

May 31, 1938.

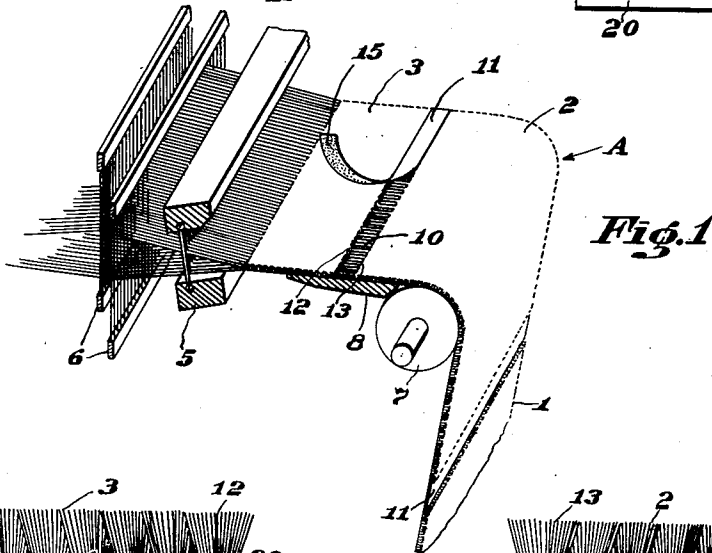
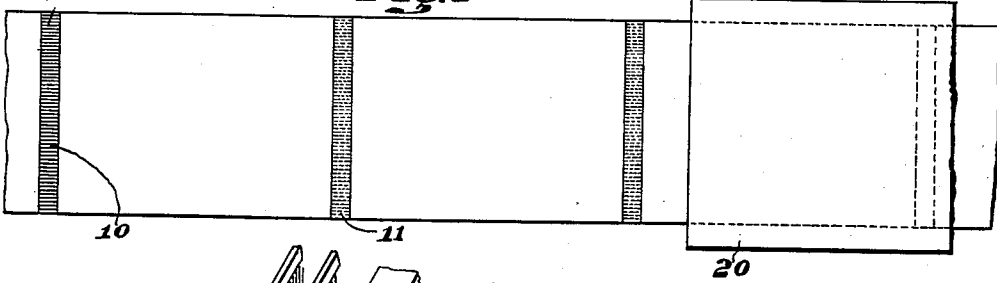
R. G. KNOWLAND

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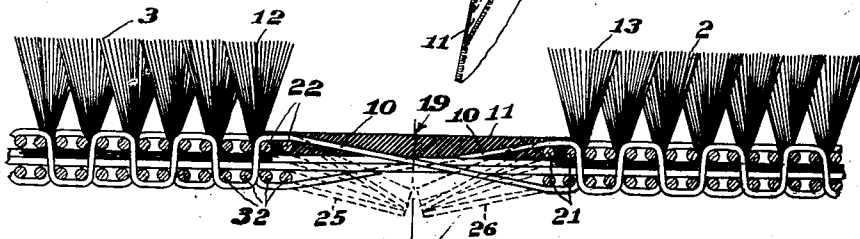
MANUFACTURE OF FLOOR COVERINGS

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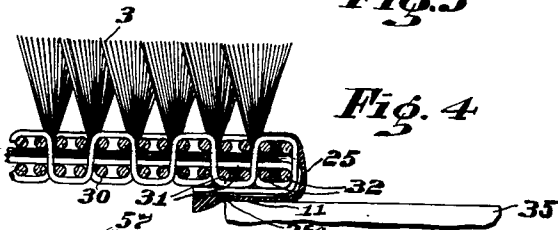
*Fig. 2*



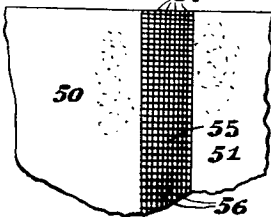
*Fig. 1*



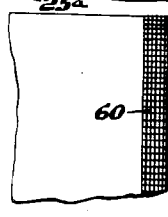
*Fig. 3*



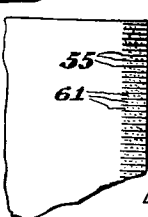
*Fig. 4*



*Fig. 5*



*Fig. 6*



*Fig. 7*

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# UNITED STATES PATENT OFFICE

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## MANUFACTURE OF FLOOR COVERINGS

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7 Claims. (Cl. 28—1)

This invention relates to the manufacture of floor coverings, and particularly to a novel method of forming the heading between adjacent rugs which are woven or otherwise fabricated in a connected series and also to a method of separating and binding the ends of individual rugs which have been so constructed.

