

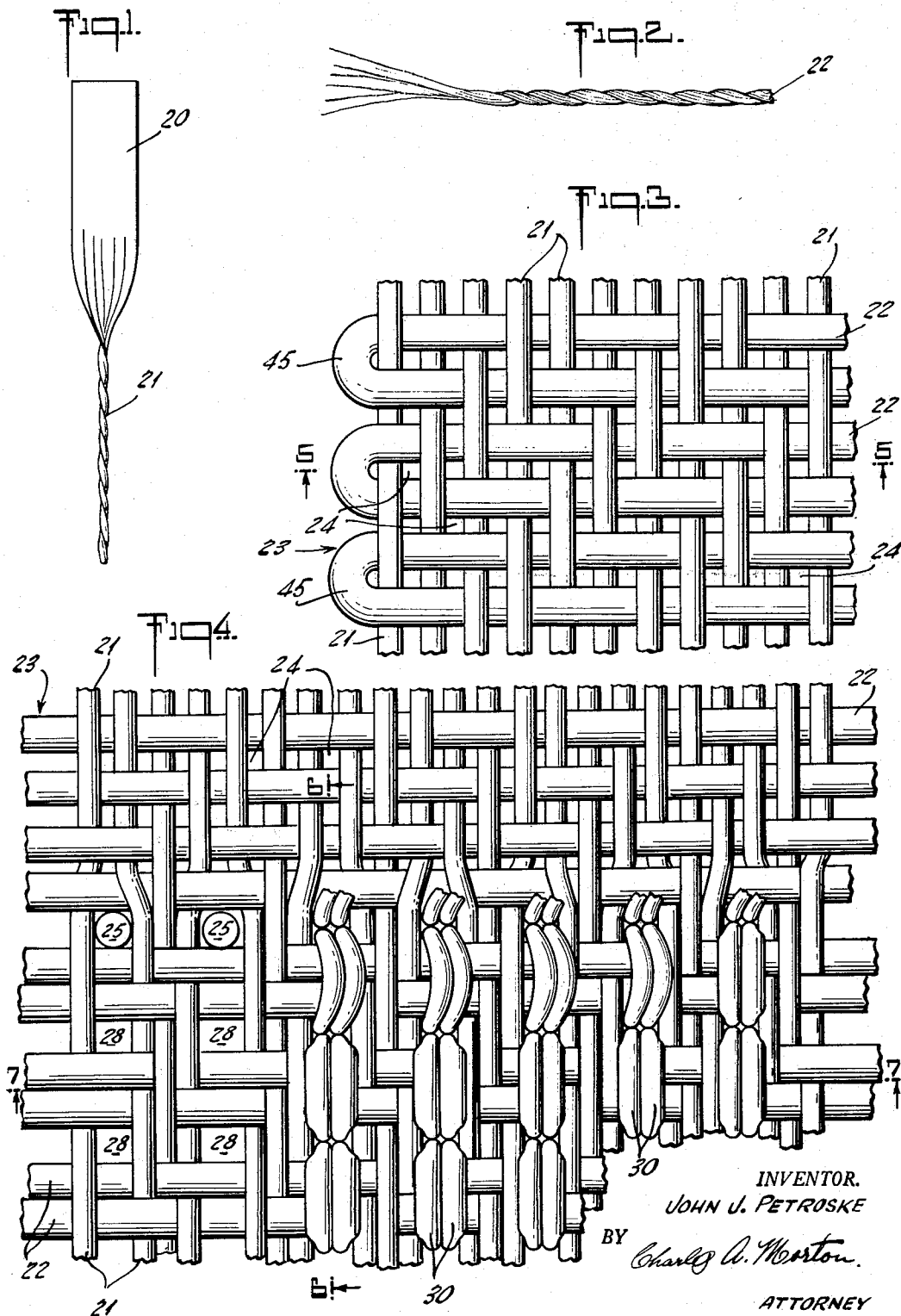
June 19, 1956

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PILE RUG AND RUG BASE

2,750,652

Filed May 28, 1953

2 Sheets-Sheet 1



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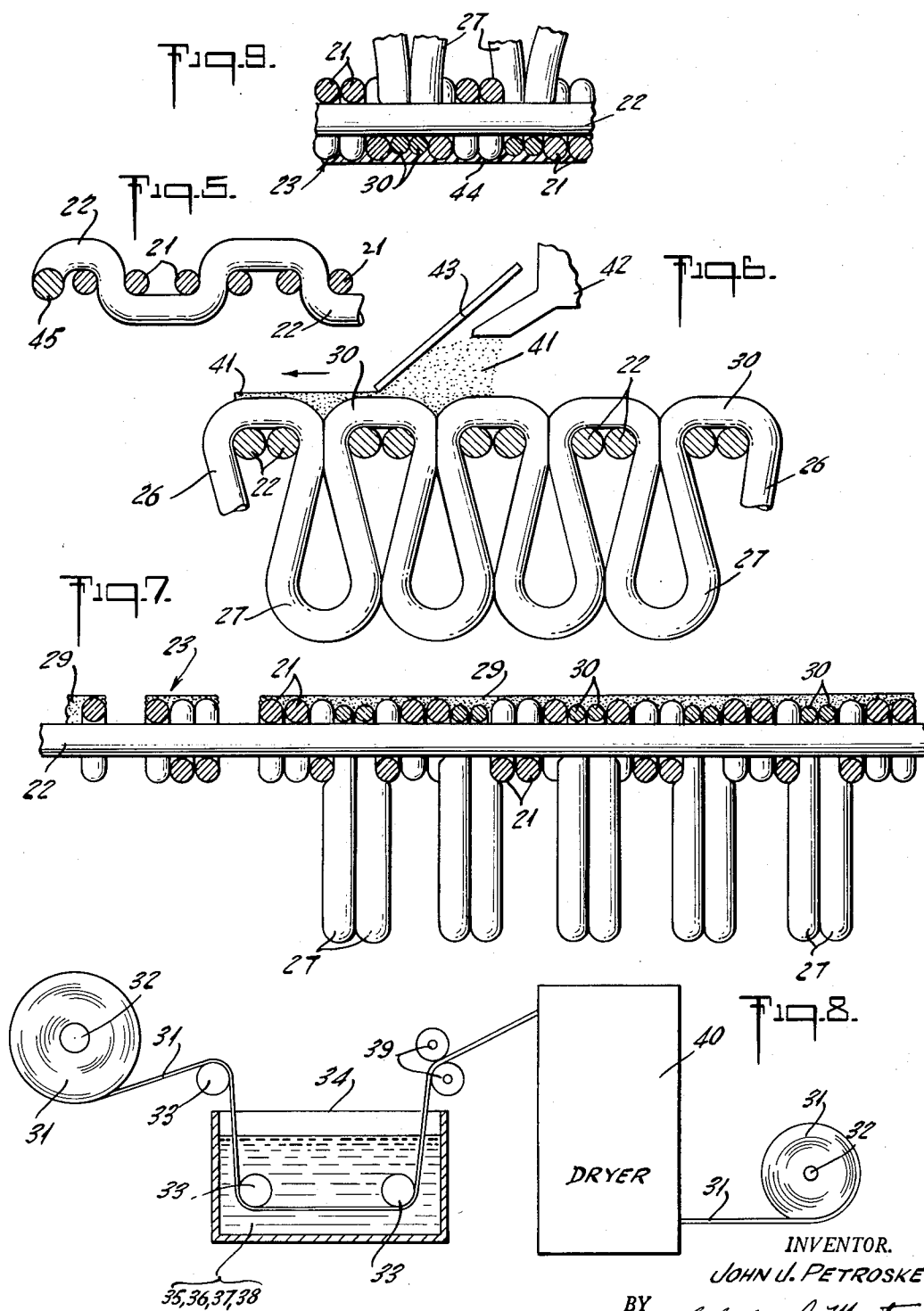
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1

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PILE RUG AND RUG BASE

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Application May 28, 1953, Serial No. 358,077

4 Claims. (Cl. 28—80)

This invention relates to an improved method of making pile, or looped pile, rugs, and to improvements in pile and in looped pile rugs and in the base structure therefor.

Rugs have been manufactured with a base structure consisting of jute yarns which are woven to form the base structure at the same time that the surface material of the rug is incorporated into the rug to form the rug body.

