June 23, 1931. S. A. WILLIAMS 1,811,416

REENFORCED INSULATION FABRIC

Filed Nov. 5, 1928 2 Sheets-Sheet 1

Fig.1.

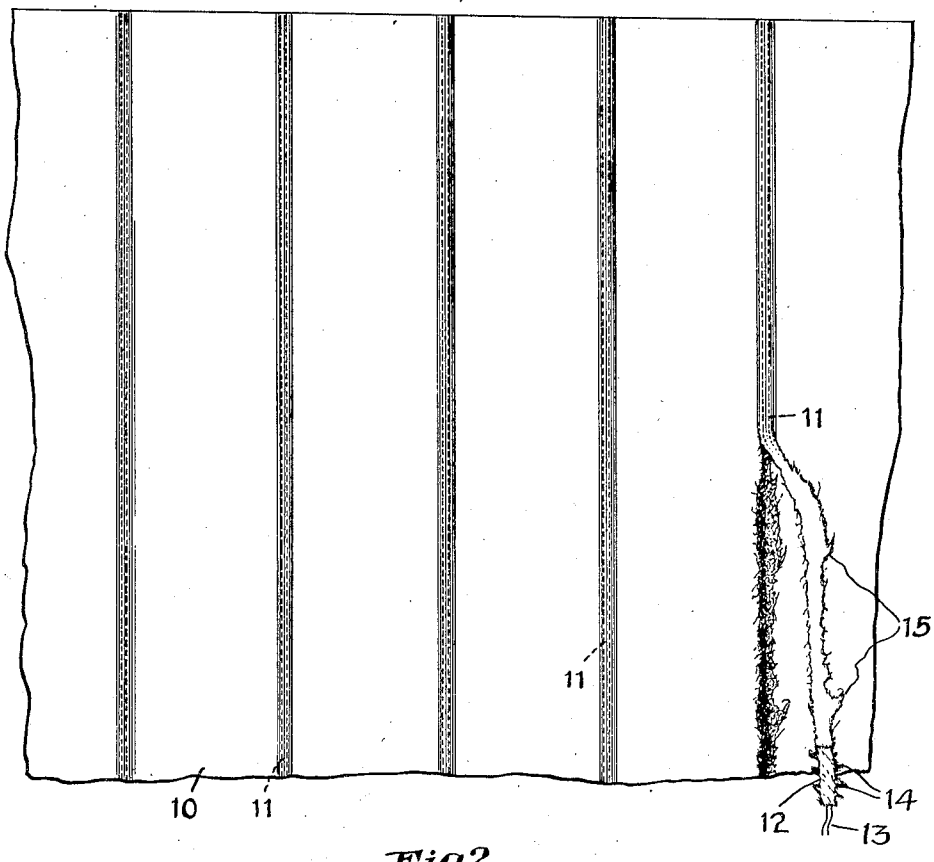
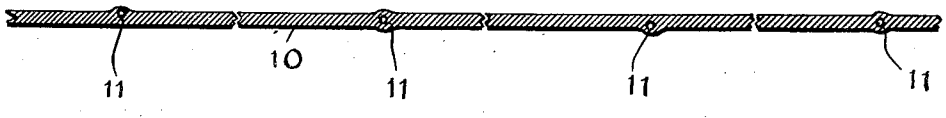


Fig.2.



Fig.3.



INVENTOR

BY Samuel A. Williams.

