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2,676,384

PILE CARPET AND METHOD OF MAKING THE SAME

Filed March 2, 1954

2 Sheets-Sheet 1

FIG. 1

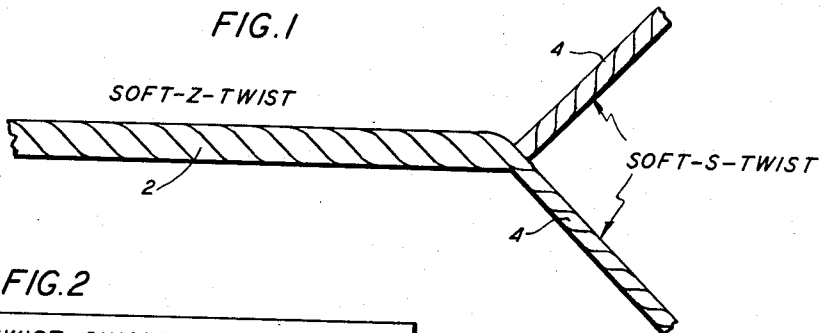
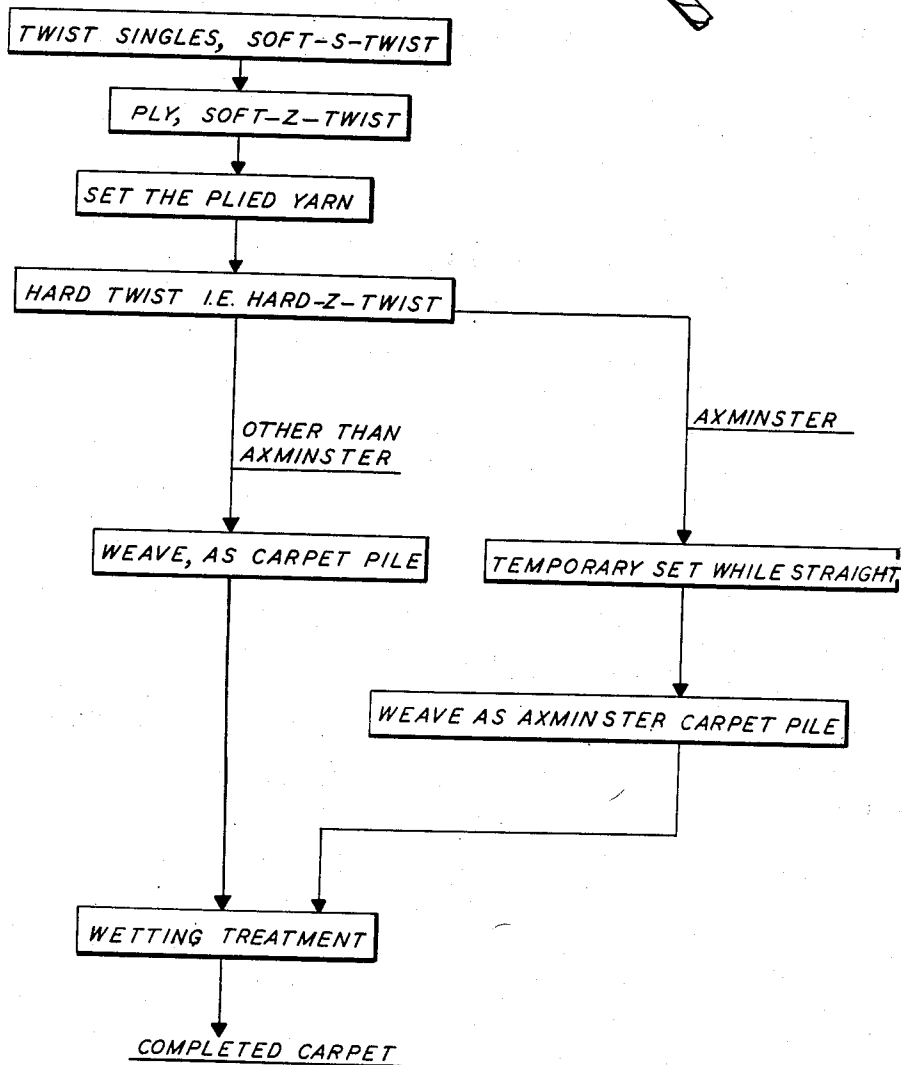


