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Shorrock

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[54] **BACKED TUFTED CARPET AND METHOD OF MANUFACTURING THE SAME**

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[52] **U.S. Cl.** ..... **156/72,** 28/72 P, 161/21, 161/67, 161/159

[51] **Int. Cl.** **D05c 15/00**

[58] **Field of Search** ..... 161/67, 21, 62; 156/72, 156/155; 28/72 P

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[57] **ABSTRACT**

A method of manufacturing a backed tufted carpet consisting of cylindrical tufts of pile yarn inserted in a backing fabric, includes the steps of coating the fixing (short) ends of the tufts with an adhesive, producing a backing - less sheet of foamed rubber, and sticking the sheet on the backing fabric. The adhesive may be caused to fill any gaps between the tuft ends thus improving the resilience of the carpet.

8 Claims, 3 Drawing Figures

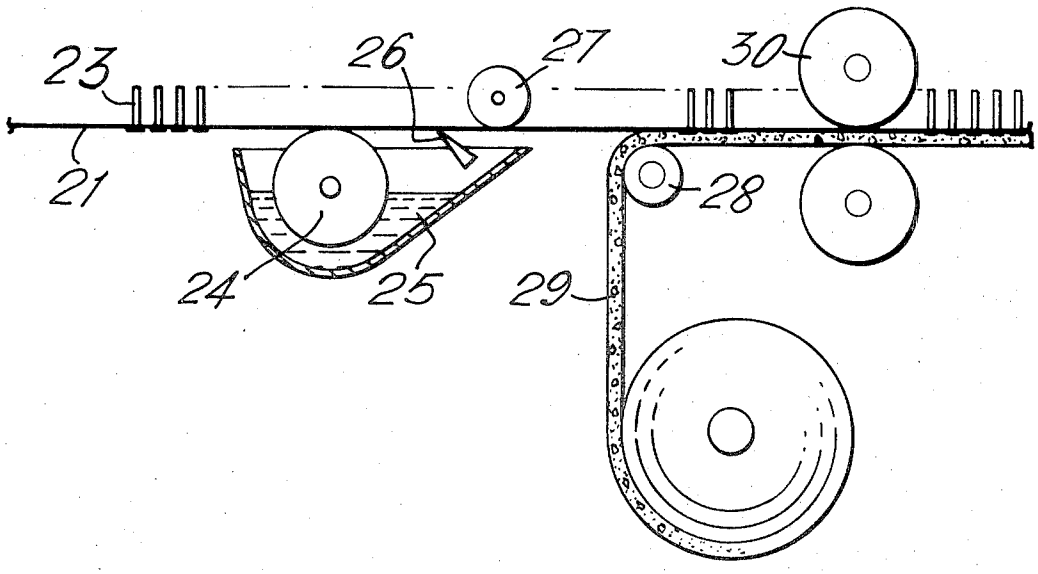
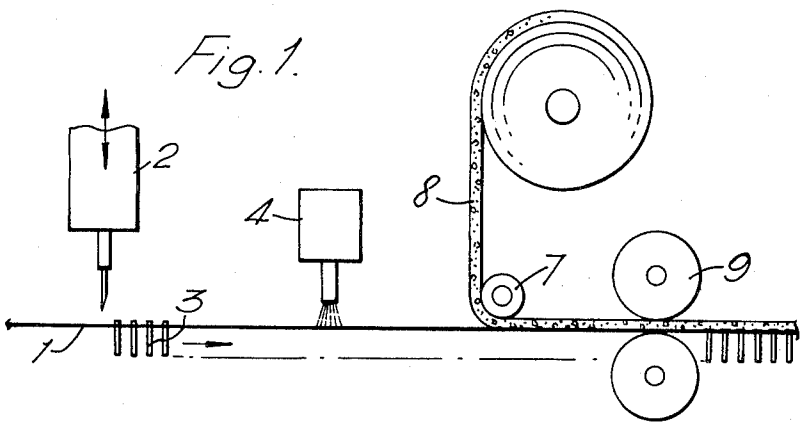


Fig. 1.



