July 5, 1938. E. HURST ET AL 2,122,472

WEB MATERIAL AND METHOD OF MAKING THE SAME

Filed May 17, 1935 3 Sheets-Sheet 1

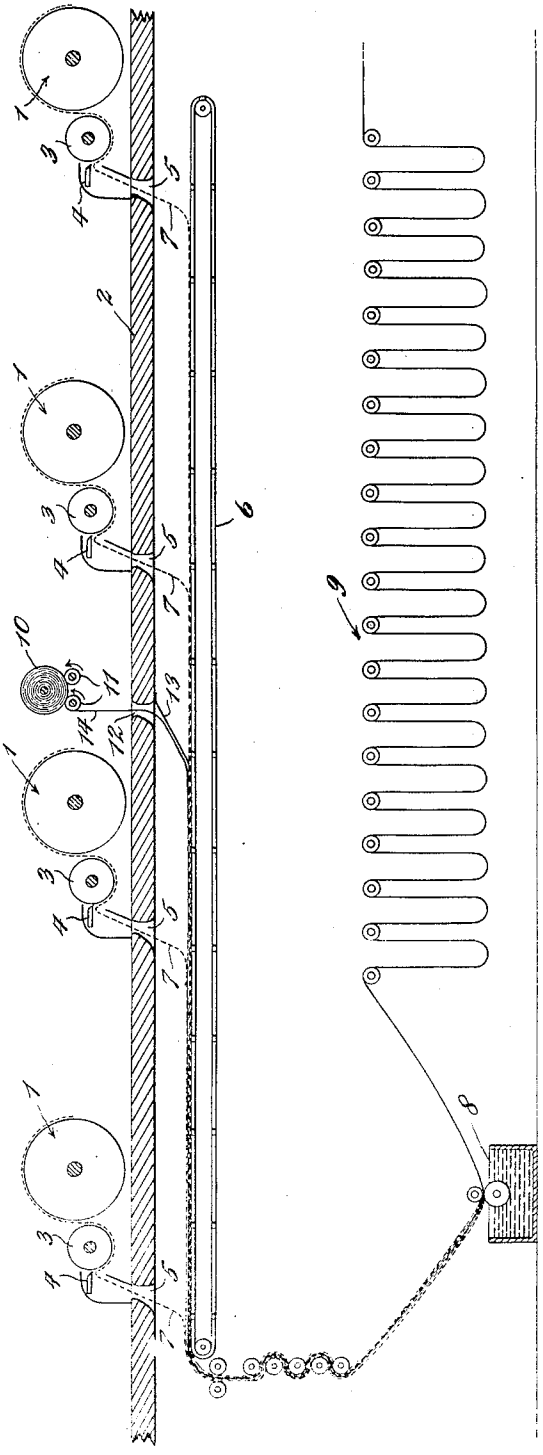


Fig. 1.

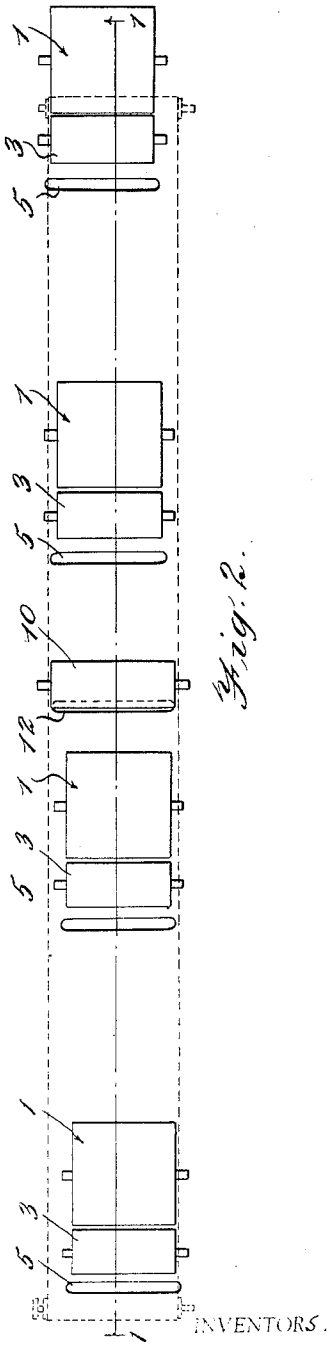


Fig. 2.

