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## (54) Rubber tube for thermally insulating electric cables.

(57) The present invention relates to a rubber tube for containing and insulating electric connection cables in manufacturing plant in the iron and steel industry, such as induction furnaces. The tube comprises a rubber band (3) wrapped on a covering layer (2) which has a contrasting color and forms a raised helical ridge. A containment band (4), made of fabric, is wrapped in a helix on the covering layer (2) between the edges of said rubber band (3), on which it is superimposed. The rubber and fabric bands (3,4) are welded to one another and to the rest of the structure by means of the known final operation of vulcanizing the tube.

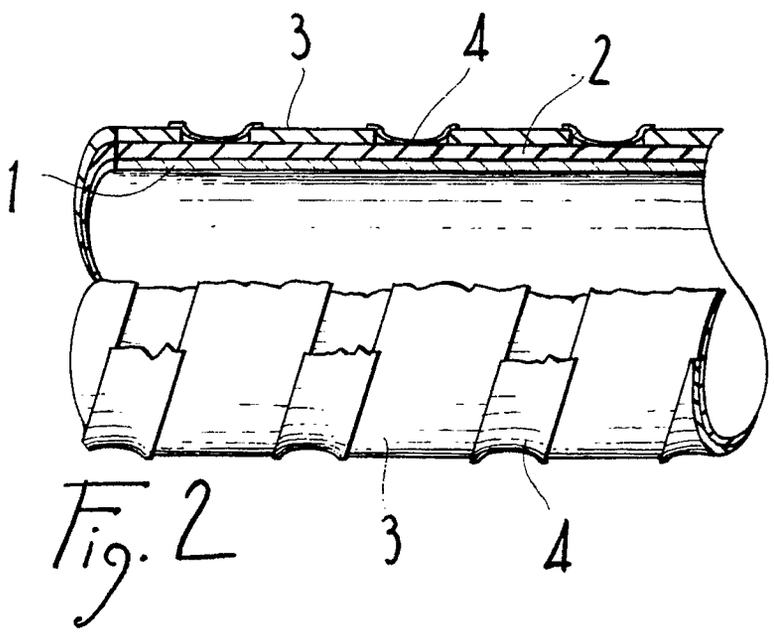


Fig. 2

EP 0 417 656 A2

# RUBBER TUBE FOR THERMALLY INSULATING ELECTRIC CABLES

The present invention relates to a rubber tube for thermally insulating electric cables which can be used particularly but not exclusively for containing and insulating electric connection cables in the iron and steel industry, for example for electric induction furnaces.

Tubes composed of special rubber mixes with excellent electrical insulation properties are currently used as sheaths for containing and cooling electric cables in manufacturing plant, such as electric induction furnaces, in the iron and steel industry.

The tubes are protected from the hot environment in which they must operate through the insertion of asbestos or aramide or glass fiber fabrics according to the operating conditions or to the requirements of the operators.

During operation, the tubes are arranged in a loop between two coupling points, at least one of which is movable. The tubes are gathered in bundles, and are subjected to frequent and rapid movements which causes the contacting surfaces of adjacent tubes to rub against each other and thus be subjected to wear.

Due to the fact that, as mentioned, the tubes are almost always gathered in bundles and are therefore arranged very close to one another, the rubbing together of the contacting surfaces of the tubes causes, in a short period of time, the wear of the various layers of the tube.

The deterioration of the outer fabric, which has a heat-shielding function, produces a rapid process of carbonization of the internal rubber, caused by the high temperatures at the worksite whereat the tubes are used.

In order to obviate this disadvantage, sleeves of various materials are currently fixed, by means of metal clamps, at regular distances, on the outer surface of the tubes.

Said sleeves have the function of mutually spacing the tubes apart, so as to protect the covering of each tube from wear caused by frictional contact with adjacent tubes.

However, this has led to other disadvantages which are mainly due to the cost of fixing the sleeves (an operation which is normally performed by the installer) and due to their limited working life, with the consequent need for numerous maintenance interventions.

Furthermore, wear of the tubes between or beneath the sleeves and/or fixing clamps may sometimes be difficult to detect and may thus be potentially dangerous.

The aim of the present invention is to provide a rubber tube particular for containing and insulating electric cables used in manufacturing plant in the iron and steel industry, which eliminates the disadvantages described above in known types, which is more economical in assembly and maintenance, and which has a longer operating life.

