April 22, 1941. C. MOSIER ET AL 2,239,293

INSULATING TAPE

Filed April 4, 1938 2 Sheets-Sheet 1

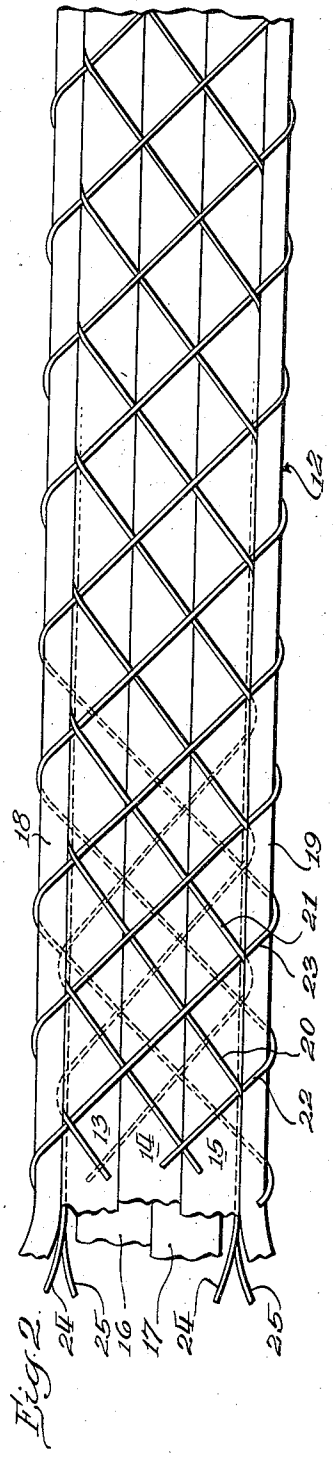


Fig. 2.

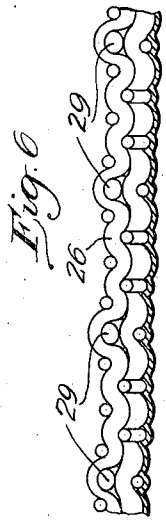


Fig. 6



Fig. 3.

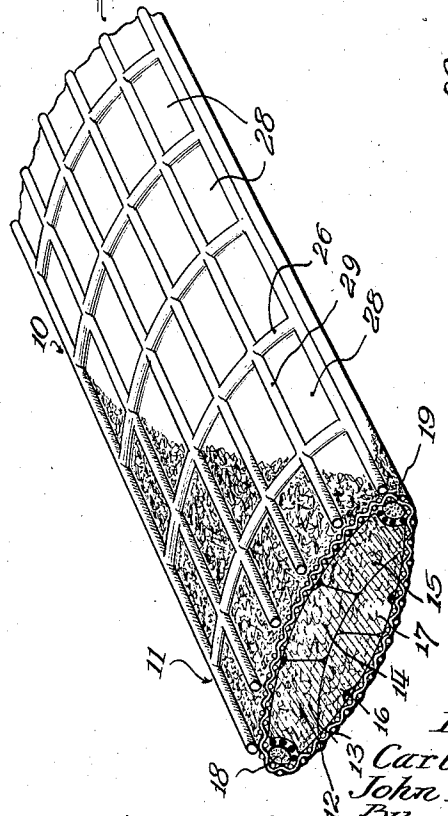


Fig. 1.