FIG. 2



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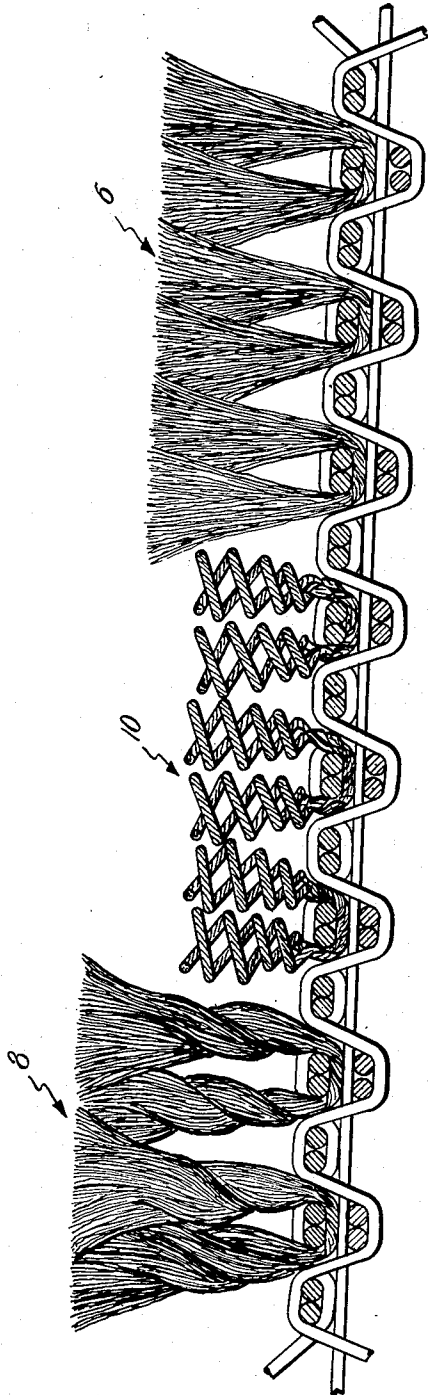


FIG. 3

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2,676,384

PILE CARPET AND METHOD OF MAKING
THE SAME

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Application March 2, 1954, Serial No. 413,508

18 Claims. (Cl. 28—76)

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The object of this invention is to produce a type of carpet having in some areas pile tufts which are higher, longer and have more twist than the pile in other areas, which higher and longer pile tufts are characterized by softness and a shaggy appearance.

In the accompanying drawing,

Fig. 1 is a schematic elevation of ply yarn employed in this invention;

Fig. 2 is a flow sheet showing the steps of our process; and

Fig. 3 is a warpwise section of a carpet of the invention showing the different types of pile tufts.

Referring to the drawing, we employ a ply yarn 2, the individual strands 4 of which have first been given a soft twist of about three turns to the inch, in a certain direction, as an S twist. In plying, the combined strands are given one turn in the opposite direction, as a Z twist, resulting in a rather soft, loosely twisted yarn. The yarn is then given a permanent set. For this purpose the yarn is reeled into skeins, which are removed from the reel and in that relaxed condition the yarn is immersed in water, with or without a wetting agent, and, after centrifuging to remove excess water, the skeins of yarn are subjected to saturated steam at about 250° F., for about thirty minutes in a closed chamber in which, by means of suitable check valves, the pressure is maintained at about 15 pounds per square inch above atmospheric. A satisfactory set of the twist may also be effected in a hot dye bath during the dyeing of the yarn. The yarn may be in skein form or wound under tension on spools, and the dye bath may be at atmospheric or elevated pressure. The yarn is thereby permanently set with the Z twist dominating the S twist.

The plied and set yarn is given an abnormally hard twist in the same direction as the plying twist, which, as above indicated, would be a Z twist. The number of twists so given the yarn varies according to the number of strands comprising the yarn. For example: 6 to 12 turns per inch, preferably 9, are given two-ply yarns; 4 to 10 turns per inch, (preferably 7, are given three-ply yarns; 3 to 8 turns per inch, preferably 6, are given four-ply yarns.

The above ranges apply to yarn weights about one run on the woolen system in which one run is the number of 1600 yard units required to make one pound.

As a result of this abnormal twisting in the Z direction, substantial ply twist is superimposed

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on the set Z ply twist. The strain of the Z twist which was set in the yarn is still inherent therein so that on cutting of and relaxation of tension in the yarn that strain will act to stimulate the untwisting of the yarn.

