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ELECTRICAL CONDUCTOR WITH ADHESIVE BACKING

Filed Aug. 15, 1963

Fig. 1

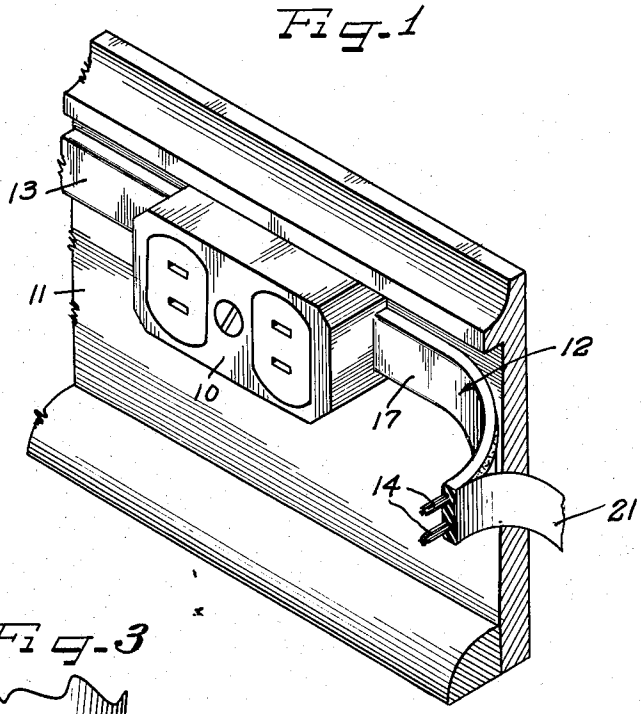


Fig. 3

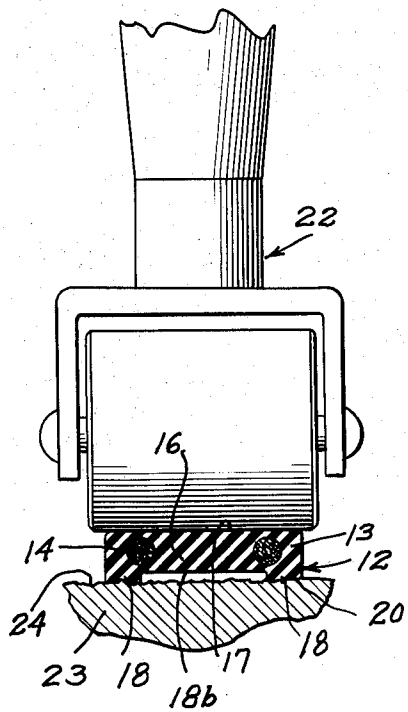
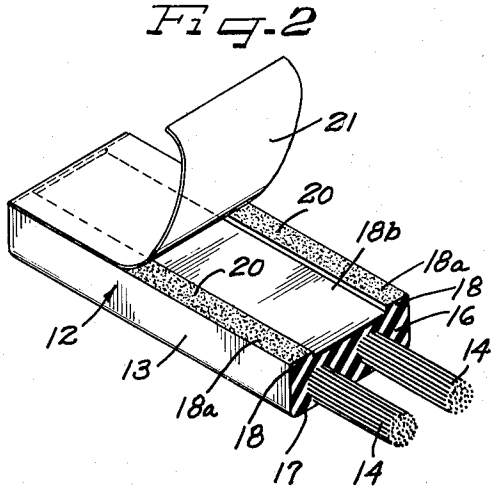


Fig. 2



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ELECTRICAL CONDUCTOR WITH ADHESIVE BACKING

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The present application is a continuation-in-part of my earlier filed application entitled "Insulated Wire Products," Serial No. 217,119, filed August 15, 1962.

The present invention relates to insulated wire assembly, and more particularly to insulated flexible current carrying conductor wires having self-affixing means for surface wiring applications so as to provide unique features of convenience, economy, safety and extended life expectancy.