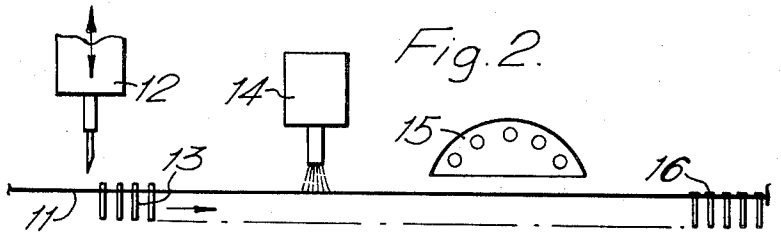


Fig. 2.

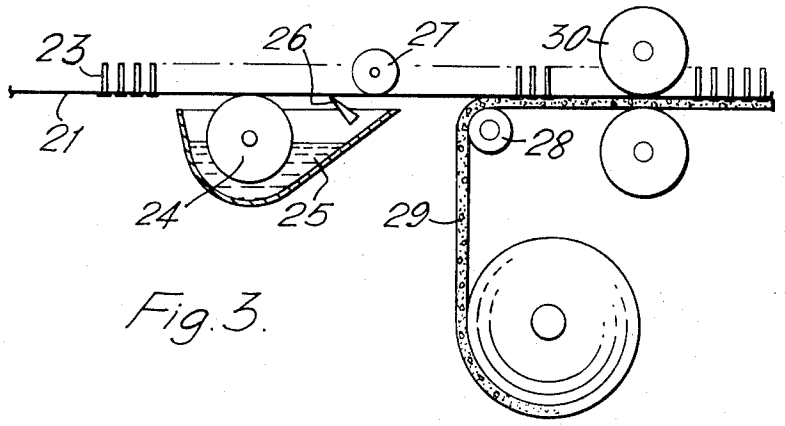


Fig. 3.

BACKED TUFTED CARPET AND METHOD OF MANUFACTURING THE SAME

My invention relates to tufted carpets and to methods of manufacture of such carpets.

Tufted carpets are often made by inserting tufts of pile yarn into a backing fabric such as woven jute cloth, and securing the tufts in position by the use of a layer of adhesive on the back or lower side of the carpet. This forms a perfectly satisfactory article, but it is often found advisable to use a resilient backing material such as foamed rubber, felt or other foamed or fibrous material, of lesser cost than the carpet itself and not decorative, to act as an underlay. This gives the carpet a very soft springy feel.

Hitherto it has been the practice to produce a foamed rubber underlay by applying a thin layer of rubber plus a foaming agent to a backing sheet such as a woven or non-woven fabric and then passing the resultant assembly through an oven which first causes the foaming agent to expand the rubber and produce pockets of gas therein, and then polymerise and set the rubber. But this means that a relatively rigid backing is first necessarily applied to the base mentioned, and I believe that until now such a backing was essential in producing a foamed rubber underlay for a tufted carpet, or for that matter for any other carpet. However, the use of the backing sheet did tend to keep the cost high.

Since it is now possible to produce a foamed sheet of rubber without the use of a supporting or backing sheet, I find it is advisable to use such a foamed sheet as an underlay attached to a carpet. The rubber is more resilient and gives a better feel than a layer of alternative material such as foamed polyurethane, and since the pores in the rubber do not communicate with one another, the foamed rubber sheet does not suck up water.

According to the present invention there is therefore provided a method of manufacturing a tufted carpet comprising the steps of traversing a backing fabric past a row of tufting needles, causing the needles to insert cylindrical tufts of pile yarn in the backing fabric, applying an adhesive to the tufts to secure them in the fabric, separately producing a layer of resilient foamed rubber without the use of a backing sheet, and sticking said layer to the backing fabric and tufts with or without the use of further adhesive.

A latex formed as a suspension of rubber in a water base is entirely satisfactory both for securing the tufts of the pile fabric in the backing material, and for securing the foamed rubber sheets to the back of the tufted carpet.