When jute yarns are used in the warp of a rug, the said yarns are slashed or treated to prevent the jute from linting, as well as to prevent the lint from forming knots, rings, and slubs, which tend to prevent the jute yarns from passing through the reeds and heddles of the loom. The lint forms slubs on the jute yarns, and the fine particles of lint float around in the air and settle in and around the loom, thus creating a dangerous fire hazard, so that a spark, as from an electric motor, may ignite some of these particles of lint and start a fire. Such fires have actually occurred due to a spark from an electric motor igniting these fine particles of lint.

Rugs have also been made with a cotton duck base, but ordinarily cotton duck is relatively light in weight and has no body to it, so that rugs made with a rug-base of a conventional cotton duck tend to curl up and kick up, and to prevent such a base from curling up or kicking up it would be necessary to use a relatively heavy cotton duck and such a rug would be so much more expensive to produce as to price said rug out of the market.

One object of this invention is to substantially reduce the fire hazard when jute yarn is employed in the manufacture of rugs.

Another object is to retain the low production cost advantage of rugs having a base structure woven with jute yarn, without incurring the fire hazard formerly incident thereto.

Another object is an economical method of making a looped, or pile, rug, embodying a preformed base structure comprising natural or untreated jute yarns, without the dangerous fire hazard formerly incident to the use of jute yarns.

Another object is in inexpensive pile, or looped pile, rug, embodying a prefabricated base structure comprising natural or untreated jute yarns, wherein the surface material is effectively bonded to the base structure by a water-insoluble adhesive, such as latex.

Another object is an inexpensive looped pile rug having a preformed base structure comprising fibre yarns (twisted paper threads) which cause the rug to lie flat so that it does not curl up or kick up when spread on the floor.

Another object is a prefabricated base structure for an inexpensive, pile, or looped pile, rug, comprising natural or untreated jute yarns and fibre yarns (twisted paper threads) interwoven to produce an improved textile fabric, as a new article of manufacture.

Other objects will appear from the detailed description which follows.

In accordance with this invention, the rug-base is pre-

2

fabricated in a loom by weaving it as a textile fabric having fibre yarns (twisted paper threads) in the warp, and natural or untreated jute yarns in the filler, the surface material in the gray is thereafter looped around and between the jute yarns as by a looping machine, the surface material is thereafter bonded to the rug base with an adhesive which becomes insoluble when dried or cured and also forms a non-skid surface coating on the back of the rug, and the rug in the gray is subsequently dyed in any color as and when required, before shipment.

One embodiment of the invention is shown, by way of illustration, in the drawing, consisting of two sheets of nine figures, numbered Figs. 1 to 9, both inclusive, wherein:

Fig. 1 is a blown-up view of a paper ribbon twisted to form a fibre yarn or twisted paper thread, which is used in the warp of the rug-base, or rug-base structure.

Fig. 2 is a blown-up view of a filler yarn or thread, as it is spun out of untreated or natural jute.

Fig. 3 is a blown-up plan view, but not to scale, of a fragment of a prefabricated rug-base structure embodying my invention, which is woven from the fibre yarns of Fig. 1 and the untreated or natural jute yarns of Fig. 2.

Fig. 4 is a blown-up view, but not to scale, showing some of the warp and filler yarns of the rug-base structure displaced by the needles of the looping machine as the looped pile is formed.

Fig. 5 is a blown-up cross sectional view, not to scale, taken along the line 5—5 of Fig. 3, looking in the direction of the arrows.

Figs. 6 and 7 are blown-up cross sectional views, not to scale, taken as along the lines 6—6, and 7—7, respectively, of Fig. 4, looking in the direction of their correspondingly numbered arrows, and showing how the bonding agent may be applied.

Fig. 8 is a schematic diagram of one form of apparatus which may be used in carrying out certain steps in the method; and

Fig. 9 is a blown-up cross sectional view of a fragment of finished rug with part of the looped pile omitted.

Like reference characters designate corresponding parts, throughout the several figures of the drawing.

The warp threads, of which one is shown in Fig. 1, are made of wet strength paper, and in the process of making the paper, the paper stock is preferably treated by adding thereto an ingredient such as melamine or urea formaldehyde. The wet strength paper is cut or otherwise subdivided into relatively narrow ribbons 20 (Fig. 1); ribbons approximately one-quarter inch wide, give good results. The wet strength paper is also treated with a water-repellent solution, and the paper ribbon 20 is twisted in the known manner into a fibre yarn or twisted paper thread 21 (Fig. 1). The water-repellent solution may be applied to the paper as the paper ribbon is being converted by twisting it into a yarn or thread 21. The solution may be applied by means of a pick-up roller (not shown), or in any other known manner. When the fibre yarns have been twisted, they are wound on a beam to form a warp beam (not shown) in the known manner.