Certain difficulties present themselves in the application of self-adhering conductor wire. The outer edges, and especially the upper edge of a horizontal installation must be tightly sealed to prevent the entrance of moisture, condensation and strong wall washing solutions, all of which tend to dissipate or destroy the bonding agent when trapped beneath the wire for extended periods of time. Many interior paints are not waterproof and when subjected to the above conditions would flake away from the wall and destroy the mounting surface.

Another difficulty is in establishing complete contact of the wire surface to the mounting surface. Since much of the wire is installed upon old surfaces which may be uneven or rough from successive coats of paint, or stippled and irregular due to the application of paint by napped or textured roller painting devices, achieving complete contact of the wire surface is difficult. Insulated wire, when impressed against an irregular surface tends to bridge small hollows, and stands away from the surface adjacent a raised nib with a resulting incomplete contact.

According to an important feature of my invention, the contact bonding surface of the wire is formed with continuous and upstanding ribs which parallel the outer edge of the wire structure.

An important object of the present invention concerns the provision of a new and improved conductor wire for self-retention on a wall surface.

Still another important object of this invention is to provide a new and improved insulated wire assembly that can be more effectively attached to another member with a minimum of effort.

Another object of this invention is to provide an efficient economical wire assembly which can be manufactured at a minimum of expense and which can be effectively installed with a minimum of effort.

In the past different means have been employed to secure insulated wires to other members such as staples, clips, wire ties and the like which all have had a common drawback in that they afford only intermittent support with varying degrees of looseness or sag of the wire between supports. Where vibration is present such as in automotive applications, the vibration and whip of the loose portion of the wire tends to cause the wire structure to abrade at the point of support.

According to certain features of the present invention and in order to alleviate this undesirable condition, provision for substantially continuous attachment and support of the insulated wire is provided. With my wire assembly, at least one continuous mounting surface is provided with a pair of longitudinally extending ribs precoated with a suitable pressure sensitive adhesive which may be revealed by peeling off a protective backing membrane just prior to application so that the self-affixing surface may be pressed against a selected support surface and bonded thereto.

According to still another feature of the present invention, the self-affixing wire assembly requires but small change in the present economical system of manufacturing insulated wire being of simple and functional construction and even presenting little change in appearance when given only a cursory examination. Both the bonding agent and protective covering are inexpensive materials and further, it may be noted that in some cases the thickness of insulating material may be reduced with a considerable saving in manufacturing costs. This is particularly true where an extra heavy insulating cover has been provided in the past to resist just such strain of external fastening means.

One variation may be appropriately noted at this time, and that is the substitution of a two-part epoxy cement as a bonding agent instead of a pressure sensitive adhesive; this finds use in the field of missiles and rocketry where an exceptionally strong adhesive is desired to hold the wire in place due to exceptional strain, and where convenience of application is a secondary consideration. The epoxy adhesive is applied to the wire and covered just as in my self-adhesive bonding agent application; just prior to affixing the wire in place a catalyst is applied to the epoxy cement to activate the bonding means.

Further objects and features of the present invention will more fully become apparent in view of the following detailed description and taken in conjunction with the accompanying drawings illustrating a single embodiment in which:

FIGURE 1 is a front elevation in isometric view and partly in section, showing a typical assembly of surface mounted electric outlet receptacle utilizing my self-affixing wire means;

FIGURE 2 is an enlarged back view in isometric of a typical section of the wire shown in FIGURE 1; and

FIGURE 3 is an enlarged vertical section illustrating the manner of applying the conductor wire to an irregular wall surface.