It has been common heretofore to weave rugs in an elongated series, each rug being joined to the next succeeding rug in the series by a so-called heading, formed by continuing the weaving of the backing fabric while omitting the formation of pile tufts. After a large number of rugs have so been woven in series, the individual rugs are cut apart by severing the heading, after which the portions of heading protruding from both ends of each rug are bent back and secured to the undersurface of the rug as by stitching or other suitable means. If desired, a fringe may be attached to the bent-back heading to enhance the appearance of the rug.

Such common methods of finishing the ends of rugs woven or otherwise fabricated in series are objectionable in that they produce a bulky ridge at the end of the rug conducive to undue wear and presenting a dangerous condition to one stepping onto the rug. It has been proposed heretofore to remedy these objectionable features by the elimination not only of the pile yarns in the heading as has been common, but also by the elimination of the weft threads of the heading, leaving the individual rugs connected together merely by unwoven warp threads. The individual rugs are thereafter cut apart by severing through the unwoven warp threads which are subsequently bent back and secured to the undersurface of the rug backing, the purpose being to reduce the bulky ridge at the end of the rug by such elimination of the weft threads.

I have found that whereas the elimination of weft threads is effective to reduce bulkiness, yet a heading composed merely of unwoven warp threads does not bind the end wefts and tuft rows sufficiently to hold them during the finishing operations to which the rugs are subjected while still connected end to end. A heading composed merely of unwoven warps is not easily cut.

It is the primary object of the present invention to improve on prior methods of this character by not only eliminating bulkiness in the turned-back heading through the elimination or subsequent removal of weft threads therein, but also by securing, while the rug is still in the loom or other fabricating mechanism, the unwoven warp threads, the end rows of pile tufts and the

weft threads of the backing immediately adjacent the heading, thereby eliminating all tendency of the component elements of the rug to loosen up during the subsequent finishing operations. It is my further purpose to provide a method in which the securing medium employed produces a composite heading which not only may thereafter readily be severed for cutting the rugs apart, but which also itself possesses adhesive properties by which the severed heading may be secured to the undersurface of the rug without further application of adhesive and without stitching.

These and further objects and advantages of my invention will appear from a more detailed description thereof taken in connection with the accompanying drawing, in which—

Fig. 1 is a perspective view of a portion of a series of rugs at the stage of a typical weaving operation at which my novel securing medium may be applied;

Fig. 2 is a diagrammatic plan view illustrative of the steps in my novel method prior to the severing of the series into individual rugs;

Fig. 3 is a sectional view taken lengthwise of a series of rugs showing the unwoven warps of the heading after the treatment indicated in Fig. 2, and I have indicated in dotted lines, the manner of severing the heading;

Fig. 4 is a detail longitudinal section of the heading of a single rug after the severing, indicating the manner in which the composite heading formed by my novel method is secured to the undersurface of the rug;

Fig. 5 is a plan view of a modified method of forming the heading, and

Figs. 6 and 7 are views of the undersurface of a rug indicating my method of securing, to the backing fabric, the heading of Fig. 5.

