

Feb. 28, 1928.

1,660,924

E. HOPKINSON

SHEET MATERIAL

Filed Nov. 3, 1923

2 Sheets-Sheet 1

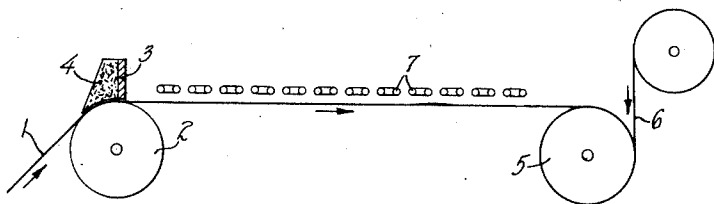


Fig. 1.

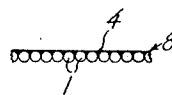


Fig. 2.

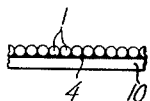


Fig. 3.

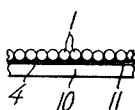


Fig. 4.

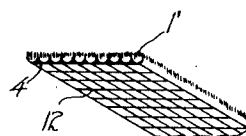


Fig. 5.

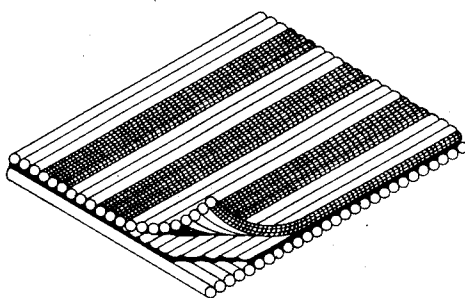


Fig. 6.