On the drawings:

The reference numeral **10** in FIGURE 1 indicates generally a conventional double outlet for electrical connection mounted upon a typical baseboard wall molding **11** with current brought to the outlet **10** and continued therefrom with a two conductor self-affixing electric wire assembly **12** which includes a plastic strip or insulator **13** having electrical conductors or wires **14, 14** embedded therein. The insulator **13** includes a rectangular or parallel sided base or base portion **16** having an upper flat surface **17** and a pair of relatively flat ribs **18, 18** mounted on opposite edges and extended along the length of an opposite side **19** of the base **16**. The ribs **18, 18** have self-affixing mounting surfaces **18*a*, 18*a*** that are provided with a pressure sensitive coating **20**. The surfaces **18*a*, 18*a*** are separated by a channel shaped area **18*b***. The area of a bottom face or surface of the base portion **16** or the area of the top surface **17** is substantially greater than the combined area of the surfaces **18*a*, 18*a***. The mounting surfaces **18*a*, 18*a*** are precoated with the pressure sensitive adhesive **20** and protected by a removable backing cover or membrane **21** which is peeled prior to application to reveal the self-affixing surface **18*a*, 18*a***, or the backing membrane or cover **21** may be left in place on any selected area of the insulator where no bonding action is desired. It will further be appreciated that where the insulator **13** is rolled into a roll that the cover **21** may be eliminated.

The manufacture of my self-affixing insulated conductor wire requires but little detailed description as the extrusion process is well known and used in the industry. In this process, a plurality of conductors in spaced relationship are drawn continuously through an extruder die

while an insulating cover of hot thermoplastic, rubber or the like is fed to the die where it is compressed and formed about the conductors. The extruder die opening governs and establishes the configuration of the insulating cover, and in the manufacture of my self-affixing wire assembly **12**, this die would form a pair of ribs **18, 18** defining a pair of continuous flatted rear mounting surfaces **18***a*, **18***a*.

Upon leaving the extruder die, and preferably while the insulator is still warm, a coating **20** of pressure sensitive adhesive is applied to the designated mounting surfaces **18***a*, **18***a* by hopper fed roll means from a fixed station and upon the continuously moving wire assembly **12**. The surfaces **18***a*, **18***a* in terms of total area, may very effectively comprise 25% to 33% of the total area of one side of the base. Stated in other terms, the width or the area of the cavity **18***b* is at least several times the combined width or area of the rib mounting surfaces **18***a*, **18***a*. The self-affixing surface **18***a* may be coated with any one of a number of known pressure sensitive adhesives **20**, and in the present embodiment excellent results can be obtained by using a known compound of uncured natural rubber applied while in a liquid state and held in suspension by a suitable rubber solvent. As the solvent is evaporated the residue of uncured rubber forms a tacky, pressure sensitive bonding agent which will adhere to almost any clean surface when impressed with but light pressure. Excellent results may be obtained by coating the surfaces **18***a*, **18***a* with an epoxy resin type adhesive **20**.

Subsequent to the adhesive coating process, and in order to maintain freshness of the bonding agent and prevent inadvertent attachment, the protective backing membrane **21** is applied to cover and seal the mounting surfaces **18***a*, **18***a*. The backing membrane **21** consists of a thin ribbon of plastic such as polyethylene or cloth fabric impregnated with polyethylene, the backing membrane **21** being of such width to cover completely one side of the insulator including the mounting surfaces **18***a*, **18***a*. Application of the backing membrane **21** is made by attaching the backing membrane **21** to the self-affixing adhesive surfaces **18***a*, **18***a* and allowing said backing membrane to uncoil from a supply spool and through suitable guide members and thence under a pressure roll which forces the backing membrane into contact with the mounting surfaces **18***a*, **18***a* where it is held in position and pulled along by the action of the continuously moving assembly **12**.

A roller **22**, of conventional design, may be used to apply the wire assembly **12** to a wall **23** which wall may have a smooth or irregular wall surface **24**.

The roller **22** is adapted to engage the flat broad insulator surface **17** and this pressure or force will be transmitted through the ribs **18, 18** to the adhesive **20** with a substantial increase in unit pressure for insuring a firm bond even where the wall surface **24** is irregular.