As stated above, it is common to form the heading between adjacent rugs woven in a connected series, by omitting the pile tufts during a predetermined length of weaving of the backing material to present an untufted area of material at which the rugs may be cut apart. In accordance with the preferred embodiment of my invention, not only the pile tufts, but also the weft threads of the backing material are omitted between adjacent rugs. This may be accomplished in any suitable manner, such as by interruption of the needle or shuttle mechanism for a brief interval during which the rug is advanced by the take-up roll. As indicated generally at A in Fig. 1, the pile areas 1, 2 and 3 defining a plurality of individual rugs fabricated in a connected series, may be woven on a loom of any suitable

type, having the reed indicated diagrammatically at 5 and the shed forming heddles indicated at 6. A take-up roll 7 is provided, as is customary, for intermittently advancing the series of rugs through the loom and over the breastplate 8. The heading 10 separating the adjacent rugs 2 and 3, which is enlarged somewhat in the drawing for clarity of illustration, comprises, as indicated, a plurality of warp threads formed by continuing the feeding of the warps of the backing fabric by the take-up roll 7 while interrupting both the needle or shuttle mechanism employed to insert the wefts of the back fabric and also the pile tuft forming mechanism such as the pile wires, tube frames or the like. Although my invention is particularly adapted for use in connection with weaving on Axminster looms, yet it is also effective when used with other types of weaving, as well as in the fabrication of rugs without weaving, and it will be noted that in certain types of looms the unwoven heading 10 will include not only the extended warps of the backing fabric, but will also include a continuation of the pile warps.

After the desired length of unwoven warp threads has been provided by suitable advancement of the take-up roll 7, the weaving of the next rug 3 of the series is commenced by starting the mechanism to insert weft shots and to form the pile area. After the weaving of the pile area 3 has commenced and while the heading 10 is still on the breastplate 8, the securing medium 11 is applied. For this purpose the loom may be stopped if necessary, but I have found that the breastplate is sufficiently extensive and the feeding of the rugs by the take-up roll 7 sufficiently slow during the weaving, to permit the operator to position and lightly secure the strip 11 over the unwoven warp 10 without interrupting the weaving operations.

The securing medium 11 preferably comprises a thin strip of rubber of a length approximately equal to the width of the rugs, and of a width approximating the length of the unwoven warps 10, whereby the strip fits snugly between the edge rows of pile tufts 12 and 13 of the rugs 2 and 3, for example, as indicated in Fig. 1.

Prior to the superimposing of the binding strip 11 over the unwoven warps, I preferably apply to the undersurface of the strip, a thin film 15 of adhesive for temporarily securing the rubber strip 11 in position.

Thereafter, and prior to cutting the rugs apart, the rugs are subjected to the common finishing operations which include the passage of the connected series of rugs through a heating chamber 20 (Fig. 2) for applying heat to the rugs in the customary manner. It will be observed that during these various well-known operations which need not be described in detail herein, the end rows of pile tufts 12 and 13 of adjacent rugs are maintained in their tightly woven position as a result of the abutting relation of the side edges of the reinforcing strip 11 with the end rows of tufts.

As indicated in Fig. 3, the application of heat to the rugs during the finishing process causes the rubber strip 11 to soften considerably and to flow somewhat downwardly and between the adjacent unwoven warp threads, whereby not only to embed the major portion of the warps in rubber, but also to surround the weft shots 21 and 22.

After the rubber has cooled, the composite heading which is thus formed with unwoven

warp threads embedded in rubber, is cut apart as indicated at 19 by severing mechanism commonly employed for such purposes, to separate the individual rugs, thereby forming the heading sections 25 and 26 for binding up the ends of the individual rugs. After the rugs have thus been cut apart, the composite heading for one of the rugs, such as is indicated at 25 in Fig. 4, is bent back in position contiguous to the undersurface of the backing fabric 30 of the rug and is then again subjected to heat in any suitable manner such as by the application of a hot iron as indicated at 35, to cause the rubber 11 again to become plastic and to flow into the backing fabric 30 thereby further to embed the unwoven warp threads 10, and also to surround and secure the warp threads 31 of the backing fabric and the end weft shots 32 thereof.

During this application of heat, I preferably also apply pressure to force the plastic rubber well into the interstices of the backing fabric and, as indicated somewhat enlarged at 25a, this application of heat and pressure also materially reduces the thickness of the composite heading which is thus secured to the undersurface of the rug, so that no bulky ridge is presented. It is apparent that if it is desired to add a fringe to the rug for the purpose of giving the rug a more dressy appearance, such fringe may readily be adhered to the composite heading after the same has been bent back in the position indicated in Fig. 4 and prior to the application of heat and pressure by the iron 35.