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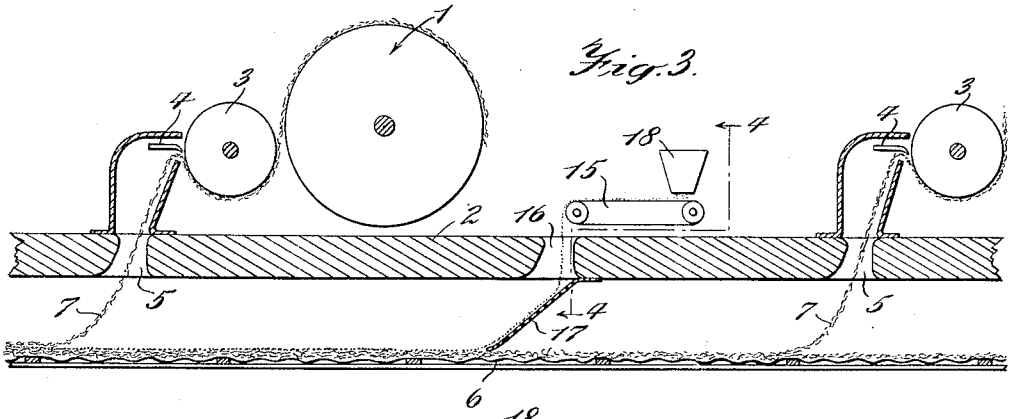


Fig. 3.

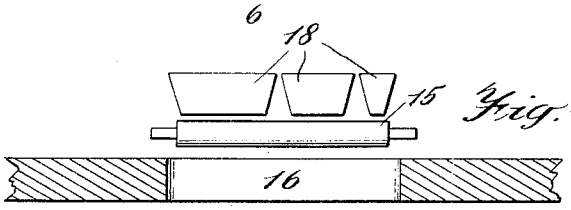


Fig. 4.

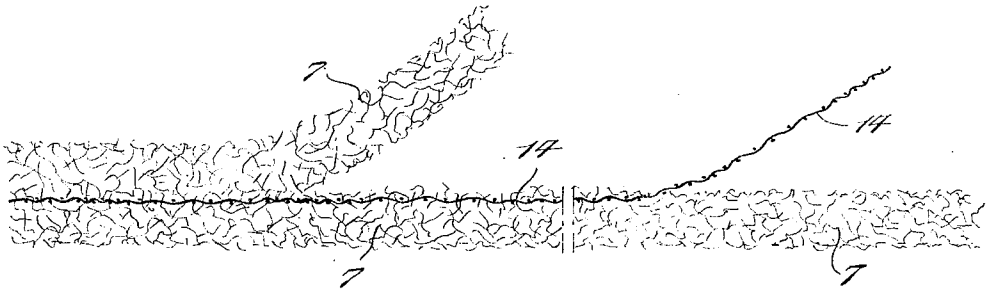


Fig. 5.

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Fig. 6.

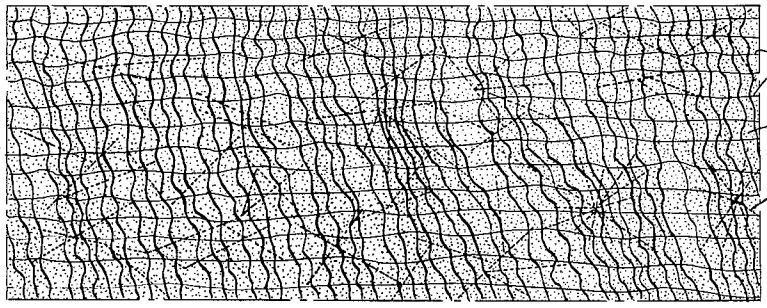


Fig. 7.