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2 Sheets-Sheet 2

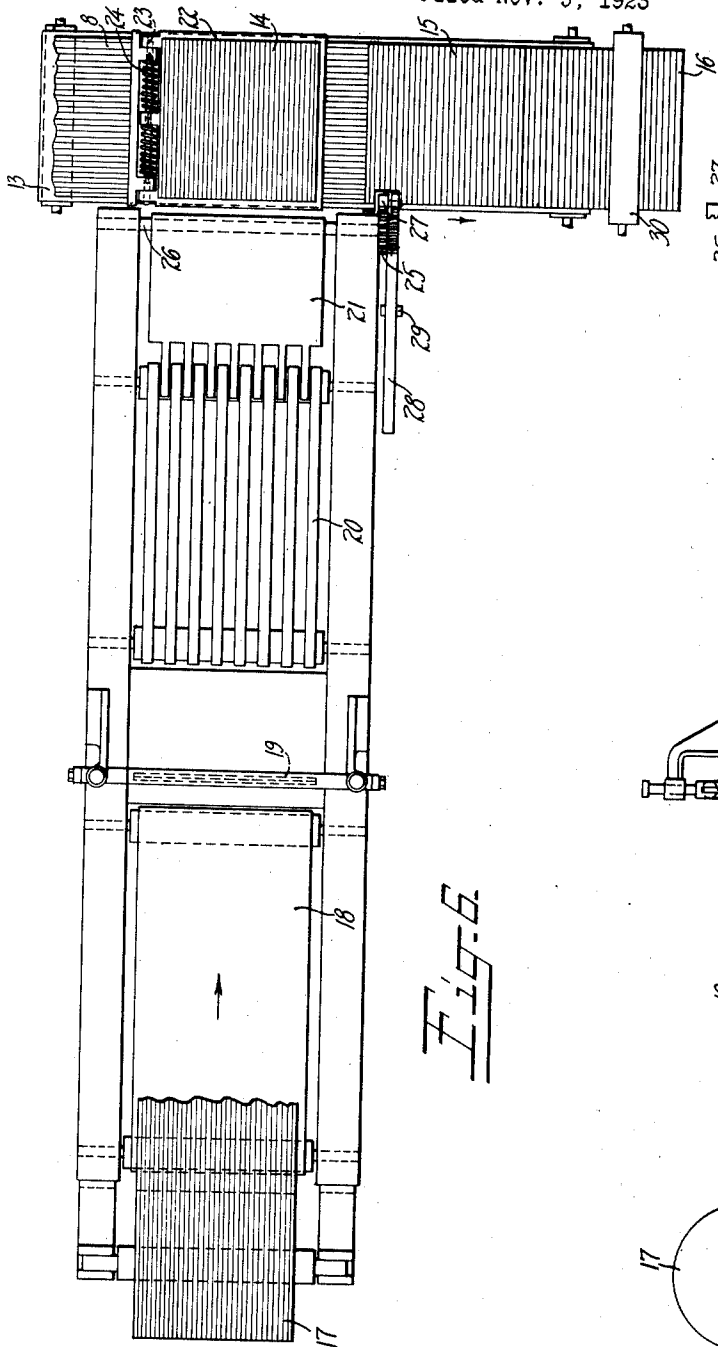


Fig. 6.

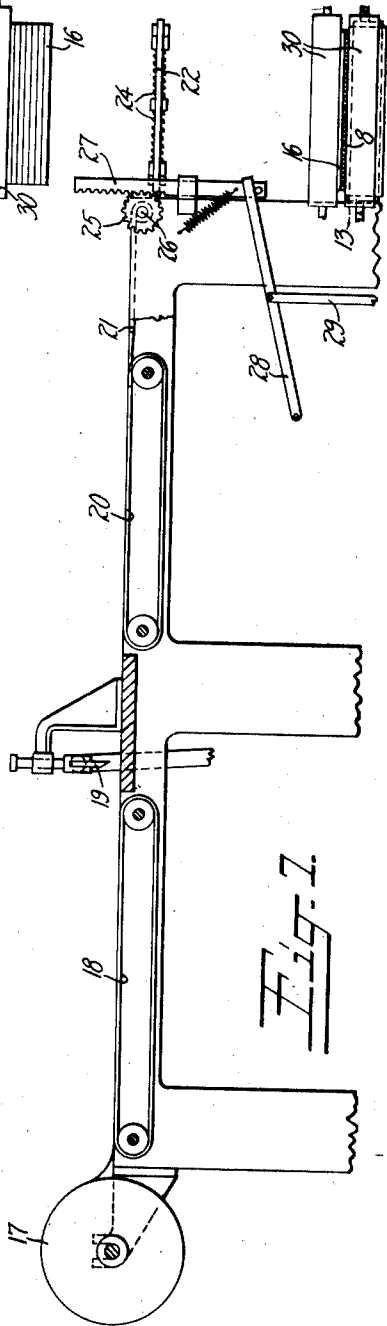


Fig. 7.

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SHEET MATERIAL.

Application filed November 3, 1923. Serial No. 673,505.

This invention relates to a new and useful sheet material having a surface layer of rovings, yarns, threads, or cords, presenting a more or less natural appearance and secured in close-lying parallel relation to a backing by a flexible bonding material which is applied so as not to pass through and be visible from the face of the goods, at least to an objectionable extent. Striped, furry, or fleeced, effects may be obtained by an appropriate selection or treatment of the threads or cords. Various backings may be employed, but cords at substantially right angles to those in the facing produce a sheet material that is pliant and substantially inelastic lengthwise and cross-wise.

The invention is illustrated in the accompanying drawings in which:—

Figure 1 is a diagrammatic elevation of an apparatus for applying bonding material;

Figure 2 is a cross-section of a facing layer of cords;

Figure 3 is a cross-section of a finished composite sheet showing the facing layer of cords applied to a backing;

Figure 4 is a view similar to Figure 3, indicating diagrammatically a skim-coat of bonding material interposed between the facing layer and backing;

Figure 5 is a perspective looking at the bottom of a sheet of the present invention with a backing of netting;

Figures 6 and 7 are plan and elevations, respectively, of an apparatus for facilitating the application of squares of cords cross-wise to a facing layer of cords;

And Figure 8 is a perspective looking at the top, illustrating a striped effect.

