

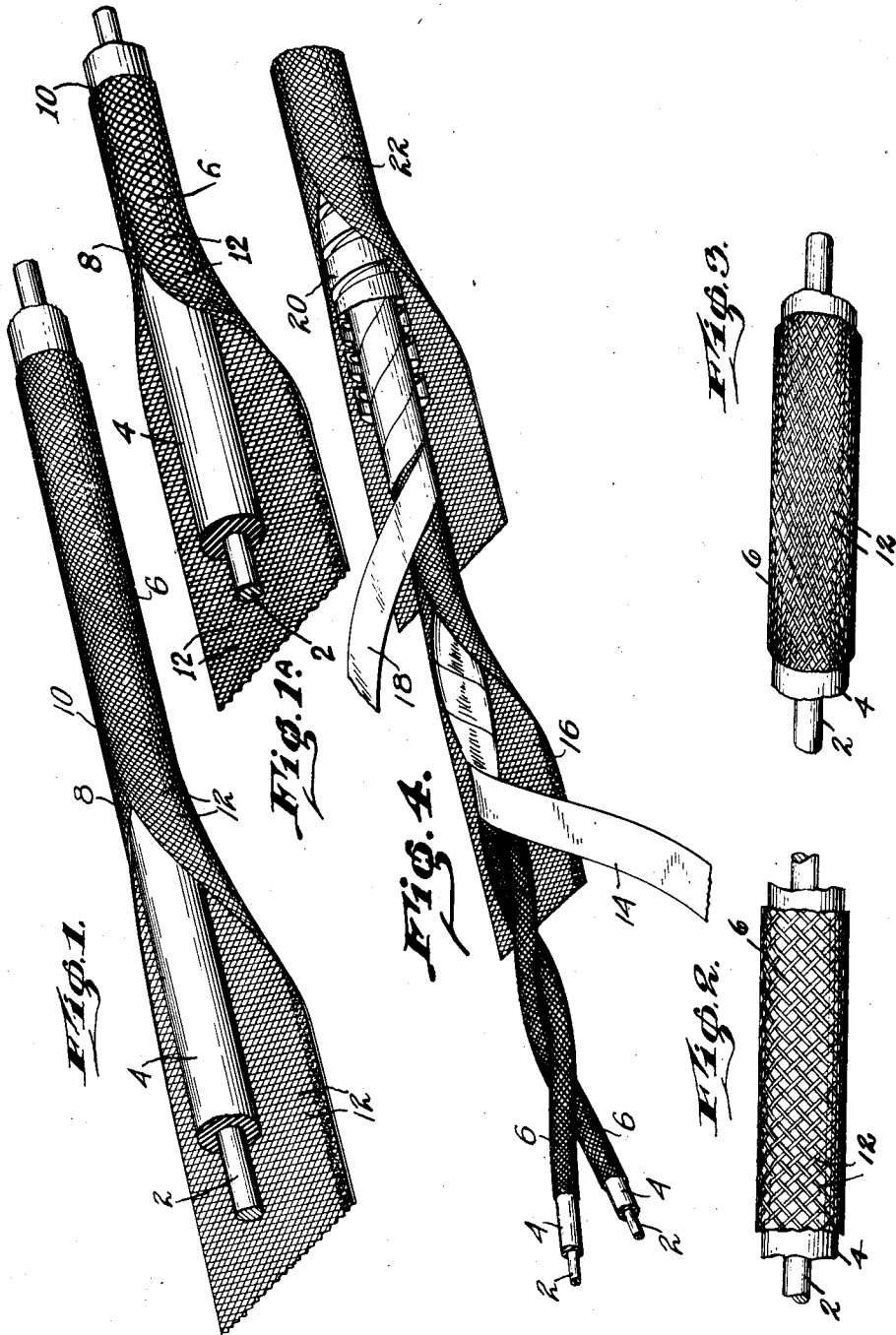
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ELECTRIC CONDUCTOR

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ELECTRIC CONDUCTOR

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9 Claims. (Cl. 174—120)

This invention is directed to the provision of a new and novel construction in insulated conductors.