The filler consists of natural or untreated jute, spun into yarns, such as the yarn 22 (Fig. 2). The jute which is used in the yarns 22 need not be slashed, because the yarn 22, suitably wound as in the form of a cop, is inserted in the shuttle, hence there is no risk that the lint of the jute will form slubs or create a fire hazard. The expressions "untreated jute," and "natural jute," as used herein refer to jute which has not been slashed.

The warp beam, consisting of the fibre yarns 21, and the filler, consisting of the natural jute yarn 22, are interwoven into a textile fabric (Fig. 3), to produce the prefabricated base structure, or rug-base 23, for the rug. The rug-base 23 may be loom width if desired, and may

be woven with selvages 45, 45 defining each of its running edges, to form two finished non-ravelling selvage edges 45, 45 running lengthwise of the rug-base 23.

The fibre yarn 21 is a much finer thread than the conventional paper-fibre yarns, and the fineness of said fibre yarns 21 makes it possible to weave the textile fabric forming rug-base 23 (Fig. 3) with about twenty warp threads to the inch, so that the rug-base 23 is of much finer texture than the conventional paper-fibre textile fabric of the prior art. Said textile fabric (Fig. 3) is an open weave which is loose enough to leave open interstices 24, 24 between the interwoven warps and fillers. It is desirable to retain these interstices 24, 24 between the warps 21 and fillers 22 of the textile fabric, hence the fabric is not calendered, because calendering of a textile fabric closes up the interstices in the body of the textile material. Because the yarns 21, 21 are composed of twisted paper ribbons, the said yarns are relatively stiff as compared with the jute yarns 22, 22, so that the fibre yarns 21 give body to the rug-base 23, and to the rug when it is finished. The fibre yarns 21, 21 are stiff enough to make rug-base 23 lie flat and to prevent the finished rug from curling up or kicking up. As the rug-base material 23 tends to shrink when the rug is being subjected to the finishing processes, the loom width of the rug-base material should include a suitable allowance to compensate for the shrinkage which will occur in the textile fabric as it is being further processed into the finished rug or floor-covering material.

As the rug-base material 23 is woven, it may either be fed, loom width, into a looping machine, as a part of a continuous process, or it may be wound up as it is woven in the loom, removed from the loom in the form of a roll, and transported to another mill for further processing.

The looping machine is provided with a row of looping needles 25, 25 (Fig. 4), which extend across the width of the looping machine at suitably spaced intervals. Each needle 25 is threaded with one or more yarns or threads 26, 26 (Fig. 6), and when the looping machine is operated, the looping needles 25, 25 pass through the interstices 24, 24 from back to front of the rug-base 23, and back again, to loop the yarns 26 over, around, and between, the filler yarns 22, 22 and between the warp threads 21, 21 to form the looped pile 27, 27 and the rows of connecting loops 30, 30 (Figs. 6 and 7).

The points of the looping needles 25, 25 enlarge those interstices through which they pass by spreading the warp and the filler threads which enclose the said interstices to displace certain of the warp threads crosswise, and certain of the filler threads lengthwise, of the rug-base 23, to enlarge certain of the interstices 24, 24 arranged at regularly spaced intervals, and thus form the larger openings 28, 28 (Fig. 4), which are large enough to accommodate the double thickness of each of the yarns 26 as each succeeding loop 27 is formed by the back and forth motion of the needles 25, 25 (Fig. 4). The displacement of the warp and filler threads separates them into groups of two or more pillared threads, the warp-pillars extending lengthwise, and the filler pillars extending crosswise, of the rug-base 23. Since the enlarged openings 28, 28 are produced by the displacement of certain of the warp and filler threads, the interstices 24, 24 which originally existed (Fig. 3) between the warp and filler threads which were pillared when displaced by the motion of the looping needles 25, 25 and by inserting the double thickness of the yarns 26, are substantially reduced if not entirely eliminated.