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Fig. 4

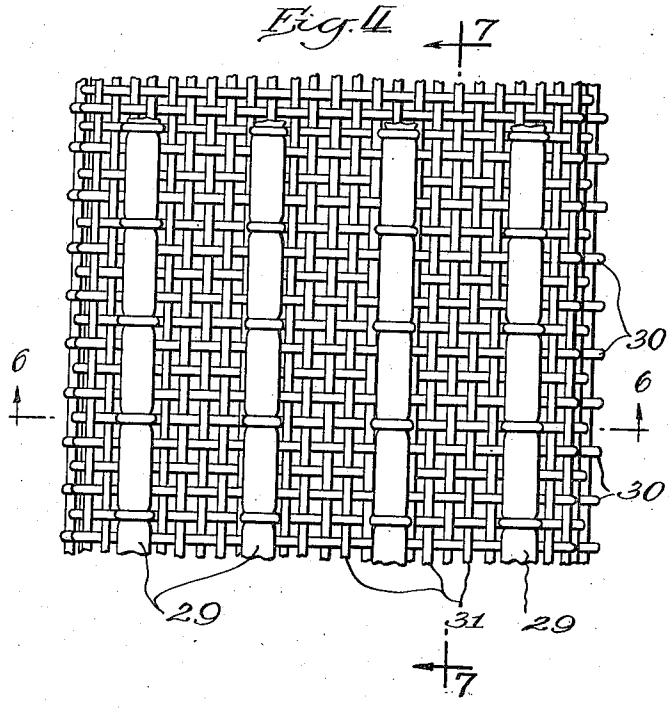
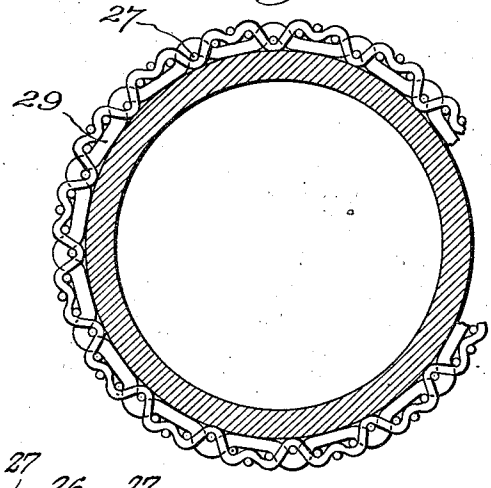


Fig. 5



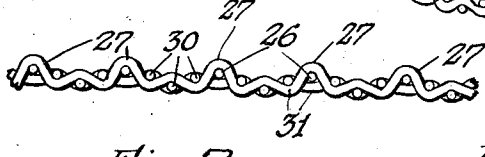


Fig. 7

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UNITED STATES PATENT OFFICE

2,239,293

INSULATING TAPE

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Application April 4, 1938, Serial No. 199,753

2 Claims. (Cl. 139—420)

The present invention relates to insulating tape of the type comprising a woven sheath with an insulating filler, and is particularly concerned with improvements in the sheath of the tape or in the insulation embodying the structure of the sheath of the tape.

One of the difficulties encountered in tape of this type is the fact that when the tape is spirally wound upon a pipe the tape, which is in the form of a flat tube filled with insulation, tends to bunch together in the middle and to become thin at the edges of the sheath.

One of the objects of the invention is the provision of an improved tape which is adapted to prevent the thinning of the edges of the tape and to give a substantially uniform insulation value over the full area of the pipe.

Another object of the invention is the provision of an improved tape structure which is adapted to entrap air between the tape and the pipe in dead air spaces and to increase the insulating value of the assembly by virtue of this improved action and structure.

Another object of the invention is the provision of an improved filler structure which is adapted to be drawn into an insulating tape sheath with greater facility by virtue of its improved structure, which gives it greater tensile strength, and which tends to cause the filler to contract into a smaller space while the filler is being drawn into the sheath.

The present application is a continuation-in-part of our prior application Serial No. 108,170 filed October 29, 1936, Patent No. 2,150,238, issued March 14, 1939.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the two sheets of drawings:

Fig. 1 is a full sized view in perspective of an insulating tape constructed according to the present invention;

Fig. 2 is a diagrammatic plan view of the filler;

Fig. 3 is an enlarged sectional view of that portion of the sheath of the tape of Fig. 1 which is located at the top, or Fig. 3 may be regarded as an enlarged sectional view of a woven insulating tape having a similar structure;

Fig. 4 is a fragmentary plan view showing the structure of a portion of the sheath;

Fig. 5 is a fragmentary sectional view of a pipe to which insulation, comprising a woven tape of the type of Fig. 3, has been applied by spiral winding.

Fig. 6 is a section taken on the plane of the line 6—6 of Fig. 4.