The insulator ribs **18, 18** perform the following functions:

(1) Since the area of contact of the ribs **18, 18** is much smaller than the area of the wire structure, pressure applied to the wire will be concentrated upon the ribs and with a considerable increase in unit pressure. This insures a complete contact and bonding of the outer edge of the structure with the mounting surface, and a complete and unbroken seal.

(2) The bonding surface is self-leveling since it makes two point contact and at the outer edges. Even if the roller pressure is uneven or not flat with the wire structure, outer edge bonding of the structure is insured.

(3) The high unit pressure concentrated upon the ribs enables deforming the ribs into complete contact with the mounting surface, even though the surface is irregular.

(4) The possibility of the roller lifting clear of the wire structure as it rolls over a raised nib is minimized, since the central area of the bonding surface is hollow, and the ribs deform to accommodate a raised irregularity.

(5) Speed of application is increased, since one rolling is sufficient to bond the wire to the mounting surface.

(6) Since virtually all bonding methods require some means of pressure, it is deemed better to have a small area subjected completely to pressure than a larger area under insufficient or incomplete pressure.

It will be understood that modifications and variations may be effected without departing from the spirit and scope of the novel concepts of the present invention.

I claim as my invention:

1. In an insulated flexible current carrying conductor wire structure for surface mounted application having integral self-affixing and self-supporting means, conductor wires of copper or the like enclosed within an insulating cover of suitable material such as rubber or plastic, the insulating cover configured to form an electrical insulating cover about the conductor wire, several ribs provided on one side of the cover which ribs provide generally flat rear exterior mounting surfaces having a total area substantially less than said side the ribs each being of essentially uniform thickness along its length and across its width for permitting application forces to be more uniformly transmitted from a surface of said cover remote from said mounting surfaces, the total area of the channeled area being at least several times the combined area of the mounting surfaces, the mounting surfaces being coated with a form of pressure sensitive contact bonding adhesive such as uncured natural rubber or the like to provide a self-affixing and bonding agent.

2. The conductor wire structure of claim **1** further characterized by the total area of said mounting surfaces of said ribs being 25% to 33% of the area of said side.

3. An insulated electrical conductor structure comprised of a length of insulator material and including

a base portion having several parallel ribs extending longitudinally along one side of the base portion and with each rib being of essentially uniform transverse thickness throughout its length,

the ribs each having relatively flat mounting surfaces with a channeled area disposed between the ribs, the total area of said channeled area being at least several times larger than the total area of said rib surfaces,

adhesive means on said mounting surfaces, and

several electrical wires embedded in said insulator extending along the length thereof.

4. An insulated electrical conductor structure comprised of a length of insulator material and including

a base portion having several parallel ribs extending longitudinally along opposite margins of one side of the base portion and having a continuous flatted base wall on an opposite side, the ribs each having a continuous rib surface with a continuous uninterrupted channeled area disposed between the ribs and the rib surfaces, the total area of said channeled area being at least several times larger than the total area of said rib surfaces, the ribs each having an essentially uniform thickness along its length thus enabling applied pressures to be uniformly transmitted to the rib surfaces for effective bonding of the rib surfaces to a wall surface, adhesive means on said flatted base wall, and several electrical wires embedded in said insulator extending along the length thereof.

5. An insulated electrical conductor structure comprised of a length of insulator material and including a base portion having several parallel ribs extending longitudinally along opposite margins of one side of the base portion and having a continuous flatted base wall on an opposite side, the ribs each having a continuous rib surface with a continuous uninterrupted channeled area disposed between the ribs and the rib surfaces, the total area of said channeled area being at

least several times larger than the total area of said rib surfaces, the ribs each having an essentially uniform thickness along its length thus enabling applied pressures to be uniformly transmitted to the rib surfaces for effective bonding of the rib surfaces to a wall surface, the total area of said rib surfaces of said ribs being 25% to 33% of the area of said side.

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