The loose open weave of the textile fabric and the ease with which the warp and filler threads are displaced and pillared by the passage of the looping needles 25, 25 and the yarns 26, 26, not only prevents the breaking of the looping needles and of the warp threads 21, filler threads 22, and yarns 26, but it also substantially reduces friction between the needles and the warp and filler threads and

the yarns, so that the needles do not become overheated and lose temper or become soft. These are very important advantages because they effect a very substantial saving in the time otherwise require to repair broken threads and yarns and to replace softened or broken needles; it also reduces the damages and seconds which result when threads, yarns, and needles, are broken, in the rug making process.

Since the rug-base is not calendered, the interstices 24, 24 formed between the warp threads 21 and the filler threads 22 when the base structure 23 is woven, remain in the rug-base until modified by the passage of the looping needles and the yarns 26, 26, and since the slippage between the paper-fibre threads 21 and the natural jute yarns 22 allows the interstices 24, 24 between them to be readily enlarged by the passage of the needles 25, 25 and the yarns 26, 26 the possibility that the needles may break the yarns of the rug-base 23 or the yarns 26, 26 or that the rug-base may break or soften the needles, is minimised.

The yarns 26, 26 from which the looped pile 27, 27 is made to form the surface of the rug, is preferably furnished in the gray, so that when the yarn 26 is looped through the rug-base 23, the rug is produced in the gray, and may be retained in the gray and in an unfinished condition, and subsequently piece dyed to any desired shade or color, or otherwise processed, as circumstances may require.

By producing the rugs in the gray, and by retaining them in this unfinished condition, the mill is able to reduce its inventory of rugs on hand by a substantial amount, and thus minimize losses due to the carry over and sale at reduced prices of substantial quantities of rugs dyed in colors which did not prove popular, or which are no longer in demand.

The connecting loops 30, and the looped yarns or looped pile 27, 27 lock the paper-fibre warp yarns 21 and the natural jute filler yarns 22 to one another, and when at a later stage in the process of manufacture, the back of the rug is sprayed, or otherwise coated with a water-insoluble adhesive such as latex, and the latex is cured, or the adhesive is allowed to harden and set, the connecting loops 30 between the loops of the looped pile 27 (or other surface material), become fixed or bonded to the warp and filler threads against any possibility of loosening up or pulling out the looped pile 27, 27.

In the process of manufacture at present preferred, the rug-base structure 23 is woven and then fed into the looping machine (Fig. 4), and the yarn 26 while in the gray, is looped through the rug-base 23 by the looping needles 25, 25 and a coating of latex 29 (Fig. 7) is then applied in any preferred manner, as by a doctor blade 43 (Fig. 6), and cured, to bond the looped pile 27, 27 to the rug-base 23, in the manner hereinafter described, and the goods in rolled up form may then be stored away temporarily ready for the dyeing operation.

Figs. 6 and 7 illustrate diagrammatically, how the latex 29 (Fig. 7), or a synthetic adhesive 41 (Fig. 6) which is insoluble after it has once hardened and set, may be applied in a liquid or semi-liquid condition to the backs of the connecting loops 30, 30 of the looped pile 27, 27 and to the warp threads 21, 21 and filler threads 22, 22 of the rug-base 23. The latex 29, or an equivalent synthetic adhesive 41, while in a fluid or freely flowing condition, is extruded from the hopper 42, to a doctor blade 43, which spreads the latex 29, or the adhesive 41, in a continuous film or coating over the back of the rug-base 23 and the connecting loops 30, 30. The latex 29, or the adhesive 41, is sufficiently fluid to flow into the openings between the rows of connecting loops 30, 30 and over the backs of the connecting loops 30, 30 and between the loops of the looped pile 27, 27 and over the exposed rear faces of the pillared warp and filler threads and any interstices or openings left between them to form a continuous coating or film covering the back of the rug mate-

rial 31 (Fig. 8). If latex is used, it is then suitably cured, and if an equivalent adhesive is used it is allowed to harden and set, and when the latex is cured, or the adhesive is set, as the case may be, it permanently bonds the backs 30 of the connecting loops of the looped pile 27, 27 to the paper-fibre warp yarns 21, 21 and to the natural jute filler yarns 22, 22 and ties them all together, so that the pile cannot loosen up, or pull out, but without impairing the flexibility and softness of the looped pile 27, 27 in the slightest degree.

