D. W. PYE.

COMPOSITE HEAT INSULATING SHEET.

APPLICATION FILED DEC. 16, 1918.

1,345,693.

Patented July 6, 1920.

Fig. 1.

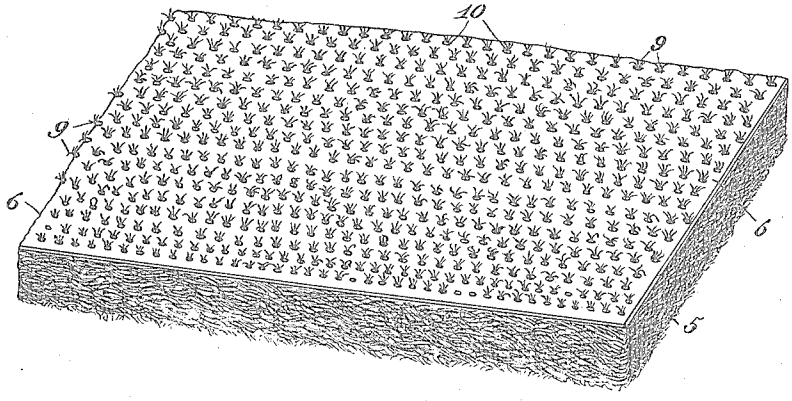


Fig. 2.

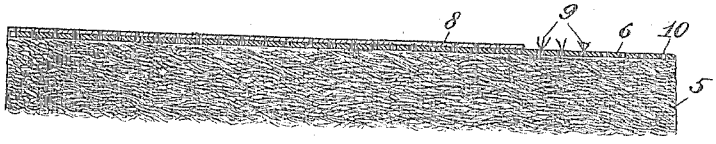


Fig. 3.

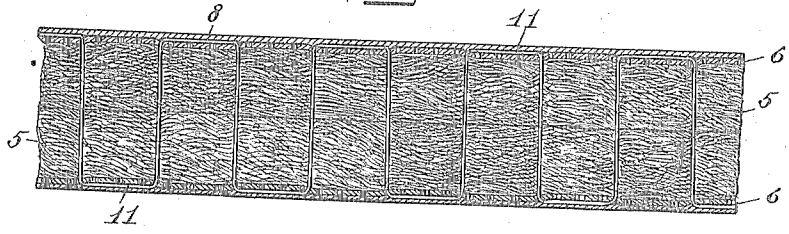
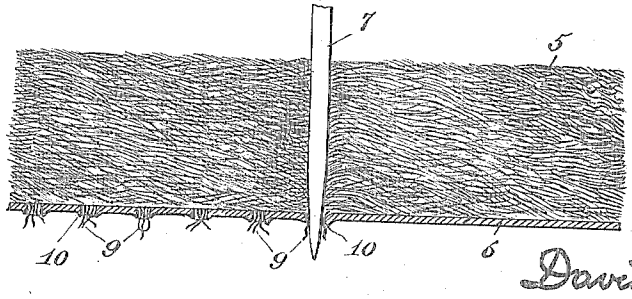


Fig. 4.



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COMPOSITE HEAT-INSULATING SHEET.

1,345,693. Specification of Letters Patent. Patented July 6, 1920.

Application filed December 16, 1918. Serial No. 266,853.

To all whom it may concern:

Be it known that I, DAVID W. PYE, a citizen of the United States, and a resident of Red Bank, county of Monmouth, and State of New Jersey, have invented certain new and useful Improvements in Composite Heat-Insulating Sheets, of which the following is a full, clear, concise, and exact description, such as will enable others skilled in the art to which the invention relates to make and use the same, reference being made therein to the accompanying drawings, which form a part of this specification.

My invention relates to composite sheets made up of a main body portion of felted material, together with a protecting or backing sheet of other material overlying the felt body portion and serving to protect the same, and also to strengthen the same to a greater or less degree; and the object of my invention is to provide a composite heat insulating sheet, quilt, or fabric of the type above referred to which is formed of a main body portion of felted material secured to which is a layer or sheet of paper, the two being joined together by forcing a needle or similar article through the felted material and through the layer of paper whereby fibers of the felted material are forced through the punctured openings in the paper and firmly clasped by the edges of said openings as the needle is withdrawn.