D. H. Halstead ATTORNEY

Published by AsbestosClaims.Law
asbestosclaims.law/library/23546/1

June 23, 1931. S. A. WILLIAMS 1,811,416

REENFORCED INSULATION FABRIC

Filed Nov. 5, 1928 2 Sheets-Sheet 2

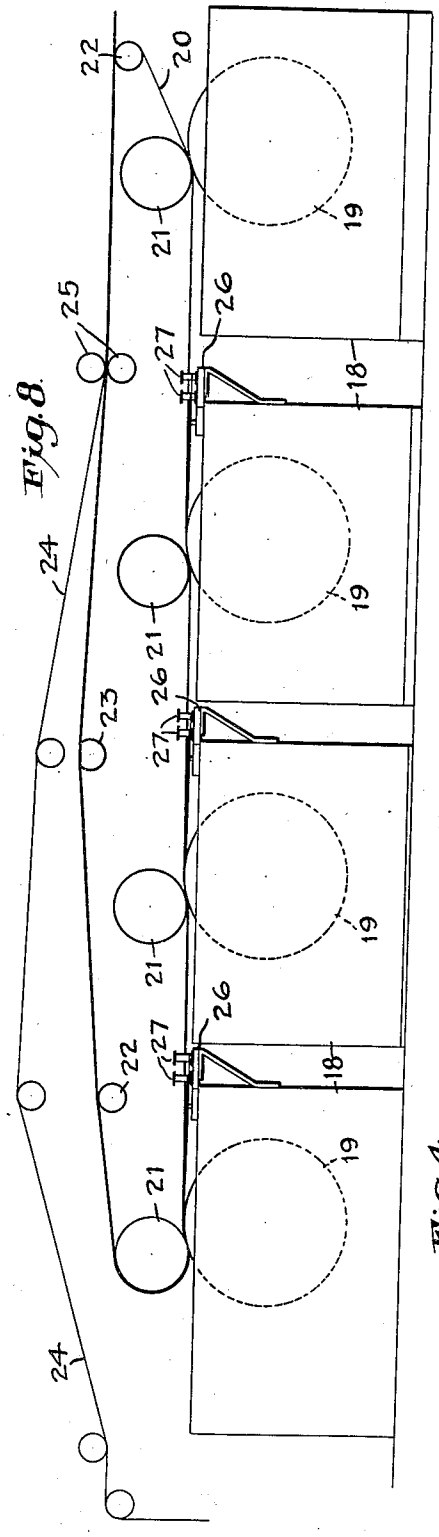


Fig. 8.

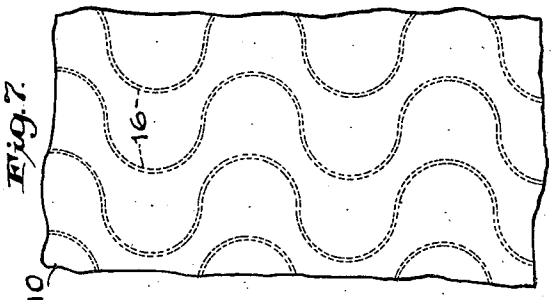


Fig. 7.

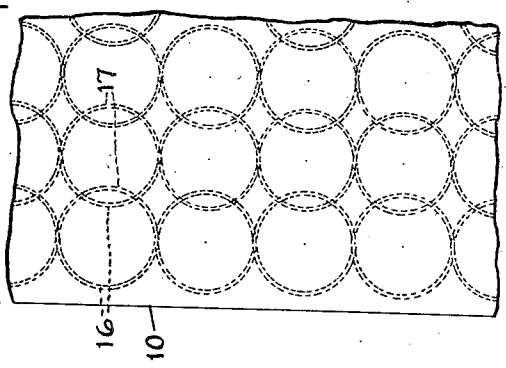


Fig. 6.

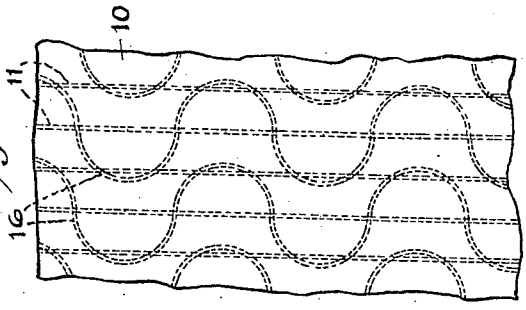


Fig. 5.

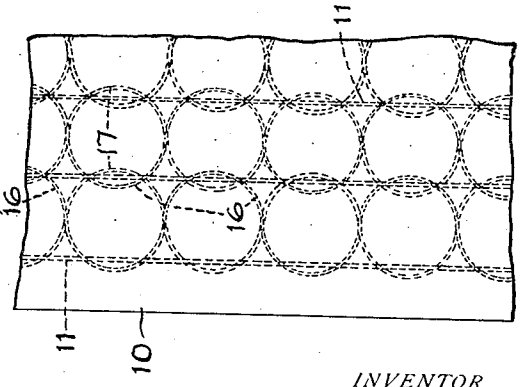


Fig. 4.