The latex 29, or the adhesive 41, does not penetrate the rug-base 23 to the pile side of the rug-material 31, and therefore the softness and flexibility of the loops of the looped pile 27, 27 of the finished rug, of which a partial fragment is shown in Fig. 9, is not impaired or diminished.

When the latex 29 is cured, or the equivalent adhesive 41 is hardened and set, said latex or adhesive forms a thin, film-like, coating or skin 44 (Fig. 9), which covers the back of the rug-base 23 which now forms the back of the rug material 31. This film-like coating or skin 44 is vermin-proof, moisture-proof, water-repellent, and non-skid. The bond is so effective, that when the rug-material 31 is cut cross-wise, the raw edge need not be bound or otherwise treated to prevent unravelling, because due to the action of the cured latex, or of the hardened adhesive, the edge of the rug-material 31 will not unravel, but forms a non-ravelling, self-bonded, edge.

It is advantageous to apply the latex coating 29 as soon as possible after the yarn in the gray has been looped by the looping needles 25, 25 to form the looped pile 27, 27 and to then cure the latex coating 29 to provide the surface coating 44, as previously described, because after the latex has been cured, the rug material may be handled in the ordinary way without any risk of loosening up or pulling out the looped pile 27, 27 because the looped pile is permanently bonded to the rug-base 23 of the rug-material 31. The rug-material 31 which is in the gray, may be piece-dyed as and when required, and in any desired color.

The film-like coating 44 is very durable, and substantially prolongs the useful life of the rug material 31. The coating 44 is fully flexible with the rug material, and will not flake, peel, crack, or craze, when the rug material or floor covering is rolled up, folded, flexed, bent, or otherwise manipulated.

By arranging the various steps in the sequence, so that the rug material 31 is piece-dyed in the final step of the sequence, the preceding steps in the process can be arranged to furnish a continuous process of making a rug in the gray, commencing with the step of weaving the rug-base 23 as shown in Fig. 3, after which the rug-base is fed into the looping machine where the looping needles 25, 25 (Fig. 4) loop the yarns 26, 26 to form the looped pile 27, 27, after which the latex 29, or equivalent adhesive, is applied to the back of the rug-base 23 and cured or set, by passing it through a curing oven or through the drying oven 40, maintained at curing, or setting, temperature, to complete the rug material 31 in the gray, ready to be piece-dyed at will.

After the rug-base has been woven in the loom, it may be removed from the take-up roll of the loom in suitable mill lengths and sold as a separate article of manufacture, as a rug-base material for a looped pile rug, in which case the rug-base material 23 may be shipped to another mill to be fed into the looping machine to stitch the looped pile, and carry out the other steps in the process.

Similarly after the rug-base 23 has been woven and fed into the looping machine to form the looped pile 27, 27, the rug material 31 may be rolled up on the take-up rollers 32 (Fig. 8) in suitable mill lengths, and held in readiness for such additional finishing steps as may be necessary, such as scouring, bleaching, rinsing, and dyeing. Such of these finish-steps as may be necessary, may be performed before or after the latex is applied and cured.

After the yarn 26 has been looped through the rug-base 23 to form the surface of the rug material (Fig. 4), the rug material 31 may be rolled up in suitable lengths as it leaves the looping machine upon a suitable roller, such as the roller 32 (Fig. 8), ready for finishing, and the rug material 31 may, in due course, and if necessary, be bleached, scoured, rinsed, and dyed, by feeding the rug material 31 around a series of idlers, such as the idlers 33, 33, 33, and through a succession of vats, one of which is shown as the vat 34 (Fig. 8), which vat may contain either a scouring agent 35, a bleaching agent 36, a rinsing agent 37, or a dyeing agent 38, according to which of the said steps in the series are necessary to satisfy the particular conditions, it being understood that if pre-scoured and/or pre-bleached, or gray yarn, is used for the yarn 26, one or more of the said steps may be entirely unnecessary, and may be omitted. Likewise if the yarn 26 is pre-dyed, the dyeing step may also be omitted.

