Nov. 18, 1930. H. I. DIAMOND 1,781,896

BIAS INSULATING TAPE

Filed Dec. 13, 1927

Fig. 1.

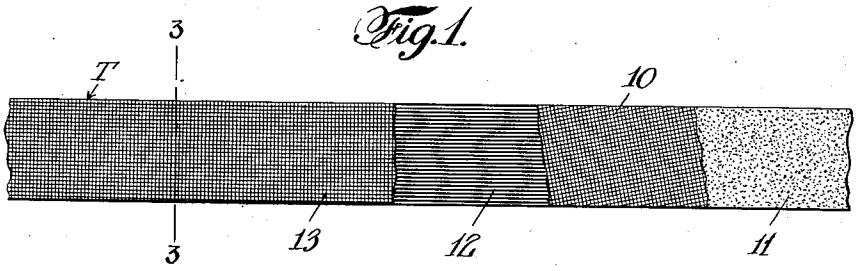


Fig. 2.

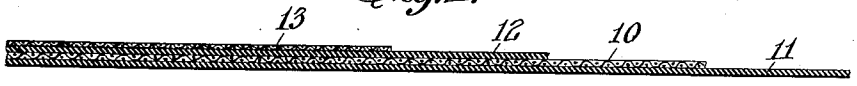


Fig. 3.

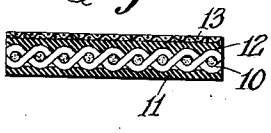


Fig. 4.

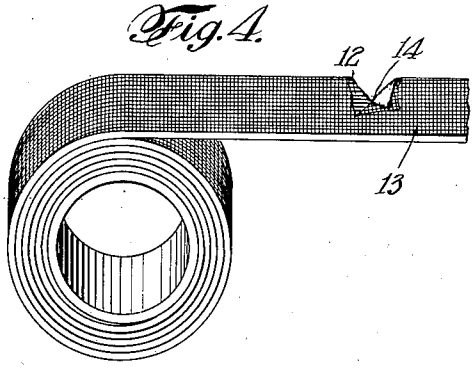
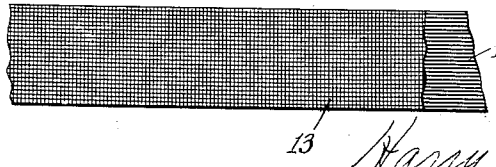


Fig. 5.



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UNITED STATES PATENT OFFICE

HARRY I. DIAMOND, OF ATLANTA, GEORGIA

BIAS INSULATING TAPE

Application filed December 13, 1927. Serial No. 239,687.

The present invention relates to an insulating tape, more especially to a bias insulating tape susceptible of a number of uses, particular among which is as an insulating wrapping for electrical conductors.

Tape of the character now commonly used, includes in its structure a straight cut fabric strip, that is a fabric strip with its longitudinal edges running parallel with its warped threads and its transverse threads lying at substantially right angles to the edges.

In the use of insulating tape, it is usual to first wind about electrical conductors strips of highly insulated material, such as a soft adhesive rubber or gutta percha compound, and afterwards to cover this insulation by winding about it a strip of fabric having "friction" material upon its faces. This practice is objectionable, because it often happens that the workmen will omit the first winding and use only the strip of fabric capable of insulating to a relatively small degree.

A further objection lies in the fact that the first winding being of a soft or plastic material cannot be wound tightly, as it will not withstand a substantial pulling strain to effect a tight winding free from bulges, puckers or folds.

It has, therefore, been found desirable to combine the two strips or windings heretofore used into one unitary tape, the fabric strip of which will reinforce and give body to the soft plastic strip enabling it to be wound tightly.

The use of either type of tape, above defined, however, does not readily lend itself in wrapping curved or irregular surfaces or in wrapping in a spiral, as about spliced ends of two electrical conductors because it does not have sufficient stretch or elasticity to prevent bulging or puckering thereof. It is desirable to have the wrapping smooth and free from puckers or folds, not only to make a neat appearance but to provide a tight even wrapping which will exclude air and moisture from the interior of the wrapping.

The invention, therefore, has for its object the provision of a bias insulating tape which will permit the same to be wound spirally or over irregular surfaces in a smooth manner.

Another object of this invention is to provide a bias tape that may be readily torn transversely by the workmen in order to sever the desired portion for use from the supply or roll.

It is a further object of the invention to provide a bias insulating tape of the unitary character, above defined, where a temporary protective strip or layer is superimposed upon the soft adhesive insulating layer, this protective strip being of such a character that the same may be torn by the hand simultaneously with the bias strip of the tape, said strips being so associated with respect to each other that said tearing will produce a projecting tab, at the torn or severed edges, facilitating the ready separation of the tape proper from the temporary protective strip.