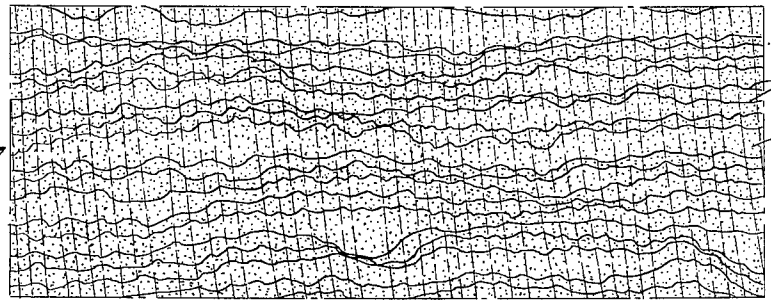


Fig. 8.

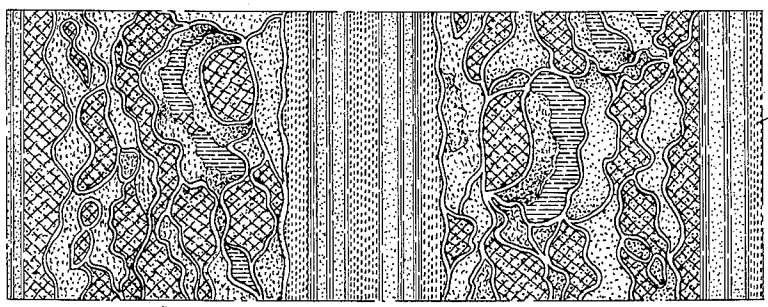
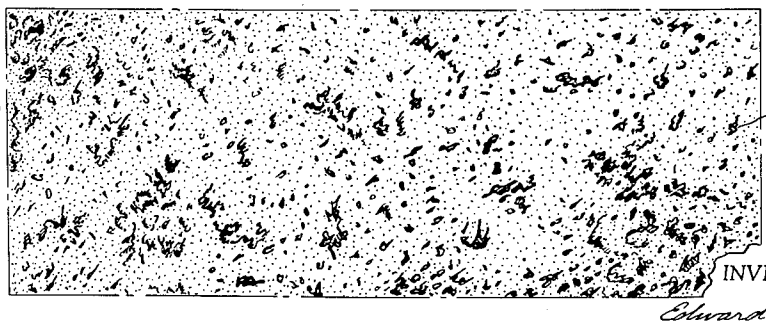


Fig. 9.



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Patented July 5, 1938 2,122,472

UNITED STATES PATENT OFFICE

2,122,472

WEB MATERIAL AND METHOD OF MAKING THE SAME

Edward Hurst and Myrick Crane, Fall River, Mass., assignors to United Cotton Products Company, Fall River, Mass., a corporation of Massachusetts

Application May 17, 1935, Serial No. 21,948

4 Claims. (Cl. 154—46)

This application relates to a novel and improved web material and to a novel method of forming that web. The novel features will be best understood from the following description and the annexed drawings, in which we have shown selected embodiments of the web and also have shown diagrammatically certain methods by which the web may be formed.

In those drawings:

Fig. 1 is a diagrammatic view in the form of a vertical section showing one form of apparatus which may be used;

Fig. 2 is a plan view of the structure appearing in Fig. 1;

Fig. 3 is a fragmentary view similar to a part of Fig. 1, but showing a slight modification of the apparatus used in practicing the method, here also the apparatus being shown very diagrammatically;

Fig. 4 is a view approximately on the line 4—4 of Fig. 3;

Fig. 5 is a view on the same plane as Fig. 1, showing the formation of the web but on a greatly enlarged scale;

Figs. 6, 7, 8, and 9 are views showing samples of web designs which may be achieved according to our invention.

Referring first to Figs. 1, 2, and 5, we have shown therein an apparatus similar in many respects to that more fully described and claimed in our Patent No. 2,055,412. This apparatus comprises means for forming a plurality of membranes, such means being exemplified by a plurality of cards 1 mounted upon a floor 2 and comprising doffer cylinders 3 and combs 4. The cards may have any suitable and usual construction and may be used to act upon any suitable fibrous material, although cotton fiber has been found most advantageous for many purposes.