In the manufacture of tufted carpet it is known to insert one end of a tuft through a backing fabric, turn the other end round and insert this end through the backing fabric in such a manner that the curved portion i.e., the base of the U of the tuft, surrounds a yarn of the backing fabric. It is also known to insert a series of loops into the backing fabric, each loop being connected to the next loop by a length of yarn extending along the back of the fabric. Since in both these methods of manufacture the yarn is fairly firmly held by the backing fabric during transfer of the half-formed carpet to an adhesive-applying plant, it follows that no serious damage to the carpet can occur by passing it round forwarding rollers, for example. Such carpets can in fact be made and transported without adhesive, and later passed through an adhesive-applying plant which applies a thick coat of adhesive to the back of the carpet, thus securing the U-shaped tufts or the continuous pile to the backing.

If however, individual straight tufts of yarn of cylindrical form are inserted in a backing fabric with only a small portion of the cylinder protruding from the back of the backing fabric, such a carpet is liable to lose tufts or portions of tufts if it is rolled, transported or passed round forwarding rollers without the tufts being fastened in position. On the other hand it may be inconvenient to apply a full coating of adhesive material to the carpet immediately after formation, either because it is not required to build an adhesive coating plant on to the tufting machine, or because the layer of foamed rubber mentioned above is to be affixed to the backing fabric later.

I therefore propose to provide means for applying a thin layer of adhesive to the tufts in a tufted carpet as soon as possible after the tufts are lodged in position. To this end I may spray on a thin coating of adhesive such as latex, and then heat the adhesive as for example, by an infra-red radiator, or high frequency electric current, to polymerise, dry or set the adhesive before the carpet passes round a forwarding roller or has the foamed layer applied to it. By this means, the tufts are firmly secured in the backing, and the foamed layer is applied later in a separate machine, on top of a thicker coating of adhesive material such as latex, in which case a certain amount of pressure may have to be applied to the said layer in order to make it adhere securely to the carpet originally formed. By this means it is possible to half-form a carpet by the insertion of tufts in the backing material which itself may be thin and of non-woven fabric, and then apply the thicker resilient backing on top of a second coat of adhesive, and thus produce a resilient carpet without the possibility of the tufts becoming detached.

Various kinds of backing fabrics are available. Thus a non-woven material made from a fleece of natural or artificial filaments adhering together may be employed. Again a fabric made of a plurality of interlaced tapes may be used, the tapes themselves being of thermoplastic materials which have previously been extruded or rolled into sheet form and then slit. Such a fabric even if woven or knitted, has a much more uniform consistency throughout the whole of its area than a backing fabric woven from jute or like yarns. Finally, a backing material may be made by partially shattering a sheet of artificial resin, this being effected along lines of strain caused in the material during its manufacture. The shattering may be effected by ultrasonic vibrations, and is preferably incomplete, so that the sheet as a whole holds together.

Reference should now be made to the accompanying drawings, in which:

FIG. 1 shows the application of a foamed backing layer to a tufted carpet immediately after the insertion of the tufts in the backing material;

FIG. 2 shows the application of a thin layer of an adhesive to the tufts after their insertion, the layer being dried thereafter; and

FIG. 3 shows the application of a foamed backing layer to the carpet as intermediately produced in FIG. 2.

In FIG. 1 a single tufting machine for directly applying a foamed backing layer to a carpet is shown. Back-

ing fabric 1 passes beneath a row of needles 2 which reciprocate up and down, inserting straight tufts 3 of pile yarn in the backing fabric. It will be noted that each of the tufts 3 has a relatively long (pile) end at the front side of the fabric and a short (fixing) end at the back of the fabric. The backing fabric travels in the direction of the arrow to the right, and passes underneath an adhesive applicator 4 which sprays the short ends (fixing ends) of the tufts with a latex material or an adhesive in a volatile solvent, which by the time it reaches the roller 7 has become tacky. At this point the backing fabric and tufts are joined by a layer 8 of resilient foamed rubber, this layer being separately produced without the use of a backing sheet. Such a layer has an improved performance as compared with previously known types of resilient layers, and after application to the adhesive, the backing layer and fabric pass between nip rollers 9, this causing adequate adhesion to take place between the resilient layer and the adhesive, the short ends of the tufts being splayed apart first by the adhesive and second by the nip rollers, so that the tufts are firmly held in the backing fabric, and the resilient layer is firmly held onto the tufts and backing fabric. The finished carpet can then be wound up on the take-up roll. If required, the nip rollers may be heated to set the adhesive and swell the pile yarn.