It should be understood that the vat 34 is only used to carry out these various steps in their proper sequence, and that after a particular step in the sequence has been performed, the rug material 31 may be fed between the squeeze rolls 39, 39 to wring out the rug material and expel the excess liquid as the rug material is drawn from the vat and then passed through a dryer 40, and then rewound upon another take-up roll 32, ready for further processing, or for storage, as conditions may require.

While the device 40 is described as a dryer, it should be understood that the device 40 may function either as a dryer or as a curing oven, according to the circumstances, and the temperature employed therein, which temperature may be regulated in the known manner, according to the conditions met. The details of the heating system and the means for controlling the temperature thereof, form no part of my invention, and are therefore omitted.

By weaving the rug-base 23 out of much finer gauge paper-fibre warp threads 21, and natural unslashed jute filler yarns 22, as a separate and distinct prefabricated double selvage base structure before weaving the pile by looping the yarns 26 through the rug-base 23, it is entirely practical either to operate the entire process through all of its various stages as a continuous process and thus produce a double-selvage (loom-width) mill-length of piece-dyed carpeting or floor covering ready to be cut into suitable rug lengths at will; or to interrupt the process just as soon as the rug-base 23 has been woven, and dispose of said rug-base material at that stage of the process as an article of manufacture; or to interrupt the process just as soon as the yarns 26 in the gray have been looped through the rug-base 23 and to dispose of the resulting product at that stage of the process, as an article of manufacture; or to interrupt the process just as soon as the latex 29 applied to the backs of the connecting loops 30, 30 of the looped pile and to the back of the rug-base 23, has been cured to bond the warps, fillers, and looped pile together, and to dispose of the resulting product at that stage of the process, as an article of manufacture; or to interrupt the process after the product consisting of the looped pile 27, 27 bonded to the rug-base has been scoured, bleached, and/or rinsed, ready to be piece-dyed, and to dispose of the resulting product at that stage of the process. So long as the base structure 23 is woven loom width with a double selvage 45, 45 all of the subsequent products will retain said double selvage edge through each and every successive stage of the process whether continuous or intermittent.

While in Fig. 3 the textile material which forms the rug-base 23 is woven in a twill-weave, it should be understood that other weaves may be employed in weaving the fibre-yarn warp and untreated or natural jute-yarn filler, textile fabric rug-base 23, if desired.

Instead of applying the latex or the adhesive by means of a doctor blade, it may be sprayed by means of a spray gun, or it may be applied by means of a pick-up or a feed roller, or in any other way.

Rugs manufactured by looping the yarns 26, 26 through the fibre and jute rug-base 23 woven in accordance with this invention, shrink much less than rugs woven with a backing made of cotton in accordance with the prior art.

Other modifications of my invention will, in the light of this disclosure, occur to those skilled in the art.

The use of paper fibre warp threads and natural jute in the filler threads, reduces friction between the warp and the filler threads when they are moved apart by the passage of the looping needles and the looping of the yarns 26, 26, and the reduction in friction increases the slippage between the warp and the filler threads, and this in turn reduces the friction between the looping needles and the rug-base material when the looping needles 25, 25 move back and forth through the rug-base 23 to form the looped pile 27, 27.

What is claimed is:

1. In a tufted pile rug, a woven backing consisting of warp threads constituted by twisted ribbons of paper treated to impart wet strength thereto, and filler threads constituted by yarns of jute, said filler and warp threads being interwoven to form a loose open weave which has well-defined interstices, and in which there is relatively high slippage between the warp and filler threads, whereby in fabrication looping needles may pass through said interstices without excessive friction, said warp threads being stiff relative to said filler threads thereby imparting body to said rug.

2. In a tufted pile rug, as set forth in claim 1, a film-like coating of cured latex formed on the undersurface of said backing.

3. A tufted pile rug comprising a woven backing consisting of warp threads constituted by twisted ribbons of paper treated to impart wet strength thereto, and filler threads constituted by yarns of jute, said filler and warp threads being interwoven to form a loose open weave which has well-defined interstices and in which there is relatively high slippage between the warp and filler threads, whereby in fabrication looping needles may pass through said interstices without excessive friction, said warp threads being stiff relative to said filler threads thereby imparting body to said rug; and yarns tufted through said backing to form pile loops above said backing and connecting loops beneath said backing.

4. A tufted rug, as set forth in claim 3, further including a film-like coating of cured latex formed on the undersurface of said backing to bond said connecting loops to said backing.

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