The fibers are formed by the card into a thin membrane or lap, as sometimes called in the art, and this membrane, after removal by the comb, is passed through an orifice 5 in the floor on to a moving and vibrating conveyor 6. In its passage through the orifice, each membrane 7 may be subjected to an aerodynamic weaving action, in a manner described in Patent No. 2,055,411.

Briefly, the aerodynamic weaving action referred to comprises the passing of air through the membrane in such a way as to change the positions of individual fibers within the membrane relatively to each other and thus to cause them to interlock with each other, without any disturbance of the continuity of the membrane. Then the membranes are placed one on top of another upon the conveyor approximately within the same lateral limits, preferably from positions displaced laterally of the conveyor with respect to each other. Preferably also, the conveyor is given a continuous but gentle agitation or vibration, and after the web leaves the conveyor it is flexed or bent back and forth between rollers, but without pressure. All these steps aid in causing the fibers of the various membranes to become loosened and displaced from the positions that they occupied in the membranes as those membranes left the cards, and also causes the fibers in the membranes to become interengaged and interwoven with each other and with the fibers of the other membranes to form a substantially unlaminated web, in which the fibers extend in a multiplicity of different directions and are disposed in a multiplicity of different planes. The fibers are then held in their interwoven and interengaged positions by a suitable adhesive or impregnating material, such as rubber latex, which may be applied at the bath 8, after which the web may be dried as on a festoon drier 9.

By the method of forming the web, the fibers within each membrane are caused to interweave and interlock, both by the action to which they are subjected at an orifice 5 and also by the other steps referred to in said copending applications. Likewise, the fibers of one membrane are caused to interlock and interweave with those of adjacent membranes so that a non-laminated web is formed in which the fibers of adjacent membranes are interwoven together to substantially the same extent as are the fibers within each membrane so as to form a substantially homogeneously woven fibrous web having substantial strength.

The fibers in the web are caused to extend in a multiplicity of different definite directions and are disposed in a multiplicity of different definite planes.

The web thus manufactured may be used for various purposes, either utilitarian or ornamental, or both. We have found that the product may be used for decorative purposes to good advantage and that a wide variety of designs and color effects may be obtained. For example, the fibrous material supplied to one card may be previously dyed to one selected color, and the material supplied to the other cards may be dyed to other distinctive colors, all before being acted upon by the cards. Then each membrane, as it leaves the card, has a color which is distinctive

and usually different from that of any other membrane used to form the web.

Then when the variously colored membranes are brought together into one web by the interweaving action mentioned above and more fully described and claimed in the aforesaid copending applications, the result is that the fibers of one membrane will be mixed with those of other membranes in varying degrees, thus causing a greater or less blending of the colors of the various membranes. For example, we have found that the interweaving action is so great that oftentimes fibers in the membrane adjacent one surface of the web will weave through the other membranes and show at the opposite surface of the web. The result is a novel web in which the color effects have an infinite variety which cannot be obtained by any other method known to us.

The web may be given still another distinctive design by incorporating therein other elements preferably having distinctive designs or colors, although such elements may be used merely to vary the form of the surface of the web. These elements may be separate and distinct from each other, or they may be in the form of threads of a fabric either woven or knit or secured together in any other way, or in any other desired form.

A sheet of fabric or other desired material may be incorporated in the body of the web as indicated in Figs. 1, 2, and 5. In Figs. 1 and 2 we have shown a roll 10 of fabric mounted upon driven rolls 11 and passing through an orifice 12 in the floor. It may be guided by an apron 13 onto one of the membranes 7 on the conveyor. This apron is preferably made of foraminous material or is otherwise provided with perforations so as to permit the ready passage of air therethrough and through the material supported thereby.