Fig. 7 is a section taken on the plane of the line 7—7 of Fig. 4.

Referring to Figs. 1 and 2, the present insulating tape, which is indicated in its entirety by the numeral 10, preferably comprises a woven sheath 11 which is tubular in shape and which is provided with a insulating filler 12.

The filler is shown in detail in Fig. 2 and preferably consists of a plurality of large, loose and soft rovings of asbestos fibers, the rovings being indicated by the numerals 13 to 17 inclusive.

These rovings are preferably so arranged that they overlap each other; that is, the rovings 16 and 17 are disposed oven the crack between the rovings 12 and 13 and 13 and 15 respectively. When the filler is complete, the rovings flatten out to an elongated structure, which may be substantially rectangular in cross section.

The filler 12 also preferably includes at each edge an asbestos rope 18, 19, which comprises asbestos or other fibers tightly twisted together, for the purpose of giving the filler a greater tensile strength.

The rovings 13 to 17 may be secured together by a plurality of threads 20, 21 and others extending spirally around the assembly 12—17 in a left hand direction as viewed in Fig. 9, and by a plurality of other threads 22, 23, and others which extend spirally around the assembly 13—19 in the opposite or right hand direction. These spiral threads 20—23 and others form a basket weave about the rovings and ropes and hold the parts of the filler together. When the spirally extending threads 20—23 are subjected to longitudinal tension with the rest of the filler, they tend to cause the filler to contract into a smaller space so that it can be more readily inserted in its sheath.

The ropes 18, 19 give the filler a tensile strength which enables it to be drawn into the sheath 11 in substantial lengths, such as, for example, fifty feet, more or less. In addition to the threads 20—23, other longitudinally extending threads 24, 25 may be arranged at the edges of the rovings to increase the tensile strength of the assembly. It should be understood that any number of rovings may be used, and rovings are preferably used in the preferred form of the invention. In some embodiments of the invention, however, other forms of flat fillers of less

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insulating value might be used with the improved sheath.

Referring to Fig. 3, this shows the outside of an improved form of sheath or of a tape which has on its rear side, that is, the side which is innermost to the pipe when the tape is spirally wound on a pipe, a plurality of insulating ropes or large threads 29 extending longitudinally of the sheath, and a plurality of relatively large thread formations 26 extending transversely of the sheath and intersecting the thread formations.

This forms depressed rectangular spaces 28 between the thread formations 26, 29, and the depressions 28 are adapted to entrap air between the sheath and the pipe when the sheath is spirally wound on a pipe or when it is applied to any other surface. This greatly increases the insulating value of the sheath and causes this increase at a slight additional cost, which is not proportionate to the increased value of the tape.

The structure of Fig. 1 may be accomplished in different ways, one example being the addition to the sheath of longitudinally and transversely extending relatively large threads or ropes of asbestos.

In the embodiment of Fig. 1, however, additional longitudinally extending large threads or ropes 29 have been used, located on the lower outside of the sheath and equally spaced from each other. Referring to Fig. 4, in this embodiment 30 indicates the weft threads and 31 the warp threads. Every fourth weft thread extends over the large thread or rope 29 and binds it to the woven assembly. Thus, for example, the large thread or rope 29 is secured by the weft thread 30 at the bottom, the woven thread 30 at the middle of the figure, and left thread 30 at the top.

The weft threads 30 may be drawn so tightly in the weaving that they cause the portions 27 of the warp threads 31 to project outward above the rest of the surface of the weave. In other words, the thread portions 27 project outward substantially as much as the ropes 29. This gives the appearance of the sheath on that side a waffle-like formation, as shown in Fig. 1, the transverse ridges being formed by the outwardly projecting portions 27 of the warp threads 31.

In other words, the cords 29, as shown in Fig. 4, are secured to the face of the fabric, which comprises the usual warp and weft threads, the said cords being secured by certain weft threads. The weft threads which go under the cords 29 are in the plane of the fabric, but that portion of the weft threads which goes over the cords 29 in Fig. 4 extends up and about each cord, leaving the cords projecting from the face of the fabric.