Referring now to Figs. 5, 6 and 7, I will describe a modification of my novel method wherein the medium employed to form a composite heading with the warp threads for securing the warp threads of the heading, the end weft shots of the backing fabric and the end rows of pile tufts and also to furnish an adhesive agency for securing the severed heading to the undersurface of the rug backing, comprises weft threads composed of a substance which I shall designate as a potential adhesive and which may subsequently be rendered plastic by the application of a suitable softening agent such as heat or a solvent.

As indicated in Fig. 5, the pile areas 50 and 51 of a pair of adjacent rugs of a woven series are separated by a heading, indicated generally at 55, and comprising, as before, the warp threads 56 which may be a continuation between the rugs of the warp threads of their respective backing fabrics. In constructing a rug in accordance with my modification, however, the rubber strip 51 is omitted, and in place thereof a plurality of weft threads 57 of special characteristics are woven through the warp threads 56. The weft threads which I employ are composed preferably entirely of a substance which may be rendered plastic by the subsequent application of a suitable softening agent. As an example of a thread which is suitable for this purpose, I may employ spun fibres of cellulose acetate, which may thereafter be completely dissolved by the use of a suitable solvent such as a mixture of 95% ethylene dichloride and 5% ethyl alcohol. If desired, I may employ a thermo-plastic yarn, composed of 15 parts chlorinated rubber, 10 parts resin, and 10 parts dibutyl phthalate. A thread of these characteristics is woven into the warp yarns of the heading in place of the weft threads customarily employed in the backing fabric, and by providing a fairly close weave of these yarns I effectively secure not only the warp threads of the heading, but also the component elements 75

of the rug itself, such as the weft yarns of the backing fabric and the pile yarns forming the end rows of pile tufts so that those elements are not loosened during the subsequent treatment of the rug. If this subsequent treatment involves the application of heat, as frequently, it is preferable to employ a weft thread which is solvent-plastic rather than thermo-plastic.

After a series of rugs have so been woven and treated, if desired, but while the weft threads are still in a non-plastic condition, the individual rugs are separated by cutting through the composite heading separating adjacent rugs, as before. The fabric which constitutes the composite heading, formed by the combination of the extended warp threads of the backing fabric and the potentially plastic weft threads, may readily be severed as any piece of fabric is severed, and thereafter the heading is bent back contiguous to the undersurface of the fabric in the customary manner, and as illustrated at 60 in Fig. 6.

Thereafter, the heading portion 60 is subjected to whatever treatment is necessary to render plastic the weft threads 57, depending upon the characteristics of the yarn employed, such as by treatment with heat, or with a suitable solvent as indicated above and as illustrated in Fig. 7. The effect of such treatment is to convert the weft threads, preferably completely, into a plastic adhesive medium, which flows into the interstices of the backing fabric, and not only effectively secures the warp threads 55 of the heading thereto, but also further secures the warp threads and the end weft shots of the backing fabric as well as the end rows of pile tufts.

Obviously, the potentially adhesive medium may be incorporated into the warp threads of the heading otherwise than in sheet form in accordance with the preferred embodiment of my invention, or in thread form in accordance with my modification, such as by treatment of the warp yarns themselves or by employing a weft yarn which carries an adhesive coating but I prefer to use a medium which not only binds the component parts of the rug during the finishing operations prior to cutting the composite heading, but which also leaves a severed heading secured to the backing fabric in which the weft threads have either been omitted or subsequently removed.

Although I have illustrated in the drawing a typical two-shot Axminster fabric, it is obvious that my invention may as effectively be employed with a three-shot or other Axminster weave as well as with weaves which are not of the Axminster type. Nor is my invention to be limited to use in connection with rugs fabricated by weaving of any sort. Thus, where a rug is constructed by securing, by adhesives or otherwise, a pile area onto a prefabricated backing such as burlap, or the like, the backing may be woven in strip form having a plurality of rug areas separated by warps which are either unwefted or are interwoven with potentially adhesive weft threads. After the pile tufts have been inserted on the backing fabric so constructed, the rubber strip element 11 may be secured in place, and treated as before, or if potentially adhesive weft threads have been employed, a plasticizing agent is subsequently applied as before. I do not wish to limit myself in such details except as indicated in the appended claims.