For the purposes of illustration only, we have shown the sheet 14 as being disposed in the web with two membranes on either side thereof. It is to be understood, however, that this positioning of the sheet may vary, as we have found that we can even place the sheet with all of the membranes on one side thereof, and in fact satisfactory web material has been thus made. The rolls 11 contact with the periphery of the roll 10, and thus the sheet 14 is fed at uniform speed through the orifice 12, this speed normally being that of the top run of the conveyor 6. If desired, it may be made greater than the speed of the conveyor, thus obtaining a crinkly effect of the sheet, but if it is made less than the speed of the conveyor, it is very apt to tear the web.

The sheet of fabric should preferably have a large number of interstices therein, and these interstices are preferably large ones so that the fibers of the web membranes may pass through the interstices and interlock and interweave with the threads of the fabric. For the purpose of convenience, we shall refer to the fabric as being made of threads, using that term broadly to include yarns or any other elements of which fabric may be formed.

Referring to Fig. 5, we have shown therein two of the membranes 7 with the sheet 14 of fabric therebetween, and have indicated diagrammatically how the fibers of the two membranes pass through the interstices of the fabric whereby the web membranes and the fabric sheet become thoroughly interwoven and united.

The fabric lends strength to the web and likewise provides a further means of ornamentation. If the sheet is made of a non-distinctive color, it may be used merely to give a desired contour to the surfaces of the web. On the other hand, if desired, the fabric may be made of a distinctive color or, for example, may be made of one distinctive color on one side thereof and another distinctive color on the opposite side thereof. With these suggestions, it will be seen that the possibilities of a wide variety of pleasing designs is an infinite one.

In Figs. 3 and 4 we have shown diagrammatically how elements other than fabric threads may be incorporated into the body of the web. We have indicated a belt conveyor 15 which may be driven by any suitable means, not shown, and is adapted to discharge material through an orifice 16 in the floor 2, this material being guided to the upper reach of the conveyor 6 by means of an apron 17. The material may be received in one or a plurality of hoppers 18 disposed over the conveyor. We have shown a plurality of these hoppers to receive different kinds of elements, thus indicating the fact that the elements incorporated in the web may be conveniently varied according to the designs which it is desired to achieve.

The elements which may be used vary widely. For example, we have found that grains of sawdust, either plain or colored, may be used to telling advantage. Similarly, pieces of tinsel or tinsel wire may be employed. In any event, the elements which are fed on to the conveyor are engaged by the fibers of the membranes with which they come in contact and securely interlocked therewith and thus incorporated into the body of the web.

The web thus made even without impregnation by rubber latex or the like is a novel product, the advantages of which are increased by treating it with a bath of suitable impregnating material, such as rubber latex, which gives it all the durability and other advantages known in the art.

In Figs. 6, 7, 8, and 9 we have shown examples of various designs which may be achieved. For example, in Fig. 6 is shown a section of web having embodied therein a very loosely woven fabric, the elements 19 of which are so loosely woven as to crinkle easily and provide large interstices 20 therebetween through which the fibers of the membranes may pass and interlock with the threads of the fabric. In Fig. 6 we have also shown elements 21 which may be in the form of tinsel thread and which may be incorporated in the web either closely adjacent the fabric or with one or more intervening membranes.

In Fig. 7 is shown a section of another piece of web in which only a fabric is used, here again this fabric being formed of loosely woven threads so as to provide relatively large interstices 20 through which the individual fibers of the membranes may pass to engage with the threads.

It is not necessary to use such loosely woven material as shown in Figs. 6 and 7. One pleasing design which we have achieved is indicated in Fig. 8, wherein lace material 22 is used having any desired design and providing sufficiently large interstices for the fibers to pass through. In Fig. 9 is shown another design which has been achieved and in which grains 23 of sawdust have been used. By using such a sawdust of different kinds of wood or differently colored, a wide variety of color effects and designs may be obtained.

