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P. SIMONS

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INSULATING TAPE

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Fig. 1

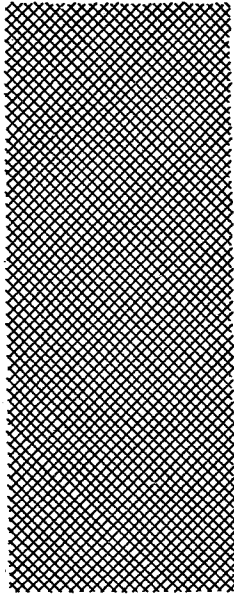
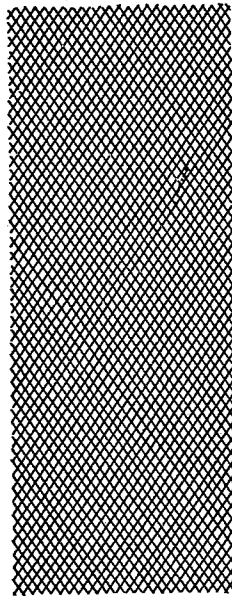


Fig. 2



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INSULATING TAPE

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My invention relates to insulating tapes.

The insulating tapes hitherto known which are particularly employed in electrical engineering with or without a layer of insulating varnish produced through impregnation, are made of an extendible woven fabric, which is woven round or flat into a tubular form and made into tapes by being cut spirally. In these tapes the warp and weft threads run at an angle to the side edge of the tape, the same as in the so-called "bias cloth." Insulating tapes of the same kind can also be made by cutting strips having the shape of rhomboids from a square mesh fabric, and sewing them together at the selvages, so that also by these means a tape is produced with straight side edges and with threads running obliquely to the latter.

The warp threads and the weft threads of the diagonal cloth obtained in the above manner form an angle of 90° with one another, the same as in every ordinary cloth, and a bias cloth of this kind with its threads at right angles to one another is, owing to the oblique position of the threads with respect to the side edge, capable of being stretched very much. In itself, a certain elasticity lengthways of the insulating tapes is necessary in order that the tapes may be wound under tension by hand or machine tightly round the object to be enveloped. The insulating tapes made of bias cloth, in which the threads interlace at right angles as hitherto known, have certain disadvantages, which must be ascribed to the insulating tapes stretching too much. It is in particular proved that the tapes of bias cloth impregnated with insulating varnish stretch so much at the tension exerted in winding them onto the object that the insulating varnish loses its close structure and become porous and cracks whereby the insulating capacity of the tape is reduced to a fraction of its original di-electric strength.

It has also been shown that the tightness

of the winding relaxes in the course of time, owing to a subsequent further stretching of the tape.

These drawbacks in the tape are eliminated according to the present invention by cutting the tape from a cloth also consisting of warp and weft threads running obliquely to the side edge but being able to stretch only to a certain degree. The extensibility is limited according to the invention by placing the warp and weft threads against one another so that in the longitudinal direction of the cloth, and of the tape cut therefrom, an acute angle is formed. The angle of the crossing of the threads can be made so acute that hardly any stretch remains in the cloth.

A suitable manner of making the new cloth is primarily to produce in the known manner a bias cloth with its threads interlacing at right angles in the usual fashion, either by cutting a tubular fabric in spirals or by sewing rhomboidal pieces of cloth together at their selvages. The bias cloth is then, preferably in a moistened or steamed condition, stretched by a method known in itself in the textile art until the angle which points in longitudinal direction and at which the threads cross one another is acute enough to be suitable for the purpose for which the insulating tape is to be employed. When thus stretched the cloth becomes longer but narrower, and at the same time the angle at the crossing points of the threads pointing with their vertex in the longitudinal direction of the strip of cloth becomes more acute in accordance with the degree to which it is stretched. The angle can for instance assume values of 80° to 60° . The definitive angle at which the threads cross one another is so chosen that, taking the kind and weight of the cloth into consideration, sufficient elasticity remains in the bias cloth for the purpose for which it is to be employed.

