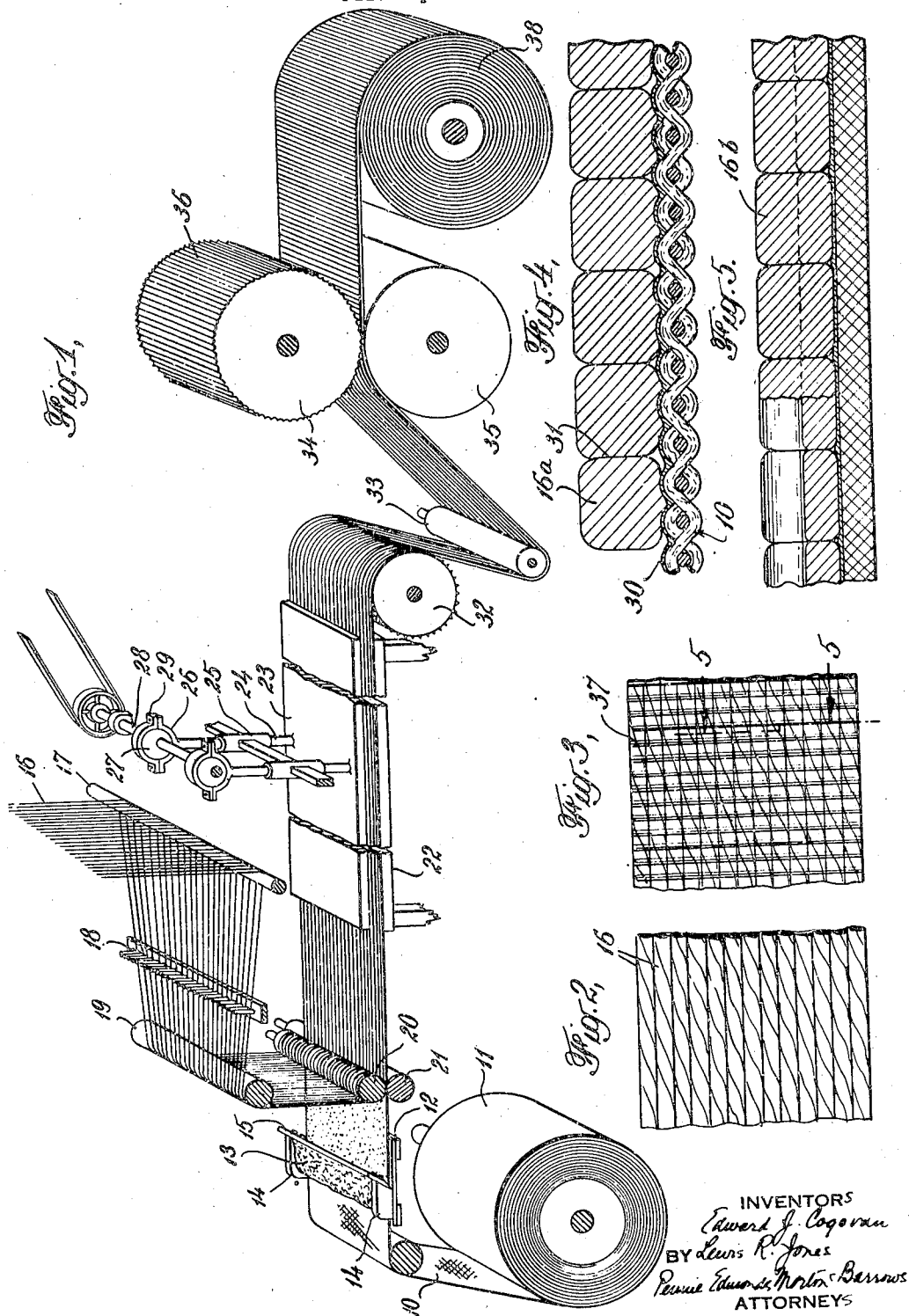


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METHOD OF MAKING FABRICS

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METHOD OF MAKING FABRICS

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This invention relates to the manufacture of fabrics of laminated construction and including a backing sheet and a layer of yarns affixed to one face of the sheet in parallel contacting relation by adhesive, an example of such a fabric being disclosed in the co-pending application of Cogovan, Serial No. 656,102, filed Mar. 21, 1946. More particularly, the invention is concerned with a novel method by which such laminated fabrics can be produced rapidly and at low cost and with a new apparatus by means of which the method may be advantageously practiced.

