

May 31, 1932.

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1,861,044

METHOD OF MAKING COMPOSITE FABRICS

Filed Oct. 24, 1930

Fig. 1

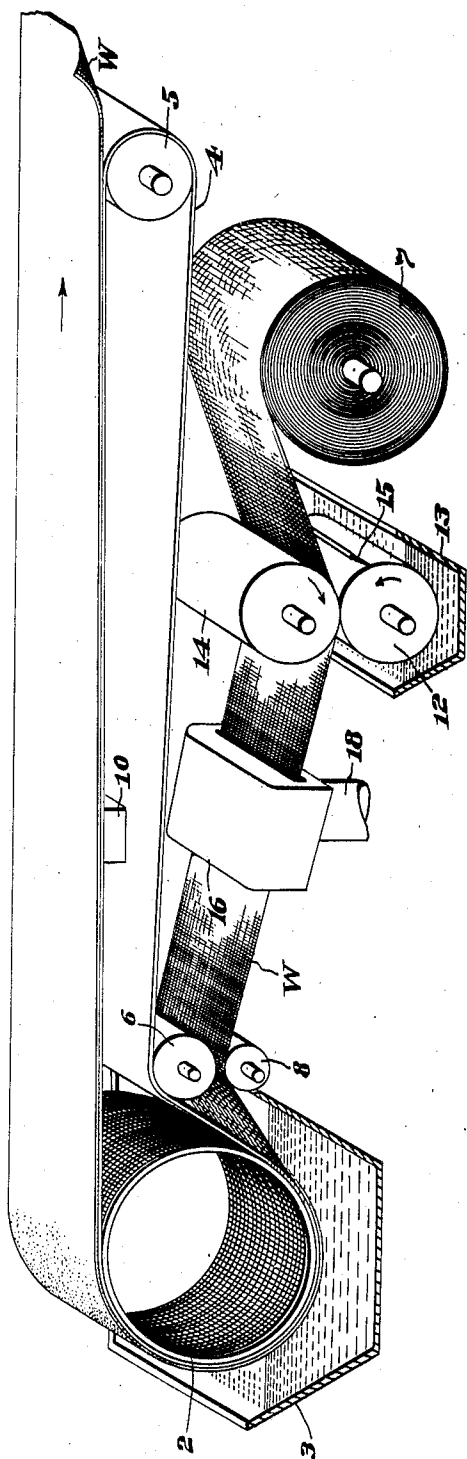
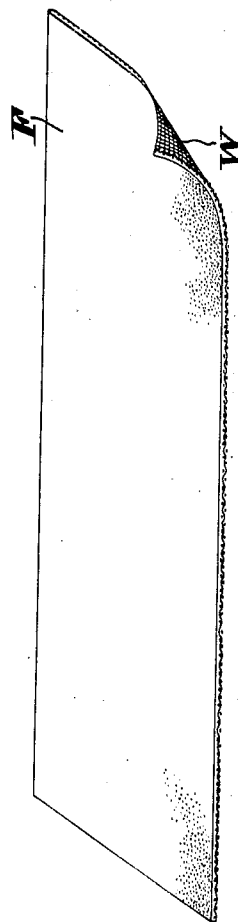


Fig. 2



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METHOD OF MAKING COMPOSITE FABRICS

Application filed October 24, 1930. Serial No. 490,893.

This invention relates to that class of fabrics in which a layer or mat of fibrous or finely divided material is combined with a textile fabric base.

5 It has been proposed heretofore to make fabrics for filtering and other uses by passing a current of fluid containing finely divided material through a loosely woven fabric and thus depositing a coating of said material on the fabric. Very satisfactory filter
10 fabrics have been produced in this manner and such fabrics, when suitably treated, are also useful in other fields. For some purposes, however, it is desirable to bond the
15 coating of fibres or granular material more securely to the threads of the fabric backing than has been found possible in prior methods. The present invention deals especially with this problem and it aims to devise a
20 thoroughly practical solution for it.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features
25 will be particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a diagrammatic perspective view of an apparatus with the aid of which
30 the method of the present invention may be practiced; and

Fig. 2 is a sectional view illustrating the general nature of the composite fabric produced by this method.