Under present practice in some types of insulated conductor it is customary to braid cotton threads about the conductor insulation, or to wrap one or more cotton threads helically about the insulation. It is customary also to braid cotton threads about an assembly of two or more conductors, the cotton braid being applied directly about the insulated conductors and/or the assembly of conductors. It is quite usual also to wrap paper tape helically about an insulated conductor assembly after which cotton threads are braided about the whole assembly.

The present invention entirely eliminates the use of braid and the braiding operation, the same protection, however, being afforded the insulated conductor.

By eliminating the braiding operation I effect great economies in machinery and floor space.

The elimination of the use of braid also provides for a very large increase in output in that by my invention the insulated conductor can be covered at the rate of as high as 500 feet per minute as compared with 180 feet per hour or but 3 feet per minute which is about maximum braiding speed.

More specifically the present invention provides for the application of a prewoven fabric to the insulated conductor, the fabric being of such a nature that the flexibility of the conductor is retained, a conductor constructed in accordance with my invention being as flexible as when braided covering is employed.

In its broadest aspects my invention comprehends the application to a conductor assembly, such as an insulated conductor, or a plurality of insulated conductors, armored cable, etc., of a prewoven fabric folded or wrapped in the direction of its length about the conductor assembly.

More specifically my invention comprehends the application to the insulated conductor in continuous lengths of a cloth tape folded or wrapped in the direction of its length about the conductor, the threads of the tape extending diagonally of the conductor axis; or, to state it in other fashion, the warp and woof threads extending respectively to the right and to the left with respect to the axis of the conductor. To obtain this specific effect, the tape may be cut on the bias, or, as a possible alternative, the tape may be cut straight instead of on the bias, wrapped in the direction of its length about the

insulated conductor, and the assembly given a slight twist to shift the threads of the woven fabric with respect to each other so that the warp and woof threads no longer cross each other at right angles as they do in the fabric as it is originally woven.

It will be appreciated that where the fabric is not cut on the bias nor the assembly twisted, the conductor assembly is sufficiently flexible for many purposes and of course the mechanical protection afforded by the fabric is as good as the braid. However, when great flexibility is desired then I prefer to have the fabric so disposed that the warp and woof threads extend diagonally of the longitudinal axis of the conductor.

With the threads of the fabric extending diagonally of the conductor axis, the threads simply slip on each other when the conductor is bent so that the flexibility of the conductor is not impaired at all.

It is to be understood that the weave employed in the fabric may be varied over a wide range. This has reference to the size of the thread employed as well as to the number of picks to the inch. It is quite evident that with one class of work it might be desirable to employ a coarse weave while a much finer weave would be satisfactory under other conditions.

It is to be understood also that my invention comprehends the use of the prewoven fabric wherever braid is now used, and that flame-retarding and moisture-resisting saturants can be employed as well as with the braided stock.

It will be appreciated that it is impracticable and unnecessary to illustrate the application of my invention to insulated conductors of every conceivable design, and I have therefore only illustrated embodiments of the invention with respect to two constructions.

Fig. 1 illustrates an insulated conductor in which the fabric is applied directly about the conductor insulation;

Fig. 1^A illustrates the same construction as in Fig. 1 but with the edges of the fabric simply abutting each other;

Fig. 2 is a fragmentary view of the construction employed in view 1, illustrating the position of the fabric threads on the unflexed conductor;

Fig. 3 is a view of the same construction but showing the position assumed by the threads when the conductor is bent or flexed; and

Fig. 4 illustrates the application of my invention to a multi-conductor cable.

Referring first of all to Figs. 1, 2 and 3: A flexible conductor 2 is shown insulated with insulation 4. This insulation may be rubber composition or other rubber-like material, or, for that matter, any flexible insulation desired, it being understood that the advantages of my invention will be realized irrespective of the type of insulation 4 employed.