The laminated fabric of the Cogovan application is characterized in that the yarns affixed to the backing sheet are heavy and of sufficiently loose twist to permit the yarns to be distorted by the application of moderate pressure, so that the yarns may be caused to make contact with the adhesively coated surface of the backing sheet and with one another over areas of substantial width. Also, in one form of that fabric, the yarns include potentially adhesive material distributed throughout the yarns and, preferably, in fibrous form, and such material may be caused to become tacky, so that it adheres to and bonds together the other fibres in the yarns. As a result of such bonding of the fibres, the durability and wear resistance of the yarns are increased, so that the fabric is adapted for use as a floor covering on areas where heavy traffic occurs.

The new method may be used in the production of the laminated fabric of the Cogovan type and also of other generally similar fabrics, which do not include all the features of the Cogovan fabrics. In the practice of the new method, the backing sheet is first coated with a thin film of an adhesive, preferably, an adhesive of the kind known commercially as "pressure sensitive." The yarns are then laid side by side in lateral contact with the coated surface, and the sheet with the yarns in place is advanced to a station where pressure is applied simultaneously to all the yarns over substantial lengths thereof to insure proper adhesion of the yarns to the coated surface. Preferably, the yarns are subjected to the repeated application of pressure and, in the case of the Cogovan fabric, the pressure causes distortion of the yarns sufficient to increase the widths of the areas of the yarns in contact with the coated surface and with one another. The fabric may then be rolled up and stored, until the adhesive has completely set, but, if the yarns include potentially adhesive material, the fabric is subjected to heat and pressure to render the material tacky, so that it will adhere to and bond

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the fibres of the yarns together, and also to increase the size of the areas of the yarns contacting with the coated surface and with one another. During the heating and pressing operation, the upper surface of the layer of yarns may be embossed to provide desirable surface effects.

For a better understanding of the invention, reference may be made to the accompanying drawing, in which

Fig. 1 is a view in perspective showing the steps of the new method as performed by the apparatus of the invention;

Figs. 2 and 3 are plan views of different forms of fabric that can be made by the new method and apparatus;

Fig. 4 is a cross-sectional view of one form of fabric that can be made by the method and apparatus; and

Fig. 5 is a sectional view on the line 5—5 of Fig. 3.

In the practice of the method of the application by means of the apparatus illustrated, the backing sheet 10 is drawn from a suitable supply such as roll 11 and passed over a support 12 beneath a body of adhesive 13, which rests on top of the sheet and is kept from overflowing at its edges by side boards 14. The thickness of the layer of adhesive applied to the sheet is determined by means of an adjustable doctor blade 15. The adhesive employed for the purpose is of the type known commercially as "pressure sensitive" and it may include, for example, natural or synthetic latex together with other ingredients, which give the adhesive the characteristic of adhering firmly when pressure is applied thereto.

The backing sheet 10 may be of various materials such as paper, felt, or textile fabrics. Burlap of the type used for bagging is satisfactory, and, when burlap is employed, the adhesive penetrates the yarns and serves to bond together the fibres thereof.

The yarns 16, which are to be applied to the coated face of the sheet, are drawn from any suitable source of supply, such as spools or other packages in a creel, or a beam. The yarns are led about a guide bar 17 and thence through a comb or reed 18 and over a guide bar or roller 19. The yarns pass beneath a roller 20, which is formed with circumferential grooves of triangular section and of such depth that the yarns project beyond the grooves and lie in lateral contact. Below roller 20, the sheet is supported by a roller 21 and the roller 20 lays the contacting

yarns against the coated surface with the yarns extending lengthwise of the sheet.

The sheet, with the yarns held lightly in place by the adhesive, next passes over a table or other support 22 of substantial area. A pressure plate 23 is mounted above the table on the lower ends of rods 24, which are vertically movable in guides 25 carried by any suitable structure. At its upper end, each rod has a semi-circular head 26 which partially encircles an eccentric disk 27 on a shaft 28 rotated by appropriate means. A strap 29 connected to the head of the rod completes the encirclement of the disk. When the shaft 28 is rotated, the rods 24 are vertically reciprocated and reciprocate the plate 23. The plate extends the full width of the sheet and has a substantial length, for example, six feet.

