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F. R. LENK, JR
WALL CONSTRUCTION

2,669,757

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Fig. 1.

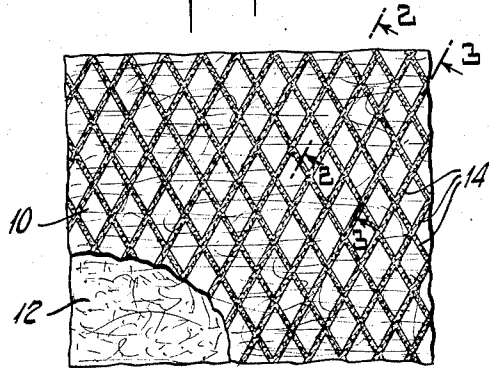
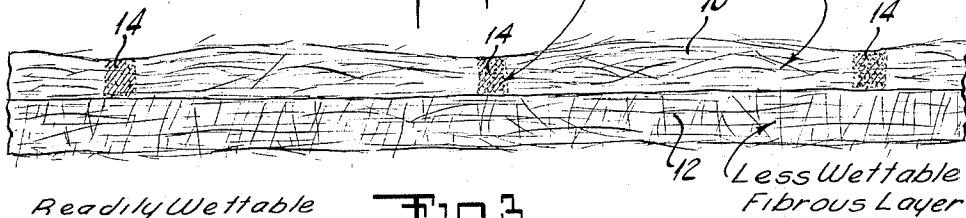
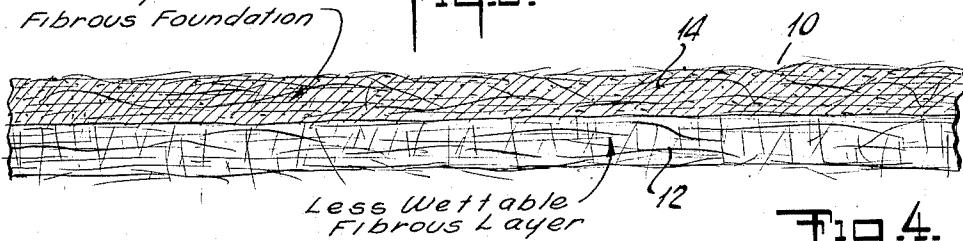


Fig. 2. adhesive Readily Wettable
Fibrous Foundation



Readily Wettable
Fibrous Foundation

Fig. 3.



Less Wettable
Fibrous Layer

Fig. 5.

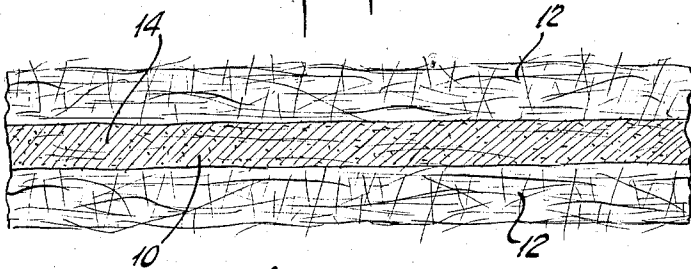


Fig. 4.

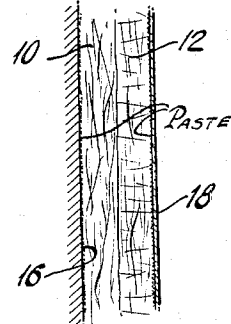
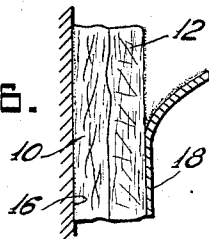


Fig. 6.



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WALL CONSTRUCTION

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Application March 31, 1949, Serial No. 84,522

5 Claims. (Cl. 20-4)

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This invention relates to cloth of novel construction and to methods of making it. It is not restricted to non-woven fabrics, but it is particularly applicable to non-woven fabrics made of the usual textile fibers, by which is meant any fibers suitable to be spun and woven into cloth. Cotton and rayon are prominent examples.

Textile fibers are distinguished especially by their length from other similar but shorter fibers, for example those used in making paper. In fact in some instances identical fibers may be classed as textile fibers or not depending on their length. Therefore as used herein the term "textile fibers" designates fibers suitable for spinning and weaving into cloth by the customary methods of making cloth and the term "textile fabric" or "textile cloth" designates fabric sheet made from such textile fibers whether or not the fabric is woven, knitted, felted or otherwise made.