A further object is to provide a heat insulating sheet or fabric wherein the reinforcing backing sheet is formed of paper, so as to be impervious to liquids, whereby cement, paint, varnish, or other liquid composition, may be applied to the paper packing and thus anchor the protruding fibers of the felted material to the paper backing and without danger of the felted material absorbing the protecting coating during its application.

I am aware that in attempting to reinforce the felted material, burlap, cloth, and similar substances have been used and the fibers pricked through openings or interstices of the cloth, and while a bond between the felted material and reinforcing backing may thus be obtained, the burlap or other backing is not impervious to moisture, nor will it allow a liquid coating such as paints and varnish to be applied thereto without absorbing a large quantity of said liquid and in turn causing the felted material to absorb quantities thereof. I have overcome these difficulties by providing an imperforate backing sheet of paper and carrying fibers of the threaded material through minute punctures in the paper backing; the sides of the punctures closing against the fibers as the puncturing instrument is withdrawn, thereby locking the fibers to the backing sheet of paper and rendering the entire article impervious to moisture, and further, allowing a liquid coating such as paint, varnish, cement, or other desirable material, to be applied to the backing sheet without causing the felted material to absorb the same, which latter would materially interfere with the heat insulating properties of the article.

My invention is regarded as including a composite sheet having the characteristics above pointed out, as well also as the method or process whereby the same is manufactured or produced, all as hereinafter explained in detail and particularly claimed in the concluding claims.

My invention has special reference to the provision of a composite sheet or fabric made up for the most part of felt material, and designed for use about metallic railway cars, in order to prevent the flow of heat or cold through the wall thereof; although it will be appreciated that the same may be used in any place where it is desired to prevent the flow of heat from one body to another, may be used to lessen the transmission of sound through a floor, wall, partition, or other structure, or for any and all other purposes for which such a composite sheet is adapted.

In the drawing accompanying and forming a part of this specification:

Figure 1 is a perspective view illustrating a section of a composite sheet made in accordance with my invention;

Fig. 2 is a view showing a section of the sheet, the surface of the covering or strengthening layer thereof being coated with a suitable cement material;

Fig. 3 is a view showing a section of a thicker sheet made up by securing two such sheets as are shown in Figs. 1 or 2 together, by quilting; and

Fig. 4 is a view illustrating the process of manufacture whereby my improved composite sheeting is produced.

Referring to the drawing, the reference numeral 5 designates the main body portion of my improved composite sheet, the same

being of felt material produced by felting hair or other fiber or material which will felt into a compact mass of considerable thickness in accordance with any of the well known felting processes; the manner in which the felt layer is produced being of secondary importance, and not involved in this present invention.

The reference numeral 6 designates a strengthening or protecting sheet overlying the body of felted material 5 and affording protection to the same, and, incidentally, more or less contributing to the strength of the felt material and of the composite sheet of which it forms the principal part. Furthermore, the protecting sheet provides a product which may be more readily handled, shipped, and manipulated during the process of installing the finished sheet or fabric in the position in which it is finally placed than would otherwise be the case. This protecting sheet may be made from various materials suitable for the ends above mentioned, although I preferably use a sheet of strong and tough paper for the same.

Fig. 4 illustrates the method or process whereby the main body of felted material 5 and the protecting sheet 6 are operated upon during the manufacture of the completed sheet to secure them together as hereinbefore pointed out; this end being accomplished by placing the felt body portion upon the strengthening sheet, and then forcing a needle 7 or equivalent implement through the two, whereby fibers of the felt body portion are carried therefrom through holes made by the needle in the protecting sheet; the needle both forming the holes in said sheet and carrying the fibers from the felt through the holes, as illustrated in said figure. While in describing the method whereby the felt body portion and protecting layer are secured together I have referred to a single needle or equivalent piercing member, it will be appreciated that in practice a large number of such members will be assembled in a single holder designed and arranged to operate upon the fabric, to thereby provide a device for securing the felt body portion and protecting sheet together rapidly and efficiently.

