METHOD OF MAKING HEATER CORDS

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1 Claim. (Cl. 154—2.25)

The present invention relates to heater cords and more particularly to braided asbestos heater cords which are used in conjunction with various electrical appliances such as coffee makers, fridges, irons, etc.

A braided asbestos heater cord includes a pair of insulated metallic conductors, each of which is surrounded by a layer of asbestos roving and an outer sheath of braided fabric which tightly encloses the insulated asbestos covered conductors. It has been customary in heater cords to provide each of the metallic conductors with an insulating jacket of an un-vulcanized elastomer. The un-vulcanized elastomer insulation is tacky and serves to hold the asbestos roving thereby, thereby facilitating the manufacture of the heater cord. While this form of heater cord is electrically satisfactory, it lacks mechanical strength and heat resistance and it is difficult to strip the un-vulcanized elastomer insulation from the mechanical conductors when one desires to attach the conductors to an electrical plug or directly to an electrical appliance.

The present heater cord has the desired electrical and mechanical characteristics, and in addition, is so constructed that the insulation may be easily stripped from the individual metallic conductors. This is accomplished by the novel use of an insulating, heat-resistant, vulcanized elastomer jacket over the metallic conductors together with a particular adhesive bonding agent which permits the subsequent positioning of asbestos roving around the vulcanized jackets and the further application of an outer braided fabric sheath.

The objects of the present invention are to provide a braided asbestos heater cord which has easy stripping characteristics; to provide a braided asbestos heater cord which includes a heat-resistant, vulcanized elastomer jacket which surrounds each of the individual metallic conductors; to provide a novel braided asbestos heater cord of the character described which has the desired electrical and mechanical characteristics, which is simple and inexpensive to manufacture, and which has a long and useful life.

Further objects and advantages of the invention will be appreciated and the invention will be better understood from the following specification wherein the invention is described by reference to the particular embodiment illustrated in the accompanying drawings.

In the drawings:
Figure 1 is a perspective view of a portion of a braided asbestos heater cord formed in accordance with the present invention with certain portions broken away to show the underlying construction of the heater cord;
Figure 2 is a perspective view of an insulated metallic conductor which is provided with outer, longitudinally extended adhesive stripes, such as are used in constructing the heater cord illustrated in Figure 1;
Figure 3 is an enlarged sectional view taken along line 3—3 of Figure 2; and
Figure 4 is an enlarged sectional view taken along line 4—4 of Figure 1.

Referring to the drawings, the reference numeral 5 designates a heater cord formed in accordance with the present invention. The heater cord 5 includes a pair of central metallic conductors 7, each of which is formed of a cylindrical bundle of flexible wire strands 9 such as fine copper wires. A thin layer of paper or separator 8 is indicated as surrounding each of the metallic conductors 7. The paper layer 8 is provided when the wire strands 9 are of copper or other metal which is adversely affected by sulfur fumes which are released during the usual vulcanizing process. A known sulfur fumes attack the surface of copper and various other metals, forming sulfides which render the wire brittle and very difficult to solder. The paper jacket 8 acts as a vapor barrier which hinders or prevents the sulfur fumes from contacting the metallic conductor. However, where the metallic conductor is not adversely affected by sulfur fumes, the paper separator 8 need not be used. For example, when the copper wire is tinned, the sulfur fumes do not adversely affect the tinned surface and a paper separator need not be used. The separator 8 is preferably made from paper or other fibrous material having a high coefficient of adhesion with rubber. An insulating jacket 11 of a heat-resistant, vulcanized elastomer surrounds each of the paper covered metallic conductors 7 and provides the desired electrical installation therefor. A layer of asbestos roving 13 extends about and is bonded by a suitable adhesive 15 to the vulcanized elastomer jacket 11 which encases each of the central metallic conductors 7.

The adhesive 15 should be such that it will remain pliable during the lifetime of the heater cord so as not to impair the mechanical characteristics of the heater cord. Any adhesive material which bonds to the vulcanized elastomer and asbestos roving and remains pliable during the lifetime of the heater cord may be used. Specifically preferred adhesive materials are those having a synthetic rubber base, or a latex or natural rubber base. These adhesives may be used as a solvent base cement or a water dispersed latex adhesive. In general, the adhesive should extend over each portion of the surface of the vulcanized elastomer jacket of the finished heater cord. The asbestos roving 13 about the insulated central conductors provides the necessary heat insulation for the heater cord.