In the practice of my invention, with respect to Figs. 1, 2 and 3, a prewoven fabric tape 6 is bent or wrapped in the direction of its length about the conductor insulation 4. Its adjacent edges 8 and 10 may be overlapped as illustrated in Fig. 1 or may be simply butted as in Fig. 1A.

As above pointed out, the tape need not be cut on the bias but may simply be folded or wrapped in the direction of its length about the insulation without detrimentally impairing the flexibility of the conductor assembly. However, where maximum flexibility is desired then the warp and woof threads 12 extend diagonally with respect to the longitudinal axis of the conductor 2 in order that the threads of the fabric will slip on each other and allow the fabric readily to elongate when the conductor assembly is bent. I have attempted to illustrate this feature in Figs. 2 and 3 in which Fig. 2 shows the relative disposition of the threads before the conductor has been bent, while Fig. 3 illustrates the manner in which they have shifted due to bending or flexing the conductor.

The diagonal disposition of the threads 12 with respect to the conductor axis is most easily obtained by cutting the prewoven fabric on the bias. On the other hand, a comparable effect is obtained by cutting the prewoven fabric straight and giving a slight twist to the conductor assembly after the application of the fabric to the conductor insulation.

The application of the prewoven fabric to the conductor insulation is a simple matter and may be effected in any desired manner. For example, the insulated conductor and the tape may be run through a tubing shoe which folds or wraps the tape in the direction of its length about the conductor insulation. The prewoven fabric tape may be applied either before or after the insulation has been vulcanized, assuming for the sake of discussion that the insulation 4 is vulcanizable. In fact, the application of the prewoven fabric tape may immediately follow the operation of applying the insulation to the conductor so that the whole operation may be a continuous one. Any suitable cement or other adhesive may be employed at the edges 8 and 10 of the tape. The fabric may be cemented or otherwise adhesively secured to the insulation 4 throughout the entire area of the fabric should this be desirable or required. I have already pointed out that the adjacent edges 8 and 10 of the fabric tape are not necessarily overlapped but may simply be butted if desired.

In Fig. 4 I have illustrated another embodiment of the invention. In this illustration I show two conductors 2 each covered with insulation 4 with prewoven fabric 6 folded or wrapped in the direction of its length about this insulation. In other words, in this illustration each insulated conductor construction is a duplicate of that shown in Fig. 1. The insulated and fabric-covered conductors are wrapped spirally with paper 14, this assembly being enclosed in prewoven fabric tape 16. This tape may be the same as the tape 6, but, in any event, it is folded or wrapped in the direction of its length about the paper

wrapped conductor assembly, and the warp and woof threads thereof are shown extending diagonally with respect to the longitudinal axis of the assembly, the same as explained in connection with Fig. 1. About the prewoven fabric 16 is another paper wrap 18, preferably wound oppositely to the paper wrap 14. This assembly is steel armored by armoring 20. Finally a prewoven fabric tape 22 is folded or wrapped in the direction of its length about the armor 20 with the threads of the fabric extending diagonally of the longitudinal axis of the assembly.

It will be appreciated that in some instances the armor 20 may not be necessary, in which event the fabric 22 is applied directly to the paper 18.

It will be understood that in all embodiments of my invention the prewoven fabric may be treated with any saturant desired, such as flameproofing or flame-retarding saturant, moisture-resistant saturant, etc., common in this industry.

It will be clear from the foregoing that my construction is a very decided advance in this art in the elimination of the necessity for braiding without sacrifice of the protection afforded by a braided covering. As pointed out at the first part of this description, my invention effects enormous economies in that it eliminates the braiding machines with their attendant expense, and enormously increases production, a possible 500 feet per minute as compared with about 3 feet per minute maximum speed of braiding machines.