INVENTOR

BY Samuel A. Williams

D. N. Halstead ATTORNEY

Published by AsbestosClaims.Law
asbestosclaims.law/library/23546/2

Patented June 23, 1931 1,811,416

UNITED STATES PATENT OFFICE

SAMUEL A. WILLIAMS, OF SCARSDALE, NEW YORK, ASSIGNOR TO JOHNS-MANVILLE CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

REENFORCED INSULATION FABRIC

Application filed November 5, 1928. Serial No. 317,235.

This invention relates to a reenforced sheet or fabric and the method of process of making the same.

One of the primary objects is to make a reenforced sheet which is strong and durable, and adapted to be used for all kinds of building purposes, inside and outside.

Another object of the invention is to provide a reenforced fabricated insulating sheet which is effective is resisting heat and electricity, adapting the same to be used for wrapping piping systems and wires, cables and apparatus used in connection with electric devices and systems.

A further object of this invention is to provide a strong, durable, weather and chemical-resisting sheet adapted to be used for wrapping pipes placed either above or below the ground, particularly the latter, where they are subjected to undue weather and elemental corrosions.

Another object of this invention is to effectively reenforce a fabricated sheet material consisting of a fire and heat-resisting material by incorporating and fabricating therewith reenforced strands or cords of like material.

A further important purpose of this invention is to produce a reenforced sheet material in which strength and durability have not in any way been sacrificed to produce a sheet which is fire and heat-resisting throughout its mass. Heretofore, sheets of this nature have been reenforced with strands or cords of an organic nature, which, due to the more or less close matting of the cords with the fibrous material of the web, makes a strong tear-resisting sheet. However, such a sheet will not withstand high heat or weathering action, as the organic strands readily carbonize and deteriorate.

Accordingly, wires have been substituted for organic strands, which has overcome the objectionable feature of carbonizing and deteriorating, but at the same time strength has been sacrificed for want of a matting relation of the wires and the fibres of the sheets.

In this invention the reenforcing strands are made by twisting or spinning cords of heat and fire-resisting yarn with fine wires, which causes the yarns and wires to firmly grip or bind together, thereby making a very strong strand having a more or less rough and fibrous surface. A cord of this nature mats very readily and effectively with the fibres of a sheet when incorporated therein, and not only makes a very strong and tear-resisting sheet, but one that will withstand intense heat and long deteriorating action of the elements; in fact, it may be said to be indestructible.

The foregoing and other objects and advantages of the invention will more fully appear from the following detail description of preferred embodiments and the method of making the same.

In order that my invention may be more readily understood and its practical and commercial advantages more fully appreciated, reference may be had to the accompanying drawings, in which I have illustrated some of the steps in the method of making and different forms of embodiment, and in which:

Fig. 1 is a sectional elevation of the preferred form, showing a portion of a reenforcing strand torn out of the fabric to illustrate the matting relation which exists between the strand and the fibre of the sheet.

Fig. 2 is a broken transverse sectional view of Fig. 1, showing the position of the reenforcing members.

Fig. 3 is a broken transverse sectional view disclosing the reenforcing strands at different depths in the sheet.

Figs. 4 and 5 disclose different modifications of the combination of straight and waved reenforcing members.

Figs. 6 and 7 disclose different modifications of curved reenforcing members; and

Published by AsbestosClaims.Law
asbestosclaims.law/library/23546/3

Fig. 8 is a diagrammatic view, in side elevation, of apparatus showing some of the steps in the method of making the product.

Referring to Fig. 1 of the drawings, a web or sheet 10 of the fabric is disclosed with straight reenforcing members 11 running in direction of the length, all of which, as will be seen in Fig. 2, are embedded in the center of the sheet. The sheet comprises a fabricated web of mineral fibre insulating material, such as asbestos or the like. In the preferred form the mineral fibre is in a pure state, and may or may not have a cementing material incorporated therein to aid in binding the fibres together.