One of the objects of the invention is to provide an improved non-woven fabric having a napped surface.

Another object includes the making of an improved textile fabric in which one of its surfaces has markedly different characteristics from the other surface, such differing characteristics including not only smoothness as compared to nap, but also wettability by water and adhesives and resistance to separation of the fibers. This aspect of the invention is applicable to filters and other uses but is particularly adaptable to wall coverings, especially to foundation materials to which wallpaper is applied. This embodiment of the invention will be described for the sake of example in connection with such foundation materials.

Another object of the invention is to provide an improved double napped fabric, that is a fabric napped on both surfaces.

Other objects and advantages of the invention will be evident in the accompanying description and accompanying drawings.

In the drawings:

Fig. 1 is a plan of one form of fabric embodying the invention;

Fig. 2 is an enlarged fragmentary section on the line 2-2 of Fig. 1, the section being taken along a bonding stripe;

Fig. 3 is an enlarged fragmentary section on the line 3-3 of Fig. 1, taken between bonding stripes;

Fig. 4 is an enlarged section of a portion of a wall covered with the improved fabric as a foundation for wallpaper; and

Fig. 5 is a section corresponding to Fig. 3 of a modified form of the invention.

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Figure 6 is an enlarged section of a portion of a wall covered with my improved fabric as a foundation for wallpaper showing the wall paper partially stripped away from the wall and the point of rupturing of the laminated layer.

In the Goldman Patent 2,039,312 there is described a non-woven textile fabric formed by superposing carded webs of cotton and binding the fibers together by adhesive material printed or pressed through the webs along separated lines. In the patent to Besso and Habicht 1,532,648 there is described a non-woven textile fabric formed by disposing cotton fibers completely at random in an air stream, gathering them on a screen, and suitably binding the fibers, for example by solvent applied at spaced points. In either an ordinary carded web, or a Besso and Habicht web, the fibers or at least a substantial proportion of them are what we call polyposed, by which is meant that the fibers are arranged at random or in many positions, without order or system. This is true in usual carded webs, for although one of the objects of carding is to align the fibers in parallel, complete alignment is not usually achieved. In fact with appropriate settings of the carding machine, and sufficient speed of operation a very high degree of random arrangement can be had. Thus I use the term polyposed to refer to the disordered arrangement of fibers in either a card web or a web of the Besso and Habicht type. In webs of polyposed fibers made by either process there is also a considerable entanglement of the fibers, which aids in holding the fibers together.

In making the improved fabric I form in any suitable manner a foundation 10 of fibers which are readily wettable by water and by particular adhesives, such as starch paste or polyvinyl acetate emulsions. I secure to one or both faces of this foundation a non-woven layer 12 of fibers of a different character, that is they are less wettable by water and such adhesives. Preferably both the foundation 10 and the layer 12 are non-woven webs of polyposed fibers. Where both layers are so made, the fibers in each web are entangled, and preferably the two webs are joined face-to-face by entanglement of the fibers of one web in the fibers of the other. These two webs are then bonded together by any suitable adhesive printed on or into the webs along separated lines such as the lines in the diamond grid pattern 14 of Fig. 1.

The difference in the wettability of the fibers may vary widely depending on the characteristics desired in the final fabric and, in fact, the fibers in the web 12 may be practically non-wettable.

As one example, the web 10 may be formed of one or more carded webs of rayon or absorbent cotton such as bleached cotton. The web 12 may be formed of one or more layers of non-absorbent cotton, such as unbleached cotton. The adhesive may be a water emulsion of polyvinyl acetate. The adhesive is ordinarily applied by passing the webs between any suitable printing roll and backing roll (not shown) such as is described by Goldman, the printing roll being in contact with the web formed of wettable fibers so as to apply the adhesive first to the wettable web and then pressing it through this into the less wettable web.