In the finished sheet the protecting layer will be secured to the main felt body portion at a large number of places throughout the area of the composite sheet, as shown in Fig. 1, the distance apart of the separate fastenings thus provided being largely a matter of choice, and dependent obviously upon the degree of security with which the felt and the overlying protecting sheet are to be fastened one to the other.

In a composite sheet such as is shown in Fig. 1, the backing material or sheet 6 will be secured to the felt body portion with sufficient security for many purposes, and a sheet of the form in which it is shown may be used without further treatment for many purposes. I prefer, however, to coat the exposed surface of the sheet 6 with a suitable cementitious material 8 to thereby secure the fibers 9 and the sheet 6 together more effectively, and to provide a smoother exterior surface for the finished sheet; the material thus applied serving to smooth the burs produced in the protecting sheet by the needle 7, to fill the holes 10 around the fibers 8, to fasten the fibers themselves to the exposed surface of the sheet, and to coat the sheet, as will be appreciated; thus providing a more finished sheet and one which will present a more pleasing appearance. The resulting sheet may also be more readily manipulated in installing the same because of the presence of the coating material, and a certain degree of additional protection will be secured by the use thereof. The coating material in question may be a suitable cement, paint, varnish, or in fact any liquid coating composition which will accomplish the ends above mentioned.

The reinforcing sheet is preferably formed of some nonporous paper which is impervious to moisture and will absorb but little of the cement, paint, or varnish of the coating composition. Further, the paper material increases the heat-insulating properties of the article, in that it prevents any air from circulating therethrough.

Fig. 2 shows a composite sheet made in accordance with my invention and in which a coating cementitious material 8 has been applied to the exposed outer surface of the protecting sheet 6, as above pointed out; and which sheet may be used in the form thus produced for many purposes. I prefer, however, to secure two such composite sheets as are shown in Fig. 2 together with their felted body portions in contact with one another, as shown in Fig. 3, the two sheets being preferably secured together by rows of stitches, as shown at 11, as in ordinary quilting operations. This obviously produces a much thicker sheet and one more effective for heat insulation, sound deadening, or other purposes for which such sheets are used; and, furthermore, produces a composite sheet, in which both exterior faces are protected by overlying strengthening or protecting sheets, as heretofore explained. The exposed surfaces of the protecting sheets are themselves shown as protected, and a more firm bond secured between them and the felted body portions, by means of an exterior coating of cement, paint, varnish, or other material, as hereinbefore explained. The cementitious material employed in producing the composite sheet wherein my invention consists is preferably a material having fire-proofing qualities, from which it follows that, in addition to the function

which the said material performs in providing a more firm bond between the protecting backing sheet or sheets 6 and the main body of felt material upon which it lies, it provides a composite sheet which will have fire-resisting qualities to a very considerable extent; the protecting sheet and the cementitious material upon the surface thereof thus imparting fireproof or fire-resisting qualities to the main felt body portion of the sheet to a marked degree.

Having thus described and explained my invention, I claim and desire to secure by Letters Patent:

1. A heat insulating article of the class described comprising a body portion of felted material, a sheet of paper overlying said felted body portion and forming a protecting backing, fibers of the felted material extending through minute punctures in said paper sheet and a coating of cementitious material upon the exposed surface of said protecting sheet of paper, embedding the protruding fibers therein.

2. A heat insulating article of the class described comprising a body portion of felted material a protecting backing sheet of paper overlying said felted body portion, fibers of the felted material extending through minute punctures in said paper sheet, the side walls of the punctures closed and gripping said fibers and preventing the absorption of a cementitious material by the felted material, and a coating of cementitious material upon the exposed surface of said protecting sheet of paper and embedding and anchoring the protruding fibers of the felted material thereto.

In testimony whereof I have signed my name to this specification this 14th day of December, 1918.

DAVID W. PYE.