It is to be understood that the drawings are diagrammatic in character. Referring to Figure 1 thereof, and with the manufacture of one form of sheet material in mind, the cord-elements 1 in close-lying or contiguous parallel relation, preferably squeezed together, and of a number to give the requisite width of sheet desired, may be conducted to a spreading device comprising a roll 2 and a doctor blade 3, in front of which latter is banked latex paste 4. As the cords are drawn under the doctor blade 3, the latex paste, or other bonding material, is levelled off to the thickness desired, a small fraction of an inch. The latex paste or bonding material passes into the cusp-like channels between the cords but not through to the op-

posite surface. The sheet of cords may then be wrapped up on a wind-up reel 5 with an interposed liner 6, with or without a previous (more or less complete) drying, as with the steam coils 7, or by festooning, as may be required by the nature of the latex paste, or other bonding material which, for the subsequent application of the backing, is desirably left in a tacky condition. By this means, a facing layer of cords 8, one side of which is untreated, may be obtained in the form illustrated in cross-section in Figure 2.

To the coated side of this facing layer of cords 8, other cords 10 may be applied at right angles, either directly, as shown in Figure 3, or after the facing layer of cords 8 has been "skim" or additionally coated, as indicated at 11 in Figure 4. These cords 10 may be applied singly or in groups, the latter preferably, in a manner later to be detailed. Or, the facing layer of cord-elements, particularly if in the form known as "rovings", indicated at 1', Figure 5, which has previously been webbed together with latex paste 4, as illustrated diagrammatically in Figure 1, may have applied thereto a netting 12. This netting 12 may be applied continuously to the facing layer 8, with or without a preliminary treatment with rubber, preferably rubber latex. Or, as before, a skim-coat may be applied on a calender to the facing layer of "rovings", Figure 5, before attaching the netting 12.

If the backing material is to consist of contiguous parallel cross-cords, in order to make the product substantially resistant to stretch both lengthwise and cross-wise, it is preferred to employ the procedure and apparatus diagrammatically illustrated in Figures 6 and 7 of the drawings. Therein, the prepared facing layer 8 is shown being conducted on a conveyor 13 (or the liner 6 might be utilized) in the direction indicated by the arrow. Groups of cross-cords in the form of squares 14 may be manually applied to the facing layer, 15, and 16 indicating previously applied squares of cross-cords.

The groups or squares of cross-cords 14 may be obtained in any suitable manner. Simple means are illustrated in Figures 6 and 7 of the drawings, in which a roll of the backing material, indicated at 17, is drawn by an intermittently or step-by-step actuated conveyor 18 under a reciprocating knife 19, which cuts it into lengths equal to

the width of the facing layer 8. The cut lengths or squares 14 may then be carried by another conveyor 20 to a platen 21, and by it turned upside down and transferred to a table 22, which is hinged, as indicated at 23. A coiled spring 24 may be suitably mounted above the hinge 23 so as to normally hold the table 22 in a horizontal position but permit of its manual depression to an inclined position, facilitating operators disposing the squares 14 in abutting relation to the previously applied square 15, for instance, and superimposing them on the facing layer 8. The platen 21 may be operated automatically by any suitable means, or manually, as through a pinion 25, for instance, fast to the shaft 26, which carries the platen 21, a rack 27 being provided to engage the pinion. Any suitable means may be utilized to operate the rack 27, as the lever 28 and reach-rod 29, the latter being connected to a foot-treadle (not shown).

The squares of cords 14, 15, 16, etc., or other form of backing, may be pressed so as to adhere to the facing layer of cords 8 in any suitable manner, for instance, continuously with the squeeze rolls 30 at the delivery end of the conveyor 13, Figure 6. Cords may have been webbed together to constitute the backing material 17 by treatment with latex, as in my prior Patent No. 1,424,020, or by spreading with a latex paste, as illustrated in Figure 1 of the drawings, or by calendering, or otherwise as convenient. Where it is desired to obtain a composite cross-cord sheet, both faces of which will possess the appearance of the untreated cords, it is preferred to web together the cords constituting the backing layer in the same manner as the facing layer.