For the purposes of illustration, we have referred above to the sheet incorporated in the web as a sheet of fabric, and such sheets have

been used with very satisfactory results. However, the invention is not limited to fabric, as other sheets may be employed, particularly for decorative purposes and for purposes of getting a design which may be found to be desirable. For example, a sheet of any suitable material, fabric or otherwise, may be provided with a picture or other design and then one or more membranes may be secured to the sheet, thereby partially veiling the picture or design. When the membranes are formed of cotton fibers which are translucent or semi-translucent in character, a certain amount of light may pass through those fibers themselves, and still more light may pass through the interstices between the fibers to illuminate the picture or design. By varying the number of membranes, or the amount of material in each membrane, or both, various combinations may be obtained which will veil the picture or design to greater or less degree.

Similarly, it will be evident that the effect of depth is obtained by the fact that the picture or design is disposed on the interior of the web, and the effect of the depth may be increased by the thickness of the membrane or membranes placed over it.

The designs may be formed in any desired way and on a wide variety of materials, for example by methods known as parterre, applique, or silhouetting. Whatever method is used, however, in forming the design of a sheet, it will be evident that such design may be combined with the fibrous membranes in such a way as to tone down or otherwise modify the design.

As a further example, a distinctive design may be formed on a sheet, and a distinctive design may be likewise formed on the membranes combined with the sheet. The membrane designs may be formed on each membrane or on a combination of several membranes as desired, and when the membranes are then united with the sheet, a composite design is achieved. Likewise, it will be obvious that a composite design may be achieved by forming distinctive designs on a plurality of membranes which when united will form a composite design. A distinctive design may be formed on a web made according to the methods outlined in the aforesaid copending applications, and then this web may be combined with other membranes having distinctive designs, all forming a composite design.

The above examples are given merely to point out the possibilities of the invention, and are not limitations thereon. Various changes may be made in the illustrated method and appratus, and we do not intend to limit ourselves except by the appended claims.

We claim:

1. In combination, a web comprising a plurality of carded membranes each formed of a multiplicity of fibers, said membranes being disposed one on another and the individual fibers being loosened and displaced from the positions they occupied in the membranes as they left the cards and extending in a multiplicity of different directions and located in a multiplicity of different planes, the fibers in the membranes being interengaged and interwoven with each other and with the fibers of the other membranes to form a substantially unlaminated web, a sheet of fabric having interstices between the threads thereof and incorporated in said web, with a multiplicity of said fibers extending through said interstices and engaging said thread to unite the web and the fabric, and an adhesive holding said fibers in said relations to each other and to the fabric.

2. In combination, a web comprising a plurality of carded membranes each formed of a multiplicity of fibers, said membranes being disposed one on another and the individual fibers being loosened and displaced from the positions they occupied in the membranes as they left the cards and extending in a multiplicity of different directions and located in a multiplicity of different planes, the fibers in the membranes being interengaged and interwoven with each other and with the fibers of the other membranes to form a substantially unlaminated web, a sheet of fabric having interstices between the threads thereof and incorporated in said web, with a multiplicity of said fibers extending through said interstices and engaging said thread to unite the web and the fabric, and an adhesive holding said fibers in said relations to each other and to the fabric, the threads of said sheet having a distinctive color and being at least partially visible at a surface of the web between the fibers of the web.

3. In combination, a sheet of material having a distinctive design thereon, a web partially veiling said design and comprising one or more carded membranes, each formed of a multiplicity of fibers with the individual fibers loosened and displaced from the positions they occupied in the membranes as they left the cards and extending in a multiplicity of different directions and located in a multiplicity of different planes, thus formng a multplicity of small interstices in the web through which said design can be seen, and an adhesive holding said fibers in said relations to each other and also securing the web to the face of the sheet.

4. In combination, a web comprising a plurality of carded membranes each formed of a multiplicity of fibers, said membranes being disposed one on another and the individual fibers being loosened and displaced from the positions they occupied in the membranes as they left the cards and extending in a multiplicity of different directions and located in a multiplicity of different planes, the fibers in the membranes being interengaged and interwoven with each other and with the fibers of the other membranes to form a substantially unlaminated web, said web having a multiplicity of small interstices therein and each of said membranes having a distinctive design at least partially visible through the interstices of the other membranes, and an adhesive holding said fibers in said relations to each other.

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