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(54) Insulating and protective serving or sheathing for wires and cables.

(57) The wire or cable (1) has one or more serving layers (2, 3) spiral wound in opposite directions. The wrapped wire is placed in a oven for compaction of the serving and its bonding to the wire or cable by softening.

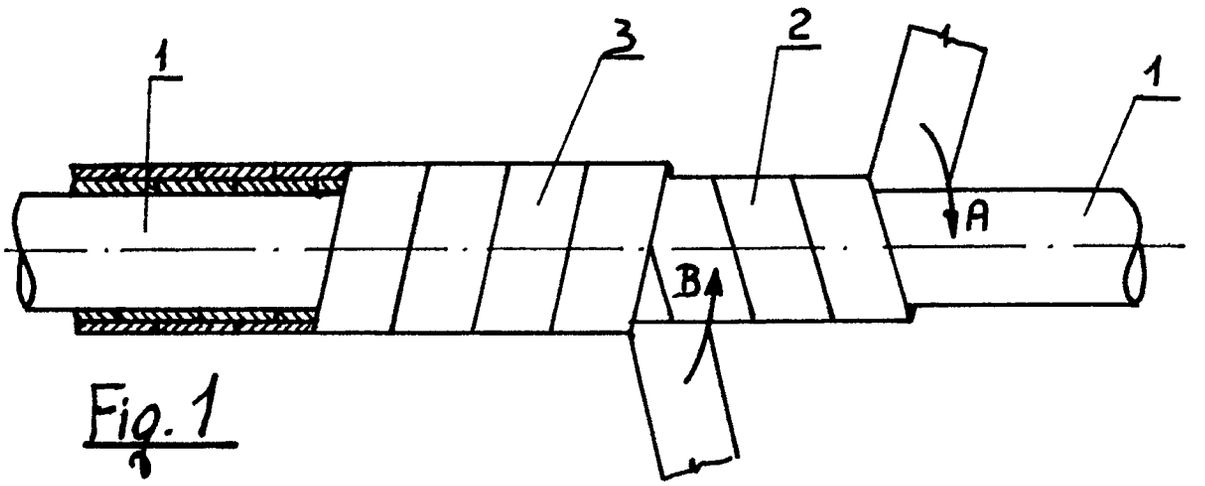

Fig. 1

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This invention covers an insulating and protective serving of wires and cables.

Numerous applications of wires and cables are known, especially for electric installations in the industry and for medical purposes, metal cables for industrial and musical instruments.

For example, this invention specifically refers to permanent probes (pace-makers) acting on the cardiac muscle or used for any other neurologic application.

At present, these single pole probes are consisting of multiple spiral connections (usually four wires) so as to ensure excellent resistance and flexibility. If differentiated loads are applied to the cardiac muscle or any other muscle, the required multiple pole connections have to be insulated both reciprocally and externally, which is currently achieved by silicone sheaths.

The resulting assembly is rather cumbersome, rigid, difficult to insert and difficult to put up with for the patient.

Furthermore, music steel strings of hand played instruments, such as the strings of guitars, mandolins, harps etc. as well as of violins, 'cellos, etc.) are subject to surface corrosion mainly caused by acid perspiration which greatly damages their life and sound quality.

These examples can be extended to many other applications of wires and cables which have to be protected against current leakage and/or corrosion.

This invention has the aim to improve the utilization and life of these wires or cables by means of an insulating and protective serving.

According to this invention, the usually tubular, thread-like wires or cables are protected by an - often multiple layer - wrapping obtained by using insulating and protective spiral wound strap. The turns are tightly placed side by side and each layer is wound in opposite direction with respect to the foregoing.

The wrapped wire is then stoved at a temperature which depends on the wire gauge. Stoving causes softening of the coating and thus improves the bond between turns as well as between wire and sheathing resulting in compaction and waterproofing of the finished wire surface.

Based upon the examples specifically discussed in this invention, the conductors used for permanent cardiac probes are biocompatible and are in material marketed under the trade name MP-35N, but other materials like copper or aluminium conductors may also be used since the insulation prevents direct contact between wire and body. The insulating strap used to protect the probe wire is biocompatible and MYLAR or TEFLON may be used for this purpose.

Oven treatment of the sheathed probe wire shall last 4 - 5 hours at a holding temperature ranging between 90° and 180° C according to the wire gauge of the conductors and the number of wraps.

According to the aims of this invention, it follows that the utilization of conductors in normal materials will permit to cut the production costs of these permanent pace-makers, to reduce space requirements for multiple probes, to improve conductor flexibility and hence to facilitate implantation which will be better tolerated by the patient.

If used for music instruments, the strings are usually in music wire and the protective serving may be the same as used for cardiac probes, i.e. in MYLAR or TEFLON. Thus protected by one or more insulating layers, the strings are no longer etched or exposed to corrosion caused by sweating hands, they will last much longer and maintain their original sound, which is a further objective of this intention. Oven treatment will be the same as for the serving adopted for cardiac probes, except for the fact that the material having the above described characteristics, has a melting temperature of about 270° C.

The invention in question is illustrated in a practical exemplifying two - layer wrap in the enclosed drawing, in which:

Fig.1 shows a lateral view and partial longitudinal section of a wire or cable insulated and protected according to this invention;

Fig.2 shows a cross section area of the wire or cable illustrated in fig.1.