The reenforcing members comprise reenforced strands of mineral fibres. These strands in the preferred form are made by spinning or twisting cords of asbestos fibres and wires together in such a manner as to produce a strand having a fibrous and more or less rough or ragged surface. Threads or cords of an organic nature may be used to reenforce the mineral fibre cords; however, wires of a non-corroding nature, such as copper or brass, are preferred, as a compound strand can be produced which is much stronger, less subject to deterioration and more resistant to heat and fire.

The reenforcing members are incorporated in the body of the sheet while it is being built up, as will be hereinafter more fully described. In view of their fibrous and more or less rough or ragged nature, the strands firmly mat with the fibres of the sheet, which produces a strong and tear-resisting fabric. The matting action between the fibrous strands and the fibres of the stock may be aided by preliminary dampening of the strands before incorporating in the sheet. Also, it has been found advantageous to flatten the strands by passing them between pressure rollers before incorporating in the sheet, as this produces more or less flat and ragged side edges and reduces the bulge of the strands when thin sheets are made. The matting action that takes place between the strands and the fibres of the sheet is illustrated in Fig. 1, disclosing a portion of a reenforcing member torn away from the sheet. At 12 with the protruding wires or cords 13 will be seen a portion of the reenforcing member as it appears before being incorporated in the sheet. The projecting and fibrous portions 14 intimately mat with the fibres of the sheet to produce a tying action between the strands and the sheet, as is clearly evidenced at 15, disclosing how portions of the body of the sheet are taken along when the strand is torn away. In other words, the wires 13 are locked to the fibres of the strands, which are in turn matted to the fibres of the sheet in such a way that the wire will not cut through the fibres, and there is no slipping or creeping action thereof in the sheets.

In Fig. 3 the reenforcing members are disclosed as incorporated at different depths in the sheets, and for certain purposes it has been found advantageous to have all the reenforcing members disposed near one of the surfaces of the sheet, slightly covered by the fibrous material. A sheet of this nature, when used for covering purposes, is preferably wrapped over the object so that the wires are on the outer surface, which results in a more effective reenforcing of the body of the sheet.

The reenforcing members disposed as hereinabove stated gives a very strong fabric in direction of the length, and one which allows for cutting in direction of the length for making narrow strips. As disclosed, the reenforcing members are shown relatively far apart; however, they can be placed close together, which greatly increases the strength of the fabric.

In order to produce a fabric which will resist sidewise stresses or tearing between the longitudinal strands, a plurality of reenforcing members 16 disposed in a wave-like form may be incorporated in the sheets along with the straight strands, with the waves overlapping the straight strands, as disclosed in Figs. 4 and 5. Some of the curved members 1 may be overlapped in a reverse direction, as shown at 17, which imparts added strength.

Preferably, a plurality of straight members are incorporated at the same depth or in the same plane in the sheet; likewise, a plurality of curved members may be disposed all in the same plane, which is different from that of the straight members, thereby increasing the strength of the fabric.

In Figs. 6 and 7 further modified forms are disclosed in which the straight strands have been omitted. In these forms, the waves may all be disposed in the same direction or some reversely to others, and in an overlapping relation, at different depths in the sheet.

As hereinabove stated, the reenforcing members are incorporated in the body of the sheet as it is being built up or formed, and referring to Fig. 8, a diagrammatic section of the apparatus for performing the preliminary steps of the methods or process of making the manufactured product is disclosed. The mineral fibers are first reduced to a liquid pulp and then run into a series of stock tanks 18, in which are disposed vacuum or moulding cylinders 19 for carrying a film of pulp up and around to be deposited on an endless felt belt 20 passing under couching rollers 21 and over supporting rollers 22. The endless belt 20 passes over a suction box 23 and is then pressed in contact with a dryer belt 24 by means of squeezing rollers 25, from which the web or sheet material is carried to a drying

machine, not shown, having heated rollers for thoroughly drying the sheet.