35 Referring first to Fig. 1, the organization there shown consists essentially of a paper machine of the cylinder type. This machine includes a screening drum or cylinder 2 mounted to revolve slowly in a vat 3 to which
40 the pulp or paper stock is delivered. The paper making wire or felt 4 runs over the cylinder 2, around a delivery roll 5, and returns over the guide roll 6 to the cylinder. This is a very common arrangement.

45 The fabric W, which is to form the backing for the mat of fibrous or granular materials, is unwound from a supply roll 7 and is led over a guide roll 8 to the felt or wire 4 and then passes through the vat 3 with the
50 felt or wire. The liquid constituent of the

pulp or stock in the vat 3 flows through the fabric and the wire or felt 4 to the interior of the cylinder 2, either due to gravity or under the influence of a partial vacuum maintained in the cylinder, and during such
55 flow the fibre and other solid constituents of the pulp are screened out and deposited on the fabric W. This fabric is carried along with the felt 4, a suction box 10 being used
60 if desired to remove part of the water or other fluid medium in which the solid constituents of the pulp are suspended. The fabric leaves the felt or wire at the roll 5 and is then carried over suitable drying
65 drums (not shown) or through any other suitable form of drying apparatus. This organization is much like those which have been used heretofore.

As above stated, the bond or union produced between the fabric and the fibrous mat
70 deposited on it by this method is not as firm or secure as is desired for some purposes. While such a bond can be improved somewhat by the use of sizings such as those used
75 in the paper industry, they are not satisfactory for the present purposes due to the fact that they bond the fibres of the mat together and thus interfere seriously with its use as
80 a filter and with the impregnation of the mat with various treating substances. I have found, however, that this difficulty can be overcome while producing the desired bonding action by pre-treating the web W with a
85 sizing or adhesive agent which is not readily soluble in the water or other medium in which the fibre in the vat 3 is suspended, but which serves to unite the mat more securely to the threads of the fabric. This pre-treatment or pre-sizing operation may conveniently be performed in an ordinary starch
90 mangle. Such an apparatus is indicated diagrammatically in Fig. 1, and comprises a lower or lifting roll 12 running in a bath or vat 13 of size, a pressure roll 14 for holding the web W of fabric in contact with the lower
95 roll 12, and a doctor or scraper 15 adjustable to determine the thickness of the coating applied. From this apparatus the pre-sized fabric may run over the guide roll 8 into the vat 3, the web being partly dried, if desired, 100

on its way to the vat by any suitable apparatus, such as a heater 16 cooperating with a suction hood 18. In some cases the character of the sizing used may be such that it will be preferable to size the fabric and dry it completely before bringing it to the machine shown in Fig. 1.

The nature of the adhesives or sizings used for this purpose necessarily will depend upon the uses to be made of the finished product. For example, if the fabric is to be used for filtering purposes, a sizing must be selected which will not contaminate the filtered liquid, or else the sizing must be harmless for the particular purposes for which the filtered liquid is to be used. A considerable variety of water resistant sizings are available and useful for this purpose, such, for example, as the unconverted starches and the more water resistant of the fish, animal or casein glues and adhesive gums. For some purposes it is permissible to use meltable highly water resistant adhesives such as asphalts and resins, either natural or synthetic, which must be applied either in a melted condition or else dissolved in some solvent or emulsified. In order to obtain the maximum effectiveness of such adhesives they should be of such a nature that they will not be dissolved materially in the liquid medium in the vat 3 but still will be maintained tacky while they are in the vat so that the fibre and solid constituents of the pulp will adhere to the threads of the fabric. If the adhesive consists of fish, animal or casein glue or the unconverted starches they will be softened sufficiently by the water in the vat to give them the desired degree of tackiness. On the other hand, if an adhesive is used which must be melted, one preferably is chosen with the melting point below the temperature of drying or of hot calendering so that the adhesive will be softened and rendered tacky either in the drying or hot calendering operations and the desired bond thus will be produced between the fabric and the mat.