I wish it to be understood that changes may be made in the details of construction and arrangement of parts herein described and illustrated without departing from the spirit and scope of my invention.

What I claim is:

1. An article of manufacture comprising an insulated electric conductor the insulation of which is covered with a prewoven fabric tape extending continuously lengthwise of the conductor, the fabric tape being folded longitudinally about the conductor insulation, to bring its opposed longitudinal edges together along the longitudinal axis of the conductor, thereby completely surrounding the insulated conductor, the threads of the prewoven fabric tape extending diagonally of the longitudinal axis of the conductor.

2. An article of manufacture comprising in combination, an insulated electric conductor, the insulation of which is covered with a prewoven fabric tape folded longitudinally about the conductor insulation, to bring its opposed longitudinal edges into engaged relation along the longitudinal axis of the conductor, the tape being cut on the bias whereby when it is placed about the conductor insulation its warp and woof threads will extend diagonally to the longitudinal axis of the conductor.

3. An article of manufacture comprising in combination, an insulated electric conductor the insulation of which is covered with a prewoven fabric tape, adhesively secured to the conductor insulation, the tape being folded longitudinally about the conductor insulation to bring its opposed longitudinal edges into engaged relation along the longitudinal axis of the conductor, the warp and woof threads of the tape extending diagonally of the longitudinal axis of the conductor.

4. An electric cable comprising one or more

insulated electric conductors the insulation of which is enveloped in a prewoven fabric tape folded longitudinally about the conductor insulation to bring its opposed longitudinal edges into engaged relation along the longitudinal axis of the cable, the threads of the tape extending diagonally of the longitudinal axis of the cable.

5. An armored electric cable with a strip of prewoven fabric tape folded longitudinally about the cable armor to bring the opposed longitudinal edges of the tape into engaged relation along the longitudinal axis of the conductor, the threads of the tape extending diagonally to the longitudinal axis of the cable.

6. An electric cable, each conductor of which has a prewoven fabric tape folded longitudinally about its insulation with the threads of the fabric extending diagonally of the conductor axis, and a prewoven fabric tape covering common to the cable conductors, the last-mentioned covering being folded longitudinally about the covered insulation of the conductors to bring its opposed edges into engaged relation along the longitudinal axis of the cable, the threads of the last mentioned tape extending diagonally of the longitudinal axis of the cable.

7. An electric cable comprising in combination, a plurality of insulated conductors, a prewoven fabric tape folded longitudinally about the insulation of each conductor to bring the opposed longitudinal edges of each tape together along the longitudinal axis of each conductor, a spiral wrapping of fibrous material about the covered conductors, and a prewoven fabric tape covering about said spiral wrapping, said last mentioned

fabric tape being folded longitudinally about the said spiral wrapping to bring its opposed longitudinal edges into engaged relation along the longitudinal axis of the assembly, and the threads of each of said tapes extending diagonally of the longitudinal axis of the cable.

8. An electric cable comprising one or more insulated metallic electric conductors, a spiral wrapping of fibrous material about the conductor insulation, a prewoven fabric tape folded longitudinally about the fibrous wrap to bring the opposed longitudinal edges of the tape into engaged relation along the longitudinal axis of the cable, a spiral wrapping of fibrous material about said prewoven fabric and a prewoven fabric tape covering folded longitudinally about the last mentioned fibrous wrap to bring the opposed longitudinal edges of the last mentioned tape into engaged relation along the longitudinal axis of the cable, the threads of each of said fabric tapes extending diagonally of the longitudinal axis of the cable.

9. An article of manufacture comprising an insulated electric conductor, the insulation of which is covered with a prewoven fabric tape extending continuously lengthwise of the conductor, the fabric tape being folded longitudinally about the conductor insulation until its opposed longitudinal marginal portions are brought into engaged relation, thereby completely to surround the conductor insulation, the threads of the prewoven fabric tape extending diagonally of the longitudinal axis of the conductor.

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