A consequent primary object of the invention is to provide a rubber tube for containing and thermally insulating electric cables which can be produced with conventional methods.

Another important object is to provide a rubber tube for containing and thermally insulating electric cables which allows an immediate viewing of the state of the protective parts which are subjected to wear.

This aim, these objects and others which will become apparent hereinafter are achieved by a rubber tube for insulating and containing electric cables, characterized in that it comprises a rubber band wrapped on a covering layer, which has a contrasting color and forms a raised helical ridge, a fabric containment band being wrapped in a helix on said covering layer between the edges of said rubber band on which it is superimposed, said rubber and fabric bands being welded to one another and to the rest of the structure by a vulcanization operation.

Further characteristics and advantages will become apparent from the detailed description of an embodiment of the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a perspective view of a portion of a tube according to the invention;

figure 2 is a sectional view of the tube of figure 1 before vulcanization;

figure 3 is a partial sectional view of the tube of figure 1 after vulcanization.

With reference to the above figures, a tube according to the invention comprises an inner layer 1 made of rubber with excellent electrical insulation characteristics, produced with conventional methods for producing wrapped tubes.

The inner layer 1 is covered by an insulating layer 2 made of heat-proof fabric, for example asbestos, aramide, glass fiber etc., which conveniently has a light coloring, for example white.

According to the invention, a band 3 made of rubber with high heat resistance, conveniently of a color which contrasts with that of the layer 2, for example black, is wrapped on said covering layer 2.

Said rubber band 3, which forms a raised helical ridge on the layer 2, has a significant thickness, at least in the range of ten millimeters, and constitutes an element adapted for resisting abra-

sion and rough handling, protecting the heat-insulating fabrics and therefore the entire body of the tube.

A containment band 4 made of fabric is wrapped in a helix on the covering layer 2, between the edges of the rubber band 3 on which it is superimposed; said band 4 is welded to said rubber band 3 and to the rest of the structure of the tube by a final conventional vulcanization operation which is usually performed to produce wrapped tubes.

As previously mentioned, the helical ridge constituted by the rubber band 3 acts as element for absorbing shocks and rough-handling and for resisting abrasion to which it is subjected and which cause it to wear, in the course of time, until the lower white layer 2 is exposed.

The user is therefore warned of the need to replace the tube to avoid damage to the electric cables which it contains.

It has thus been observed in practice that the invention has achieved the intended aim and objects, since its use achieves evident savings in assembly, as it is already produced with a built-in protective element, thus eliminating the current cost of the fixing of the sleeves.

Due to its particular shape, the tube can be installed for a longer duration with respect to current ones and in any case can visually inform the user of its state of wear, thereby entailing evident savings from the point of view of maintenance.

The invention thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may furthermore be replaced with other technically equivalent elements.

In practice, the materials employed, as well as the dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

## Claims

1. Rubber tube for insulating and containing electric cables, characterized in that it comprises a rubber band wrapped on a covering layer thereof which has a contrasting color, forming a raised helical ridge, a fabric containment band being wrapped in a helix on said covering layer between the edges of the rubber band on which it is superimposed, said rubber and fabric bands being welded to one another and to the rest of the structure by a vulcanization operation.

2. Rubber tube according to claim 1, characterized in that said covering layer is made of rubber with fabrics which have high heat resistance, such as for example fabrics made of asbestos, aramide, glass fiber etc.

3. Rubber tube according to claims 1 and 2, characterized in that said rubber band which is wrapped so as to form said raised helical ridge is made of rubber with high heat resistance.

4. Rubber tube according to one or more of the preceding claims, characterized in that the thickness of said rubber band which is wrapped so as to form a helical raised ridge is at least 10 mm.

5. Rubber tube according to one or more of the preceding claims, characterized in that said fabric containment band has such a width as to superimpose its edges on those of said rubber band, compressing them with said vulcanization operation.