In some embodiments of the invention, the weft threads which pass over the cords 29 (Fig. 4) are drawn so tightly that all of the warp threads with which they engage are pulled upward into the plane of the outer surface of the cords, as shown in Fig. 6. This forms a number of transverse ridges in the fabric, which serve to divide the fabric up into air spaces that are interrupted transversely as well as longitudinally, as shown in Fig. 1.

In other embodiments of the invention only the cords 29 may project from the surface of the fabric.

The waterproof layer shown on the opposite face in Fig. 3 is not merely for the purpose of waterproofing, but performs an additional function in the case of a fabric having its other face formed with such air spaces. The air spaces would not be as effective as they are if it were not for the fact that in addition to having the air spaces, the fabric has an outer air-tight layer which entraps and encloses the air and makes these air spaces, dead air spaces; that is, the air from these spaces cannot circulate through the fabric and effect a cooling by convection on account of the air-tight layer on the outer surface.

It will thus be noted that the outwardly projecting portions of the warp threads, which are pulled outward by the weft threads 30 into the same plane as the outside of the ropes 29, form transversely extending ridges. These ridges are formed by a plurality of the warp threads side by side, all projecting to the plane of the outer surface of the ropes.

It should also be understood that the advantages of the woven fabric of Fig. 1 or Fig. 4 may be utilized in an insulating cover, as shown in Figs. 3 and 5, in which the insulation comprises merely a woven strip of such material provided with the dead air spaces on that side which engages the pipe.

Either filled tape or the unfilled tape may be spirally wound about a pipe in order to cover the pipe continuously with insulation. The insulating tape of Fig. 1 is completed by drawing the filler of Fig. 2 into the sheath, as shown in Fig. 1, to effect a complete filling of the sheath, as described in our copending application, Serial No. 199,752 filed April 4, 1938.

The external face of the insulating tape, that is, the face opposite the cords 29, in the case of Fig. 1 or 5 may be provided with a waterproof layer 41, according to the method disclosed in Gillies Patent No. 1,937,561, issued December 5, 1933, to provide an insulating tape of the type shown in Gillies Patent No. 1,903,106, issued March 28, 1933, for Waterproof heat insulating tape.

It will thus be observed that we have invented an improved insulating tape having an improved sheath and an improved filler. The sheath is so constructed as to provide dead air spaces between one of its faces and the pipe to which it is applied, thereby greatly increasing the insulating value of the assembly.

The filler is provided with longitudinally extending ropes at each edge, which prevent the thinning or feathering of the tape at its edges as it is applied to the pipe, and these ropes are very economically applied, since they are a part of the filler assembly and do not require any special sheath.

The present filler is so constructed that it has sufficient tensile strength to be drawn into the tape, and when it is once inside the sheath it causes the sheath to assume a ribbon-like form of uniform thickness.

While we have illustrated a preferred embodiment of our invention, many modifications may be made without departing from the spirit of the invention, and we do not wish to be limited to the precise details of construction set forth, but desire to avail ourselves of all changes within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States, is:

1. In an insulating tape, a woven fabric member consisting of warp threads and weft threads which comprise asbestos fibers, certain of said warp threads being in the form of relatively large

cords located at regularly spaced intervals on one side of said fabric, and certain of said weft threads at predetermined intervals passing over said large cords and securing them to the body of the fabric whereby that side of the insulation is provided with a plurality of separated air spaces, said predetermined weft threads being drawn more tightly than the warp threads which they engage, whereby said latter warp threads are drawn outward flush with the outer surface of said large cords to form transversely extending ridges on that side of the fabric.

2. In an insulating fabric, a woven insulating body comprising warp and weft threads woven together and a plurality of relatively large cords carried by said fabric on the face thereof and secured against the adjacent warp and weft threads by predetermined of said threads, the said cords being located parallel to each other at regularly spaced intervals to form an air space between the fabric and an article to which said face is applied, the said securing threads being weft threads and being drawn tight enough to raise those portions of the warp threads which are on the same side as said cords into the plane of the outer surface of said cords whereby ridges are formed on said fabric transverse to the direction of said cords.

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