The abnormal hard twist develops unruliness in the yarns when they are relieved of tension, causing them to contract and kink. To use such abnormally twisted yarns in the manufacture of Axminster carpet, they are first subjected to a temporary setting operation in which they are first straightened out to remove the kinks by being wound on spools and then wet in water, preferably hot to accelerate the process, or by subjecting them to a moist atmosphere at approximately 170° F. for thirty minutes. The process described in the Reinhardt and Johnson Patent No. 2,509,351, May 30, 1950, may be employed. Thus, the strain or resiliency in the yarn is substantially removed or relieved so that the yarn is maintained abnormally hard twisted and free of kinks, and in this condition may be threaded through the tubes and woven in an Axminster loom.

Or the abnormally hard twisted yarns may be used, without the temporary setting operation above referred to, on carpet looms of types other than Axminster in which the yarns are woven under tension and thus maintained abnormally hard twisted and free of kinks, such as the pile wire carpet looms employed in the manufacture of jacquard and velvet carpets.

These hard twisted yarns, in combination with conventional, less twisted, yarns thus are woven into carpet, such as Axminster, jacquard or velvet carpets. When cut by the pile wires in the manufacture of jacquard or velvet carpets, these abnormally hard twisted pile yarns tend to untwist and expand, due to relaxation of the tension, so that they are extended in length accordingly, but they retain some or all of the ply twist which was set in them before they were hard-twisted.

In the case of Axminster carpets, when cut by the shearing blades, the height of the abnormally twisted yarns and the conventional yarns would be the same because the temporary set imparted to the yarns prior to weaving prevents their untwisting and expanding when cut.

In weaving carpet there may also be included hard twisted yarns according to Reinhardt et al. Patent No. 2,509,352 or according to Jackson Patent No. 2,662,560, or, preferably, Miller Patent No. 2,662,559.

Subsequently the woven jacquard, velvet or

Axminster carpets are subjected to an operation comprising wetting out the pile tufts to cause the hard twist in the tufts to uncoil so that the over-twist given the yarn in the abnormal twisting operation is substantially removed from the legs of the pile tufts which are further extended in length and become longer and higher than the pile formed from the conventional, less twisted yarns. At the same time the twist in tufts formed from conventional yarns is substantially or completely removed. In the case of Axminster carpet the wetting removes the temporary set, permitting the described uncoiling action.

For this wetting operation, spraying or any other known wetting means, such as steam treating, may be employed. The pile may be wet with cold or with warm water. When water is used we prefer to maintain the pile in a wet condition for an appreciable interval, from 1 to 3 hours. For steaming, we may employ a pipe connected to a steam supply and having a row of small holes along its length. This pipe is positioned immediately above the carpet so that steam may be blown under pressure onto the carpet as it passes thereunder. This steaming causes the yarn to loosen up and induces an uncoiling action therein. With this method of operation we prefer to pass the carpet over a bar or the like at an angle so as to open up the pile and direct the steam from the perforated pipe into the legs of the pile tufts. This expedites the untwisting action in the pile tufts. Any other means for applying moisture to the pile may be employed. The strain in the yarn in the Z direction in which it was permanently set activates the uncoiling activity of the yarn.

There is no permanence associated with the last, the abnormal, twist given the yarn and that is substantially removed by the activity imposed on the yarn by this wetting treatment. Because of the permanent set given the yarn following the initial plying of the same, uncoiling of the twist does not extend into the initial ply twist, so that only the last or abnormal twist is substantially removed.

When the carpets are subjected to the final wetting treatment above described, the legs of the hard twisted tufts according to Patent No. 2,509,352, Patent No. 2,662,560 or Patent No. 2,662,559, contract and produce areas of less height than the areas formed from the conventional pile yarns and of less height than the areas of the longer and higher soft and shaggy pile tufts.

The wetting may be applied through the back of the carpet with satisfactory results. But, if applied through the back, this must be done prior to the customary sizing process or prior to the application of an adhesive coating, which is applied to the back of some fabrics, in order that the water may penetrate the backing structure and reach the pile tufts. Applying the water directly to the pile face is preferred.

The twist given the individual strands may, if desired, be in the Z direction rather than S, in which case the plying twist would be in the S direction instead of Z. The subsequent abnormal twist imparted to the yarn would then be in the S direction.

The ply twist may be in the same direction as the singles twist.

However, the abnormal twist imparted to the yarn may be in the direction opposite to the ply twist, instead of in the same direction, as preferred and described above, but in order to achieve

satisfactory results by that procedure we have found that substantially 25% more twist than that indicated above is required. Imparting the abnormal twist in the same direction as the plying twist is the most efficient and desirable.

If after the uncoiling action of the yarns some of the resulting pile tufts are slightly longer than others of like nature, they are cut to a uniform height by the shearing device customarily used in the finishing of carpets.