I claim:

1. The method of making floor coverings which comprises constructing a plurality of pile areas

connected end to end by a heading consisting of unwefted warp threads, binding together the warp threads by securing thereto a sheet of thermo-plastic material, separating adjacent floor coverings by severing simultaneously the heading and the thermo-plastic material, bending back the severed heading and thermo-plastic material and applying heat thereto to secure the bent back heading to the undersurface of the backing fabric.

2. The method of making floor coverings which comprises constructing a plurality of pile areas connected end to end by a heading consisting of unwefted warp threads, binding together the heading by applying to the warp threads a sheet of thermo-plastic material, applying heat to the thermo-plastic material to render the same plastic and embed unwefted warp threads therein, separating adjacent floor coverings by severing simultaneously the heading and the thermo-plastic material, bending back the severed heading and thermo-plastic material and applying heat thereto to secure the bent back heading to the undersurface of the backing fabric.

3. The method of making floor coverings which comprises forming a pile area on a backing fabric composed of warp and weft yarns, extending the warp yarns of the backing fabric beyond the pile area so formed to connect the same to the pile area of the next succeeding floor covering, said connecting portion being devoid of pile, binding together the extended warp yarns by securing thereto a potentially adhesive medium forming with the warp yarns a composite heading extending between adjacent floor coverings, separating the individual floor coverings by severing the composite heading so formed, bending back the severed heading and treating the potentially adhesive medium in the heading to secure, adhesively, the warp yarns to the undersurface of the backing fabric.

4. The method of making floor coverings which comprises forming a pile area on a backing fabric composed of warp and weft yarns, extending the warp yarns of the backing fabric beyond the pile area so formed to connect the same to the pile area of the next succeeding floor covering, said connecting portion being devoid of pile, binding together the extended warp yarns by applying thereto a thin strip of rubber material disposed contiguous to the end rows of pile tufts of the successive pile areas, heating the rubber material to render the same plastic whereby to embed the warp yarns in the rubber material, separating the successive floor coverings by severing the warp yarns so embedded, bending back the embedded warp yarns and securing the same to the undersurface of the backing fabric by again applying heat to the rubber material.

5. The method of making floor coverings which comprises forming a pile area on a backing fabric composed of warp and weft yarns, extending the warp yarns of the backing fabric beyond the pile area so formed to connect the same to the pile area of the next succeeding floor covering, binding together the extended warp yarns by weaving into the extended warp yarns potentially adhesive weft yarns to form a continuous fabric extending between successive rugs and binding the end weft shots and end rows of pile tufts in each rug, separating the rugs by severing the connecting fabric, bending back the severed fabric and securing the severed portions to the undersurface of the backing fabric by treating the

potentially adhesive weft yarns to liberate an adhesive.

6. The method of binding the weft-wise cut ends of pile floor coverings, which comprises weaving a length of fabric with the pile tufts therein, providing a length of material without tufts and then continuing to weave the fabric with tufts to provide a second length of woven tufted fabric and to leave between the two woven tufted portions a length of untufted material containing warp threads, applying to said length of untufted material while under tension a potentially adhesive medium, cutting weft-wise the material between the tufted portions thereby leaving a length of untufted material extending beyond the edge of the adjacent tufted portion, folding said last named length of untufted material about the bottom of such adjacent portion of tufted material, treating said potentially adhesive medium to render it actively adhesive and

adhering the length of untufted material containing such adhesive to the back of the adjacent portion of tufted material.

7. The method of making floor coverings which comprises forming a pile area on a backing fabric composed of warp and weft yarns, extending the warp yarns of the backing fabric beyond the pile area so formed to connect the same to the pile area of the next succeeding floor covering, said connecting portion being devoid of pile, and binding together the extended warp yarns by securing thereto a potentially adhesive medium forming with the warp yarns a composite heading extending between adjacent floor coverings, whereby the end weft shots and end rows of pile tufts of the successive pile areas are secure while the floor coverings are being subjected to the finishing operations.

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