the conductor is reduced by 10%, thereby defeating the very object sought by the use of this wire. The present invention eliminates all of these difficulties in an extremely simple manner, and very greatly speeds up the cleaning of the ends of the wire.

Referring to the drawing there is shown one form of apparatus suitable for carrying out the method of this invention. It is illustrated as comprising an alcohol lamp composed of an alcohol container 1, a removable cap 2 having a wick cap 3, and a wick 4. Mounted on the cap by means of a clamp 7 is an arm 9 which is secured to the clamp and vertically adjustable to different positions by means of a set screw 8. Secured to the arm is a tube 10 which is positioned to project into the flame arising from the wick of the lamp. The tube 10 forms the inner wall of a double walled vessel having the outer wall 11 through which cold water may be run by reason of the pipes 12 and 13.

When the alcohol lamp is lighted the flame which results comprises the outer cone 5 in which combustion of the alcohol vapors takes place and the inner colder cone 6 comprising the alcohol vapors which have not yet reached the ignition point. It will be noted that the tube 10 is positioned so as to project into the inner cone 6 and has a tapered end 10^a to facilitate the passage of some of the unburned vapor from the cone 6 into and through the tube 10. It is to be noted that it is not essential that an alcohol lamp be used since a Bunsen burner is about as equally effective for the purpose.

A piece of Litz wire has been indicated at L and comprises the copper conductors C, each of which is provided with an insulating coating of enamel in accordance with well known practice. A piece of the wire of the desired length is cut off and the end is passed through the tube 10 into the flame. It is projected into the flame so that the end thereof is in the cone 5, in which combustion is taking place. This immediately heats up the end of the wire, burning the cotton covering from it and the enamel from the individual conductors C. In the finer sizes these conductors quickly reach a visible red heat. When this occurs the Litz wire L is pulled back so that the exposed conductors C which are red hot cool off in the inner cone of vapor 6. This vapor is a reducing

vapor or atmosphere in that it has a relatively high content of hydrogen. Since the hot wires being exposed to this reducing atmosphere cool off and any oxides which are present are reduced, the conductor is withdrawn through the reducing atmosphere in the tube 10 in a finished state with the ends of the conductors C in a bright, clean condition entirely free of any insulation, oxidation or foreign material. By positioning the tube 10 so that it is filled with the vapors from the cone this oxygen is entirely excluded from contact with the hot wires while they are cooling, which insures a clean surface. The conductor is then ready for bending and soldering.

The cotton braid in the region A was also found to have carbonized and amalgamated with the enamel of the conductors at the region of division between the outer and inner cones. In other words, the portion in the cone 5 burns off and in the direction back away therefrom the temperature rapidly falls off so that the cotton braiding chars and the insulation softens and amalgamates therewith. The result is that the ends of the threads of the cotton braid in the region A are sealed down forming a finished end which is not thereafter easily frayed. This is a very practical advantage in that a neat, finished appearance results and the cotton braid is prevented thereafter from tending to unravel destroying its protecting value and presenting an unsightly appearance.

It is apparent to those skilled in the art that both the method and the apparatus are subject to some variation by those skilled in the art without departure from the novelty thereof. I do not, therefore, desire to be strictly limited to this disclosure which is given for purposes of illustration, but rather to the claims granted me.

What I claim is:

1. A method of removing the insulation from the end of an insulated electrical conductor which comprises burning off the insulation at the end and heating the conductors and cooling the exposed conductor in a reducing atmosphere.

2. The method of removing the insulation from a stranded insulated conductor which comprises exposing the insulated end of the wire to an open flame to burn the insulation and heat the conductors, and cooling the exposed conductors in a reducing atmosphere.

3. The method of removing the insulation from a stranded insulated conductor which comprises exposing the insulated end of the wire to an open flame to burn the insulation and heat the conductors, and cooling the exposed conductors in a reducing atmosphere comprising the inner cone of the flame.

4. The method of removing the insulation from a stranded insulated conductor which comprises exposing the insulated end of the wire to an open flame to burn the insulation and heat the conductors, and exposing the heated conductors to the unburned vapors comprising the inner cone of the flame.

5. A method of removing the insulation from a standard electrical conductor which comprises burning off the insulation in an open flame while heating the conductors and moving the heated conductors into the reducing atmosphere of the inner cone of the open flame to cool them therein.

6. A method of removing from an electrical conductor the insulation thereon, comprising enamel, which includes exposing the enameled conductor to an open flame to burn the enamel

therefrom and heat the wires, and cooling the heated wire in the reducing atmosphere of the flame.

7. A method of removing the insulation from a stranded conductor comprising a plurality of individual enameled strands enclosed within a fabric casing, which comprises exposing the insulated conductor to the outer cone of an open flame to burn off the fabric and enamel and heat the wires, and cooling the heated wires in the inner reducing cone of the flame.

8. A method of removing the insulation from a stranded conductor comprising a plurality of individual enameled strands enclosed within a fabric casing, which comprises exposing the insulated conductor to the outer cone of an open flame to burn off the fabric and enamel and heat the wires, and moving the heated wires into the inner cone of the flame to cool them.

9. An apparatus for removing the insulation from electrical conductors comprising means for burning a combustible fluid in an open flame, and means forming a chamber projecting into the open flame so as to fill it with the unburned reducing vapors of the open flame.

10. An apparatus for removing the insulation from electrical conductors comprising means for burning a combustible fluid in an open flame, means forming a chamber projecting into the open flame so as to fill it with the unburned reducing vapors of the open flame, and a water cooled jacket for said means.

11. In an apparatus for removing the insulation from electrical conductors the combination comprising an alcohol lamp in combination with means comprising a tube positioned to project into the flame of the lamp so that the space within the tube is filled with the unburned vapors of the inner cone of the flame.

12. In an apparatus for removing the insulation from electrical conductors the combination comprising an alcohol lamp in combination with means comprising a tube positioned to project into the flame of the lamp so that the space within the tube is filled with the unburned vapors of the inner cone of the flame, and means forming with the tube a water cooled jacket therefor.

13. In an apparatus for removing the insulation from electrical conductors the combination comprising means for burning a fluid in an open flame in combination with means comprising a tube positioned to project into the flame so that the space within the tube is filled with the unburned vapors of the inner cone of the flame.

14. In an apparatus for removing the insulation from electrical conductors the combination comprising means for burning a fluid in an open flame in combination with means comprising a tube positioned to project into the flame so that the space within the tube is filled with the unburned vapors of the inner cone of the flame, and means forming with the tube a water cooled jacket therefor.

15. A method of removing the insulation from an insulated electrical conductor which comprises exposing the insulated end of the conductor to the combusting portion of an open flame to burn the insulation therefrom and heat the conductors, forming a column of the unburned vapors from said flame, and withdrawing the heated end of the conductor through said column to cool it while therein.

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