Between the moulding cylinders, and supported upon the edges of the tanks or on any other suitable means, are bars 26 carrying spools of reenforcing strands. Each one of the moulding cylinders 19 will deposit a film or layer of stock upon the belt 20, and the layers, in view of the plastic state of the stock, will mat together to form a sheet. With the series of bars 26 disposed between the moulding cylinders, the strands carried by the respective bars will be incorporated between the different films or layers. If it is desired to have strands only in the center of the sheet, the center bar 26, as disclosed in the drawings, is the only one allowed to feed into the web; and likewise, to place the reenforcing strands near either surface of the sheet, only one of the end bars is loaded and allowed to feed strands into the web. Means are provided by which the above bars may be operated by the machine to give them a slow reciprocating movement if desired, which causes the strands to be fed into the web in a wave-like form. By reciprocating the two end bars and maintaining the center bar stationary, straight strands will be incorporated in the center of the sheet with wave-like strands on the sides and interspacing layers of stock therebetween, along with outside layers all matted together in one homogeneous sheet. Again, if only two adjacent bars are used, the one being reciprocated and the outside one remaining stationary, a sheet will be formed having the center strands in a wave-like form and on one side thereof will be straight strands. The number of tanks and spool bars used may be increased or decreased so that any thickness of sheet may be produced with any number of reenforcing members, as may be desired, disposed in the most effective manner.

The sheet, after thoroughly drying, makes a very strong and durable fabric without any further treatment. However, in the preferred form the sheet is subjected to another step in the way of a treatment, to render it waterproof and dielectric. To give the sheet these properties, it is impregnated with an asphaltic or bituminous compound by passing the same through a heated solution of these compounds, and then between squeezing rollers to remove the surplus compound, after which it is dried, cooled and wound upon a roll for use. In the drying process, the web may be passed between heated rollers, which not only dries, but causes a more thorough impregnation of the compound throughout the sheet.

The impregnating material in this preferred form of the invention has a high melting point and is of such a nature as to remain in a comparatively solid and flexible state when the fabric is subjected to either low or high temperatures.

The sheets may also be rendered resistant to water and electricity by incorporating in the mineral fibre stock gutta percha or rubber compounds which may be in the form of dispersion products. The web after drying is then subjected to a heating and curing process.

What I claim is:

1. An electrical resisting fabric comprising a sheet composed of mineral fibres matted together in a homogeneous mass and having cords of mineral fibres reenforced with a strand of relatively large tensile strength matted therein, the sheet and the strands being impregnated with a dielectric material.

2. A fire and heat-resisting sheet comprising matted layers of mineral fibres having reenforcing members incorporated therein, said reenforcing members consisting of cords of mineral fibres having ragged outer surfaces which mat with the fibres of the sheet and reenforced with a strand of relatively large tensile strength.

3. A felted insulating fabric comprising a sheet composed of a matted mass of mineral fibres having reenforcing members matted therein, said reenforcing members consisting of cords of mineral fibres reenforced with fine wires.

4. A fire and heat-resisting felted fabric comprising a sheet composed of a matted mass of mineral fibres having longitudinally disposed reenforcing members incorporated therein, said reenforcing members consisting of reenforced cords of mineral fibres reenforced with a strand of relatively large tensile strength and having rough fibrous surfaces which intimately mat with the fibres of the sheet.

5. A fire and heat-resisting felted fabric, comprising a sheet composed of matted layers of asbestos fibres having fire-resisting reenforcing members incorporated therein, said reenforcing members consisting of cords of asbestos fibres reenforced with strands of non-corroding material, the outer surfaces of the reenforcing members having ragged fibrous outer surfaces which intimately mat with the fibres of the sheet.

6. A fire and heat-resisting felted sheet comprising a matted mass of asbestos fibres having a plurality of longitudinal fibrous reenforcing cords of fire-resisting material intimately matted therein, said cords being reenforced by strands of fire-resistant material of relatively large tensile strength and disposed in planes at different depths in the sheet.

7. A fire and heat-resisting felted sheet comprising a matted mass of asbestos fibres having a plurality of longitudinal fibrous reenforcing cords of fire-resisting material intimately matted therein, said cords being re-

enforced by strands of fire-resistant material of relatively large tensile strength and disposed in planes at different depths in the sheet, and those in one plane being straight and those in another plane being curved with the curves overlapping the straight strands.

8. A fire and heat-resisting felted sheet comprising a matted mass of asbestos fibres having a plurality of longitudinal reenforcing strands of fibrous material intimately matted therein, said strands being reenforced by a wire strand of fire-resistant material of relatively large tensile strength.

Signed at New York city, in the county of New York and State of New York, this 30th day of October, A. D. 1928.

SAMUEL A. WILLIAMS.