The composite built-up sheet material may then be finished by vulcanizing if the bonding material is vulcanizable, and/or by napping one or both faces of the cords if it is desired to obtain the appearance of suede leather, fur, or fleece. Of course, this napping operation is optional.

From the foregoing it will be seen that the invention contemplates the manufacture of a composite or laminated sheet material consisting of a surface layer of cord-elements—by which term it is intended to comprehend yarns, threads, cords, or any association of fibers resembling the same, in contra-distinction to parallel or haphazardly disposed fibers in the form of a mat—which are webbed together with a bonding material not marring or detracting from the appearance of the cords from one side of the layer thereof, and a backing whose character may be varied to impart an inelastic or semi-elastic quality to the composite sheet material in a transverse or cross-

wise direction. The cord-elements may be made of cotton, wool, silk, or any other fibers, or a mixture thereof, as desired. The bonding material may be applied in any manner convenient and adapted to suit the nature of the constituent materials. Rubber latex, preferably concentrated, and with or without incorporated compounding vulcanizing agents (as the nature of the finished product may require), is the preferred bonding material, but it is within the broad invention to employ other flexible adhesive substances. If a vulcanizable rubber composition is used, it is desirable to employ a compound curable at a low temperature or with a short elevated heat treatment so as not to have to subject the cord-elements to an appearance-marring treatment. The preferred form of backing is cross-wise disposed and discontinuous cords of any desired spacing, but netting or square woven fabric of any suitable kind may be employed and applied to the surface layer 8 of cords, as convenient. Of course, a square woven backing need not be cut into squares and applied to the surface layer 8, it being better, in this case, to superimpose webs of the two materials and continuously press them together, as with the pressing rolls illustrated in Figures 6 and 7.

Sheet material may be manufactured according to the present invention to meet a wide variety of needs, for instance, the uppers of canvas shoes, upholstery, imitation fleeces or furs, articles of wearing apparel, and many other uses not here necessary to enumerate.

In view of the many changes and modifications that may be made without departing from the principles underlying the discovery, reference should be made to the appended claims for an understanding of the scope of the invention.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:—

1. Laminated sheet material comprising a facing layer of parallel compactly contiguous uncoated cords, a backing, and bonding material anchoring the cords together in parallel relation and to the backing, the bonding material being applied to the inside face of the facing layer of cords and being substantially excluded from the opposite face by the compactness of the cords.

2. Laminated sheet material comprising a facing layer of parallel compactly contiguous uncoated cords, a backing, and bonding material anchoring the cords together in parallel relation and to the backing, the bonding material being excluded from the outside of the facing layer of cords by the compactness of the cords.

3. Laminated sheet material comprising a facing layer of parallel compactly contiguous

ous uncoated cords, a backing, and vulcanized rubber anchoring the cords together in parallel relation and to the backing, the vulcanized rubber being excluded from the outside of the facing layer by the compactness of the cords.

4. The method of manufacturing sheet material which consists in webbing uncoated cords together in compactly contiguous parallel relation with bonding material applied to one face only of the sheets, the bonding material being excluded from the opposite face of the sheet by the compactness of the cords in the sheet, applying a backing to the webbed-together-cords, and uniting the backing to the bonding face of the webbed-together-cord.

5. The method of manufacturing sheet material which consists in webbing uncoated cords together in compactly contiguous parallel relation with bonding material of vulcanizable rubber composition applied to one face only of the sheet of cords, and being excluded from the other face by the compactness of the cords in the sheet, applying a backing to the coated face of the webbed-together-cords, pressing the backing to the bonding face of the webbed-together-cords, and vulcanizing the resulting laminated sheet.

Signed at New York city, county of New York, and State of New York, this 1st day of November, 1923.

ERNEST HOPKINSON.