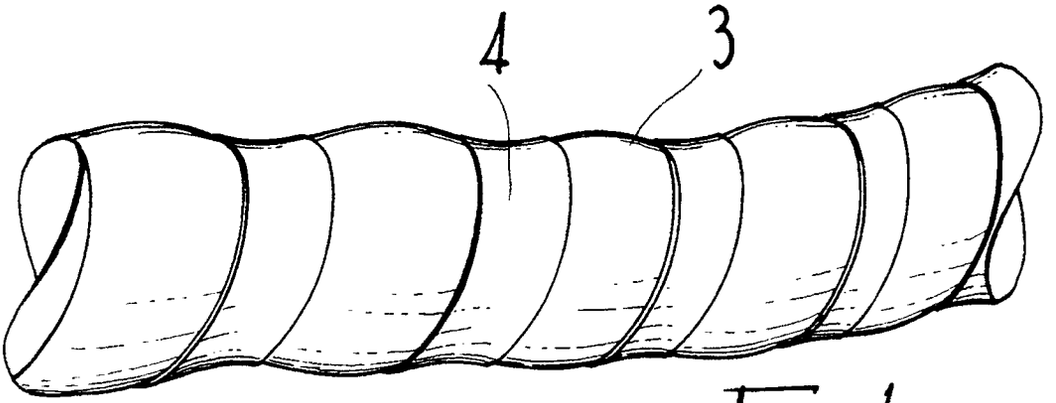


Fig. 1

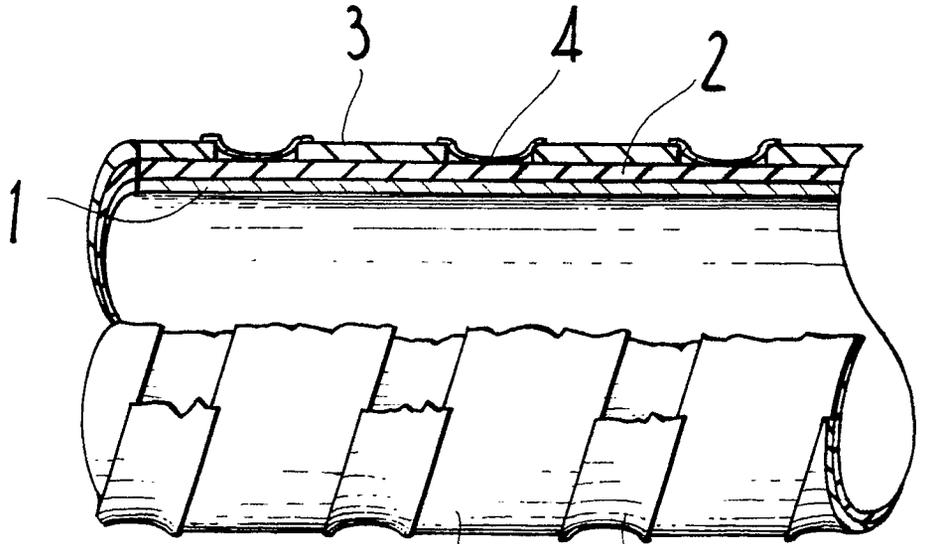


Fig. 2

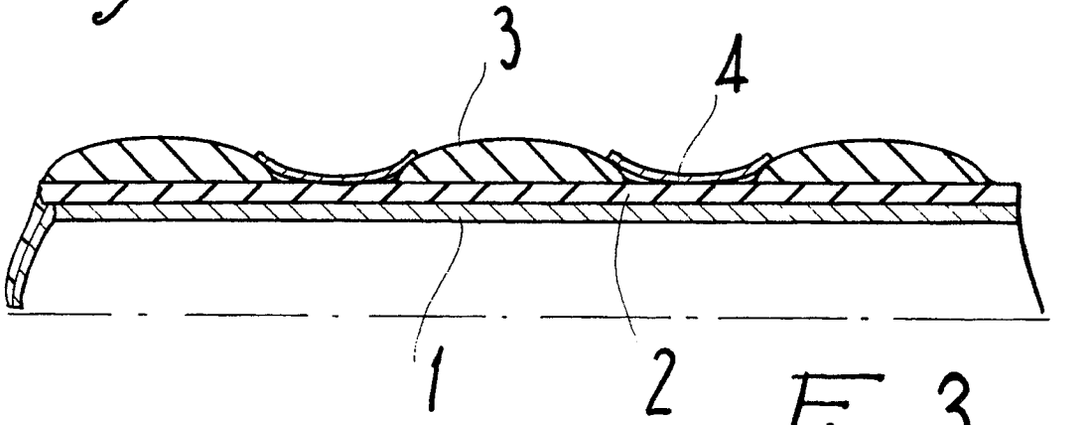


Fig. 3