The two insulated conductors, each of which includes a paper separator, a jacket of vulcanized elastomer, and an outer layer of asbestos roving, are spirally wound about each other and are compressed within and by the outer sheath or covering of braided fabric 17. The outer braided fabric jacket compresses the inner assembly of the heater cord, i.e., the spirally wound insulated conductor cords, into the usual, generally circular, cross-sectional form.

The heater cord 5, except for the application of the adhesive, may be formed by usual cord-forming equipment. In forming the heater cord 5, the individual wire conductors are initially covered with a separator 8 of paper or other fibrous material. The paper tape separator 8 is drawn longitudinally over the conductor or spirally wound around the metallic conductor completely surround the conductor. The separator 8 provides a continuous surface around the conductor to which the rubber layer may adhere evenly during the vulcanization of the rubber jacket. The separator covered conductor is then drawn through ordinary extruding and vulcanizing apparatus which extrudes a heat-resistant elastomer around each of the separator covered metallic conductors 7 and then vulcanizes the elastomer, thereby forming the vulcanized jackets 11. A suitable adhesive 15 is then applied over at least a portion of the surface of each of the vulcanized, insulated elastomer
jackets 11. It has been found quite satisfactory to apply only a pair of longitudinally extending, diametrically opposed stripes 19 of latex rubber adhesive to the surface of each of the vulcanized insulating jackets 11 as illustrated in Figures 2 and 3. These stripes may be applied by an applicator mechanism such as that disclosed in application Serial No. 570,295, filed March 8, 1956, now Patent No. 2,880,668. Immediately after the application of the adhesive 15, the adhesive coated, insulated conductors are each covered with a layer of asbestos roving 13. This operation may be performed by the usual asbestos serving machine. After the asbestos roving 13 is applied around the insulated metallic conductors, a pair of such asbestos covered insulated conductors are spirally wound about each other and delivered to the usual braiding machine where the outer braided fabric jacket 17 is tightly formed around the inner insulated conductor assembly. The outer braided fabric jacket compresses the inner insulated conductor assembly into a generally circular, cross section.

The elastomer which is used in forming the vulcanized jacket of the present heater cord should be of a heat-resistant type which will not change its characteristics or deteriorate at the temperatures to which it will be subjected. It is so chosen and is applied in sufficient amount to provide the desired electrical insulating characteristics for the heater cord.

The adhesive 15 which is applied to the surface of the vulcanized elastomer jacket may, as pointed out above, be applied in the form of longitudinally extending stripes. For convenience, when a latex rubber adhesive is used, it is mixed with an evaporable thinner such as benzene so as to be in a relatively fluid condition at the time that it is applied to the vulcanized elastomer jacket. The subsequent application of the asbestos roving around the vulcanized elastomer jacket by the usual asbestos serving apparatus causes the latex rubber adhesive to be smeared over a major portion of the surface area of the vulcanized elastomer jacket 11 as indicated in Figure 1.

The described heater cord is particularly useful because the insulation may be easily stripped from the central conductors. This easy stripping characteristic results from the use of the vulcanized elastomer jackets immediately about the individual metallic conductors or immediately about the paper separator surrounding the metallic conductors. After cutting through the vulcanized jackets at a point adjacent one of the ends of the heater cord, the jackets which may include an inner paper separator liner may be easily pulled off of the end portions of the underlying metallic conductors. This is due to the fact that the jackets are neither tacky nor bonded to the metallic conductors. The described heater cord is also found to be more satisfactory than the prior heater cord constructions because it is easier and less expensive to construct and very efficient in operation.

Various features believed to be new are set forth in the appended claim:

1 claim:

The method of manufacturing a heater cord comprising applying a jacket of a heat-resistant elastomer insulation to each of a pair of stranded metallic conductors, vulcanizing each of said elastomer jackets, applying axially extending stripes of a fluid mixture of a latex rubber adhesive and a thinner to the surface of each of said vulcanized elastomer jackets, spirally wrapping a layer of asbestos serving over each of said vulcanized elastomer jackets after said fluid mixture has been applied thereto and before said thinner evaporates to thereby spread said adhesive over a major portion of the surface of said vulcanized elastomer jackets, spirally winding the pair of asbestos-covered, insulated conductors about each other and then applying an outer covering of braided fabric tightly about said assembly so as to compress said assembly into a generally circular cross section.

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