FIG. 2 shows a machine in which a backing fabric 11 passes under a row of needles 12 which apply rows of tufts 13 to the backing fabric. As before, the upper or short ends of the tuft are sprayed with a latex adhesive from a spray 14, and the backing fabric and tufts then pass underneath a dryer 15 which uses infra-red or ultra high frequency radiation to dry or polymerise the adhesive. The application of the latex and drying thereof flattens the upper ends of the tufts as seen at 16, so that they are very firmly fixed in the backing fabric. The fabric and tufts can then be wound up onto a take-up roll to be processed later as shown in FIG. 3.

In this Figure, which shows a second machine, the fabric and tufts have been reversed, the tufts 23 projecting upwards from the backing fabric, with the securing layer of adhesive for the tufts on the lower side of the fabric. This fabric now passes over a roller 24 which applies adhesive from a bath 25 thereof to the lower side of the backing fabric, the thickness of the layer being regulated by a doctor blade 26. The fabric and tufts are held against the blade by tension in the fabric and by a jockey roller 27. After leaving the doctor blade, the fabric and tufts pass along to a further roller 28 which applies a resilient layer 29 of foamed material of the type referred to, the resultant assembly passing between nip rollers 29 which cause complete adhesion of the resilient layer to the backing fabric. If necessary, these rollers may be heated so as to dry or polymerise the adhesive, whereafter the finished carpet can be rolled up on a take-up roll.

The backing fabric may be of normal type such as woven jute, but is perferably of non-woven material composed for example of polyethylene threads which are laid randomly to form a sheeting, and then caused to adhere to one another by means of pressure applied by heated rollers. Alternatively, polystyrene threads made by pulling apart or shattering a sheet of oriented molecule polystyrene may be used instead. Such materials, since they do not contain a definite pattern of threads as in a woven fabric, enable better location of the tufts and more secure holding thereof, until the tufts are secured in the fabric by the adhesive.

The advantage of using a separately made foamed backing sheet as compared with applying the rubber to the backing layer and forming it in situ so that by the use of a thick second layer of adhesive it is possible to level up the surface between the fixing ends of the tufts, the foamed sheet then lying quite flat and providing uniform resilience over the whole area of the carpet. If the foamed layer is formed on the carpet, the tuft ends project into the layer and produce an uneven and reduced resilience across the layer, which is quite noticeable.

I claim:

1. A method of manufacturing a tufted carpet comprising the steps of traversing a backing fabric which has a front and a back past a row of tufting needles, causing said needles to insert straight tufts of pile yarn through said backing fabric with each tuft having a relatively long, pile end projecting forwardly from the front of the backing fabric and an opposed relatively short fixing end projecting from the back of the fabric, applying an adhesive to said short ends of said tufts at the back of the fabric to secure them in said fabric, separately producing a layer of resilient foamed rubber, sticking said layer to said back of said backing fabric and said short ends of said tufts by means of an adhesive, and splaying said short ends apart and situating them in flattened condition against the back of the fabric, said splaying and flattening of said short ends being carried out at a time no later than the sticking of said layer to said back of said backing fabric.

2. A method as recited in claim 1 wherein all said steps with the single exception of the production of said resilient foamed layer, are performed sequentially in a single machine.

3. A method as recited in claim 1 in which the insertion of said tufts and the application of a first layer of adhesive are effected on one machine, whereafter the part-finished carpet is transferred to another machine where said part - finished carpet receives a second coating of adhesive on the first, said second coating filling any gaps between said short ends of said tufts, said foamed layer being applied to said second layer of adhesive.

4. A method as recited in claim 1 including the step of setting said adhesive by radiation.

5. A method as recited in claim 1 wherein said backing fabric is selected from non-woven material.

6. In a method as recited in claim 1 and wherein the splaying apart of said short ends of said tufts is carried out at least partly by the application of said adhesive to said short ends of said tufts at the back of the fabric.

7. In a method as recited in claim 6 and wherein the splaying apart and flattening of said short ends of said tufts is completed simultaneously with the sticking of said layer to said back of said backing fabric.

8. In a method as recited in claim 7 and wherein the sticking of said layer to said back of said fabric is brought about by passing said layer and said backing fabric together with said tufts between nip rollers.

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