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LEAD WIRE TAPE

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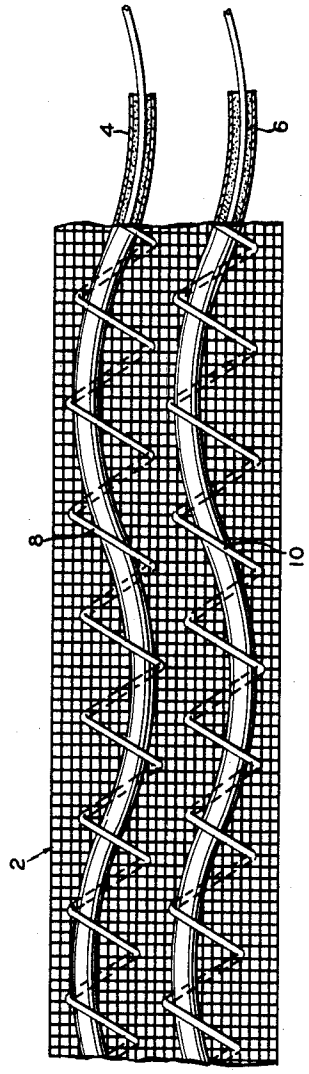

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LEAD WIRE TAPE

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3 Claims. (Cl. 174—117)

This invention relates to a novel lead wire tape which finds utility in applications in which it is necessary to subject a lead wire to great differences in temperature.

More particularly, the novel lead wire tape of this invention finds application in connecting transducers to recording instruments where the transducers are used on rockets, missiles and the like. Transducers are customarily cemented to the exterior metal skin of rockets or missiles, and it is then necessary to run lead wires from the transducers to the recording instrument mounted inside the rocket or missile body. The lead wires must be cemented to the metal skin also since other forms of bonding such as rivets and the like cannot be used.

As the rocket or missile travels through the air, the air friction causes the metal skin to become extremely hot thereby resulting in expansion thereof and, accordingly, it is necessary to compensate for the difference between the coefficient of expansion of the metal skin and the coefficient of expansion of the lead wire. Due to the wide range of temperature to which the rocket or missile is subjected, the difference in coefficient of expansion between the missile skin and the lead wire is sufficient to result in the lead wire breaking or pulling loose from the contacts unless provision is made to compensate for the difference in coefficient of expansion.

In accordance with the present invention, the difficulties resulting from this difference in coefficient of expansion are overcome by mounting the lead wire or wires on a fabric tape. The tape may be formed from any type of fiber which is unaffected by high temperatures, such as glass or quartz fiber and the like. The tape is woven with a relatively loose mesh so that when it is affixed to the skin of a missile, for example, a suitable cement will flow through the interstices in the woven tape, thereby securing the woven tape to the missile skin. The lead wire or wires are sewed to the woven tape by means of threads, which are formed from similar temperature resistant fibers to those used in the woven tape, and the lead wire is secured to the tape in the form of a sinusoidal curve, or any other curve taking a wave form, and thus when the lead wire expands and contracts, the expansion and contraction is taken up in a lateral rather than a longitudinal plane so that there is no possibility of the lead wire breaking or becoming detached from the contacts or the surface to which it has been attached. The lead wire may be of any type desired, and may, for example, consist of Constantan wire run axially through a copper tube, the Constantan lead wire being insulated from the copper tube by means of an insulating material such as aluminum oxide refractory dust swaged to a compact condition between the two conductors. Other insulating materials such as glass or ceramic materials may also be used.

The entire lead wire tape assembly may be bonded to the metal skin of a missile or the like, using a suitable bonding material such as a cement comprising a mixture of silicone resin, mica, and cristobalite silica, such as that described in copending application Serial No. 633,382, filed January 10, 1957.

Referring to the accompanying drawing in which one embodiment of the novel lead wire tape of the invention

is shown, the device consists of the woven fabric tape base 2, which is woven from glass or quartz fiber or the like, this tape base having a pair of coaxial cables 4 and 6 sewed thereto by means of the threads 8 and 10. The coaxial cables are sewn to the woven tape base in the form of a sinusoidal curve, or any other curve taking a wave form, so that the adhesion of the coaxial cables and tape to a metal surface is not impaired due to the difference in coefficient of expansion of the metal cables and that of the metal surface.

In the embodiment shown, the coaxial leads consist of No. 28 Constantan wire run axially through a copper tube having a diameter of 0.043 inch, the Constantan lead being insulated from the outer tube by aluminum oxide refractory dust swaged between the two conductors.

It will be obvious to those skilled in the art that many modifications may be made within the scope of the present invention without departing from the spirit thereof, and the invention includes all such modifications.

We claim:

1. A lead wire tape for high temperature applications comprising an inelastic open woven fabric base made of a material selected from the group consisting of glass and quartz fibers, at least one high temperature resistant lead wire, and means comprising stitching along the length of said wire for loosely securing said wire to said base in a generally wave-like form, the wire having a length overlying said fabric which is greater than the fabric base to which it is secured, whereby the expansion and contraction of said wire occurs in a lateral rather than a longitudinal plane.

2. A lead wire tape for high temperature applications comprising an inelastic open woven fabric base made of a material selected from the group consisting of glass and quartz fibers; at least one high temperature resistant composite wire, including an inner conductor of low temperature coefficient of resistance material, an outer metallic sheath, and refractory material spacing said conductor and said sheath; and means comprising stitching along the length of said wire for loosely securing said wire to said base in a generally wave-like form, the wire having a length overlying said fabric which is greater than the fabric base to which it is secured, whereby the expansion and contraction of said wire occurs in a lateral rather than a longitudinal plane.

3. A lead wire tape for high temperature applications comprising an inelastic open woven fabric base made of a material selected from the group consisting of glass and quartz fibers, at least one high temperature resistant lead wire having a low temperature coefficient of resistance, and means comprising stitching along the length of said wire for loosely securing said wire to said base in a generally wave-like form, the wire having a length overlying said fabric which is greater than the fabric base to which it is secured, whereby the expansion and contraction of said wire occurs in a lateral rather than a longitudinal plane.

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