The pile face of the resultant carpet, Fig. 3, has conventional pile tufts 6 of uniform height and substantially or completely free of twist, and other pile tufts 8 also of a uniform height but higher and longer than the former and shaggy and twisted in appearance so that a distinct contrast in texture and appearance is created between the respective areas of these different tufts in the pile surface of the carpet. When a hard twisted yarn according to one of Patent Nos. 2,509,352, 2,662,560 or 2,662,550, as referred to above, is also used in this manufacture, it forms a third kind of pile tuft which is lower than either of the other two kinds. The tufts at 10, Fig. 3, illustrate this third kind of tuft when formed according to Patent No. 2,662,559. Thus three areas, each of a different level and appearance, are provided, producing another pile surface of attractive and novel design.

The present application is a continuation-in-part of our prior application Serial No. 230,429, filed June 7, 1951, now abandoned.

We claim:

1. The method of making a pile carpet having areas of pile tufts longer and higher than as woven and other, contrasting, areas of shorter and lower pile tufts, which comprises giving individual strands of carpet pile yarn a soft twist in a certain direction, plying said strands with an initial soft ply twist, thereafter setting the twist in the yarn, giving the plied and set yarn an abnormally hard twist of such a number of turns that substantial ply twist is imparted to the yarn, weaving the yarn while maintaining the yarn abnormally hard twisted and free of kinks, together with other carpet pile yarn which has not been set, into a pile carpet to form pile tufts, and wetting the pile face of the carpet to substantially remove said abnormally hard twist from the legs of the hard-twisted pile tufts and cause their legs to lengthen to form areas of pile tufts contrasting in height and twist with said other areas of unset pile tufts.

2. The method of claim 1 wherein said wetting is effected by blowing steam under pressure into the legs of the pile tufts.

3. The method according to claim 1 wherein the carpet is an Axminster carpet and the yarn is maintained abnormally hard twisted and free of kinks during weaving by giving the yarn prior to weaving a temporary set while free of kinks.

4. The method according to claim 1 wherein the carpet is woven on a pile wire carpet loom and the yarn is maintained abnormally hard twisted and free of kinks during weaving by weaving the pile yarns over pile wires while the yarns are under tension.

5. The method of making a pile carpet having areas of pile tufts longer and higher than as woven and other, contrasting, areas of shorter and lower pile tufts, which comprises giving individual strands of carpet pile yarn a soft twist in a certain direction, plying said strands with an initial

soft ply twist in the opposite direction, thereafter setting the twist in the yarn, giving the plied and set yarn an abnormally hard twist in the same direction as the set ply twist and of such a number of turns that substantial ply twist is superimposed on the set ply twist previously imparted to the yarn, weaving the yarn while maintaining the yarn abnormally hard twisted and free of kinks, together with other carpet pile yarn which has not been set, into a pile carpet to form pile tufts, and wetting the pile face of the carpet to substantially remove said abnormally hard twist from the legs of the hard-twisted pile tufts and cause their legs to lengthen to form areas of pile tufts contrasting in height and twist with said other areas of unset pile tufts.

6. The method according to claim 5 wherein the carpet is an Axminster carpet and the yarn is maintained abnormally hard twisted and free of kinks during weaving by giving the yarn prior to weaving a temporary set while free of kinks.

7. The method according to claim 5 wherein the carpet is woven on a pile wire carpet loom and the yarn is maintained abnormally hard twisted and free of kinks during weaving by weaving the pile yarns over pile wires while the yarns are under tension.

8. The method of making a pile carpet having areas of pile tufts longer and higher than as woven and other, contrasting, areas of shorter and lower pile tufts, which comprises giving individual strands of carpet pile yarn a soft twist in a certain direction, plying said strands with an initial soft ply twist in the opposite direction, thereafter setting the twist in the yarn, giving the plied and set yarn an abnormally hard twist in the direction opposite the set ply twist and of such a number of turns that the initial ply twist is removed and substantial ply twist in the direction of that given the individual strands is imparted to the yarn, weaving the yarn while maintaining the yarn abnormally hard twisted and free of kinks, together with other carpet pile yarn which has not been set, into a pile carpet to form pile tufts, and wetting the pile face of the carpet to substantially remove said abnormally hard twist from the legs of the hard-twisted pile tufts and cause their legs to lengthen to form areas of pile tufts contrasting in height and twist with said other areas of unset pile tufts.

9. The method according to claim 8 wherein the carpet is an Axminster carpet and the yarn is maintained abnormally hard twisted and free of kinks during weaving by giving the yarn prior to weaving a temporary set while free of kinks.