It is known to stretch cloth with its threads running parallel and at right angles to the

selvage until its elasticity is removed. But such cloth can be stretched but very little, and the small elasticity it possesses is due to the twist the threads receive in spinning. For insulating tapes cloth of that kind cannot be used, whether stretched or not. On the other hand it is known to arrange, in the cloth linings of pneumatic tires for bicycles and the like which have threads running obliquely to the side edges of the selvage, the threads in the edge zones of the selvage to cross one another at such an obtuse angle, that when air is pumped into the tire, in the edge zones of the cloth the greatest possible extension can take place transversely to the circumferential direction of the tire. The object of the invention is on the contrary, to reduce in bias cloth to a certain degree the great extensibility in the direction of the tension applied, and to thereby prevent a subsequent stretching of the tape made from it, after they are wound round the object and particularly to ensure that in tapes impregnated with insulating varnish, the varnish retains its density and di-electric strength even if the tapes are wound round with a strong pull by a machine.

For instance, insulating tapes for high tension purposes, which are wound round at a considerable tension by a winding machine are according to the invention tensioned to such a degree, that the tape, when being applied cannot be stretched more than 10%, whereas the insulating tapes hitherto known and consisting of the usual diagonal cloth with threads crossing one another at right angles often have a strength of 20%.

When the tapes are wound by hand, the pull exerted in applying the tape is less and in that case a more elastic cloth with threads crossing one another at a less acute angle may be chosen. In every case when choosing the angle to be formed by the threads, the pull exerted in applying the tapes, the kind of cloth and the sort of varnish used must be taken into consideration, in order that the degree to which the tape may be stretched is not exceeded.

For the novel cloth, as a rule, the angle formed by the threads and pointing with its vertex in the longitudinal direction of the cloth (Gewebebahn), is made as small as 60°. If the crossing angle of the threads is made smaller than 60° then the stretching capacity of the woven fabrics coming into consideration for insulating tapes is nearly reduced to nothing, so that only the comparatively small elasticity of the thread itself is still effective. For certain engineering purposes for example particularly for low tension tapes which are made without stiffening and impregnation and are therefore cheap to make, cloth of the above kind also has the advantage that it may be cut from any part of the cloth without fraying. Instead of using the

novel cloth for insulating tapes, it may also be used for other purposes, requiring a reduced elasticity. Bias cloth in which the mesh angle is 60° and less, can be used for all kinds of tapes and ribbons, which may be cut from any part of the cloth without fraying.

In the drawing the subject-matter of the invention is schematically illustrated.

Fig. 1 represents a bias cloth tape made in the usual manner with the warp and weft threads interlacing at right angles and running obliquely to the longitudinal direction.

Fig. 2 shows bias cloth tape according to the invention in a stretched condition with its warp and weft threads running obliquely to the longitudinal direction and forming where they interlace an acute angle in the longitudinal direction of the tape.

I claim as my invention:—

1. An insulating tape made of strips cut from a woven fabric having its warp and weft threads running obliquely to its lateral edges, said warp and weft threads forming at their crossings acute angles pointing in longitudinal direction of the tape.

2. An insulating tape for electrical engineering purposes made of strips cut from a woven fabric having its warp and weft threads running obliquely to its lateral edges, said warp and weft threads forming at their crossings acute angles pointing in longitudinal direction of the tape.

3. A method of transforming bias cloth having warp and weft threads crossing at right angles into insulating tape having its warp and weft threads inclined at an acute angle pointing in longitudinal direction of the tape, consisting in stretching square mesh bias cloth in a direction in parallel to its lateral edges until the said warp and weft threads form the desired acute angle.

4. A method of transforming bias cloth having warp and weft threads crossing at right angles into insulating tape having its warp and weft threads inclined at an acute angle pointing in longitudinal direction of the tape, consisting in stretching square mesh bias cloth in a direction in parallel to its lateral edges until the said warp and weft threads form the desired acute angle, and applying the required dressing to the material in the acute angular position of the threads.

5. A method of transforming bias cloth having warp and weft threads crossing at right angles into insulating tape having its warp and weft threads inclined at an acute angle pointing in longitudinal direction of the tape, consisting in stretching square mesh bias cloth in a direction in parallel to its lateral edges until the said warp and weft threads form the desired acute angle, and cutting the stretched acute angle bias cloth longitudinally into strips to form tapes of the desired width.

6. A method of transforming bias cloth having warp and weft threads crossing at right angles into insulating tape having its warp and weft threads inclined at an acute angle pointing in longitudinal direction of the tape, consisting in stretching square mesh bias cloth in a direction in parallel to its lateral edges until the said warp and weft threads form the desired acute angle, impregnating the stretched cloth with varnish and cutting the stretched and varnished cloth longitudinally of its edges into strips of suitable width to form the tape.

In testimony whereof I affix my signature.
PAUL SIMONS.

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