The other objects and features of invention will appear from sundry details of construction, operation and arrangement of parts hereafter specifically described and pointed out in the appended claims.

In the drawings which show the invention as at present devised:

Figure 1 shows one of the broad faces of a tape made in accordance with the invention with its several layers broken away to show in succession a small portion of the various layers;

Figure 2 is a longitudinal section through the tape showing Figure 1, the layers being greatly exaggerated in thickness for the purpose of clarity;

Figure 3 is a transverse sectional view of the tape taken substantially on the line 3—3 of Figure 1.

Figure 4 is a prospective view showing the act of tearing the tape transversely; and

Figure 5 is a plan view of a piece of the tape which has been torn in the manner shown in Figure 4.

Referring in detail to the drawings, T designates the tape of the invention built up to include a strip 10 of fabric cut on the bias

having one face coated with a friction material 11, and having united thereto on its other face, preferably by pressure, a layer strip 12 of rubber or any other approved highly adhesive and highly insulating material. It is to be understood that it is within the purview of this present invention to have both faces of the fabric 10 skin-coated with the friction material 11 and the insulating layer 12 applied directly to one of the friction coated surfaces. To the outer or highly adhesive layer 12 is applied a protective strip 13, preferably in the form of a sized fabric, known as "Holland", to which the layer 12 will only moderately adhere, the protective strip being for the purpose of preventing the convolutions from adhering when the tape is in roll form.

When a portion of the tape is required for use, a convenient length is unwound, the protective layer 13 is stripped from the layer 12 and the exposed face of the layer 12 is then applied to the electrical conductor or other objects in the usual way. Obviously this tape combines the functions of two tapes commonly used, as the layer 12 forms a highly insulating covering and the fabric layer 10 forms the covering or protective layer of the insulating wrapping, it being understood, of course, that this tape is usually wound in a helical form with its edges slightly overlapping and is pulled tightly during the winding operation to close all crevices and interstices to exclude air and moisture. It will be appreciated that the fabric layer 10 will withstand the strain of the pull incident with the tight wrapping of the tape in the manner described which would not be sustained by a strip of rubber of sufficient softness as is required to obtain a proper contact between the object wrapped and the insulating layer.

As has been stated above, a tape of the ordinary straight cut fabrics will not admit of a smooth, even wrapping in helical form or around irregular surfaces as may occur in the spliced ends of electrical conductors or the like, and for this reason applicant provides his fabric layer 10 in the form of a bias strip.

However, the difficulty in the use of bias strips for insulating tape has been that it strongly resists tearing to the extent of making the use of a cutting tool necessary, which the workman finds inconvenient to handle, and consequently bias insulating tapes have not been regarded as practical.

It has been found that if the bias strip 10 is cut so that one set of threads is disposed at an angle between 5° and 40° relative to the longitudinal edge of the strip, the same may be torn readily by the hand without any inconvenience, and at the same time the tape will have sufficient elasticity, due to its bias, to permit it to be pulled and stretched around irregular surfaces in a manner that will produce the desired and proper smooth winding. The best result can be obtained with the tape when the fabric 10 has been cut on a bias so that one set of the threads is disposed at an angle between 10° and 25° relative to the longitudinal edge of the strip, although any degree between 5° and 40° will give satisfactory results.

With tapes as herein shown, a temporary protective strip 13 is required as a practical measure and, when this strip is of a fabric, the same is not bias but straight cut, thereby offering no hindrances to the manual tearing of the tape in a transverse direction, but assists in effecting the initial portion of the tear in the fabric 10, which is simultaneously made therewith. Furthermore, by virtue of the fabric 10 being bias and the strip 13 being straight cut, this tearing of the tape, as shown in Figure 4, results in either the torn end of the strip 10 or strip 13 projecting beyond the other, thus forming a tab 15 which facilitates the separation of the tape proper T from the protecting strip 13.

Insulating tapes are generally passed through a calender either to friction coat them or to apply a thicker layer of insulating material, such as the layer 12. It is found that to employ a usual bias-cut fabric wherein the threads are disposed at an angle or 45° relative to the longitudinal edge of the strip, the fabric becomes distorted while passing through the calender, making the resultant strip very inconvenient to handle and undesirable in a number of respects. Therefore, by reducing the angle of one set of the threads of the strip 10 a more perfect result is obtained while calendering the same, and the best result as before stated is obtained when one set of the threads is disposed at an angle between 10° and 25° relative to the longitudinal edge of the strip. However, in the drawings the fabric is shown as being cut on a bias wherein one set of the threads is disposed at an angle of 17° relative to the longitudinal edge of the fabric.