10. The method according to claim 8 wherein the carpet is woven on a pile wire carpet loom and the yarn is maintained abnormally hard twisted and free of kinks during weaving by weaving the pile yarns over pile wires while the yarns are under tension.

11. The method of producing a pile carpet having areas of long and high pile tufts which are soft and shaggy in character and areas of shorter pile tufts, which comprises giving individual strands of yarn a soft singles twist in a certain direction, plying said strands with an initial soft ply twist in the opposite direction, reeling the resulting soft loosely twisted yarn into skeins, immersing the skeins in water, removing excess water, subjecting the skeins to a steaming treatment equivalent to treatment with saturated steam at about 250° F. for about 30 minutes, whereby the yarn is given a permanent dominating twist in the plying direction, giving the yarn

an abnormal twist in the same direction as the ply twist and of such a number of turns that substantial ply twist in the direction opposite that given the individual strands is superimposed on the permanent, set, twist previously imparted to the yarns, weaving these yarns while maintaining them abnormally hard twisted and free of kinks, together with carpet pile yarns which have been ply twisted in a single direction only into a pile carpet, wetting the pile tufts and simultaneously applying heat, thereby removing the abnormal twist from the legs of the pile tufts and causing the legs to lengthen while retaining the ply twist, whereby the pile face of the carpet has certain areas of pile tufts of one height and other areas of higher and longer pile tufts having a soft and shaggy character.

12. The method according to claim 11 wherein the carpet is an Axminster carpet and the yarn is maintained abnormally hard twisted and free of kinks during weaving by giving the yarn prior to weaving a temporary set while free of kinks.

13. The method according to claim 11 wherein the carpet is woven on a pile wire carpet loom and the yarn is maintained abnormally hard twisted and free of kinks during weaving by weaving the pile yarns over pile wires while the yarns are under tension.

14. A pile carpet having areas of long, high, cut and twisted pile tufts which are substantially uniform in appearance and of greater height than as woven and other areas of shorter, lower and less twisted pile tufts, said long, high and twisted pile tufts consisting of individually-soft-twisted carpet pile yarns plied together with a soft ply twist, said twisted plied yarn and twisted yarns forming the same being permanently set, the pile face of the carpet having a distinctive design formed by the contrast in height and twist between the pile tufts of the respective areas.

15. A pile carpet having areas of long, high, cut and twisted pile tufts which are substantially uniform in appearance and of greater height than as woven, other areas of shorter, lower and less twisted pile tufts, and still other areas of hard-twisted cut pile tufts still lower than said lower pile tufts, said long, high, and twisted pile tufts consisting of individually-soft-twisted carpet pile yarns plied together with a soft ply twist, said twisted plied yarn and twisted yarns forming the same being permanently set, the pile face of the carpet having a distinctive design formed by the contrast in height and twist between the pile tufts of the respective areas.

16. A pile carpet having areas of long, high, cut and twisted pile tufts which are substantially uniform in appearance and of greater height than as woven and other areas of shorter, lower, and less twisted pile tufts, said long, high and twisted pile tufts consisting of individually-soft-twisted carpet pile yarns plied together with a soft ply twist opposite in direction to the twist in the individual yarns, said twisted plied yarn and twisted yarns forming the same being permanently set, the pile face of the carpet having a distinctive design formed by the contrast in height and twist between the pile tufts of the respective areas.

17. A pile carpet having areas of long, high, cut and twisted pile tufts which are substantially uniform in appearance and of greater height than as woven and other areas of shorter, lower and less twisted pile tufts, said long, high and twisted pile tufts consisting of individually-

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soft-twisted carpet pile yarns plied together with a soft ply twist the same in direction as the twist in the individual yarns, said twisted plied yarn and twisted yarns forming the same being permanently set, the pile face of the carpet having a distinctive design formed by the contrast in height and twist between the pile tufts of the respective areas.

18. A pile carpet having areas of long, high, cut and twisted pile tufts which are substantially uniform in appearance and of greater height than as woven and other areas of shorter, lower and less twisted pile tufts, and still other areas of hard-twisted cut pile tufts still lower than said lower pile tufts, said long, high and twisted pile tufts consisting of individually-soft-twisted carpet pile yarns plied together with a soft ply twist opposite in direction to the twist in the individual yarns, said twisted plied yarn and twisted yarns forming the same being perma-

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nently set, the pile face of the carpet having a distinctive design formed by the contrast in height and twist between the pile tufts of the respective areas.

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