With reference to these figures, 1 refers to the wire or cable covered by a first layer 2 consisting of a strap tightly spiral-wrapped in one (e.g. anticlockwise) direction, topped by another layer 3 consisting of a strap tightly spiral-wrapped in the opposite (clockwise) direction. Obviously, these two layers may be covered by a third layer, spiral-wrapped in the same direction as the first one; the third layer may then be topped by a fourth, the spiral wrap of which will have the same direction as the second, and so on.

The straps used for the wrappings 2, 3 and following layers are usually in the same material and of the same size.

When used for permanent probes, the conductor gauge is ranging between 0.10 and 0.14 mm and the strap thickness is about 14 micron. If two layers are applied, the final insulated and sheathed wire will have a diameter of ≈0.16 - 0.20 mm.

The steel strings of music instruments have a gauge ranging between 0.2 and 1.5 mm and will be protected by the same 14 micron strap mentioned above.

The width of the strap will depend on the original diameter of the section which is reduced to 14 micron by drawing; for indicatory purposes, this

width may be approx. 1 mm.

As mentioned above, the strap may be in merchant type MYLAR or TEFLON which are both **biocompatible** and have excellent anticorrosion and insulating properties, although any other appropriate material may also be used for this purpose.

According to this invention, after application of the insulating and protective serving, the wire or cable is placed in an oven for compaction of the wraps by bonding the layers both reciprocally and to the wire or cable. Compaction is achieved by softening of the strap material which will require a temperature ranging between 90° and 180° C (the melting point of MYLAR and TEFLON being about 270° C) and a holding time of 4 - 5 hours, depending on the wire gauge and on the number or wraps.

It is clear that the description regarding permanent probe wires and instruments strings may be extended to any other applications involving wires or cables requiring efficient protection and insulation, such as used for electronic, and high precision scientific instruments and the like.

Claims

1. Insulating and protective serving of wires and cables, **characterized** by the fact that it is consisting of one or more layers of strap spiral wrapped around the wire or cable (1) which is then oven stoved to soften the strap material in order to achieve compaction of the strap layers and their bonding, both reciprocally and to the wire or cable.

2. Sheathing as described in claim 1), **characterized** by the fact that the spiral turns of each layer (2, 3) are placed closely to each other.

3. Sheathing as described in claim 1, **characterized** by the fact that the spiral turns (2, 3) are wound in alternating directions.

4. Sheathing as described in claim 1, **characterized** by the fact that the strap used for the serving (2, 3) is in electric insulating material.

5. Sheathing as described in claim 1, **characterized** by the fact that the strap used for the serving (2, 3) is in corrosionproofing material.

6. Sheathing as described in claim 1, **characterized** by the fact that the strap is in material bearing the brand name MYLAR or TEFLON featuring excellent insulating, protective and biocompatible properties.

7. Sheathing as described in claim 6, **characterized** by the fact that the MYLAR or TEFLON used for the serving has a thickness of about 14 micron.

8. Sheathing as described in claim 6, **characterized** by the fact that the oven treatment of the MYLAR or TEFLON strap takes 4 - 5 hours at a holding temperature ranging between 90° and 180° C, according to the wire gauge and number of layers.

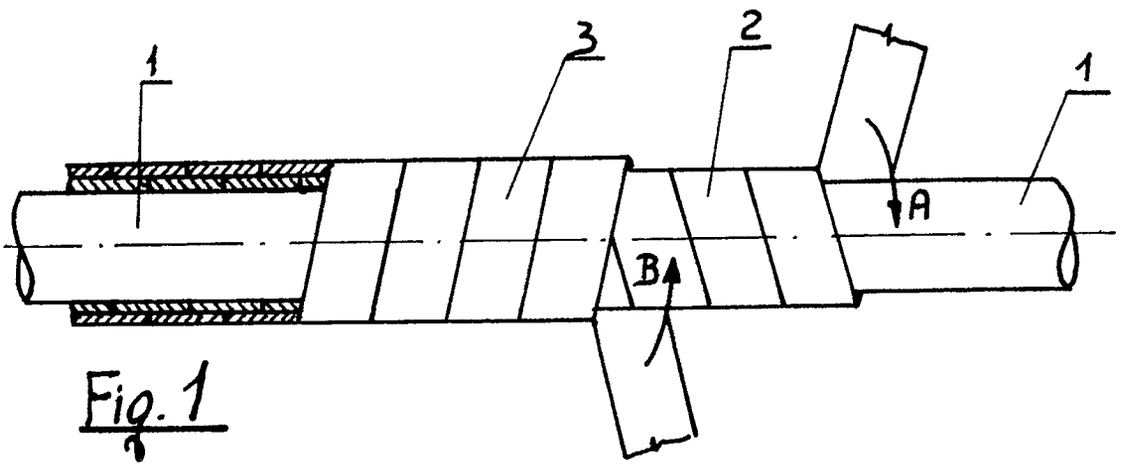

Fig. 1

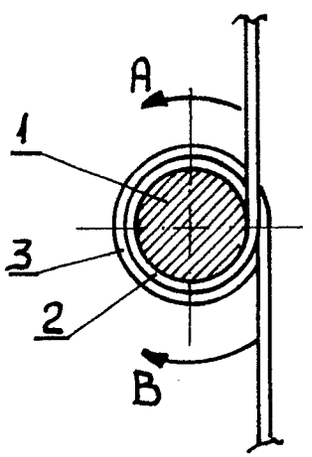

Fig. 2