In this way the wettable web becomes saturated with the adhesive along the printing lines and the less wettable web either repels the dispersion of adhesive or receives it to a limited extent. The extent to which the adhesive is distributed in the less wettable web and the extent to which that web is wetted by the adhesive depends upon the nature of the dispersion of adhesive, the relative wettability of the fibers when the adhesive is applied, the wetness or dryness of the fibers, and the pressure of the printing roll. These factors can be varied within wide limits to produce, when the dispersant or solvent for the adhesive is evaporated, a fabric in which the less wettable fibers are firmly bonded or are very slightly bonded to each other, or a fabric in which only the wettable web and those less wettable fibers near the surface of the wettable web are bound to each other, or a fabric in which all the less wettable fibers are bonded more or less lightly together, and to the wettable fibers. However, due to the entanglement of the non-wettable fibers in the wettable fibers which latter are bonded together, the less wettable web will be held to the more wettable web and the fibers of the less wettable web will hold together because of their entanglement regardless of how slight a degree of bonding is applied to the less wettable fibers themselves. Any desired degree of bonding of the less wettable web can be obtained by regulating the degree of wettability temporarily or permanently, and by regulating the wetness of the fibers at the time the webs are bound. For example, an assembly of bleached cotton and unbleached cotton is saturated with water and the excess squeezed out in a wet-out padder and the web is then printed with a polyvinyl acetate emulsion in the known way, after which the web is dried. The polyvinyl acetate emulsion thoroughly wets the bleached cotton and upon drying binds these fibers firmly. But the unbleached cotton, being less wettable, collects less polyvinyl acetate emulsion, and so is less firmly bound. The result is a fabric having a soft nap of unbleached cotton fibers.

The softness of the nap of the fabric and the degree of bonding of the less wettable layer can be regulated by controlling the wettability of this layer, either temporarily or permanently. For example wetting agents can be incorporated in the wet-out bath to increase temporarily the wettability of the gray cotton layer. This increases the firmness of bonding of this layer, but since the wetting agent is removed or reduced in drying, the wettability of the final fabric is not affected. Wettability of the final fabric may be controlled, however, by partially removing the natural waxes from the unbleached cotton or by coating rayon with waxes or other substances rendering it repellent to the desired degree. If desired, and especially in cases where the less wettable web is not bonded or only slightly bond-

ed, the fabric may be pressed to compact and further entangle the already tangled fibers of the less wettable web and thus increase the resistance to separation of these fibers due to entanglement alone. This pressing may be accomplished by running the web between calender rolls or by simply winding the web into a roll under tension.

Preferably the distance between adjacent lines of adhesive is not greater than half the length of the average fiber so that each of a majority of the more wettable fibers is secured to other fibers at two points. The result is a pervious fabric having one relatively smooth layer of firmly bonded fibers united to a nap of less firmly bonded less wettable fibers or even unbonded fibers some of which at least are entangled in the bonded fibers.

It is preferable that material which is to be used as a base for wallpaper be differentially wettable by a water dispersion of the usual starch paste and that the surface next to the wall be highly wettable by such paste in order that this surface may be strongly bonded to the wall while the other surface may be bonded to the wallpaper by a weaker, but adequate bond.

Referring to Fig. 4, 16 designates the surface of a wall which may be wood, composition board or the like. The composite fabric above described is applied to this surface either by tacking at intervals or by any suitable adhesive such as starch paste which forms a relatively permanent bond and which is not readily softened by subsequent application of the adhesive on the wallpaper. The firmly bonded or wettable side of the fabric is applied to the surface 16 and the napped side is away from the wall. Wallpaper represented by the layer 18 may then be applied by pasting to the napped side of fabric in the same manner that paper is customarily pasted on walls.

The material has the advantage that the wallpaper adheres to the fabric and thus to the wall firmly enough to stay in place as long as desired but the fabric enables the paper to be stripped readily from the wall when it is desired to repaper the wall. Whenever it is desired to strip the wallpaper, an edge or corner of the paper is pried loose from the wall by knife or spatula and using this loosened edge as a hold, the paper can be readily stripped without soaking or softening of the paste.

The ability to strip the paper is believed to be due both to the low wettability of the napped layer and to the relatively weak bonding of the fibers in this layer. The low wettability permits limited absorption of the wallpaper paste and prevents the paste from reaching the firmly bonded wettable layer thus preventing the paper from being bonded to the wettable layer. The ease with which this napped layer is ruptured or split allows fibers to be separated in the nap layer without damaging the firm layer beneath. When the wall has been papered once and is stripped for the first time, some of the fibers of the napped layer will be removed with the paper, the quantity removed depending upon how wettable to the starch paste these fibers are and how firmly they are bonded to each other and to the wettable layer. By suitably adjusting the various factors involved a fabric can be made which will shed part of its fibers with each successive stripping and thus will permit several successive stripings of wallpaper from the same fabric.