It will be manifest from the above that a very novel, efficient and inexpensive insulating tape has been provided, which is unitary in structure, eliminating the necessity of the two windings now required to make a proper insulated covering for electrical conductors, and which also has incorporated in this structure means permitting the tape to have the elasticity necessary for smooth and proper helical wrapping or covering irregular surfaces, while, at the same time, is of such a character as may be manually torn transversely when desired, and will also provide a tab facilitating the separation of the temporary protective strip from the tape as a result of said tearing.

While the tape shown herein is provided with the rubber insulating layer 12, it is un-

derstood that this invention is not limited to this disclosure and may be used in connection solely with ordinary friction tape with or without the temporary protective covering or strip 13. It is also preferred in the manufacture of this invention to produce the same in continuous unbroken strips instead of a plurality of bias strip sections joined together at their ends.

It is also clear that, while this invention has been disclosed in connection with so-called insulating and friction tape, it is likewise useful in connection with surgical adhesive tape, and it is to be understood that my invention may include this and other tapes of a similar nature.

What is claimed is:

1. A wrapping tape comprising a bias-cut fabric strip, one set of the threads of said fabric being disposed at an angle between 5° and 40° relative to the longitudinal edge of the strip, whereby the strip may be readily manually torn and pulled smooth when wound irregularly or about irregular surfaces, and an adhesive material on said strip.

2. A wrapping tape comprising a stretchable bias-cut fabric strip, one set of the threads being disposed at an angle of about 17° relative to the longitudinal edge of the strip, whereby the strip may be manually torn and pulled smooth when wound irregularly, and an adhesive material on said strip.

3. A wrapping tape comprising a stretchable adhesive strip, and a protective covering strip on one face of said adhesive strip, said adhesive strip being of bias-cut fabric having one set of its threads disposed at an angle between 10° and 25° relative to the longitudinal edge of the strip and said protective strip being straight cut.

4. A wrapping tape of the kind described comprising a bias-cut stretchable adhesive strip having one set of its threads disposed at an angle between 5° and 40° relative to the longitudinal edge of the strip, a protective covering strip of straight cut fabric on the adhesive material on said strip whereby said strip may be manually torn transversely, whereby a projecting tab is provided at said severed ends as a result of said tearing to facilitate the separation of said strips.

5. A wrapping tape of the kind described comprising a bias-cut stretchable insulating strip having one set of its threads disposed at an angle of about 17° relative to the longitudinal edge of the strip, a protective strip on said strip, said protective strip being straight cut.

6. An insulating tape comprising a bias-cut fabric strip having one set of threads disposed at an angle between 10° and 25° relative to the longitudinal edge of the strip, whereby the same may be pulled smooth when wound irregularly and manually torn in a transverse direction, and an insulating material on said strip.

7. An insulating tape comprising a bias-cut fabric strip having one set of threads disposed at an angle between 10° and 25° relative to the longitudinal edge of the strip, whereby the same may be pulled smooth when wound irregularly and manually torn in a transverse direction, an insulating material on said strip, and a temporary protective covering strip of straight cut fabric superposed on one surface of said bias cut strip.

8. An insulating tape comprising a bias-cut fabric strip treated with rubber, said fabric having one set of threads disposed at an angle between 10° and 25° relative to the longitudinal edge of the strip, whereby the same may be pulled smooth when wound irregularly and manually torn in a transverse direction, and a temporary protective covering strip of straight cut fabric superposed on one surface of said bias cut strip.

9. An insulating tape comprising a bias-cut fabric having one set of the threads disposed at an angle between 5° and 40° relative to the longitudinal edge of the fabric, said fabric having coatings of adhesive material and rubber supposed thereon.

10. An insulating tape comprising a bias-cut fabric having one set of the threads disposed at an angle between 10° and 25° relative to the longitudinal edge of the fabric, said fabric having coatings of adhesive material and rubber superposed thereon.

11. An insulating tape comprising a bias-cut fabric having one set of threads disposed at an angle of about 17° relative to the longitudinal edge of the fabric, said fabric having coatings of adhesive material and rubber superposed thereon.

12. An insulating tape comprising a bias-cut fabric having one set of the threads disposed at an angle between 5° and 40° relative to the longitudinal edge of the strip, a coating of friction material on one side thereof, a coating of rubber on the other side thereof, and a removable protective covering on said rubber coating.

13. An insulating tape comprising a bias-cut fabric having one set of the threads disposed at an angle of about 17° relative to the longitudinal edge of the strip, a coating of friction material on one side thereof, a coating of rubber on the other side thereof, and a removable protective covering on said rubber coating.

In testimony whereof, I have affixed my signature to this specification.

HARRY I. DIAMOND.