Whichever procedure is followed, the fibrous mat is bonded securely to the threads of the fabric backing. Usually the backing consists of an open mesh fabric, such as cheese cloth, scrim, Osnaburg, burlap or other suitable fabric base, so that the sizing does not form an adhesive film across the surface of the fabric. Consequently, the fibres of the mat are affected to only a very slight degree by the adhesive or sizing and the integrity of the mat is maintained chiefly by the felting of the fibres together as distinguished from the adhesion or cementing of the fibres to each other. Thus the mat is maintained in such a condition that it is readily pervious to liquids and is well adapted for use as a filtering medium or for impregnation with various substances. Be-

cause of the improved bond between the mat and the fabric this material can be used for a variety of purposes which similar products produced by prior methods could not satisfy.

It is contemplated that this fabric can be used for purposes other than filtering, and the process may be modified somewhat and the fabric may be given additional treatments to adapt it for these other uses. Such treatments may, for example, consist in impregnating the fibrous mat with various fillers, binders, or finishing compounds, depending upon the results desired. The fillers or impregnating substances may, for example, have rubber, bakelite, resinous, starchy, or casein bases, and some of these materials may be associated with the fibre in the beater. The fibrous mat is valuable in making many of these filled or coated composite fabrics because of affording a greater body and in many cases reducing also the expense of manufacture. At the same time the initial bond produced between this fibrous mat and the fabric base is useful in facilitating the handling of the goods in the subsequent operations notwithstanding the fact that these later operations may involve the impregnation of the composite sheet with substances which are themselves strong binders. These considerations also will determine to a very large degree the composition of the pulp used in the vat 3. This pulp or paper stock may be prepared according to the usual methods followed in the paper industry, the fibre being dispersed in water or some other suitable fluid medium and held suspended in said medium while it is deposited on the fabric backing. For most purposes the fibrous materials used will be similar to those employed in the paper industry, the fibre being derived from wood or rag stock. Other fibres, however, may be used, and in fact I have found it advantageous to use short cotton fibre which ordinarily is regarded as waste. A very good mat can be made with this short cotton fibre. Fillers such as clay, talc, and the like, can also be used with the fibre. An important difference between this mat as used in a filter fabric and the combinations of paper and fabric which have been made heretofore is that the fibres of the mat are not adhesively bonded to each other to any substantial degree but are felted together so that the mat is very pervious to fluids. In Fig. 2 the fabric backing is shown at W and the fibre mat at F.

Having thus described my invention, what I desire to claim as new is:

1. That improvement in methods of making fabrics of the character described which consists in treating a textile fabric with a water resistant sizing, suspending finely divided material in a fluid medium, and passing a current of said medium containing said material through said fabric while the sizing is

in a tacky condition and thereby screening out said material and causing it to adhere to said fabric.

2. That improvement in methods of making fabrics of the character described which consists in treating a textile fabric with a water resistant sizing, and passing a current of fluid containing fibre dispersed therein through said fabric under such conditions that the sizing is rendered tacky, whereby the fibre is deposited on said fabric and caused to adhere to the threads thereof.

3. That improvement in methods of making fabrics of the character described which consist in treating a textile fabric with a water resistant sizing, subjecting the fabric so treated to a drying action, suspending fibre in a liquid medium, and passing said medium with the fibre so suspended therein through said treated fabric while supporting it on a screening surface, and thereby coating the fabric with said fibre which is caused to bond to the threads of the fibre due to the presence of said sizing.

4. That improvement in methods of making fabrics of the character described which consists in treating a textile fabric with a water resistant sizing, subjecting the fabric so treated to a drying action, suspending fibre in a dispersed condition in a liquid medium capable of rendering said sizing tacky, and passing a current of said medium with the fibre suspended therein through said treated fabric while supporting the fabric on a screening surface and thereby coating the fabric with said fibre which is caused to adhere to said fabric due to the presence of said sizing.

5. That improvement in methods of making fabrics of the character described which consists in treating a textile fabric with a water resistant meltable sizing, suspending finely divided material in a fluid medium, passing a current of said medium containing said material through said fabric and thereby screening out said material and depositing it on said fabric, and at some stage in the process heating the fabric and the coating deposited thereon sufficiently to render said sizing tacky and thereby bonding the coating to the threads of the fabric.

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