In its reciprocation, the plate 23 strikes the yarns and forces them against the coated surface. The yarns, which are initially circular in cross-section, are somewhat deformed by the action of the plate, and assume the shape indicated at 16a, with each yarn making contact over a substantial area with the film 30 of adhesive on the upper surface of the sheet. In such deformation of the yarns, the area of each yarn in contact with the coating is increased from little more than a line contact to an area having a width at least equal to one-half the diameter of the yarn. At the same time, the areas 31 of contact between adjacent yarns are similarly increased to have a width at least equal to one-half the diameter of the yarn.

During the travel of the sheet beneath the plate 23, the plate makes repeated contact with the yarns, and pats them against the sheet and at the same time distorts them as described. As the yarns are of relatively loose twist, they tend to absorb adhesive among their fibres, and such absorption of adhesive, together with the increased area of each yarn in contact with the coated surface of the sheet, insures that the yarns will be firmly secured to the sheet.

Beyond the support 21, the fabric passes over a driven spike roll 32 by which the sheet and yarns are drawn from their respective supplies. If the yarns contain no potentially adhesive material, the fabric may be wound up after leaving the spike roll and allowed to stand in storage until the adhesive has fully set. If the yarns employed contain potentially adhesive material, additional operations are performed as follows.

From the spike roll, the fabric passes around a guide roll 33 and then between upper and lower rolls 34, 35. The upper roll 34 is of substantial weight and heated to a temperature sufficient to cause the potentially adhesive material in the yarns to soften. If desired, the heated roll 34 may be provided with a surface which serves to emboss the upper surface of the yarn layer, and, in the construction illustrated, the roll is provided with longitudinal flutes 36. The pressure of the roll 34 causes the yarns to be further flattened against the backing sheet and into contact with one another, until they assume the transverse cross-section indicated at 16b. During this compression of the yarns, the heat applied by roll 34 causes the potentially adhesive material in the yarns to become tacky and adhere to adjacent fibres. As the fabric issues from between rolls 34, 35, the adhesive material sets, the fibres in the yarns are bound in place, and the yarns retain the shape 16b. Also, if roll 34 has been provided with flutes or other embossing means, the layer of yarns is formed with indentations to provide

surface effects. When a roll with flutes is used, as shown, the finished fabric has transverse indentations 37 which may be of such close spacing as to resemble the lines sometimes visible on pile fabric of ordinary construction and indicating the location of the rows of pile tufts. The indentations or other surface effects produced by the heated roll are retained in the final product, because of the bonding action of the adhesive contained within the yarn, which holds the fibres in the positions into which they are forced by the action of the flutes, etc.

Beyond rolls 34, 35, the material is wound into a roll 38 which may be stored to permit complete setting of the adhesive. When the adhesive employed is pressure sensitive, the action of the patting plate 23 causes the adhesive to bind the yarns firmly to the backing sheet and the adhesive is further set by the action of hot roll 34. However, a short additional ageing time may be desirable.

We have found that, in the application of yarns to a backing sheet to be retained in place thereon by adhesive, good results are not obtained by the use of rollers for pressing the yarns against the sheet. The reason seems to be that such rollers make only a line contact with the yarns and, after passing out from beneath the roller, the yarns tend to spring free from the sheet. In the use of the patting plate, all of the yarns are simultaneously pressed against the sheet over substantial lengths thereof, and, since the backing sheet and yarns move continuously, the plate 23 applies drag to the yarns, while it is in contact therewith. This drag tends to keep the yarns taut and straight, while they are being pressed against the sheet. Instead of using a plate, it is possible to obtain comparable effects by employing a belt led about a number of rollers in such manner as to have a stretch of substantial length in contact with the yarn layer and held against the latter by the rollers. It is difficult, however, to operate such a belt at a speed which produces good results, and the reciprocating plate has been found to be superior thereto.

We claim:

1. A method of making a fabric, which comprises applying a thin film of adhesive to the surface of a backing sheet, laying a plurality of heavy yarns side by side and in lateral contact on the coated surface, and, while supporting the sheet, intermittently applying pressure simultaneously to all the yarns over substantial lengths thereof to increase the widths of their areas in contact with the coated surface of the sheet and with one another.

2. A method of making a fabric, which comprises applying a thin film of adhesive to the surface of a backing sheet, laying a plurality of heavy yarns side by side and in lateral contact on the coated surface, and, while supporting the sheet, intermittently applying pressure simultaneously to all the yarns over substantial lengths thereof to increase the widths of the areas of the yarns in contact with the coated surface of the sheet and with one another, and simultaneously pressing the yarns against the sheet and embossing the yarns, the pressing and embossing further increasing the widths of the areas of the yarns in contact with the coated surface of the sheet and with one another.