I have found the customary wallpaper paste

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to be satisfactory for applying wallpaper to my improved foundation fabric, such pastes including water dispersions of various starches such as wheat flour starch, as is well-known in the art. However, I have found that successive strip-
 5 pings can be facilitated and the number of strip-
 10 pings from a given foundation fabric may be materially increased by incorporating in the paste means which tend further to prevent the paste from passing through the layer of non-
 15 wetttable fibers to the wetttable fibers. This can be accomplished by mixing in the paste, filter aids or materials which tend to combine with the remaining non-wetttable fibers to form a filter
 20 tending to prevent the paste from reaching the wetttable fibers. Such filter aids may be diatomaceous earth, short unbleached cotton fibers, chopped rayon fibers and the like. For example, I have greatly increased the successive strip-
 25 pings by using an adhesive consisting of starch flour from about 20% to about 50% and diatomaceous earth from about 80% to about 50% (solids content in both cases). Successive strip-
 30 pings of paper applied to the foundation fabric above described with an adhesive consisting of starch 25% and diatomaceous earth 75% solids content gradually build up a thin cake resembling a filter cake on the wetttable layer of fibers. In such instances I have successfully stripped
 35 five successive pieces of wallpaper from the same non-woven fabric base.

My invention enables me to provide an improved non-woven double napped fabric by a very economical process. I make two layers of napped fabric by any suitable method, for example as illustrated in Fig. 2. The adhesive used is one which can be reactivated when dried, for example an emulsion of a thermoplastic material such as polyvinyl acetate. Then the two layers containing the adhesive and formed by the fibers 10 are placed together and the adhesive is activated. Where this is thermoplastic the two layers are pressed between hot calendar rolls. The adhesive on each layer melts or softens and adheres to the other layer on cooling. This produces a fabric having a core of the more wetttable fibers firmly adhered together and a nap on each side of the less wetttable fibers. Such fabric is useful for plumper fabric for shoes and for various kinds of filters.

The invention claimed is:

1. In a wall, the combination of a support, a non-woven fabric including a first layer of polyposed fibers and a second layer of polyposed fibers entangled with each other and with the fibers of the first layer, the fibers of the first layer being adhesively bonded to each other along separated lines and to the support to secure the second layer to the support, the fibers of the second layer being markedly less firmly bonded together along coinciding separated lines and more easily separable than the fibers of the first layer so as to comprise a more rupturable layer, and layer of wallpaper adhesively bonded to the second layer of fibers.

2. In a wall, the combination of a support, a non-woven fabric secured to the support and including a first layer of polyposed fibers adhesively bonded to each other along separated lines, a second layer of polyposed fibers adhesively bonded to each other and to the first layer along separated lines coinciding with the separated lines along which the fibers of the first layer are bonded to each other, and a layer of wallpaper adhesively bonded to the second layer; the

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adhesive bonds between the fibers of the first layer being markedly stronger than the adhesive bonds between the fibers of the second layer and markedly stronger than the adhesive bond between the layers, whereby the fibers of the said second layer being markedly less firmly bonded together comprise a rupturable layer permitting the wallpaper to be stripped from the wall without damaging the first layer underneath.

3. A non-woven fabric comprising in combination a first layer of relatively wetttable polyposed fibers, a second layer of polyposed fibers less wetttable than the first mentioned fibers, the fibers of the first and second layers being adhesively bonded to each other along separated lines, the second layer being adhesively bonded to the first layer along coinciding separated lines and forming one surface of the fabric, and a third layer of polyposed fibers adhesively bonded along separated lines and less wetttable than the first mentioned fibers, the third layer being adhesively bonded along coinciding separated lines to the first layer and forming the opposite face of the fabric, the adhesive bond between the fibers of the first layer being markedly stronger than the adhesive bond between the fibers of the second and third layers.

4. In a wall, the combination of a support, a first layer of relatively wetttable polyposed fibers adhesively bonded to each other along separated lines and secured to the support, a second layer of markedly less wetttable polyposed fibers comprising a rupturable layer secured to the first layer and a layer of wallpaper adhesively bonded to the second layer by a water-dispersible adhesive having from about 20 per cent to about 50 per cent of a filter aid dispersed in the adhesive.

5. In a wall, the combination of a support, a first layer of relatively wetttable polyposed fibers adhesively bonded along separated lines to each other and secured to the support, a second layer of markedly less wetttable polyposed fibers comprising a rupturable layer secured to the first layer and a layer of wallpaper adhesively bonded to the second layer by a water-dispersible adhesive having from about 20 per cent to about 50 per cent diatomaceous earth dispersed in the adhesive.

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