3. A method of making a fabric, which comprises applying a thin film of adhesive to the surface of a backing sheet, laying a plurality of heavy yarns side by side and in lateral contact

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on the coated surface, and, while supporting the sheet, repeatedly and intermittently applying pressure in a direction normal to the surface of the sheet simultaneously to all the yarns over substantial lengths thereof to increase the widths of the areas of the yarns in contact with the coated surface and with one another.

4. A method of making a fabric, which comprises applying a thin film of pressure sensitive adhesive to the surface of a backing sheet, laying a plurality of heavy yarns side by side and in lateral contact on the coated surface, and, while supporting the sheet, intermittently applying pressure simultaneously to all the yarns over substantial lengths thereof, the pressure being sufficient to increase the widths of the areas of the yarns in contact with the coated surface of the sheet and with one another and also to cause the adhesive to hold the yarns securely.

5. A method of making a fabric, which comprises applying a thin film of adhesive to the surface of a backing sheet, laying a plurality of heavy yarns side by side and in lateral contact on the coated surface, each yarn including a major proportion of fibres, which are not potentially adhesive, and a minor proportion of potentially adhesive material distributed throughout the yarn, supporting the sheet and applying pressure simultaneously to all the yarns over substantial lengths thereof to increase the widths of the areas of the yarns in contact with the coated surface of the sheet and with one another, and subsequently applying heat and intermittent pressure to the yarns, the heat rendering tacky the potentially adhesive material in the yarns to cause the material to adhere to and bind together the fibres and the pressure further increasing the widths of the areas of the yarns in contact with the coated surface and with one another.

6. A method of making a fabric, which comprises applying a thin film of adhesive to the surface of a backing sheet, laying a plurality of heavy yarns side by side and in lateral contact on the coated surface, each yarn including a major proportion of fibres, which are not potentially adhesive, and a minor proportion of potentially adhesive material distributed throughout the yarn supporting the sheet and applying pressure simultaneously to all the yarns over substantial lengths thereof to increase the widths of the areas of the yarns in contact with the coated surface of the sheet and with one another, and subsequently heating, intermittently pressing, and embossing the yarns, the heat applied rendering tacky the potentially adhesive material in the yarns to cause the material to adhere to and bind together the fibres and the pressure further increasing the widths of the areas of the yarns in contact with the coated surface of the sheet and with one another.

7. A method of making a fabric, which comprises applying a thin film of adhesive to the surface of a backing sheet, laying a plurality of heavy yarns side by side and in lateral contact on the coated surface, each yarn including a major proportion of fibres, which are not potentially adhesive, and a minor proportion of

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potentially adhesive material distributed throughout the yarn supporting the sheet and intermittently applying pressure simultaneously to all the yarns over substantial lengths thereof to increase the widths of the areas of the yarns in contact with the coated surface of the sheet and with one another, and subsequently heating, pressing, and transversely indenting the yarns, the heat applied rendering tacky the potentially adhesive material in the yarns to cause the material to adhere to and bind together the fibres and the pressure further increasing the widths of the areas of the yarns in contact with the coated surface of the sheet and with one another.

8. A method of making a fabric, which comprises applying a thin film of pressure sensitive adhesive to the surface of a backing sheet, laying a plurality of heavy yarns side by side and in lateral contact on the coated surface, and, while supporting the sheet, patting all the yarns simultaneously over substantial lengths thereof against the sheet to increase the widths of the areas of the yarns in contact with the coated surface of the sheet and with one another.

9. A method of making a fabric, which comprises moving a backing sheet in the direction of its length, applying a thin film of adhesive to the surface of the traveling sheet, laying a plurality of heavy yarns side by side lengthwise of the sheet on the coated surface thereof and in lateral contact with one another, and, while supporting the sheet, intermittently applying pressure simultaneously to all the yarns over substantial lengths thereof to increase the widths of the areas of the yarns in contact with the coated surface of the sheet and with one another.

10. A method of making a fabric, which comprises moving a backing sheet in the direction of its length, applying a thin film of adhesive to the surface of the traveling sheet, laying a plurality of heavy yarns side by side lengthwise of the sheet on the coated surface thereof and in lateral contact with one another, and, while supporting the sheet, repeatedly patting all the yarns simultaneously over substantial lengths thereof to increase the widths of the areas of the yarns in contact with the coated surface of the sheet and with one another.

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